

Survey of Critical Biological Resources Jefferson County, Colorado 2010-2011



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2010-2011

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May 2012

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EXECUTIVE SUMMARY

In 2010, Jefferson County contracted with Colorado State University and the Colorado Natural Heritage Program (CNHP) to survey for critical biological resources in Jefferson County with funding provided by Jefferson County Open Space. 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 scientific data on biological resources for land managers, planners, and the citizens of Jefferson County for conducting proactive landscape planning. This document is intended to be 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-based National Wetland Inventory maps were digitized in accordance with the U.S. Fish and Wildlife Wetland Inventory protocol to provide an additional data resource for Jefferson County.

Jefferson County Open Space has a proven track record of conserving lands for their biodiversity and natural heritage virtues. The proximity of Jefferson County to Colorado's largest metropolitan area and the continuing urban growth within this region adds considerable importance to conservation planning. The information in this report on the significant biological resources of Jefferson County can be utilized for assessing candidate conservation areas, their acquisition values, and to assist with meeting the goals identified in the update to Jefferson County's 2008 Open Space Master Plan. This project provides data that will allow staff to make informed determinations regarding land management to ensure Jefferson County resource values are protected and sustained.

The first survey of this type was conducted by Jefferson County Open Space and, the Colorado Natural Heritage Program (CNHP) in 1993. Colorado Natural Heritage Program Surveys of critical biological resources have been completed in 37 other Colorado counties. As the only comprehensive synthesis of biodiversity conservation data, the statewide dataset assembled by the CNHP over the last 30 years is unique in Colorado. The CNHP dataset has provided a scientific foundation for several of Colorado's biggest conservation successes over the last 30 years. The results presented in the 1993 Natural Heritage Inventory of Jefferson County (Pague et al. 1993) provided the foundation for numerous conservation successes in Jefferson County.

This update to the 1993 report (Pague et al.) is considered essential as the significance of identified species and plant communities has changed over time and population growth in the County has resulted in changes to the landscape. With 65% of previously identified natural area lands already preserved by Jefferson County, an assessment of candidate lands for Open Space preservation requires updated and relevant information.

In the spring of 2010, CNHP identified 92 potential survey areas for significant plants, animals, wetland, and upland habitats. Areas that were expected to contain significant elements of biodiversity were delineated as "Targeted Inventory Areas" (TIAs). In addition, the County was interested in identifying the biological resources on large landscapes that are not fragmented and in good condition. These target areas were then prioritized for field

survey based on the relative rarity of the elements expected to be found there, the potential for high quality intact habitats and potential for access. Summer field surveys were conducted within 57% of the TIAs and those areas found to contain significant elements were delineated as “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.

CNHP has identified 46 Potential Conservation Areas (PCAs) in Jefferson County. Thirty-nine of these 46 PCAs are either new or updated; the remaining seven PCA's were previously documented for Jefferson County in 1994 but were not updated because of either access issues or low priority rankings. Two of the new or updated PCAs are of outstanding biodiversity significance (B1), 15 are of very high significance (B2), 13 are of high significance (B3), five are of moderate biodiversity (B4), and four 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 two PCAs ranked with Outstanding Biodiversity Significance (B1) include the South Platte River Valley and Hankins Gulch PCAs, which achieve B1 ranks due to the presence of globally critically imperiled (G1) element occurrences that are in excellent (A-ranked) condition. These elements are the Pawnee montane skipper butterfly (*Hesperia leonardus montana*) and Rocky Mountain monkeyflower (*Mimulus gemmiparus*), respectively.

Rare plant and animal records from the 1993 survey included 8 rare animals, 10 rare plants and 16 rare plant communities. At the conclusion of the 2010/2011 survey there are 35 rare or imperiled plant species, 11 rare or imperiled animal species, 1 fungus, and 29 wetland and upland plant communities of concern now documented in Jefferson County. During this survey, two plants and one fungus were observed/documented that are State records. They are the only known locations in the State for these elements, the openfield sedge (*Carex conoidea*) from the Turkey Creek at Aspen Park PCA (B4), twinpod (*Physaria* x1) from the Ken Caryl Hogbacks PCA (B2), and a new subspecies of an earthstar fungus (*Mycenastrum corium* ssp. *ferrugineum*) from the Prospect Park PCA (B2). Both the twinpod and the earthstar are new discoveries to science. In addition, there were also eight county records. In addition, there were 21 state rare (S1 or S2) plant species that were documented during this survey.

A total of four federally listed threatened species (two plants and two animals) including the Pawnee montane skipper (*Hesperia leonardus montanus*), Preble's meadow jumping mouse (*Zapus hudsonius preblei*), Ute ladies' tresses (*Spiranthes diluvialis*), and Colorado butterfly plant (*Oenothera coloradensis* ssp. *coloradensis*) were observed during the survey. The *Oenothera coloradensis* ssp. *coloradensis* is a new occurrence and was reported by the US Fish and Wildlife Service to CNHP. The other three species were already known to occur in the County.

The data from the updated National Wetland Inventory (NWI) maps indicate that about 2% (10,117 acres) of the land in Jefferson County (494,535 acres) are classified as wetlands. Greater than half of the PCAs contain wetland plants, wetland dependent animals and/or plant communities. Of the 35 rare plant species documented in the survey, 60% are wetland

species. Wetlands, whether they are seeps, springs, seasonal drainages, or large rivers add significantly to the biodiversity of the ecological systems in Jefferson County. A nice example is a wetland complex within the Mount Lindo to Plymouth Mountain Potential Conservation Area that supports the only verified breeding populations of the State-rare Ovenbird (*Seiurus aurocapilla*). Oven Birds are suspected to breed at six other locations along the Front Range (Kingery 1998). Colorado wetlands are among the most disturbed and imperiled areas within the County and efforts to protect wetlands will offer significant benefits to the surrounding areas.

Jefferson County supports an amazing richness of rare fauna and flora well worth preserving for future generations. The diversity of species and plant communities that range from subalpine forests to ponderosa pine forests and savannas, from shrublands to mixed grass and tall grass prairies, 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 Jefferson County will have both statewide and global significance.

The final report and PCAs of the survey are provided to Jefferson County in this report 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: Frank Kunze, Bryan Posthumus, and Randal Frank (Jefferson County); and Jill Minter (U.S. Environmental Protection Agency, Region 8). Frank Kunze was involved in the first biological inventory of Jefferson County and provided valuable continuity and knowledge to this project. Thea Rock was another instrumental assistant especially during the initial phases of this project.

We would like to thank CNHP biologists who assisted with field work including John Nunnali, Amber Provinzono and Katie Dykgreve. This project would not have been successful without the help of many dedicated volunteers who participated in the project: Jennifer Ackerfield, Stacey Anderson, Megan Bowes, David Buckner, Donald Hazlett, Ellen Heath, Mary Jane Howell, Scott Kellman, Pam Little, Eileen Sake, Scotty Smith, Crystal Strouse, Rich Scully, Christine Taliga, and Denise Wilson.

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

Thanks to our staff and work-studies at Colorado Natural Heritage Program who processed data and/or researched sections: Jill Handwerk, Karin Decker, John Nunnali, Jeremy Siemers, Amy Lavender, and Michael Menefee. Denise Culver and David Anderson were invaluable resources and also assisted in 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 Jefferson County Open Space and US Environmental Protection, Region 8, Wetland Program Development Grant with in-kind match provided by Colorado State University.



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INTRODUCTION

Jefferson County is located in east-central Colorado along the central portion of Colorado's Front Range. The City and County of Denver shares its western border with Jefferson County in the northeast quarter of the County (Figure 1). The County includes plains, foothills and mountainous terrain; it ranges in elevation from approximately 5,250 to 11,600 feet. A survey was previously conducted for Jefferson County in 1993 by CNHP.

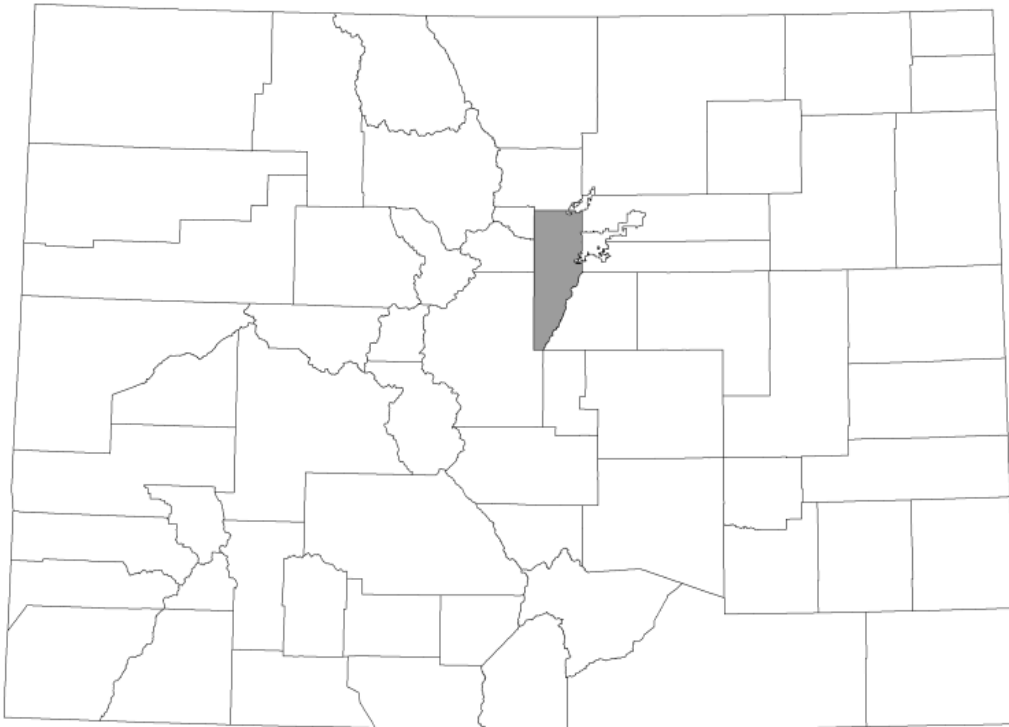


Figure 1. Location of Jefferson County in Colorado.

All of the County's watersheds are crucial to Colorado's water resources, as they are one of the primary water supplies 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, and recreation. With such easy access to Metropolitan Denver, the mountain environment of the County is attractive to home owners.

Jefferson County, named for U.S. President Thomas Jefferson, is one of Colorado's smaller counties, encompassing some 772 square miles (2,001 km²) in north-central Colorado (Figure 3). Jefferson County is bordered by Boulder and Broomfield Counties on the north; Adams, Arapahoe, Denver and Douglas Counties to the east; Park County to the south, and Park, Clear Creek, and Gilpin Counties on the west. It was formed with 12 other counties in 1859 from the Jefferson Territory, which was also formed in 1859 from the Kansas Territory. Elevations in the County range from about 5,250 feet (1,600 m) where Dry Creek leaves the County at the northeast corner, to about 11,590 ft. (3,533 m) at Buffalo Peak in the Pike National Forest near Buffalo Creek. Along the western two thirds of the County, the

steep slopes and rough terrain of the Front Range include the majority of the County's rugged terrain between the plains and the intermountain ranges. The County is also a popular destination for fishing, hiking, mountain biking, hunting, and wildlife viewing. 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 Jefferson 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 Jefferson County* were those employed worldwide throughout the Natural Heritage Program Network. 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 Jefferson 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 Jefferson County contracted with Colorado State University and CNHP to identify biologically significant areas on lands that have not undergone disturbance or fragmentation within Jefferson County. Identification of sites containing rare biological resources will allow conservation of these resources for future generations, enabling proactive planning to avoid land use conflicts in the future.

The locations of areas with the potential for harboring biologically significant resources 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);
- Reviewing aerial photographs, geologic substrate and vegetation layers in GIS to identify high quality undisturbed and unfragmented landscapes with suitable habitat for rare biological resources; and
- Conducting extensive field surveys.

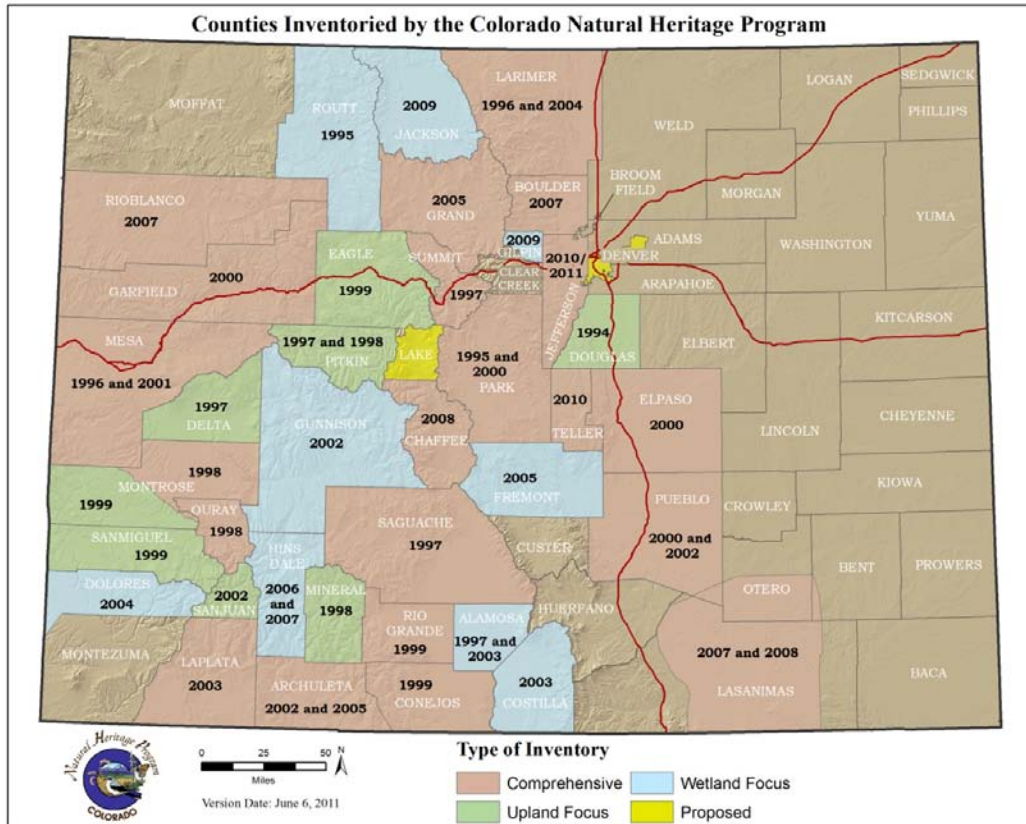


Figure 2. Status map of CNHP County Surveys of Biological Resources as of 06/2011.

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 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. Based on current knowledge, the sites in this report represent areas that CNHP recommends for protection in order to preserve the natural heritage of Jefferson County.

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 define 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.

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 Jefferson 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 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).

National Wetland Inventory (NWI) Classification

Wetland classification codes used for the wetland mapping are from NWI’s Cowardin classification system (Cowardin et al. 1979). This hierarchical treatment of wetlands describes wetlands at varying scales of specificity. For the scope of this project and the resolution of data, wetland features have been coded using the first three levels of the hierarchy: System, Subsystem and Class. In addition to these levels, additional information about a site’s hydrology and the influence of human modifications was identified. The result is a 4-6 character alphanumeric code. Components of the code are described below.

SYSTEM and **SUBSYSTEM**: The System and Subsystem together divide mapped features into a handful of aquatic resource types. System represents the first character in the code. Systems present in the study area include: Riverine (R: rivers and streams), Lacustrine (L: lakes), and Palustrine (P: vegetated wetlands, e.g., marshes, swamps, bogs, etc., even if associated with rivers or lakes). These are followed (when appropriate) by Subsystem. In the study area only the Riverine and Lacustrine systems require Subsystem division. The

Riverine Subsystems present in the study area are: Lower Perennial (2: low gradient, slow moving channels), Upper Perennial (3: steep, fast moving channels), and Intermittent (4: channels that do not flow year round, including manmade ditches). The Lacustrine Subsystems present in the study area are: Limnetic (1: lake water > 2 m deep) and Littoral (2: lake water < 2 m deep).

CLASS: The third portion of the code is the Class, which identifies the dominate substrate or vegetation structure present. Class types present in the study area include: Aquatic Bed (AB: aquatic rooted or floating vegetation), Emergent (EM: herbaceous, non-woody vegetation), Scrub-shrub (SS: low woody vegetation), Forested (FO: trees), Unconsolidated Bottom (UB: unvegetated surfaces with small particle sizes not associated with river and lake edges), Unconsolidated Shore (US: unvegetated surfaces with variable small particle sized associated with river and lake edges), and Streambed (SB: variable substrate sizes within stream channels).

HYDROLOGIC REGIME: Hydrologic Regimes describe the duration and timing of flooding. For this project, seven Hydrologic Regimes were identified, including: A (temporarily flooded), B (saturated), C (seasonally flooded), F (semi-permanently flooded), G (intermittently exposed), H (permanently flooded), and K (artificially flooded). Duration increases from A-H, though B sites are rarely flooded, but have water at or very near the surface consistently.

SPECIAL MODIFIER: Three Special Modifier codes were used in the study area. The Modifiers present information about artificially and naturally modified wetlands. No natural modifications (beaver dams) were mapped in the study area, thus all wetlands with a Modifier code are considered to be modified by humans. The only modified code mapped in the study is x (excavated).

PROJECT BACKGROUND

Ecoregions

Jefferson County is situated at the intersection of the Southern Rocky Mountain and Central Shortgrass Prairie ecoregions as defined by The Nature Conservancy (TNC 1997, modified from Bailey 1995) (Figure 3). 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. The Central Shortgrass Prairie ecoregion includes the shortgrass steppe and extends from southeast Wyoming and southwest Nebraska to northeast New Mexico and the Oklahoma panhandle. The major ecological zones in the Southern Rocky Mountain ecoregion are alpine, subalpine, upper montane, lower montane and foothill. The only ecoregion not found in Jefferson County is the alpine ecoregion. In the Central Shortgrass Prairie ecoregion, the major habitat types include temperate grassland, savanna, and shrubland (Neely et al. 2001, Neely et al. 2006) which are all found in Jefferson County.

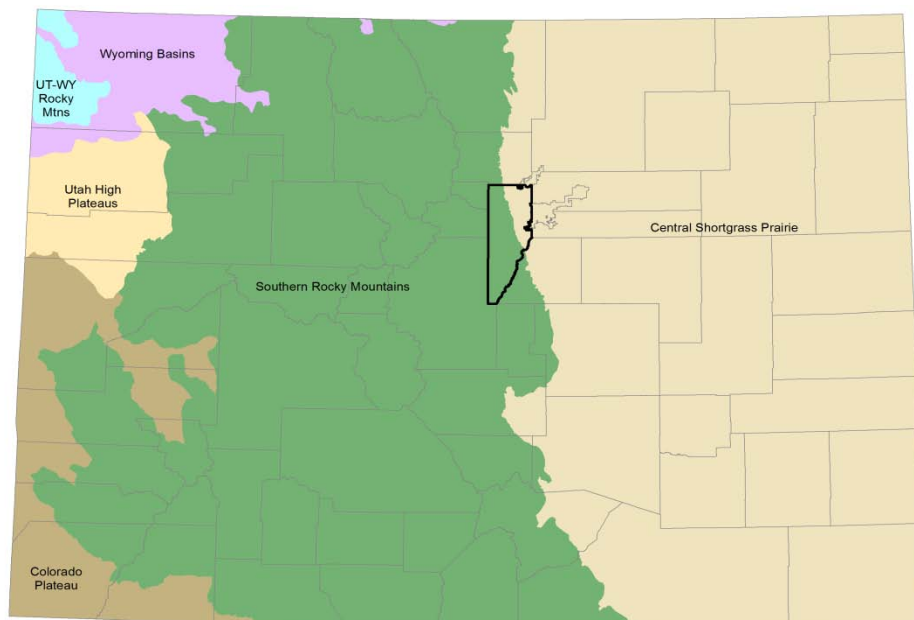


Figure 3. Jefferson County in relation to the Southern Rocky Mountain and Central Shortgrass Prairie Ecoregions.

Hydrology

Surface Water

The South Platte River and its tributaries originate in the Rocky Mountains to the west of Jefferson County. The County lies on the south central portion of the South Platte Basin which covers 18,924 square miles; this area drains a large portion of the northeast quarter of the state (Topper 2003). The southeast border of Jefferson County is formed by the South Platte River. Three major tributaries of the South Platte bisect Jefferson County as they flow to the South Platte River, the North Fork of the South Platte, Bear Creek, and Clear Creek. Deep canyons cut through the foothills by these tributaries to create the dramatic topographic relief characteristic of Jefferson County (Figure 4).

The USGS developed a standardized system to classify watersheds. Hydrologic units are the watershed boundaries organized by size and they range from regions to the smaller cataloging units (HUCs), which are roughly equivalent to your local watershed. Jefferson County falls within four USGS Hydrologic Unit Codes (HUCs):

1. Upper South Platte River watershed includes Buffalo, Clear, Cub, Deer, Elk, Goose, Turkey, and Wigwam Creeks; and the North Fork of the South Platte;
2. Middle South Platte River-Cherry Creek watershed includes Big Dry, Walnut and Woman Creeks;
3. Clear Creek watershed includes Clear and Ralston creeks; and
4. Saint Vrain River watershed includes Coal Creek.

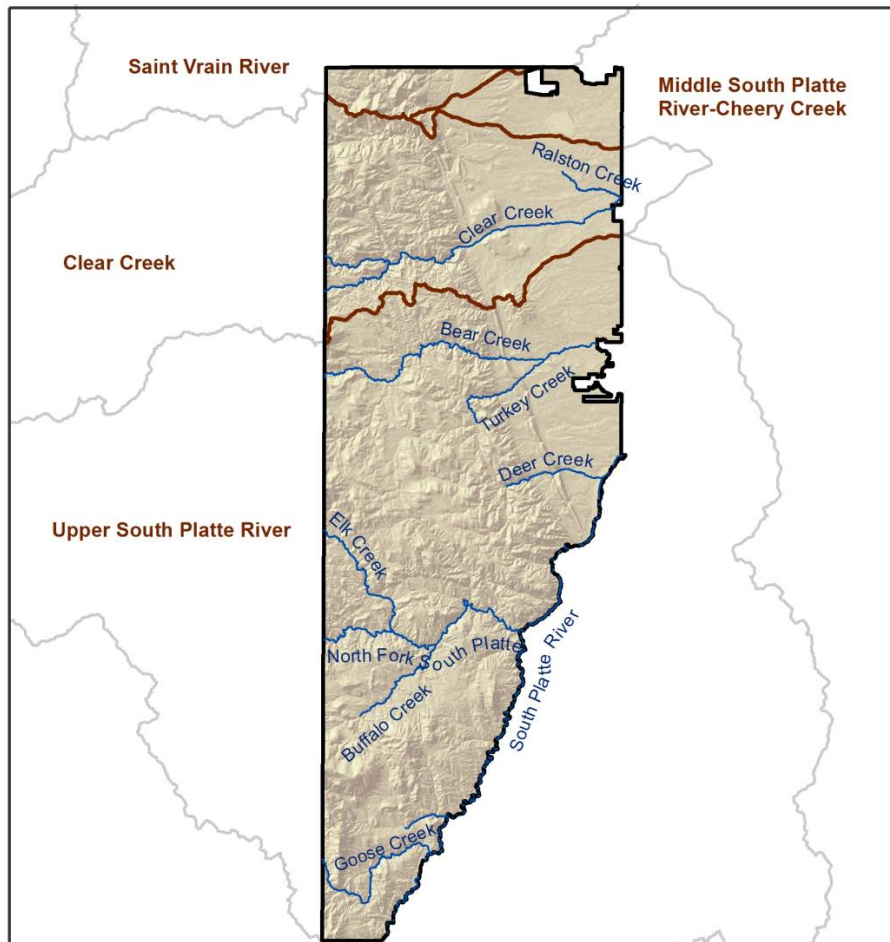


Figure 4. USGS Hydrologic Unit Watersheds (HUCs) and major drainages of Jefferson County.

Four major watersheds cover Jefferson County with the majority of the county covered by the Upper South Platte River and the Clear Creek watersheds. The very northern section of the county is split between the Saint Vrain River and the Middle South Platte River watersheds (Figure 4). These watersheds are included within the larger South Platte River Basin. This large area covers ten counties completely and portions of nine other counties. The majority of the population in the state lives within the South Platte Basin with the heaviest concentrations found along the Front Range (Topper et al. 2003). Jefferson County

is located in the south central portion of the basin. The population in the South Platte Basin is expected to grow by almost 2 million people, or by 65 percent by 2030, giving this region the fourth largest growth rate in Colorado (CWCB 2012).

A unique feature of the South Platte basin includes the massive quantities of west slope water that are stored in numerous reservoirs in the basin from nine trans-mountain diversions. It is estimated that these diversions bring in excess of 400,000 acre-feet of water annually into the South Platte River Watershed from the west slope and that over 1.1 million acre-feet of water are stored in 22 reservoirs within the basin (Topper et al. 2003). There are 98 reservoirs located within Jefferson County. One of the largest reservoirs in the State is Chatfield Reservoir at 1,455 acres, which lies on the border of Jefferson County and within Douglas County. Chatfield Reservoir is a large federal water storage project which is also a Colorado State Park and part of the Denver Water storage system. Chatfield Reservoir, in addition to three other reservoirs within Jefferson County form part of Denver Water's storage system: Cheesman Reservoir (909 acres); Ralston Reservoir (153 acres), and Strontia Springs (98 acres). The area of Denver Water's collection system covers approximately 2.5 million acres of which 280,000 acres lie within Jefferson County, the third largest area for all counties within the collection system. Standley Lake, which supplies water to Westminster, at 1,202 acres is the largest reservoir in the County and is considered a major importer to the basin (CWCB 2006). Bear Creek Lake supplies drinking water to Lakewood and is a City of Lakewood Regional Park. Wellington Reservoir is privately owned by the Wellington Reservoir Company, but open to the public and at 158 acres is the third largest reservoir in the County (CDOW 2004). The sectors with the greatest water withdrawals in Jefferson County were for industrial uses, crop irrigation, and public supply (Ivahnenko and Flynn 2010).

Groundwater

Jefferson County lies in the southern section of the Platte River Basin known as the Lower South Platte River Basin. For most of the county that includes the montane, foothill and plains where the potential evapotranspiration rates exceed average annual precipitation rates. The South Platte River basin aquifer is unconfined; therefore, the water-surface elevations of rivers, canals, and ponds influence water levels in the aquifer. The ground water generally flows to the South Platte River but ground-water flow patterns are complex due to surface-water diversions, ground-water withdrawals, irrigation return flows and seeps from canals. Large production wells can depress the water table in the alluvial aquifer so water flows from the river into the aquifer. Typically, infiltration, irrigation, seepage from ponds and canals recharge the alluvial aquifers and ground water discharges to the main channel of the river. Groundwater discharge to the river creates the base flow for the river. Alluvial deposits especially in northeast Jefferson County are ancient and include Holocene and Pleistocene alluvial sand, gravel and clay deposits in the floodplains with eolian sand and silt covering some surfaces or overlapping the alluvial deposits. Elevated ground-water levels will allow a hydraulic connection with the alluvial deposits of the stream valleys when ground water levels are high. These deposits are thin and discontinuous as you move west from the plains into the foothills and only serve as a water resource on a very local basis (Topper 2003).

Water Quality

A number of waterways in Jefferson County are currently classified by the Environmental Protection Agency as impaired including Bear Creek below Bear Creek Lake, Ralston Creek, and Swede Gulch due to *Escherichia coli*; Gooseberry Gulch due to ammonia; South Platte River above Cheesman Reservoir due to sedimentation; Clear Creek due to the occurrence of heavy metals; and a number of tributaries of the South Platte River north of Chatfield Reservoir due to presence of selenium (US EPA 2012). Clear Creek watershed is most heavily impacted by runoff from abandoned mines with over a third of the waterways impacted (USEPA Watershed water quality reports; website accessed 4/2012). The majority of the impacts are from non-point sources that contribute nutrient loads into the water bodies (runoff from agriculture, septic tanks and other unidentified sources).

Geology

Precambrian substrates dominate the geology of Jefferson County. The Pikes Peak batholith extends across most of the south half of Jefferson County south of Chatfield Reservoir. Older granitic and metamorphic rocks form most of the remainder of the north and west two thirds of the County. The hogback running northwest to southeast from the center of the County's north border to the south tip of the Chatfield reservoir floodplain forms the dividing line between the older Precambrian granite and metamorphic rocks, and formations of more recent origin. The hogback itself is formed in Cretaceous and Jurassic sedimentary rocks of the Dakota, Morrison, and Ralston Creek Formations, which are famous for the presence of dinosaur tracks and fossils. Adjacent to the hogback on its west, Paleozoic sedimentary rocks of the Fountain, Lykins, and Lyons Formations are exposed, while adjacent to the east there are Cretaceous rocks including sandstones of the Rocky Ridge, Terry, and Hygiene Members; Pierre and Benton shales; and Niobrara, Carlile, Greenhorn, and Graneros Formation sedimentary rocks. Further east rocks of the more recent Tertiary including igneous and sedimentary rocks of the Dawson Arkose and intrusive igneous rocks of the middle Tertiary are found. Continuing eastward to the plains, rocks of the recent Quaternary age formed in glacial drift, gravels, and erosional alluviums are present (Figure 5).

Two of the geologic highlights of Jefferson County are Red Rocks Park and Dinosaur Ridge. Red Rocks is a marvel of natural red rock formations formed in sedimentary rocks of the Pennsylvanian-Permian Fountain Formation. Immediately east of Red Rocks Park is Dinosaur Ridge. The Dinosaur Ridge area is one of the world's most famous dinosaur fossil localities. In 1877, some of the best-known dinosaurs of the time were found here. In 1973, the area was recognized for its uniqueness as well as its historical and scientific significance when it was designated the "Morrison Fossil Area National Natural Landmark" by the National Park Service. The rocks on the east side of Dinosaur Ridge are part of the Cretaceous Dakota Formation. When Alameda Parkway was being constructed in 1937 to provide access to Red Rocks Park, workers discovered hundreds of dinosaur footprints. These were found to include mostly *Iguanodon*-like footprints. Carnivorous theropod tracks are also present.

Simplified Geology of Jefferson County, Colorado

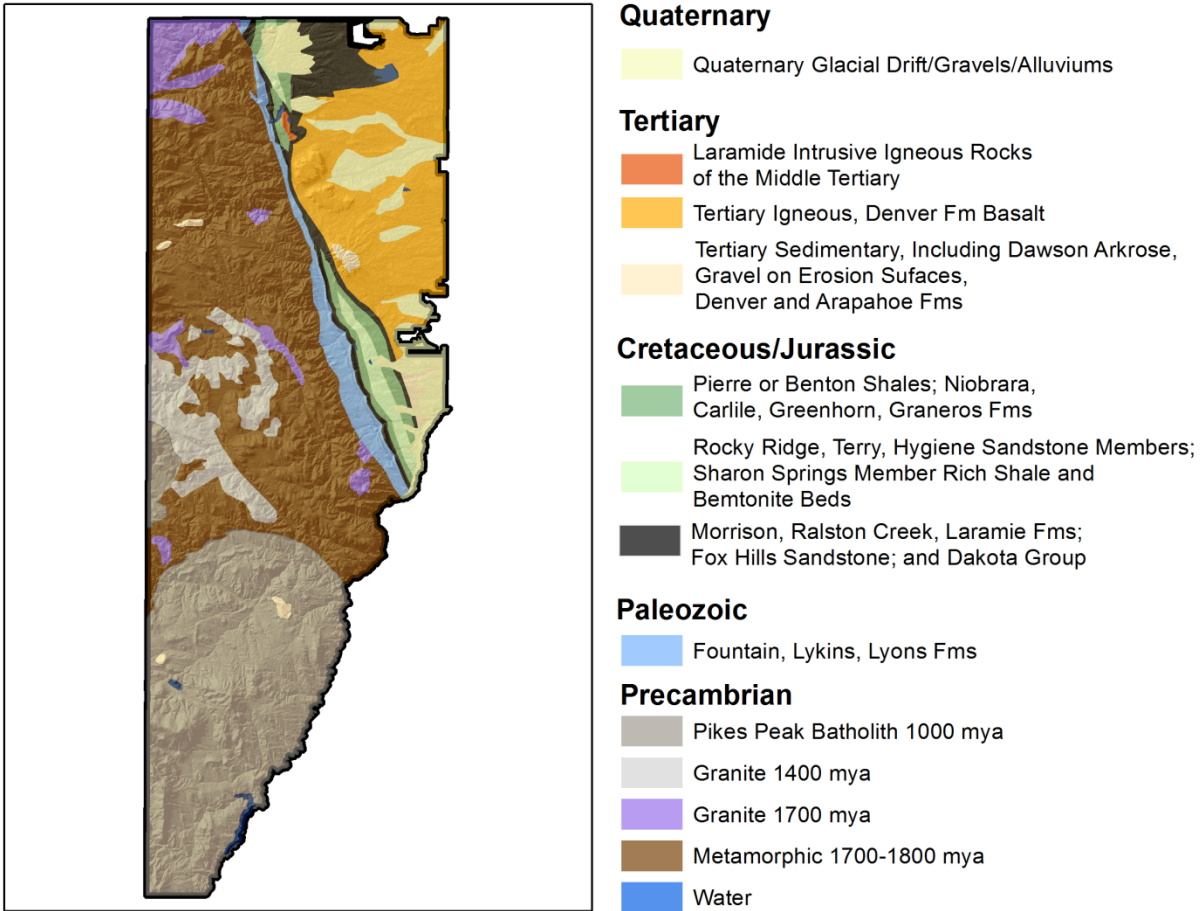


Figure 5. Geology of Jefferson County.



Lyons Hogback Formation outcrop along the Front Range in Jefferson County. Photo: Pam Smith

Soils

Jefferson County has a broad variety of soils mostly correlating with the physiographic area of consideration (plains, foothills, and mountains). In general, there are eight soil series represented within the county that are commonly found at the Potential Conservation Areas. Soil series are groups of soils that because of their analogous characteristics perform similarly for land use purposes. The soil complexes that contain these soil series as their dominant series are shown in Figure 6 (USDA 1995).

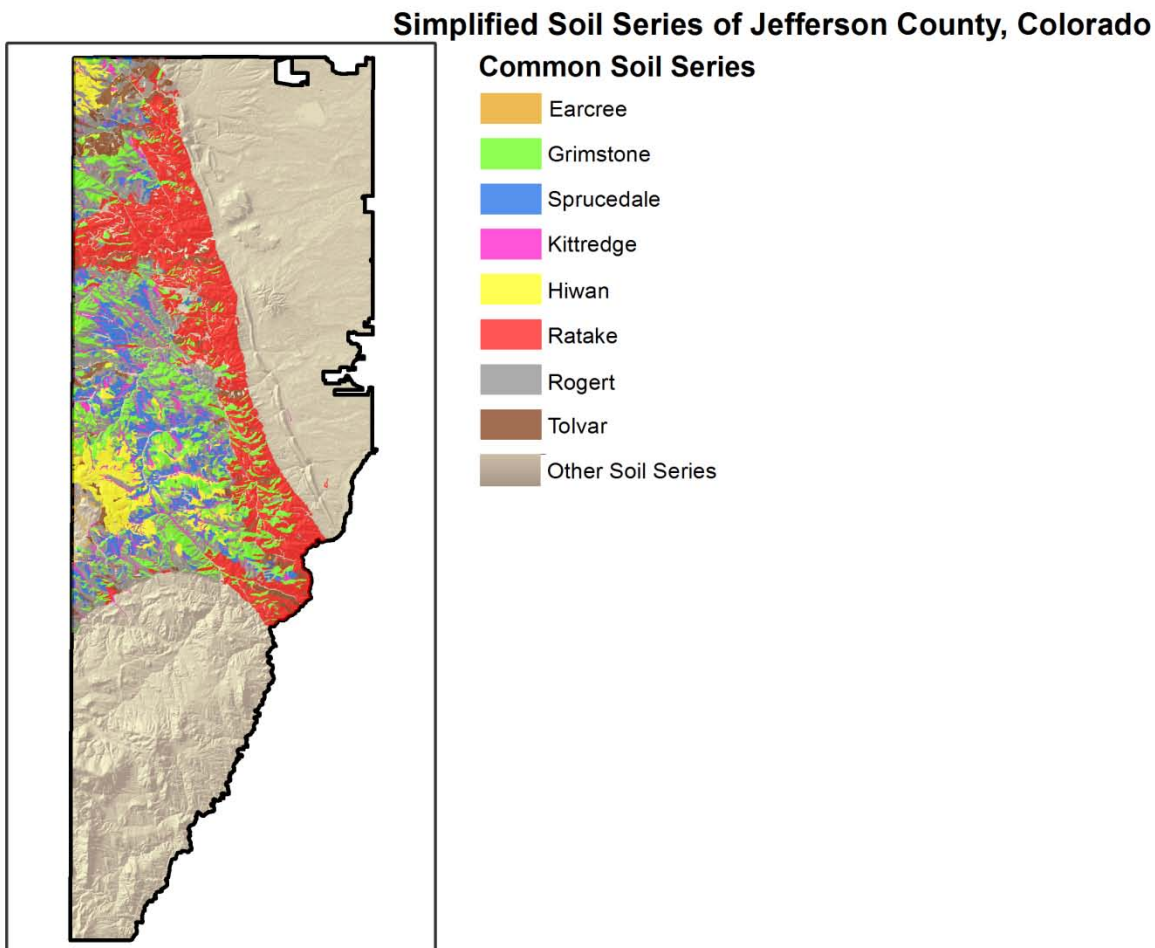


Figure 6. Soil Series of Jefferson County.

Common Soil Series in Jefferson County within the Potential Conservation Areas

Eight soil series are represented within the mountains and foothills region of the County that were noted within the Potential Conservation Areas including the Earcree, Grimstone, Hiwan, Kittredge, Ratake, Rogert, Sprucedale and Tolvar series (Moore 1992, Price and Amen 1984, Soil Survey Staff NRCS 2012). The following descriptions are taken directly from the USDA soil survey of Golden Area Colorado and Soil Survey of Pike National Forest, Eastern Part, Colorado (Moore 1992, Price and Amen 1984).

Earcree Series

The Earcree series consists of deep, well drained soils on alluvial fans and toe slopes and in

drainage ways of the mountains. The soils are formed in noncalcareous, loamy alluvium and colluvium derived dominantly from igneous and metamorphic rocks. The native vegetation is mainly an overstory of aspen, Douglas-fir, and lodgepole pine and an understory of shrubs and grasses.

Grimstone Series

The Grimstone series consists of moderately deep and well drained soils. They are formed in colluvium and slope alluvium over residuum derived from noncalcareous, moderately fine textured very micaceous bedrocks. These soils occur on mountain slopes, hills, and ridges with slopes of 2 to 60 percent. Due to their fine textured nature, these soils are well drained with medium to rapid runoff and moderate permeability. These soils are restricted to the mountainous areas of Colorado and are of moderate extent within the State. Some native vegetation of the Grimstone series includes lodgepole pine, spruce, wild rose, fox barley, and elk sedge.

Hiwan Series

The Hiwan series consists of shallow, well drained soils on mountain side slopes, shoulders, and ridges, most commonly on the north aspect. Hiwan soils formed in acidic, stony, gravelly, and sandy material derived from igneous and metamorphic rocks on slopes of 5 to 60 percent. The native vegetation is Douglas-fir and lodgepole pine and ponderosa pine and an understory of common juniper, kinnikinnick, and scattered grasses and forbs.

Kittredge Series

The Kittredge series consists of deep, well drained soils on terraces, mountain side slopes, toe slopes, and fans and in concave drainage ways. Kittredge soils formed in loamy alluvium and colluvium derived from igneous and metamorphic rocks, mainly schist, gneiss, and granite on slopes of 3 to 30 percent. The native vegetation is mainly Arizona fescue, mountain muhly, Parry oatgrass, bluegrass, and often with an open overstory of ponderosa pine.

Ratake Series

The Ratake series consists of shallow, well drained soils that formed in noncalcareous, stony, gravelly, and loamy colluvium and in residuum dominantly of igneous and metamorphic rocks. The soils are on mountain side slopes, summits, and ridges with slopes of 5 to 60 percent. The native vegetation on the Ratake soil is mainly an overstory of scattered ponderosa pines or Rocky mountain juniper with an understory of mountain mahogany, needle-and-thread, western wheatgrass, Arizona fescue, mountain muhly, and forbs.

Rogert Series

The Rogert series consists of shallow, well drained soils on mountain ridges and side slopes. The slopes commonly have a south, east, or west aspect. The soils formed in noncalcareous, stony and gravelly, loamy material derived from metamorphic and igneous rocks on slopes of 15 to 70 percent. The native vegetation is mainly an overstory of ponderosa pine and Douglas-fir and an understory of Arizona fescue, wheatgrass, junegrass, forbs, and shrubs.

Sprucedale Series

The Sprucedale series consists of shallow, well drained soils on mountain side slopes, toe slopes, and summits and in knoblike areas. Sprucedale soils formed in noncalcareous, micaceous, gravelly, and loamy alluvial and colluvial material derived from igneous and metamorphic rocks, mainly schist, gneiss, and granitic rocks. These soils occur on slopes of 3 to 30 percent. The native vegetation is mainly an overstory of ponderosa pine and Douglas-fir and an understory of common juniper, mountain mahogany, and a variety of forbs and grasses including needle-and-thread, western wheatgrass, Arizona fescue, and mountain muhly.

Tolvar Series

The Tolvar series consists of deep, well drained soils on north-facing mountain side slopes. The soils formed in stony, gravelly, and loamy material derived from igneous and metamorphic rocks on slopes of 15 to 70 percent. The native vegetation is mainly an overstory of Douglas-fir and some lodgepole pine and ponderosa pine with an understory of common juniper, kinnikinnick, and scattered grasses and forbs.

Climate

In Jefferson County, the summers can be warm or hot in most valleys, but much cooler in the mountains. Winters are cold in the mountains. Valleys are colder than the lower slopes of adjacent mountains because of cold air drainage. In the mountains, precipitation occurs throughout the year, and a deep snowpack accumulates during winter. Snowmelt usually supplies much more water than can be used for agriculture in the area. In the valleys, precipitation in summer falls as showers; some thunderstorms occur. In winter the ground is covered with snow much of the time, but the snow can melt or evaporate because of the frequent Chinook winds, which blow down-slope and are warm and dry. The temperature and precipitation for the survey area as recorded at Evergreen and Lakewood, Colorado, in the period 1961 to 2011 is summarized in the following paragraphs.

In winter (December through February) the average temperatures at Evergreen and Lakewood are 28 and 32 degrees F, respectively. The average daily minimum temperature in winter is 11 degrees at Evergreen and 19 degrees at Lakewood. The lowest temperature on record, which occurred at Evergreen on January 12, 1963, is -38 degrees. In summer (June through August) the average temperature is 62 degrees at Evergreen and 69 degrees at Lakewood. The average daily maximum temperature in summer is 79 degrees at Evergreen and 84 degrees at Lakewood. The highest recorded temperature, which occurred at Lakewood on June 27, 1994, is 104 degrees (WRCC 2012).

The total annual precipitation is 18 inches at Evergreen and 17 inches at Lakewood. Of this, 71 percent usually falls in March through August (Figure 7). The heaviest 1-day rainfall during the period of record was 3.69 inches at Evergreen on May 6, 1969. Thunderstorms occur on about 40 days each year, and most occur in summer (WRCC 2012).

The average seasonal snowfall is about 82 inches at Evergreen and about 61 inches at Lakewood. The greatest snow depth at any one time during the period of record was 40 inches at Evergreen. At Evergreen, on average 120 days per year have at least 1 inch of

snow on the ground. The number of such days varies greatly from year to year (WRCC 2012).

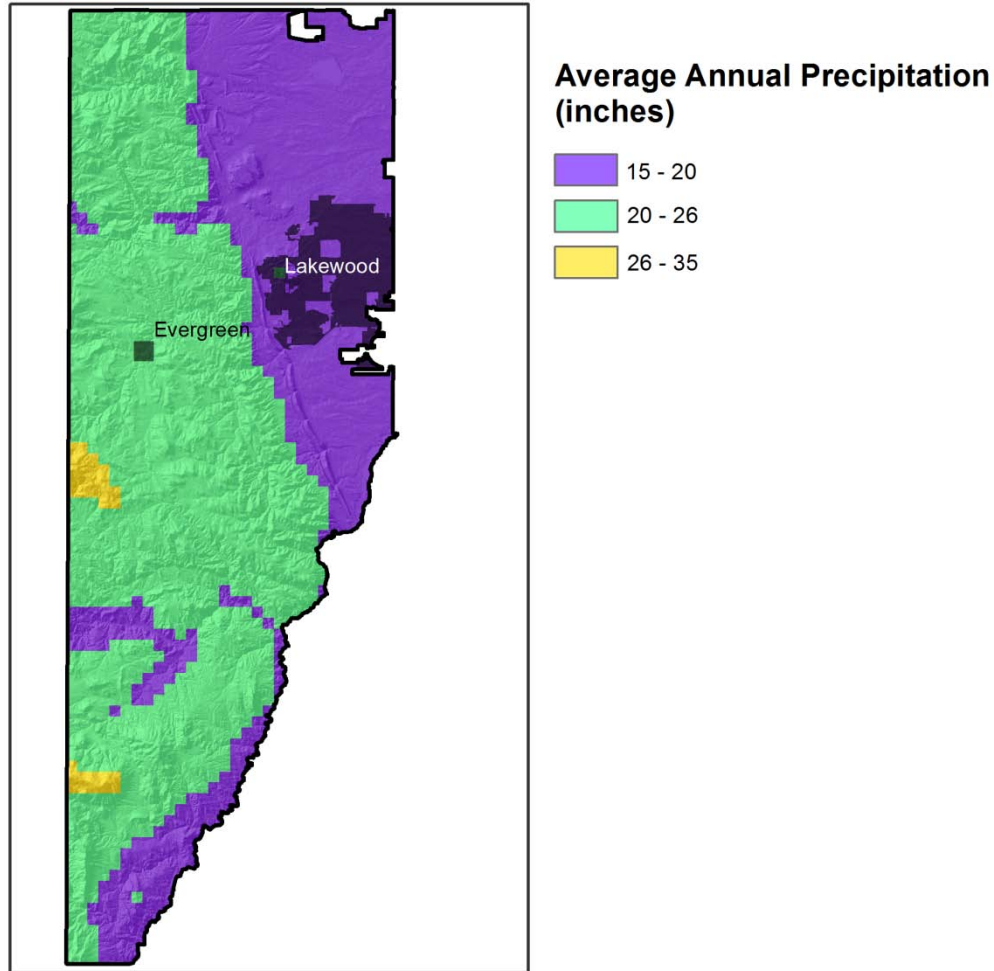


Figure 7. Annual average precipitation in Jefferson County.

Population

At the 2010 census, the population of Jefferson County had increased by 1.4% from the 2000 census to 534,543, which ranked 4th of 63 Colorado counties (U.S. Census Bureau 2012). Population in the County has shown a steady increase over the past century, especially in the past two decades. The County includes rural areas in the western mountains of the county, densely populated urban centers of Lakewood, Arvada, Westminster, and Golden in the northeast quarter of the County, and areas of exurban residential development along the foothills (Figure 8). According to the 2010 Census, approximately 60% of the County's population resides in five large cities in the northeast quarter of the county; Arvada, Golden, Lakewood, Westminster, and Wheat Ridge.

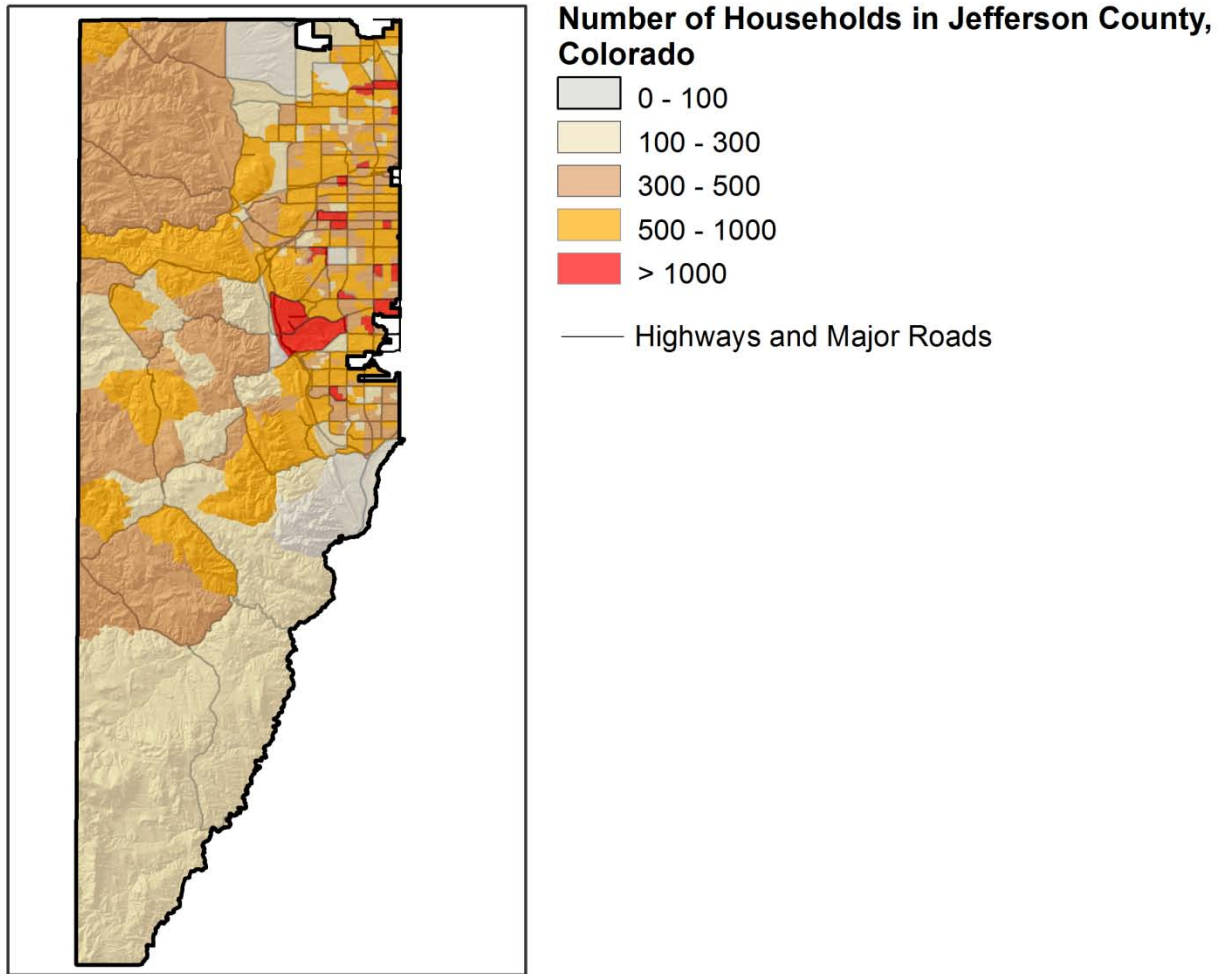


Figure 8. The density of homes in Jefferson County.

Land Ownership

Slightly more than 80% of the land in Jefferson County is in private ownership. Federally managed lands account for a large portion of the remainder, and include 14% of the County acreage (Figure 9) with National Forest lands accounting for the majority of the Federal lands. The Pike National Forest and the Lost Creek Scenic Area (a National Park Service National Natural Landmark) comprise 13% of the Federal lands in the County with the majority of the land located in the southern part of Jefferson County. Other Federal lands include lands managed by the Bureau of Land Management (0.03%) and Rocky Flats (Department of Energy and US Fish and Wildlife Service). The Denver Federal Center owns 0.2% of Jefferson County lands. Lands held by the State of Colorado account for 1.3% of the County property and they include the Ralston Creek State Wildlife Area, State Land Board properties (which include 105 acres of Stewardship Trust lands), and portions of four Colorado State Parks (Golden Gate Canyon, Eldorado Canyon, Staunton, and Chatfield State Parks). Jefferson County Open Space owns 2% of the acreage, Denver Water 1%, and Denver Mountain Parks own 0.4%. The remainder of the County is owned by city or county local government entities.

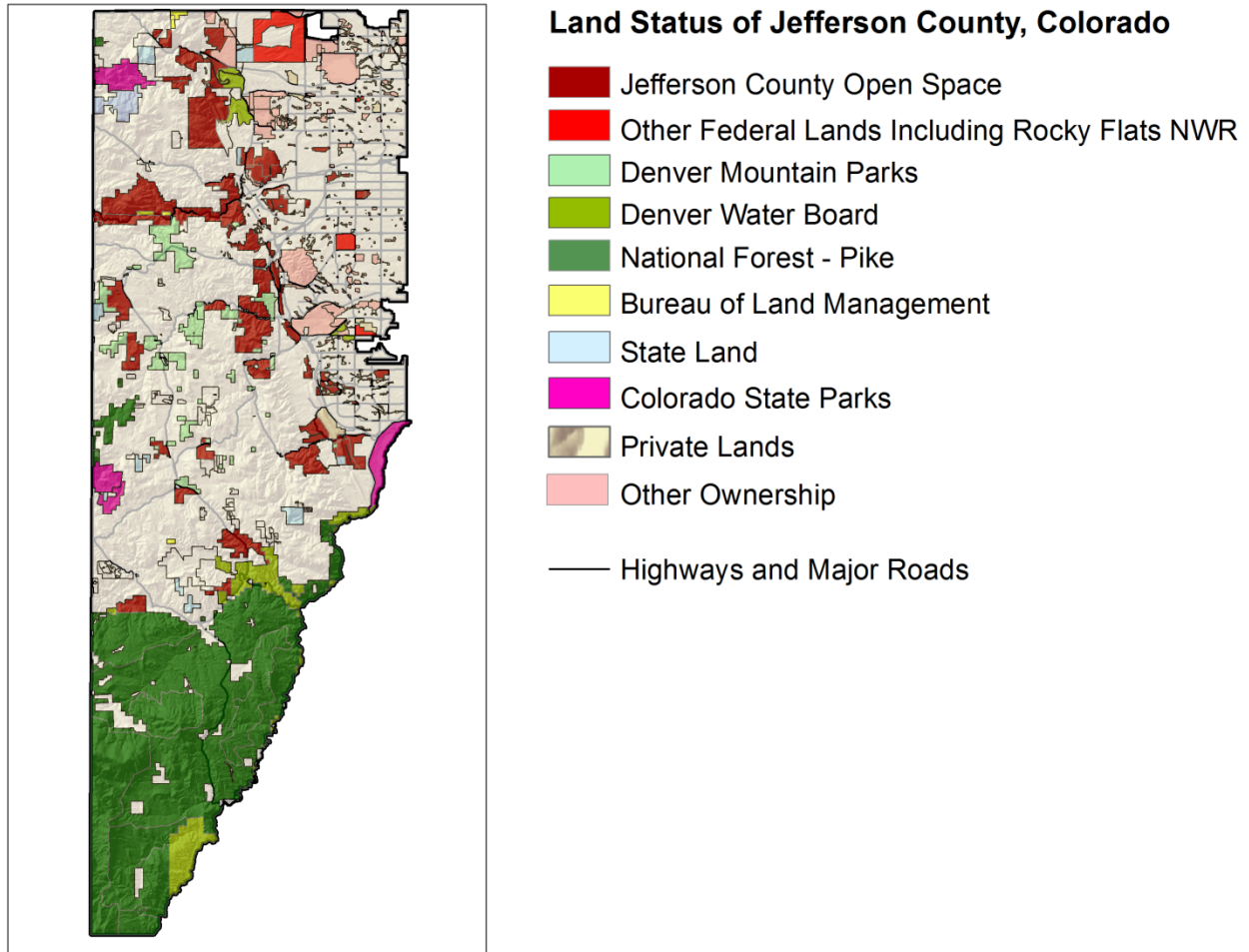


Figure 9. Land ownership in Jefferson County.

The current economy of Jefferson County relies heavily on the services sector including retail trade, health care, professional, scientific, technical, accommodations and food services, and others accounting for over 80% of the County’s employment. Within the services sector, leisure, recreation, and tourism are responsible for 18% of the employment (Headwater Economics 2009). Today, urban development, recreation, and ranching are the major land uses within the County. Timber harvest and mining are limited within the County. Due to Jefferson County’s location in the central Rocky Mountains, directly adjacent to Denver, there are ample opportunities for outdoor recreation for inhabitants of the Metropolitan Denver region. Fishing, hunting, horseback riding, biking, hiking, golfing, ice skating and kayaking are some of the most popular activities in the County (Jefferson County 2008). Regional attractions include Hiwan Homestead Museum, Lookout Mountain Nature Center and Preserve, Boettcher Mansion, Dinosaur Ridge Visitor Center, Red Rocks Amphitheater, and Buffalo Bill Memorial Museum and Grave (Jefferson County 2008).

Ecological Systems

There are a variety of biological and ecological scales that are used to understand our natural world and they range from genes to landscapes. “Ecological Systems represent recurring groups of biological communities that are found in similar physical environments

and are influenced by similar dynamic ecological processes, such as fire or flooding” (NatureServe 2012). This scale provides an intermediately sized unit that is mappable and identifiable by conservation and resource managers in the field. NatureServe and its natural heritage program members have a working classification of the terrestrial ecological systems in the United States and its territories. Currently, 600 ecological systems are classified and described. These groupings of plant associations provide the basis for interpreting larger-scale ecological system patterns and concepts (NatureServe 2012).

Jefferson County is dominated by ecological systems of montane elevations characteristic of the Southern Rocky Mountain Ecoregion (Table 1, Figure 10). At higher elevations, large portions of the County are dominated by ponderosa pine and mixed conifer woodlands, and lodgepole pine forest, especially in the western portion of the County. Spruce-fir forests are present in the highest elevations of the County. Vegetation of the hogbacks is dominated by foothill shrubland, and west of the hogbacks, the undeveloped lands still remaining are dominated by foothill grassland. Figure 10 shows ecological systems with cover of at least 1% of the County’s acreage.

Table 1. Ecological Systems in Jefferson County (NatureServe 2012).

Ecological System	Acres	Percent of County
Rocky Mountain Ponderosa Pine Woodland	151,704	30.7
Rocky Mountain Montane Dry - Mesic Mixed Conifer Forest and Woodland	63,029	12.7
Rocky Mountain Lower Montane - Foothill Shrubland	54,885	11.1
Western Great Plains Foothill and Piedmont Grassland	54,461	11.0
Rocky Mountain Lodgepole Pine Forest	33,246	6.7
Rocky Mountain Subalpine Mesic - Spruce-Fir Forest and Woodland	10,840	2.2
Rocky Mountain Ponderosa Pine Savanna	10,703	2.2
Rocky Mountain Subalpine - Montane Riparian Woodland and Shrubland	5,372	1.1
Southern Rocky Mountain Montane Grassland	4,851	1.0
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	3,950	0.8
Inter-mountain Basins Big Sagebrush Steppe	2,968	0.6
Rocky Mountain Cliff and Canyon	2,393	0.5
Inter-Mountain Basins Big Sagebrush Shrubland	1,677	0.3
Rocky Mountain Aspen Forest and Woodland	1,660	0.3
Inter-Mountain Basins Montane Sagebrush Steppe	837	0.2
Rocky Mountain Gambel Oak - Mixed Montane Shrubland	827	0.2
Rocky Mountain Subalpine Dry - Mesic Spruce-Fir Forest and Woodland	626	0.1
Western Great Plains Riparian/Western Great Plains Floodplain	326	0.1
Other		
Open Water	2,398	0.5
Disturbed / Non-natural (Residential and Cultivated Lands)	87,727	17.7
Total acres	494,480	

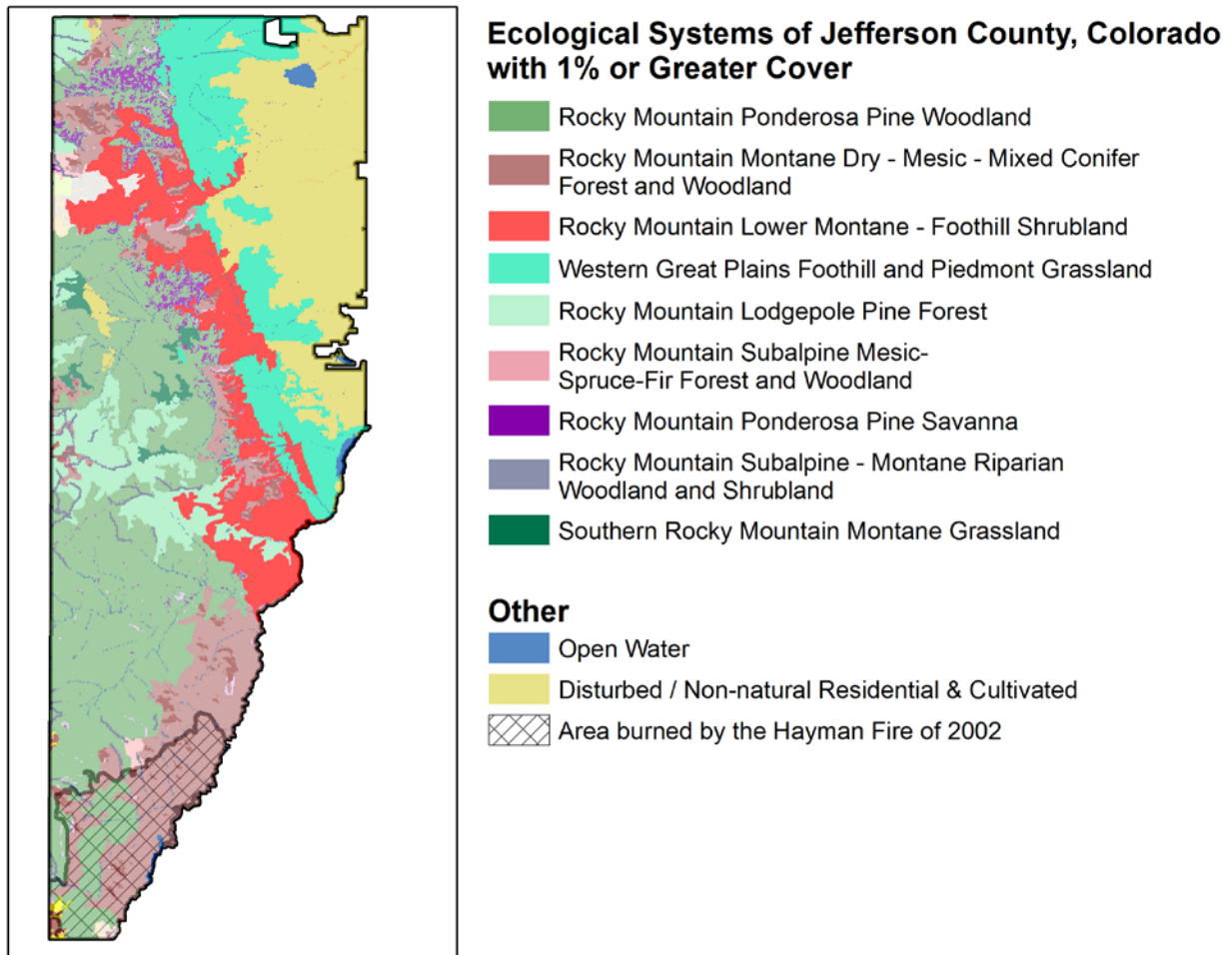


Figure 10. Major Ecological Systems of Jefferson County with 1% or greater cover (NatureServe 2012).

The following are brief description of the major ecological systems found in Jefferson County derived from NatureServe (2012).

Rocky Mountain Ponderosa Pine Woodland

Pinus ponderosa (ponderosa pine) woodlands dominate Jefferson County, covering 31% of the land area. In Colorado, ponderosa pine woodlands and savannas are typically found between the lower elevation grassland and shrubland communities, while the coniferous forests are found at higher elevations. In Jefferson County, elevations supporting ponderosa pine woodland are generally between 7,000 and 9,000 feet, where they form extensive stands. Occurrences of these woodlands are typically found in warm, dry exposed sites on almost any slope or aspect, and on moderately steep to very steep slopes or ridge tops. At more mesic sites, ponderosa pine woodlands intergrade with mixed conifer forests or other forest types. Forest and woodland communities are often dominated by ponderosa pine, a drought-resistant, shade-intolerant conifer characteristic of lower treeline in the major mountain ranges of the western United States. Fire is generally regarded as the dominant natural 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 and others (2006) describe a continuum of potential fire severity and effects to *Pinus ponderosa* forests and woodlands 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 were found to be no more common than they were 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 plentiful following high intensity fires, reforestation will be limited by seed availability. Kaufmann and others (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

The mixed conifer forest and woodlands are highly variable ecological systems of the montane zone of the Rocky Mountains. This is the second most common ecosystem in Jefferson County, accounting for about 13% of total acreage. These forests occur 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 *Pinus ponderosa* (ponderosa pine) are the most common conifer species with ponderosa pine ranging from being merely present to being codominant. Douglas fir dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon sideslopes, ridge tops, 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. Often the understory includes a number of cold-deciduous shrubs and graminoid species, including *Arctostaphylos uva-ursi* (kinnikinnick), *Symphoricarpos* spp. (snowberry), *Jamesia americana* (waxflower), *Quercus gambelii* (Gambel oak), and *Festuca arizonica* (Arizona fescue). This system is 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 did experience a range of low to moderate and high severity burns. High severity burn occurred in 41% of the area while 19% of the area experienced moderate severity burn. It is unusual for a high intensity fire to occur over such a large area in a ponderosa pine ecosystem (Kaufman et al. 2006).

Rocky Lower Montane - Foothill Shrubland

This large patch ecological system is found in the foothills, canyon slopes and lower mountains of the Rocky Mountains and ranges from southern New Mexico extending north into Wyoming, and west into the Intermountain region. It comprises about 11% of the County's acreage. It is common where *Quercus gambelii* (Gambel oak) is absent such as the northern Colorado Front Range and in drier foothills and prairie hills. This system is generally drier than Rocky Mountain Gambel Oak-Mixed Montane Shrubland, but may include mesic montane shrublands where *Q. gambelii* does not occur. It may occur as a mosaic of two or three plant associations often surrounded by grasslands or woodlands. Scattered trees or inclusions of grassland patches or steppe may be present, but the vegetation is typically dominated by a variety of shrubs including *Amelanchier utahensis* (Utah serviceberry), *Cercocarpus montanus* (mountain mohagany), *Purshia tridentata* (antelope bitterbrush), *Rhus trilobata* (skunkbush sumac), *Ribes cereum* (wax currant), or *Yucca glauca* (soapweed yucca). Grasses are represented as species of *Muhlenbergia* (muhly), *Bouteloua* (grama grass), *Hesperostipa* (stipa grass), and *Pseudoroegneria spicata* (bluebunch wheatgrass). Fires play an important role in this system as the dominant shrubs usually have a severe die-back, although some plants will stump sprout. *Cercocarpus montanus* requires a disturbance such as fire to reproduce, either by seed sprout or root crown sprouting. Fire suppression may have allowed an invasion of trees into some of these shrublands, but in many cases sites are too xeric for tree growth.

Western Great Plains Foothill and Piedmont Grassland

This large patch system typically occurs between 5,250 and 7,200 feet (1,600-2,200 m) in elevation. It is best characterized as a mixed-grass to tallgrass prairie on mostly moderate to gentle slopes, usually at the base of foothill slopes such as the hogbacks of the Rocky Mountain Front Range, where it typically occurs as a relatively narrow elevational band between montane woodlands and shrublands and the shortgrass steppe. In Jefferson County, it comprises 11% of the County's acreage. The system also extends east on the Front Range piedmont alongside the Chalk Bluffs at the Colorado-Wyoming border, out into the Great Plains on the Palmer Divide, and on piedmont slopes below mesas and foothills in southeastern Colorado and northeastern New Mexico. Usually occurrences of this system have multiple plant associations that may be dominated by *Andropogon gerardii* (big bluestem), *Schizachyrium scoparium* (little bluestem), *Muhlenbergia montana* (mountain muhly), *Nassella viridula* (green needlegrass), *Pascopyrum smithii* (western wheatgrass), *Sporobolus cryptandrus* (sand dropseed), *Bouteloua gracilis* (blue grama), *Hesperostipa comata* (needle and thread grass), or *Hesperostipa neomexicana* (New Mexico threadgrass). Typical adjacent ecological systems include foothill shrublands, ponderosa pine savannas, juniper savannas, as well as shortgrass prairie. A combination of increased precipitation from orographic rain, temperature, and soils limits this system to the lower elevation zone with approximately 40 cm of precipitation/year. It is maintained by frequent fire and associated with well-drained clay soils. This system is one of the most severely altered systems in the Southern Rocky Mountains ecoregion. Alteration is due to fire suppression, housing and water developments, conversion to hay meadows, or overgrazing. Fire suppression has allowed for shrub and tree invasion into the grassland and alters the species composition as well (Mast et al. 1997, Mast et al. 1998). Housing and water developments severely fragment and usually destroy the habitat, while agricultural use has

converted tall grass prairies into hay meadows dominated by exotic grasses, e.g., smooth brome (*Bromopsis inermis*). It is very unusual to find excellent occurrences of this system. Threats are very high for this system and therefore, a premium is set on protecting the existing occurrences. Viable populations of Ottoe skipper (*Hesperia ottoe*), Cross-line skipper (*Polites origenes rhena*), Arogos skipper (*Atrytone arogos iowa*), Dusted skipper (*Atrytonopsis hianna turneri*), and Regal fritillary (*Speyeria idalia*) are indicators of a healthy and functioning foothills grasslands system.

Rocky Mountain Lodgepole Pine Forest

This matrix forming system is widespread in upper montane to subalpine elevations of the Rocky Mountains, Intermountain region, and north into the Canadian Rockies. Lodgepole pine forest comprise about 7% of the County's acreage. These are subalpine forests where the dominance of *Pinus contorta* (lodgepole pine) is related to fire history and topo-edaphic conditions. Most forests in this ecological system are early to mid-successional forests which developed following fires. Following stand-replacing fires, *P. contorta* will rapidly colonize and develop into dense, even-aged stands. This system consists of extensive stands of pure lodgepole pine or, to a lesser extent, stands in association with other conifer species. These forests are dominated by *P. contorta* with shrub, grass, or barren understories. Sometimes there are intermingled mixed conifer/*Populus tremuloides* (quaking aspen) stands with the latter occurring with inclusions of deeper, typically fine-textured soils. The shrub stratum may be conspicuous to absent; common species include *Arctostaphylos uva-ursi* (kinnikinnick), *Ceanothus velutinus* (snowbrush ceanothus), *Linnaea borealis* (twinline), *Mahonia repens* (creeping barberry), *Purshia tridentata* (antelope bitterbrush), *Spiraea betulifolia* (white spirea), *Spiraea douglasii* (rose spirea), *Shepherdia canadensis* (russet buffaloberry), *Vaccinium caespitosum* (dwarf bilberry), *Vaccinium scoparium* (grouse whortleberry), *Vaccinium membranaceum* (thinleaf huckleberry), *Symphoricarpos albus* (common snowberry), and *Ribes* spp. (currant). Shrub and herbaceous layers are often poorly developed in lodgepole pine forests, and plant species diversity is low. This low understory diversity is probably related to the single age class and dense canopy of many stands. Soils supporting these forests are typically well-drained, gravelly, have coarse textures, are acidic, and rarely formed from calcareous parent materials. In Colorado, lodgepole pine forests generally occur between 8,000-10,000 feet from gentle to steep slopes on all aspects. *Pinus contorta* is an aggressively colonizing, shade-intolerant conifer which usually occurs in lower subalpine forests in the major ranges of the western United States. Establishment is episodic and linked to stand-replacing disturbances, primarily fire. The incidence of serotinous cones (cones that require fire to open) varies within and between varieties of *P. contorta*, being most prevalent in Rocky Mountain populations. Hoffman and Alexander (1980, 1983) report that in stands where *P. contorta* exhibits a multi-aged population structure, with regeneration occurring, there is typically a higher proportion of trees bearing nonserotinous cones.

Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland

Spruce-fir mesic 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 Jefferson County. These forests account for a little more than 2% of the County's acreage, and are concentrated 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, 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* (starry false lily of the valley), *Cornus sericea* (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.

Rocky Mountain Ponderosa Pine Savanna

This ecological system is found predominantly in the Colorado Plateau region, west into scattered locations in the Great Basin, and north along the eastern front of the southern Rocky Mountains into southeastern Wyoming. These savannas occur at the lower treeline/ecotone between grassland or shrubland and more mesic coniferous forests, typically in warm, dry, exposed sites. Elevations range from less than 6,200 ft (1,900 m) in central and northern Wyoming to 9,200 ft (2,800 m) in the New Mexico mountains to well over 8,860 ft (2,700 m) on the higher plateaus of the Southwest. *Pinus ponderosa* (ponderosa pine) is found on rolling plains, plateaus, or dry slopes usually on more southerly aspects. This system is best described as a savanna that has widely spaced (<25% tree canopy cover >150 years old) with ponderosa pine as the predominant conifer. It is maintained by a fire regime of frequent, low-intensity surface fires. A healthy occurrence often consists of open and park-like stands dominated by ponderosa pine. Understory vegetation in true savanna occurrences is predominantly fire-resistant grasses and forbs that resprout following surface fires; shrubs, understory trees, and downed logs are uncommon. Important species include *Festuca arizonica* (Arizona fescue), *Pseudoroegneria spicata* (bluebunch wheatgrass), *Andropogon gerardii* (big bluestem), *Schizachyrium scoparium* (little bluestem), *Festuca* spp. (fescue grass), and *Bouteloua gracilis* (blue grama). A century of anthropogenic disturbance and fire suppression has resulted in a higher density of ponderosa pine trees, altering the fire regime and species composition. Presently, many stands contain understories of more shade-tolerant species, such as *Pseudotsuga menziesii* (Douglas fir) and/or *Abies* spp. (fir), as well as younger cohorts of *P. ponderosa*.

Rocky Mountain Subalpine - Montane Riparian Woodland and Shrubland

This riparian woodland system is comprised of seasonally flooded forests and woodlands found at montane to subalpine elevations of the Rocky Mountain cordillera, from southern New Mexico north into Montana, and west into the Intermountain region and the Colorado Plateau. This system comprises only about 1% of the County's acreage. The system contains conifer and aspen woodlands, and montane to subalpine riparian shrublands that line montane streams. These are communities tolerant of periodic flooding and high water tables. They occupy narrow bands along streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains with sinuous stream channels. Less

frequently, occurrences are found in moderate-wide valley bottoms on large floodplains along broad, meandering rivers, and on pond or lake margins. Snowmelt moisture in this system may create shallow water tables or seeps for a portion of the growing season. Consequently, the shrub components of this community can sometimes be found around seeps, fens, and isolated springs on hillslopes away from valley bottoms. The shrubs of this system also often occur as a mosaic of multiple communities that are shrub and herb dominated. They can include above-treeline, willow-dominated communities in snowmelt-fed basins that feed into streams. Generally, these communities are found at higher elevations, but they can also be found anywhere from 4,920-12,400 ft (1,500-3,475 m). Dominant tree species include *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), *Pseudotsuga menziesii* (Douglas fir), *Picea pungens* (blue spruce), *Populus tremuloides* (quaking aspen), and *Juniperus scopulorum* (Rocky Mountain juniper). Other trees that may be present include *Alnus incana* (thinleaf alder), *Abies concolor* (white fir), *Pinus contorta* (lodgepole pine), *Populus angustifolia* (narrowleaf cottonwood), *Acer negundo* (box elder), and *Juniperus osteosperma* (Utah juniper). The dominant shrubs of the system reflect the large elevational gradient and include *Betula nana* (dwarf birch), *Betula occidentalis* (water birch), *Cornus sericea* (red-osier dogwood), *Salix bebbiana* (Bebb willow), *Salix boothii* (Both's willow), *Salix brachycarpa* (shortfruit willow), *Salix drummondiana* (Drummond's willow), *Salix eriocephala* (Missouri River willow), *Salix geyeriana* (Geyer willow), *Salix monticola* (park willow), *Salix planifolia* (diamondleaf willow), and *Salix wolfii* (Wolf's willow).

Southern Rocky Mountain Montane Grassland

This Rocky Mountain ecological system typically occurs between 7,200 and 9,850 ft (2,200-3,000 m) elevation on flat to rolling plains and parks or on lower sideslopes that are dry, but it may extend up to 10,990 ft (3,350 m) on warm aspects. In Jefferson County the systems comprise 1% of the County's acreage. Soils resemble prairie soils in that the A-horizon is dark brown, relatively high in organic matter, slightly acidic, and usually well-drained. An occurrence usually consists of a mosaic of two or three plant associations with one of the following dominant bunch grasses: *Danthonia intermedia* (timber oatgrass), *Danthonia parryi* (Parry's oatgrass), *Festuca idahoensis* (Idaho fescue), *Festuca arizonica* (Arizona fescue), *Festuca thurberi* (Thurber's fescue), *Muhlenbergia filiculmis* (slimstem muhly), or *Pseudoroegneria spicata* (bluebunch wheatgrass). The subdominants include *Muhlenbergia montana* (mountain muhly), *Chondrosium gracile* (blue grama), and *Poa secunda* (Sandberg bluegrass). These large-patch grasslands are intermixed with matrix stands of spruce-fir (*Picea-Abies*), lodgepole pine (*Pinus contorta*), ponderosa pine (*Pinus ponderosa*), and aspen (*Populus*) forests. In limited circumstances (e.g., South Park in Colorado), they form the "matrix" of high-elevation plateaus.

Flora and Fauna

The variation in topographic relief in Jefferson County is spectacular. There is an increase of over 6,000 feet in elevation from the eastern border of the County to the 11,590 foot high Buffalo Peak, situated in the southwest portion of the County. There are 37 named mountain peaks that range from 8,000-10,000 feet. The large influential mountain peaks of Jefferson County include Blue Mountain, Centennial Mountain, Centennial Cone, Genessee Mountain, Bergen Peak, Barriar Peak, Black Mountain and the Tarryall, Kenosha and South

Platte River Mountains. The mountainous terrain significantly influences the types of plants, animals and anthropogenic developments that currently exist. The Southern half of the County, including Buffalo Peak, lies within the mountains of Colorado's Front Range and the County's north half is situated at the convergence of Colorado's eastern plains and the Front Range Mountains. The hogbacks and North and South Table Mountains are rare geologic formations that support unique environments. This dramatic topographic relief, complex physiography, and unique geology, combined with the geographic position of Jefferson County has created a rich mosaic of ecosystems and corresponding habitat for wildlife, providing for a high diversity of flora and fauna. Jefferson County is comprised of three principal ecological zones transitioning along an elevational gradient from lower elevation foothills to the mid-elevation montane zone to high-elevation subalpine zone. 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 that climatic patterns are changing, and that Colorado, with its high topographic relief and consequent ecological complexity, may expect marked effects from these changes (Armstrong et al. 2011, USGS 2010, and Colorado WCB 2012).



Centennial Cone Peak in Jefferson County: Photo Pam Smith

Flora

In Colorado 3,430 plant taxa are documented (Hartman and Nelson 2008) in the entire State; of these, 997 have been documented in Jefferson County by the University of Colorado at Boulder Herbarium (COLO). Therefore, 30% of the species known from the State can be found in Jefferson County, which occupies about 7% of the land area. The diversity of plant species and plant communities in the County is high. This is directly related to the diversity of habitats from plains, foothills, montane to subalpine mountain

regions. The hogbacks also support rare plant communities and plants as do the areas with large rocky outcrops, cool canyons and a variety of forests and shrublands. Riparian areas represent a small amount of the area but contribute greatly to the health and floristic biodiversity of Jefferson County. Non-native species account for a small portion of the flora in the county; there are 185 non-native plant species documented which represent five percent of the taxa.

The flora of Colorado reflects three phytogeographic principles: a migration corridor along the mountains oriented north-south, a barrier to east-west migration leading to distinct characters of West Slope and East Slope floras, and the Southern Rocky Mountains represent an extensive high-altitude portion of the American Cordillera and its isolation from areas with similar climate (such as boreal regions) leads to a high degree of endemism (Weber 1964). At least eight plant species that occur in Jefferson County are endemic to Colorado and another seven are regional endemic plant species with ranges that extend to nearby states.



Wildflowers at Centennial Cone Open Space in Jefferson County: Photo Pam Smith

At least 35 plant species occur in Jefferson County that are considered to be rare. This is a comparatively high number when you consider Boulder County, which contains 1,649 species (or roughly half the plant species in the state) has 24 documented rare species (Neid et al. 2009). A number of species are naturally rare because they are adapted to specific habitats that are rare; some plants are also geographically restricted. Many species were once more common, but have declined in abundance, geographic range, or both because of disturbance and/or changes in climate or hydrology. Jefferson County lies along the Front Range in an area where there has been significant development. The protection of rare species helps protect our natural heritage, biodiversity of plants and animals, our quality of life and rare habitats.

Fauna

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, Armstrong et al. 2011). 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 (Armstrong et al. 2011), 428 birds (Kingery 1998), 18 amphibians, 50 reptile species (Hammerson 1999) and about 80 native species of fish (Woodling 1985). Jefferson County is home to at least 80 mammals (Armstrong et al. 2011), 121 bird species (Kingery 1998), 6 amphibians, 17 reptiles (Hammerson 1999), and at least 11 native fish species (Woodling 1985). Although many of the mammals are habitat specialists, some are generalists and use many different habitats. In Colorado and Jefferson 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 (*Callospermophilus lateralis*) that occur from the alpine down to the foothills and beyond in a variety of habitats. Carnivores are also habitat generalists occurring in a broad range of habitats and include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), mountain lion (*Felix concolor*), several species in the weasel family including long-tailed (*Mustela frenata*) and short-tailed weasel (*Mustela erminea*), and historically gray wolf (*Canis lupus*). Ungulates including mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*) and bighorn sheep (*Ovis canadensis*) are also habitat generalists and in addition they will migrate between habitats to make use of seasonally available foraging and breeding resources.

Other animal species are more restricted by their habitat requirements to specific elevations and ecosystems. These specialist species can be routinely found in those ecosystems. Only a few lizards occur in Jefferson County but one species, the short-horned lizard (*Phrynosoma hernandesi*), is widely distributed across a broad elevational range (3,500 to 8,500 feet) in several habitats including grasslands, mountain shrubland, semidesert shrubland, pinyon-juniper woodland, and montane forests (Hammerson 1999).

Bird distribution is related to habitat preference with vegetative type and structure exerting a major influence on bird distribution (Kingery 1998) and the 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.



Black-tailed prairie dog. Photo M. Menefee

Grasslands in Jefferson County support a large number of mammal and bird species and are home to Black-tailed prairie dog (*Cynomys ludovicianus*), which is a keystone species in this ecosystem (Kotliar 2000, Miller et al. 2000). A keystone species plays a critical role in maintaining the structure of a community and its impact is greater than would be expected based on relative abundance or biomass. Prairie dog burrows provide homes for birds and other mammals and reptiles and they themselves are important prey for mammal and avian predators.

Natural grasslands provide optimal forage for elk, mule deer and pronghorn (*Antilocapra americana*). Small mammals found in grasslands include meadow vole (*Microtus pennsylvanicus*) and thirteen-lined ground squirrel (*Ictidomys 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*) and Lark Sparrow (*Chondestes grammacus*). Numerous raptors forage over the grasslands including Red-tailed Hawk (*Buteo jamaicensis*), Prairie Falcon (*Falco mexicanus*) and Peregrine Falcon (*Falco peregrinus*); in the winter Ferruginous Hawks (*Buteo regalis*) 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 undulates erythrocheilus*) and short-horned lizards 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 (Hammerson 1999).

Shrublands, including Gambel oak (*Quercus gambelii*) and mountain mahogany (*Cercocarpus montanus*) communities, are among the most productive systems providing animals with an abundance of resources. Small mammals such as the least and Colorado chipmunk (*Neotamias minimus* and *N. quadrivittatus*) are abundant here and the uncommon gray fox (*Urocyon cinereoargenteus*) makes this habitat its home. Townsend's big-eared bats (*Corynorhinus 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*). The Long-eared Owl (*Asio otus*) will nest in large oaks within these shrublands.

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 the Ovenbird (*Seiurus aurocapillus*), Pygmy Nuthatch (*Sitta pygmaea*), Western Tanager (*Piranga ludoviciana*), Plumbeous Vireo (*Vireo plumbeus*) and Yellow-rumped Warbler (*Dendroica coronata*) and raptors such as Flammulated Owl (*Otus flammeolus*) and Northern Pygmy Owl (*Glaucidium gnoma*) which nest and hunt in ponderosa pine forests. Old growth ponderosa pine/Douglas fir forests provide breeding habitat essential for the Flammulated Owl (*Otus flammeolus* photo above by B. Linkhart). In Colorado, nesting Flammulated Owls showed a preference for old trees and stands of ponderosa pine and Douglas-fir (Reynolds and Linkhart 1992).



Pawnee montane skipper. On Dotted gayfeather. Photo J. Sovell

Insects are essential to ecosystem function and ponderosa pine woodlands provide habitat for the critically imperiled butterfly, the Pawnee montane skipper (*Hesperia leonardus montana*). This butterfly occurs in ponderosa pine woodlands and on outcrops of Pikes Peak granite where adequate adult and larval food sources are present; adults feed on nectar sources, the primary source being dotted gayfeather (*Liatris punctata*) and larvae feed on grasses especially blue grama (*Bouteloua gracilis*). The worldwide distribution of the Pawnee montane skipper occurs within a 36 square mile area centered on the South Platte River Valley in Jefferson, Douglas, Teller, and Park Counties. The largest viable populations of this butterfly, occurs in the ponderosa pine forests of Jefferson County (Sovell 2011). A significant portion (approximately 40%) of this species' global range is located on lands that were burned by the Hayman Fire of 2002. Subsequent monitoring within the burn area suggests that this burned habitat represents marginal habitat for the Pawnee montane skipper. From 2002 to 2010, Pawnee montane skipper monitoring in Jefferson County within areas of the Hayman Fire and in adjacent unburned habitat suitable for the butterfly, documented the highest counts in unburned habitat (Sovell 2011).

High elevation conifer forests include stands of subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), Douglas fir (*Pseudotsuga menziesii*) and blue spruce *Picea pungens*). Mammals that characterize these spruce-fir forests include southern red-backed vole (*Clethrionomys gapperi*), pine squirrels (*Tamiasciurus hudsonicus*) and snowshoe hare (*Lepus americanus*). 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-fir forest where they forage on decadent trees for insects.

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 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 ecosystem functions. These functions including slowing spring runoff and raising the water table, promoting water storage and sediment trapping (Wright and Jones 2002), and creating habitat for other mammal species such as mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), birds, fish, reptiles, 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 Jefferson County and that rely on riparian and wetland habitats include 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*) and Lincoln's Sparrow (*Melospiza lincolnii*). 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*), common garter snake (*Thamnophis sirtalis*) and western terrestrial garter snake (*Thamnophis elegans vagrans*) (Hammerson 1999). The 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 2012).



Beaver. Photo D. Malone



Northern Leopard Frog. Photo D. Culver

Stream and wetland ecosystems in Jefferson County provide important habitat for the meadow jumping mouse subspecies, *Zapus hudsonius preblei*. Extensive human



Preble's meadow jumping mouse. Photo R. Schorr

development along the eastern plains-foothills interface of Colorado and Wyoming has resulted in the loss and degradation of the mouse's habitat. Subsequent declines in population of the mouse, resulted in the listing of the Preble's meadow jumping mouse as threatened under the endangered species act (U. S. Department of the Interior 1998). Good quality habitat for the mouse consists of multi-layered vertical structure such as shrubs and grasses and high floral species richness (Trainor 2007). In Jefferson County, suitable habitat consists of riparian shrub communities of predominantly willow (*Salix* spp.) with a

lush understory of native mixed grassland. In Jefferson County, the Preble's meadow jumping mouse has been reported from Coal Creek, Elk Creek, Kennedy Gulch, Ralston Creek, Rock Creek, Sixmile Creek, Walnut Creek, and Woman Creek.

Stream and wetland ecosystems in Jefferson County also provide important habitat for a variety of native and introduced fish species. Native fish still present in the County include creek chub (*Semotilus atromaculatus*), fathead minnow (*Pimephales promelas*), Iowa darter (*Etheostoma exile*), longnose dace (*Rhinichthys cataractae*), longnose sucker (*Catostomus catostomus*), plains killifish (*Fundulus kansae*), sand shiner (*Notropis stramineus*), and white sucker (*Catostomus commersoni*), which occupy the lakes, rivers, and streams of the County (Hanophy 2006, Woodling 1985). The greenback cutthroat trout (*Oncorhynchus clarki stomias*) historically occurred in Jefferson County, but is now extirpated and is presently found in only a few headwater streams in the Arkansas and South Platte River drainages (Young 2009). Native trout, are adapted to cold, clear, well-oxygenated water that supply an abundance of their macroinvertebrate food resource (Coleman 2007). Numerous fish species have been introduced to Colorado streams and are now ubiquitously distributed throughout appropriate habitat including Jefferson County and include brown (*Salmo trutta*), rainbow (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*).

Although the Southern Rocky Mountains currently has a variety of native mammals, the distribution, abundance and diversity of native populations has changed over the last few decades, probably as a result of human influence (Armstrong et al. 2011). 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. 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 bighorn 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). Of these mammals, the mountain lion, black bear, elk, mule deer, and bighorn sheep still occur in Jefferson County (Armstrong et al. 2011). There is a reintroduced and highly managed herd of bison at Denver's Genesee Park near Genesee.

CONSERVATION ASSESSMENT

Potential Impacts to Biological Diversity in Jefferson County

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

Development

Residential development is increasing in Jefferson County, especially along Interstate 70, Highway 285, Highway 93 and Highway 6 corridors and in the foothills. In addition, construction of the proposed Northwest Corridor/Beltway between Bloomfield and Golden crosses undeveloped land within Jefferson County and could stimulate commercial and residential development along its pathway. The County’s population is projected to increase by 1% per year over the next 20 years, reaching over 900,000 people by 2030 (Jefferson County 2012). This projected growth will require a corresponding increase in development leading to a number of environmental stresses, including habitat loss and ecosystem fragmentation, introduction and proliferation of non-native species, reduced diversity of native species, increased runoff of stormwater, fire suppression, and predation and disturbance from domestic animals (dogs and cats) (Oxley et al. 1974, Johnson 2001, Lepczyk et al. 2004, Alberti 2005). Increasing human density in an area can lead to a change in the composition of wildlife populations (e.g., numbers of foxes and coyotes may increase, or number of bird species present may decrease), and may also alter movement patterns and behavior of wildlife. In Seattle, urban sprawl resulted in reduced plant, bird and small mammal diversity and in Boulder, Colorado small mammal populations declined as a result of development (Hansen et al. 2005). These results are particularly alarming because the loss of habitat to development is considered irreversible. Development also impacts riparian ecosystems and in the mountains of the West, it is the most common stressor of stream ecosystems. Structurally complex, multi-layered vegetation corridors along streams buffer stream systems against sources of stress such as buildings, roads, mining, livestock, and agriculture. Greater than 70 percent of the streams in the West are located in the mountains and 31 percent of mountain streams in the Southern Rocky Mountains have riparian habitat characterized as “most disturbed” (USEPA 2010).

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. In addition, the timing of runoff is projected to shift earlier in the spring, a shift that will reduce late-summer stream flows. These changes are projected to occur regardless of changes in precipitation.

Recreation

Recreation, once very local and perhaps even unnoticeable, is increasing and becoming a threat to natural ecosystems in Jefferson 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 including hiking, 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 (Colorado DNR 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 the zone of influence being approximating 250 feet (75 meters). Mountain lakes and riparian zones are routes and destinations for many established trails. Thus, impacts to native vegetation (mainly trampling) in these areas can be high.

Fragmentation and Edge Effects

Edges are simply the outer boundary of an ecosystem that abruptly grades into another type of habitat, 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).

Roads

There is a complex, dense network of roads in many parts of Jefferson County due primarily to historical mining activities, agricultural uses, and urban and residential development. Expansion of the existing road network will detrimentally affect the biodiversity of the region. Roads are associated with a wide variety of impacts to natural

communities, including invasion by non-native plant species, increased depredation and parasitism of bird nests, increased impacts of pets, fragmentation of habitats, erosion, pollution, and road mortality (Beier and Noss 1998). Roads function as conduits, barriers, habitats, sources, and sinks for some species and populations of species (Forman 1995). Road networks crossing landscapes can increase erosion and alter local hydrological regimes. Runoff from roads may impact local vegetation *via* contribution of heavy metals and sediments. Road networks interrupt horizontal ecological flows, alter landscape spatial patterns, and therefore inhibit important interior species (Forman and Alexander 1998). Effects on wildlife can be attributed to road avoidance and mortality due to vehicular collisions (roadkill). Traffic noise appears to be the most important variable in road avoidance, although visual disturbance, pollutants, and predators moving along a road are alternative hypotheses as to the cause of avoidance (Forman and Alexander 1998). Songbirds appear to be sensitive to remarkably low noise levels, even to noise levels similar to that of a library reading room (Reijnen et al. 1995).

Non-native Species

Invasion of non-native and aggressive species, and their replacement of native species, is one a threat to Jefferson County's natural diversity. 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. 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 native fish genetic stock (James 1993; D'Antonio and Vitousek 1992).

Although complete eradication of non-native aggressive species is not possible, control efforts can pay off. For non-native invasive plant species, one important guideline is that "ecological voids do not exist" (Young 1981). When a plant is removed, something will take its place. Consequently, killing aggressive non-natives requires an existing seed source of desirable native replacements, otherwise more unwanted species, perhaps even more noxious than those removed will replace them. If seeds of native replacements are not naturally available, then reseeding with desirable natives is usually necessary. When seeding, it is important to consider seedbed characteristics including rock cover and the soil's potential 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. More detailed information is available at:

<http://parks.state.co.us/SiteCollectionImages/parks/Programs/CNAP/CNAPPublications/RevegetationGuide/revegetation.pdf>

Wildfire Impacts

A substantial portion of southeastern Jefferson County was burned in the Hayman Fire of 2002 (Figure 11). Most of the area burned in Jefferson County was subject to high severity fire. Ignited during an extremely dry year that followed several below average years of precipitation, this fire occurred under extreme fire conditions, where abundant and continuously spread 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 a potential threat 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 (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, 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.

The Hayman Fire burned approximately 40% of the federally threatened Pawnee montane skipper's (*Hesperia leonardus montana*) suitable habitat. Monitoring over the past decade has shown that these burned areas are marginal habitat for the butterfly (Sovell 2011). Consequently, conservation of the remaining tracts of ponderosa pine forest in Jefferson County that lie within the mapped distribution of the butterfly is critical to the long-term viability of the species (Sovell 2011).



Hayman burn site near Wigwam Creek in Southern Jefferson County: Photo: Pam Smith

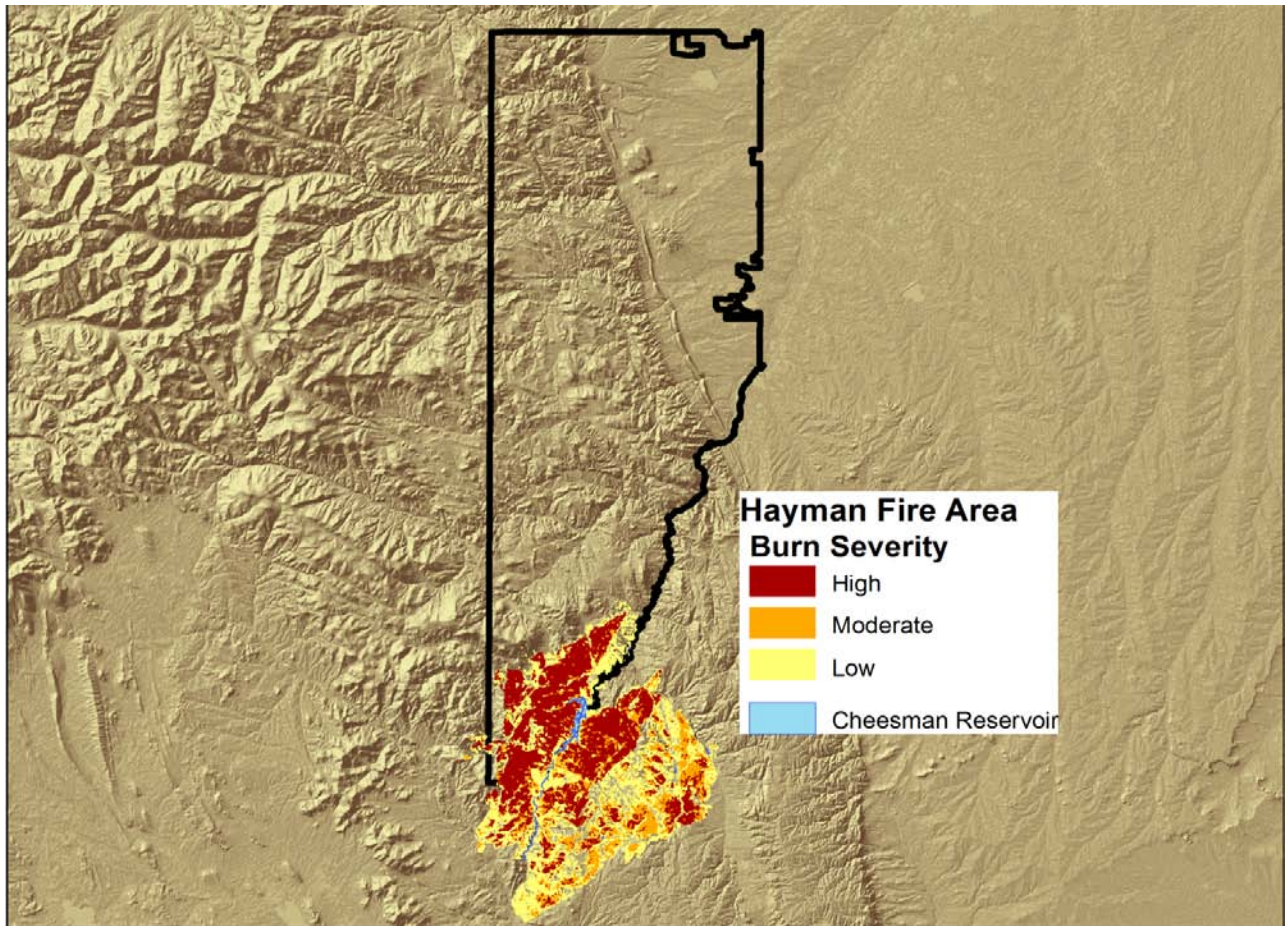


Figure 11. Extent and severity of 2002 Hayman Fire in Jefferson County.

Mineral Extraction Impacts

Mining brought economic benefits to Jefferson County, but it also impacted terrestrial and aquatic ecosystems through the production of toxic acid or alkaline drainage, and by resulting in erosion and sedimentation of aquatic systems (Windell 1992). Mine tailings dumped in or near wetland or riparian areas can alter stream hydrology by changing surface flows and sediment fluxes (Chimner et al 2007). Placer mining, which was common in Jefferson County, was dominated by sluicing, hydraulic mining, booming and dredging which resulted in large tracts of gravel waste in areas that were once riparian benches and streams. The presence of this gravel waste lying along stream sides dramatically alters the physical nature of the stream and riparian habitat (Rueth et al. 2002). Mine drainage has been the most serious long-term consequence of hardrock mining. In Colorado, hardrock mining has left Colorado with 1,616 river miles polluted by mine drainage (Rueth et al. 2002) and 9,100 contaminated wetlands and lakes (Gellhorn 2002). Due to the rich mineralization of the region, Jefferson County was heavily mined and now contains large numbers of abandoned mines. In the steep mountain canyons of Jefferson County there are approximately 148 inactive mines (Colorado DRMS 2012). Field observations by CNHP biologists in Jefferson County documented numerous stream and riparian habitats that continue to be impacted by historic placer mining, mine tailings, waste piles, and mine drainage. Physical habitat along the hogbacks outside of Golden has been greatly altered by

historical and present clay mining operations and water quality in Ralston Creek has been degraded by leaching of uranium-laden water from the inactive Schwartzwalder Mine, prompting the State to order the owner, the Cotter Corporation, to remove or contain all groundwater and surface water pollutants at the site.

Livestock Grazing

Domestic livestock grazing has been a traditional livelihood in Jefferson 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 Jefferson County are found within 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, reduce streamside canopy and instream cover, increase water temperatures, increase velocity and flood tendencies and diminish general riparian and wetland functions (Windell et al. 1986, Rueth et al. 2002). 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 gulying and introduction of non-native forage species).

Hydrological Modifications

River impoundment in the form of lakes, reservoirs, irrigation ditches, and canals can affect aquatic dependent plants and animals (Chien 1985, Friedman et al. 1998). Diversions and impoundments alter peak flows and subsequently the flooding necessary for many plants, including cottonwood trees, to reproduce, resulting in plant composition changes (Rood and Mahoney 1993). As plant composition changes, aquatic and terrestrial fauna can also change. In addition to impoundment, rivers are also altered by stream bank stabilization projects (e.g., channelization) (Rosgen 1996). Streams and rivers are dynamic, moving across the land creating point bars, terraces, oxbow reaches, and flood plains, where riparian woodland and shrubland form. By stabilizing and channelizing a waterway, the creation of these geomorphic settings is often eliminated and riparian plant communities are no longer able to regenerate or survive. In general, the cumulative effect from dams, reservoirs, and channelization is a gradual shift from diverse multi-aged riparian communities to mature single-aged canopies. Wetlands are also impacted by water use. Many historical wetlands, such as seeps and springs, have been lost or altered due to water "development" projects such as water diversions or impoundments. The number of species supported by a manmade pond with minimal edge habitat is generally less than the number supported by intact seep and spring wetland or naturally occurring pond.

Logging

Most logging operations require a network of roads. The impacts from roads can result in threats to biodiversity (see "Roads" for more detailed discussion). Other logging impacts include loss of wildlife habitat, habitat fragmentation, soil erosion, and lower water quality

for aquatic species. The U.S. Forest Service monitors logging closely; nonetheless, problems can still occur. The effect logging has on biodiversity have not been determined in Jefferson County.



Rock climbers along Clear Creek in Jefferson County: Photo by Pam Smith

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 Jefferson County* was conducted in several steps summarized below. Additionally, input from Jefferson County 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 Jefferson County. A variety of information sources were searched for plant and animal data. Collections were searched at Colorado State University, University of Colorado, University of Wyoming, Denver Botanical Garden, 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 Jefferson County

The information collected in the previous step was used to refine a list of potential species and natural plant communities. In general, species and plant communities that have been recorded from Jefferson County or from adjacent counties are included in this list. Over 217 rare species and significant plant communities were targeted in this survey (Appendices A-C). This target list included 83 plants, 58 animals, and 77 plant communities. 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 and imperiled species or significant plant communities (see Map 1). Previously documented locations of rare species as well as large areas of unfragmented land were targeted for survey efforts. Areas with potentially high natural values were selected using soil surveys, geology maps, vegetation surveys, aerial photos (color-infrared and natural color), land ownership information, personal recommendations from knowledgeable Open Space employees and local residents, and roadside surveys by field scientists. In addition, ten landowners were identified that had the largest holdings in Jefferson County. They were each contacted to request access to their properties for conducting surveys. Sites chosen for surveys 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.

The condition of shrublands is especially difficult to discern from aerial photographs, and a quick survey from roadsides 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 survey efforts. For animals, species with ranks of G1-G4 or that are rare in the State (S1-S2) were the primary targets. Although species with lower Natural Heritage Program ranks were not the main focus of survey efforts, many of these species occupy similar habitats as the targeted species, and were searched for and documented if encountered.

Contact Landowners

Obtaining permission to conduct surveys on private property was essential to this project. Once survey sites were chosen, land ownership of these areas was determined using GIS land ownership coverage obtained from the Jefferson County assessor's online database, ASPIN. 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 or as landowners allowed. 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.

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. In some cases 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:

3) Animal data collection

- Amphibians: visual observation, vocal surveys and capture using aquatic dip nets (Hammerson 1999)
- Birds: visual observation or identification by song or call (Andrews and Righter 1992, Kingery 1998, National Geographic Society 2006)
- Invertebrates: sweep netting (Scott 1986, Dunkle 2000, Opler et al. 2009)
- Mammals: visual observation, pit fall trapping and Sherman live trapping and (Armstrong et al. 2011)



Field survey data collection. Photo by Rebecca Gourney.

4) 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 Vegetation Classification (Anderson et al. 1998; Comer et al. 2003) and the Comprehensive Statewide Wetlands Classification (Carsey et al. 2003). Plant synonyms follow Kartesz (1999) and Weber and Wittmann (2001).
- Vegetation data for each major plant association in the wetlands were collected using visual ocular estimates of species cover in a representative portion of the plant association.
- Soil descriptions follow USDA NRCS for Golden Area (Price 1984) and Pike National Forest (Moore 1992).
- UTM coordinates and elevation from Garmin GPSMap60Cx and Reference photos of the site.
- Current and historic land use (e.g., grazing, logging, recreational use) when apparent.
- Notes on geology and geomorphology.
- Indicators of disturbance such as logging, grazing, flooding, etc.



Field survey data collection. Photo by Ellen Heath.

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. A number of private landowners were not willing to allow access to their properties.

National Wetland Inventory (NWI) Mapping Methodology

Photo-interpretation of the entire study area was completed by the NWI program in the early 1980s following a standardized classification and mapping methodology (Cowardin et al. 1979). However, these original maps were made on transparent Mylar sheets for transfer to paper and were not available in a digital, geo-rectified format. Using a process developed at CNHP, digital scans of the original NWI maps were converted into geo-rectified polygonal data.

Each polygon was attributed with the original NWI code and all polygons were checked for invalid codes and minimum size requirements. Where coding standards have changed over the years, newer valid codes were applied. In some limited cases, where distortion of the scanned image had clearly shifted the original polygons from their intended spatial location, polygons were moved to reflect the true location of wetlands. However, the purpose of converting the original NWI data was not to update or correct the photo-interpretation, but to efficiently convert a large amount of hardcopy data to a digital format.

To ensure accuracy in coding, an automated procedure checked the data layer for invalid wetland codes, size limitations and topological errors. Each error flagged was identified and carefully examined to be accurately repaired.

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 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.

<p>Federal Status:</p> <p>1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993) and (61 Federal Register 7598, 1996)</p> <p>LE Listed Endangered: defined as a species, subspecies, or variety in danger of extinction throughout all or a significant portion of its range.</p> <p>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> <p>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).</p> <p>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.</p> <p>PDL Proposed for delisting.</p> <p>XN Nonessential experimental population.</p> <p>2. U.S. Forest Service (Forest Service Manual 2670.5) (noted by the Forest Service as "S")</p> <p>FS Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by:</p> <p style="padding-left: 40px;">Significant current or predicted downward trends in population numbers or density.</p> <p style="padding-left: 40px;">Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.</p> <p>3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as "S")</p> <p>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.</p> <p>4. State Status:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	
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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 (irreplaceable): only known occurrence of an element A-ranked occurrence of a G1 element (or at least C-ranked if best known 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 occurs. 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.



Biologists netting butterflies in Jefferson County. Photo: Pam Smith.

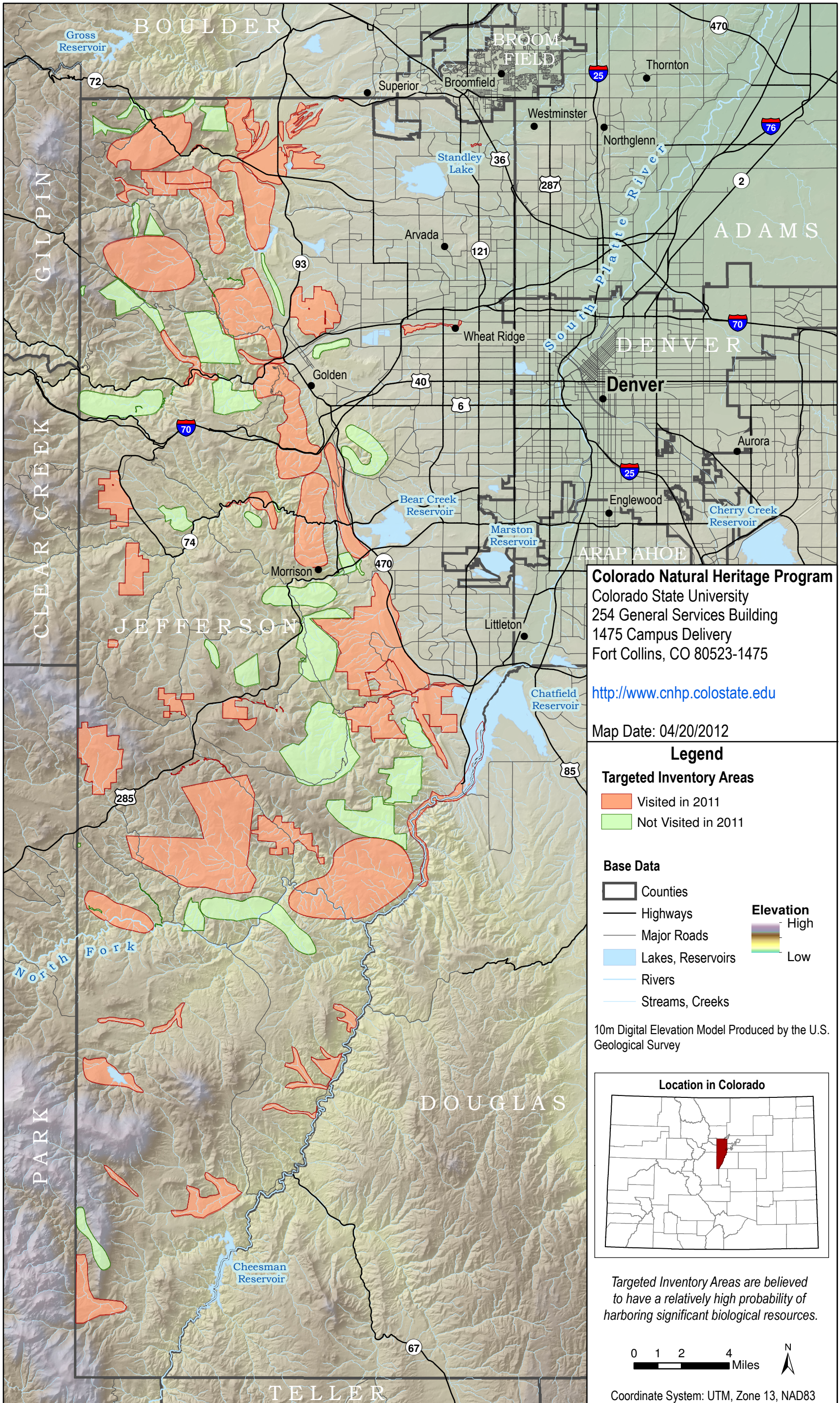
RESULTS

Targeted Inventory Areas

Results of the 2010/2011 survey of Jefferson County indicate that there are many areas with outstanding to very high biological significance. Pre-field season, 92 wetland and upland Targeted Inventory Areas (TIAs) were identified within Jefferson County (Map 1). TIAs were selected that potentially had intact natural processes, native species composition, and vegetation structures indicative of healthy systems. Fifty-two TIAs (57%) were visited during two field seasons (May to September of 2010/2011). Twenty-two of the 92 TIAs included large (>200 acres) and unfragmented lands totaling 29,439 acres. Twenty-one landowners were contacted to seek permission for CNHP biologists to access and survey their property. Five landowners whose lands included 3,894 acres granted access to their properties for surveying purposes.



Large unfragmented landscape along the Front Range in Jefferson County. Photo: Pam Smith



Map 1. CNHP Targeted Inventory Areas in Jefferson County.

As a result of the 2010/2011 survey of Jefferson County, element occurrence records now exist for one amphibian, seven birds, four insects, two mammals, 29 natural communities, 35 rare or imperiled plants and one rare fungus (Table 8). All of these elements are associated with PCAs in Jefferson County and were incorporated in CNHPs Biodiversity Tracking and Conservation Data System (BIOTICS). Element occurrence records that existed previous to this survey included 8 rare animals, 10 rare plants and 16 rare plant communities.

A biological survey was conducted previously for Jefferson County in 1993 and researchers have added new information which has been archived in BIOTICS. During the course of this project some of the previously documented records were merged, deleted and reclassified to reflect current data standards (NatureServe 2012). There were 48 new plant element occurrence records documented during the 2010/2011 survey and an additional 21 plant records were updated. There were 17 new plant association records processed and 16 more existing records were updated. Twenty-two new zoology element occurrence records were processed and eight records were updated (Table 8).

In the entire State of Colorado 30 plant species have the most imperiled status rank of G1, and are considered as globally critically imperiled. In Jefferson County, there were three G1 ranked plant species (which includes T1), three G2 (globally impaired), and six G3 (globally vulnerable) ranked species documented in 2010/ 2011(see Methodology Section, Table 2 for Global Rank descriptions). For the State of Colorado there are 18 animal elements that are ranked as G1(T1). There is one G1 (T1) ranked species in Jefferson County, a butterfly, the Pawnee Montane Skipper (*Hesperia leonardus montana*). The Prebles' Meadow Jumping Mouse (*Zapus hudsonius preblei*) is a T2 (=G2 for subspecies) ranked mammal species. Both the butterfly and the jumping mouse are federally listed threatened species. State rare (S1 and S2) species documented in Jefferson County include 5 animals, 10 plant communities (which are also globally imperiled), and 24 plant species.



American lady's slipper orchid, a state rare plant in Jefferson County, CO. Photo: Pam Smith

Table 8. Significant Species and Plant Communities Documented from Jefferson County

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive	Last Observation Date
Amphibians							
<i>Lithobates pipiens</i>	Northern Leopard Frog	G5	S3		BLM/FS	SC	2000
Birds							
<i>Accipiter gentilis</i>	Northern Goshawk	G5	S3B		BLM/FS		2010
<i>Falco mexicanus</i>	Prairie Falcon	G5	S4B, S4N				
<i>Falco peregrines anatum</i>	American Peregrine Falcon	G4T4	S2B		FS	SC	2010
<i>Glaucidium gnoma</i>	Northern Pygmy Owl	G5	S3B				2011
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S1B, S3N		BLM/FS	ST	2011
<i>Melanerpes lewis</i>	Lewis's Woodpecker	G5	S2B		FS		2011
<i>Seiurus aurocapilla</i>	Ovenbird	G4	S3B, S4N				2010
Insects							
<i>Atrytone arogos</i>	Arogos Skipper	G3	S2				2010
<i>Celastrina humulus</i>	Hops Azure	G2G3	S2				2011
<i>Hesperia leonardus montana</i>	Pawnee Montane Skipper	G4T1	S1	LT			2011
<i>Hesperia ottoe</i>	Ottoe Skipper	G3G4	S2		USFS		2010
Mammals							
<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	G4	S3		BLM/FS	SC	2011
<i>Zapus hudsonius preblei</i>	Meadow Jumping Mouse Subspecies	G5T2	S1	LT		ST	2011
Plant Communities							
<i>Alnus incana</i> / Mesic Forb Shrubland	Thinleaf Alder / Mesic Forb Riparian Mixed Foothills Shrubland	G3	S3				1996

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive	Last Observation Date
<i>Andropogon gerardii</i> - <i>Schizachyrium scoparium</i> Western Great Plains Herbaceous Vegetation	Big Bluestem – Little Bluestem Xeric Tallgrass Prairie	G2?	S2				2011
<i>Andropogon gerardii</i> – <i>Sporobolus heterolepis</i> Western Foothills Herbaceous Vegetation	Big Bluestem – Prairie Dropseed Xeric Tallgrass Prairie	G2	S1				2011
<i>Calamagrostis canadensis</i> Western Herbaceous Vegetation	Bluejoint Reedgrass Montane Wet Meadow	G4	S4				2011
<i>Carex nebrascensis</i> Herbaceous Vegetation	Nebraska Sedge Wet Meadow	G4	S3				2011
<i>Cercocarpus montanus</i> / <i>Hesperostipa comata</i> Shrubland	Mountain mahogany/ Needle-and-Thread Grass Mixed Foothill Shrubland	G2	S2				2011
<i>Danthonia parryi</i> Herbaceous Vegetation	Parry's Oatgrass Montane Grassland	G3	S3				2011
<i>Hesperostipa comata</i> Colorado Front Range Herbaceous Vegetation	Needle-and-Thread Mixed Grass Prairie	G1G2	S1S2				2011
<i>Juniperus scopulorum</i> / <i>Cercocarpus montanus</i> Woodland	Rocky Mountain Juniper / Mountain-mahogany Foothills Woodland/ Scarp Woodland	G2	S2				2011
<i>Picea pungens</i> / <i>Alnus incana</i> Woodland	Blue Spruce /Thinleaf Alder Montane Riparian Forest	G3	S3				2011
<i>Picea pungens</i> / <i>Betula occidentalis</i> Woodland	Blue Spruce / Birch Montane Riparian Woodland	G2	S2				2011

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive	Last Observation Date
<i>Pinus flexilis</i> / <i>Arctostaphylos uva-ursi</i> **	Limber Pine/Kinnikinnick Lower Montane Woodland	G4	S3				1992
<i>Pinus ponderosa</i> / <i>Alnus incana</i> Woodland	Ponderosa pine / Thinleaf Alder Woodland	G2	S2				1996
<i>Pinus ponderosa</i> / <i>Arctostaphylos uva-ursi</i>	Ponderosa Pine/Kinnikinnick Lower Montane Forest	G4	S3				1992
<i>Pinus ponderosa</i> / <i>Cercocarpus montanus</i> / <i>Andropogon gerardii</i>	Foothills Ponderosa Pine Scrub Woodlands	G2	S2?				1992
<i>Pinus ponderosa</i> / <i>Cercocarpus montanus</i>	Foothills Ponderosa Pine Scrub Woodlands	G4	S4				1992
<i>Pinus ponderosa</i> / <i>Leucopoa kingii</i>	Foothills Ponderosa Pine Savannas	G3	S3				1992
<i>Pinus ponderosa</i> / <i>Muhlenbergia montana</i>	Foothills Ponderosa Pine Savannas	G4G5	S2S3				1992
<i>Pinus ponderosa</i> / <i>Quercus gambelii</i>	Foothills Ponderosa Pine Scrub Woodlands	G5	S4				1992
<i>Populus angustifolia</i> / <i>Alnus incana</i> Woodland	Narrowleaf Cottonwood/ Thinleaf Alder Montane Riparian Forest	G3	S3				2011
<i>Populus angustifolia</i> - <i>Pseudotsuga menziesii</i> Woodland*	Narrowleaf Cottonwood – Douglas Fir Montane Riparian Forest	G3	S2				2011
<i>Populus angustifolia</i> / <i>Salix drummondiana</i> - <i>Acer glabrum</i> Woodland*	Narrowleaf Cottonwood / Drummond Willow – Rocky	G2?	S1				2011

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive	Last Observation Date
	Mountain Maple						
<i>Populus tremuloides</i> / <i>Corylus cornuta</i> Forest*	Quaking Aspen / Beaked Hazelnut Montane Riparian Forest	G3	S1				2011
<i>Pseudotsuga menziesii</i> / <i>Betula occidentalis</i> Woodland	Douglas Fir / Water Birch Montane Riparian Forest	G3?	S3				2011
<i>Pseudotsuga menziesii</i> / <i>Carex geyeri</i> Forest	Douglas Fir / Geyer's Sedge Lower Montane Forest	G4?	S3				2011
<i>Pseudotsuga menziesii</i> / <i>Jamesia americana</i>	Douglas Fir/ Waxflower Lower Montane Forests	G3G4	S3				1992
<i>Salix monticola</i> / <i>Calamagrostis canadensis</i> Shrubland	Rocky Mountain Willow / Bluejoint Reedgrass Montane Willow Carr	G3	S3				2011
<i>Salix monticola</i> / <i>Carex utriculata</i> Shrubland	Rocky Mountain Willow / Beaked Sedge Montane Riparian Willow Carr	G3	S3				2011
<i>Salix monticola</i> /Mesic Forbs Shrubland	Rocky Mountain Willow Montane Riparian Willow Carr	G4	S3				1996
Plants							
<i>Agastache foeniculum</i>	Lavender hyssop	G4G5	S1				1878
<i>Amorpha nana</i>	Dwarf wild indigo	G5	S2S3				2011
<i>Aquilegia chrysantha</i> var. <i>rydbergii</i> *	Golden columbine	G4T1Q	S1		BLM/FS		2011
<i>Aquilegia saximontana</i>	Rocky Mountain columbine	G3	S3				2011
<i>Aristida basiramea</i>	Forked three-	G5	S1				2010

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive	Last Observation Date
	awn grass						
<i>Astragalus sparsiflorus</i>	Front Range milkvetch	G2	S2				2010
<i>Carex conoidea</i> **	Openfield sedge	G5	S1				2011
<i>Carex peckii</i> *	Peck's sedge	G4G5	S1				2011
<i>Carex saximontana</i>	Rocky Mountain sedge	G5	S1				2011
<i>Carex sprengelii</i>	Longbeak sedge	G5?	S2S3				2011
<i>Carex torreyi</i>	Torrey's sedge	G4	S1				2011
<i>Claytonia rubra</i>	Redstem spring beauty	G5	S1				2010
<i>Crataegus chrysocarpa</i>	Yellow hawthorn	G5	S1				2011
<i>Cypripedium calceolus ssp. parviflorum</i>	American yellow lady's-slipper	G5	S2		FS		2011
<i>Geranium bicknellii</i>	Bicknell's northern crane's-bill	G5	S2				2010
<i>Heuchera hallii</i>	Front Range alum-root	G3	S3				2011
<i>Hippochaete variegata</i>	Variegated horsetail	G5	S1				2011
<i>Juncus vaseyi</i> *	Vasey's rush	G5?	S1				2011
<i>Lilium philadelphicum</i>	Wood lily	G5T5	S3/S4				2011
<i>Malaxis monophyllos ssp. brachypoda</i>	White adder's-mouth	G4Q	S1		FS		2011
<i>Mimulus gemmiparus</i>	Weber's monkeyflower	G1	S1				2011
<i>Nuttallia speciosa</i>	Jeweled blazingstar	G3	S3				2011
<i>Oenothera coloradensis ssp. coloradensis</i>	Colorado butterfly plant	G3T2	S1	LT			2011
<i>Phacelia denticulata</i> *	Rocky Mountain phacelia	G3	SU				2011
<i>Physaria vitulifera</i>	Rydberg twinpod	G3	S3				2011
<i>Physaria</i> x 1**	Twinpod	G1Q	S1				2010

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive	Last Observation Date
<i>Polypodium saximontanum</i>	Rocky Mountain polypody	G3?	S3?				2011
<i>Potentilla ambigens</i>	Southern Rocky Mountain cinquefoil	G3	S1S2				2010
<i>Ribes americanum</i>	American current	G5	S2				1910
<i>Selaginella weatherbiana</i>	Weatherby's spikemoss	G3G4	S3S4				2011
<i>Sisyrinchium demissum</i>	Blue-eyed grass	G5	S2				1994
<i>Smilax lasioneura</i>	Carrion-flower	G5	S3S4				2011
<i>Spiranthes diluvialis</i>	Ute lady's-tresses	G2G3	S2	LT			2011
<i>Telesonix jamesii</i>	James's false saxifrage	G2	S2				2011
<i>Viola pedatifida</i>	Prairie violet	G5	S2				2010
Fungi							
<i>Mycenastrum corium</i> ssp. <i>ferrugineum</i> **	Earthstar	G1	S1				1998

*County Record **State Record

Fauna

Birds

Three bird species documented in Jefferson County that are rare in Colorado, but common elsewhere include the American Peregrine Falcon (*Falco peregrines anatum*), Bald Eagle (*Haliaeetus leucocephalus*), and Ovenbird (*Seiurus aurocapilla*). The American Peregrine Falcon nests in rocky cliffs found at Cathedral Spires and Ralston Buttes; nest sites are located within the Cathedral Spires and White Ranch Hogbacks PCAs. The Bald Eagle prefers open water and riparian forests with large trees for nesting and a pair have consistently nested at Standley Lake since the early 1990s. The Ovenbird is extremely rare in Colorado and occurs only along the front of the Rocky Mountain Range within the State. In Jefferson County there is a nesting Ovenbird population that occupies the foothills within the Mount Lindo to Plymouth Mountain site. This is the only place within Colorado where breeding of Ovenbirds has been verified, but it is suspected to breed at six other locations along the Front Range (Kingery 1998). The Mount Lindo to Plymouth Mountain PCA may represent the best breeding habitat for this species in Colorado and should be considered for conservation action by Jefferson County Open Space.



Ovenbird singing in riparian woodland in Larimer County foothills. Photo: David Leatherman 2012.

Small Mammals

Four small mammal species were targeted, the meadow jumping mouse subspecies (*Zapus hudsonius preblei*), black-tailed prairie dog (*Cynomys ludovicianus*), dwarf shrew (*Sorex nanus*), and Preble's shrew (*Sorex preblei*). The federally threatened subspecies *Zapus hudsonius preblei* is found along four stream systems in the County. This effort documented a new occurrence along the middle portion of Ralston Creek near Blue Mountain. *Zapus hudsonius preblei* is represented in three Jefferson County PCAs, the Rocky Flats, South Platte River, and Middle Ralston Creek sites. A number of new black-tailed prairie dog occurrences were documented during the 2010 and 2011 surveys including occurrences submitted by Jefferson County Open Space biologists. There are large populations of prairie dogs in the east portion of Jefferson County that include eight separate complexes. The more viable populations are represented within the Rocky Flats and Hildebrand Potential Conservation Area sites and the remaining complexes occur adjacent to urban development. Large complexes of prairie dogs are also present within the area of Standley Lake and an area on the north side of North Table Mountain. These two complexes occur on undeveloped land interspersed within urban residential development; these sites should be included in any future conservation actions directed at black-tailed prairie dogs even though they are in a matrix of urban development. Trapping was not conducted for the two shrew species.



Habitat for the Preble's meadow jumping mouse along Ralston Creek. Photo: John Sovell.

Amphibians and Reptiles

Northern leopard frogs (*Lithobates pipiens*) were once found throughout Jefferson County, but their status may be threatened by the non-native bullfrogs (*Lithobates catesbeiana*) that also occur in Jefferson County (Hammerson 1999). Prior surveys have documented six populations of the northern leopard frog in Jefferson County. Two of these populations, at Ranson/Edwards Homestead Ranch Open Space and Hildebrand Park, were visited during this survey, but no frogs were observed. The western toad (*Anaxyrus boreas*), previously known as the boreal toad (*Bufo boreas*), was once common in many parts of Colorado. However, this amphibian has been steadily declining for the past twenty years (Hammerson 1999; Jackson 2005). Currently, there are 71 breeding sites known in Colorado that comprise 38 separate populations (Boreal Toad Recovery Team 2006). However, only two of these populations are considered viable. There are no breeding populations of the western toad currently known from Jefferson County (Hammerson 1999). Jefferson County is at the eastern edge of its historical range and there is potential for the toad to have occupied the County in the past.

Three rare reptiles tracked by CNHP with potential to occur in the County include the many-lined skink (*Eumeces multivirgatus multivirgatus*), short-horned lizard (*Phrynosoma hernandesi*), and lined snake (*Tropidoclonion lineatum*). All three were survey targets, but

were not found during the 2010 and 2011 survey. A common reptile often encountered during survey work was the plateau lizard (*Sceloporus undulates*), which inhabits rocky habitats including cliffs, talus, canyons, and hogbacks.



A plateau lizard at Jefferson County Deer Creek Open Space. Photo: Pam Smith

Butterflies

Numerous rare butterflies have been identified within Jefferson County. There is a large area of suitable habitat present within the County that can support populations of these rare species both within lower elevation piedmont grasslands, mid-elevation ponderosa pine woodland, and at high elevation ponderosa pine and fir mixed conifer forests. BIOTICS contains 25 records of rare butterflies in Jefferson County that occur in both tallgrass prairie and forested areas. Zoologists and ecologists surveyed approximately ten days for 14 rare or imperiled butterfly species. Suitable habitat, in good condition, was found for all 14 species, however, only three species were documented, the Arogos skipper (*Atrytone arogos*) hops feeding azure (*Celastrina humulus*), and Pawnee montane skipper (*Hesperia montana*). Deadman Gulch, Ken Caryl Hogbacks Complex, Mount Falcon Red Rocks, Rocky Flats, Deer Creek and South Platte River Valley sites are all important areas for rare butterflies in Jefferson County and should be focal areas for butterfly conservation in the County.



A hops feeding azure butterfly on American hops vine. Photo: John Sovell.

Flora

Globally Rare Species

Jefferson County hosts an array of rare and uncommon plant species and plant communities. The diverse topography and the fact that a significant amount of land has been protected from destructive types of development have likely contributed to the biodiversity of the County. Some of the rarest species in Jefferson County are also considered to be globally rare (G1-G2). Three globally critically imperiled species found in Jefferson County during the 2010/2011 survey include the rocky Mountain monkey flower (*Mimulus gemmiparis*), twinpod (*Physaria* x1) and the golden columbine (*Aquilegia chrysantha* var. *rydbergii*).

Mimulus gemmiparis had previously been documented before the 2010/2011 survey; the populations were re-surveyed and updated in 2011. This species is a Colorado endemic occurring from 8,400 to 11,120 feet along both sides of the Front Range of Colorado. *Mimulus gemmiparis* is a unique annual species because it reproduces predominantly with asexual buds. This species most often grows in moist, seep habitats on cliff ledges or under rocky overhangs. Currently, there are eight known occurrences of this species in the world (Beatty et al. 2003). Two of these populations are in Jefferson County on lands owned by

the Colorado State Parks and U.S. Forest Service. Both previously documented populations still contained healthy populations although the plant counts were lower than what has typically been recorded in the past most likely due to the especially dry season in 2011.

Physaria x1 is a newly described hybrid taxa currently only known only from Jefferson County; it is found on the limestone shales of Niobrara outcrops along the foothill hogbacks and is described in more detail below. The golden columbine population is a new discovery for the County. It occurs in protected seeps that are usually wet year round. Currently, it is only known from a total of 10 occurrences in four counties in Colorado. The occurrence discovered in 2011 in Jefferson County is currently the only known occurrence in the County.



Golden Columbine in Jefferson County, CO 2011. Photo: Pam Smith

Endemic Species

Colorado endemics are those taxa known to occur only within the confines of the State. Currently about 100 plant taxa are considered to be Colorado endemics (Hartman and Nelson 2008, CNHP 2012). Eight species of Colorado endemic species were documented in Jefferson County during the surveys in 2010/2011:

- Colorado gumweed (*Grindelia inornata*)

- Front Range alum-root (*Heuchera hallii*)
- Front Range milkvetch (*Astragalus sparsiflorus*)
- Rydberg twinpod (*Physaria vitulifera*)
- Rocky Mountain aletes (*Aletes anisatus*)
- Rocky Mountain columbine (*Aquilegia saximontana*)
- Rocky Mountain monkeyflower (*Mimulus gemmiparus*)
- Twinpod x1 (*Physaria* x1)

Jefferson County is also home to seven regional endemic plant species. Many of these plants are known from just a few other adjacent states. These include:

- Fendler's false cloak fern (*Argyrochosma fendleri*)
- Golden columbine (*Aquilegia chrysantha* var. *rydbergi*)
- Grassy slope sedge (*Carex oreocharis*)
- James' false saxifrage (*Telesonix jamesii*)
- Jeweled blazing star (*Nuttallia speciosa*)
- Rocky Mountain phacelia (*Phacelia denticulata*)
- Southern Rocky Mountain cinquefoil (*Potentilla ambigens*)
- Stemless Indian parsley (*Aletes acaulis*)

New Additions to State Tracking List

As a result of the survey, four new plants and one species of fungi were added to CNHP's fully tracked plant species list:

- 1) Bicknell's geranium (*Geranium bicknellii*) G5/S2. The CNHP database contains two records from Jefferson County; these were observed in the Deer Creek Canyon area in 2010/11. Only three specimens have been collected within the last 50 years in Colorado according to herbarium records from Colorado State University Herbarium (CSU), Rocky Mountain Herbarium (RM), Denver Botanic Gardens – Kathryn Kalmbach Herbarium (KHD) and University of Colorado Herbarium (COLO). Herbaria collections include a total of nine records in six Colorado counties. Several of the records note the small number of plants found indicating the plant is often found in small numbers. For this reason only photographs were taken for species confirmation. According to the USDA Plants database, this species is considered to be endangered or threatened in at least six other states. Germination is thought to be triggered by disturbance, exposure and warming of the soil; the seeds remain for decades in the seedbank. The plants are annual-biennial species and don't persist long. Perhaps this plant is more prevalent in some years and disappears until growing conditions are optimal.



Geranium bicknellii in flower and fruit in Jefferson County. Photos: Pam Smith.

- 2) Redstem spring beauty (*Claytonia rubra*) G5/S1 This plant is known from three counties in Colorado. Deer Creek Canyon and Ken-Caryl Ranch Open Space are currently the only two documented sites in the CNHP database for Jefferson County. This plant is a small, succulent annual species and is found in a variety of shady habitats including some disturbances near windthrows and trails. In Colorado this plant is found at springs in protected canyons and shaded forests of the Front Range. The few collections known in Colorado are from Boulder, Douglas and Jefferson Counties (Ackerfield 2011, Weber and Wittmann 2001).



Redstem spring beauty in Jefferson County: Photo by Pam Smith

- 3) Rydberg twinpod (*Physaria vitulifera*) G3S3 The distribution of *Physaria vitulifera* was re-evaluated by Jennings (2004). He was able to determine that a number of specimens identified in Wyoming previously as *Physaria vitulifera* were actually a different species (*Physaria acutifolia*). The results from his studies indicate that *Physaria vitulifera* is limited to the east slope of the Front Range in Colorado and is a

state endemic species. The northernmost population is in Boulder County and the southernmost is documented in the vicinity of Colorado Springs. It is typically found on metamorphic rocks or decayed granitic soils. It is very similar in appearance to the rare Bell's twinpod (*Physaria bellii*) but grows on metamorphic rock based soils whereas *Physaria bellii* is typically found on soils derived from sedimentary rocks including shale and sandstone.



Habitat of *Physaria vitulifera* in Jefferson County on decayed metamorphic granite. Photo by Pam Smith

- 4) *Physaria* x1 (*Physaria bellii* X *P. vitulifera*) (G1QS1) The newly identified hybrid species, *Physaria* x1, was genetically determined to be a cross between two rare plants that are both Colorado endemics, Rydberg twinpod (*Physaria vitulifera*) and Bell's twinpod (*Physaria bellii*) by Kothera et al. (2007). In the Natural Heritage Inventory conducted for Jefferson County in 1992-93 (Pague et al. 1993), two populations of plants were identified as Bell's twinpod (*Physaria bellii*). Several scientists who observed these populations all noted the plants at these sites appeared to be different than typical *Physaria bellii* and suggested they could be hybrid species. Genetic studies by Kothera (2007) confirmed that the two Jefferson County populations of plants were hybrids between *Physaria bellii* and *P. vitulifera*. The distributions of the hybrid, and the two parental species were also worked out by Kothera and Jennings (2004). Based on their data, the Natural Heritage Program was able to assess the new ranges of these twinpod species in Colorado. *Physaria bellii* is now only known from Larimer and Boulder Counties. Jefferson County has the only known populations of the hybrid

species in the world. The hybrid has not yet been formally named in the literature and is currently listed in the Natural Heritage Program database as *Physaria* x1.



Angular fruits of *Physaria* x1 from Jefferson County on the left and round fruits of *Physaria bellii* (Larimer County): Photos by Pam Smith

- 5) *Mycenastrum corium* ssp. *ferrugineum*. This new subspecies of an earthstar fungus was discovered in 1998 and described in the literature in 2005. The Wheat Ridge Greenbelt in Jefferson County is the only known location in the world for this taxon at this time. It is very distinctive because of its bright red spores. The more common subspecies have brown to olive spores. (Miller et al. 2005).

County Records

During this survey eight county records for plants were documented in Jefferson County and include: Rocky Mountain phacelia (*Phacelia denticulata*), twinpod (*Physaria* x1), golden columbine (*Aquilegia chrysantha* var. *rydbergii*), Peck sedge (*Carex peckii*), Vasey bulrush (*Juncus vaseyi*), dwarf red blackberry (*Cylactis pubescens*), and Colorado gumweed (*Grindelia inornata*). Torrey sedge (*Carex torreyi*) was last documented according to herbarium records in Jefferson County in 1906. A notation by Weber and Wittmann (2001) notes a Boulder collection from 1973 was the first one collected in the state since the Jefferson County specimen of 1906.



Torrey's sedge (*Carex torreyi*) along Coyote Creek, first documented occurrence in Jefferson County since 1906. Photo: Pam Smith

State Rare Plants

A total of twenty-one plants were found in Jefferson County that are considered to be State rare and imperiled plants that are ranked S1 or S2 that were documented in 2010/11 (note: this list includes a few species that are also globally imperiled). Thirteen species represent new element occurrence records for Jefferson County: *Aquilegia chrysantha* var. *rydbergii*, *Astragalus sparsiflorus*, *Carex conoidea*, *Carex peckii*, *Carex saximontana*, *C. torreyi*, *Carex spengelii*, *Claytonia rubra*, *Geranium bicknellii*, *Hippochaete variegata*, *Juncus vaseyi*, *Oenothera coloradensis* ssp. *coloradensis*, and *Physaria* x1. The remaining eight species are updated occurrences and include: *Amorpha nana*, *Aristida basiramea*, *Cypripedium calceolus* ssp. *parviflorum*, *Malaxis monophyllos* ssp. *brachypoda*, *Mimulus gemmiparus*, *Potentilla ambigens*, *Spiranthes diluvialis* and *Telesonix jamesii*. Of these plants, two are federally listed Threatened species: *Oenothera coloradensis* ssp. *coloradensis* and *Spiranthes diluvialis*.



Considered to be the rarest orchid in Colorado, the White Adder's Mouth Orchid (*Malaxis monophyllos* ssp. *brachypoda*) documented for the first time since 1989 in Jefferson County. Photo: Pam Smith 2011

There are two plants and one fungi that were documented that are State records. They are the only known locations in the State and they include: openfield sedge (*Carex conoidea*), twinpod (*Physaria* x1) and a new subspecies of an earthstar fungus (*Mycenastrum corium*

ssp. *ferrugineum*). Both the twinpod and the earthstar are new discoveries to science.

Uncommon Plant Species

Other uncommon plants that are not considered rare in the state but are infrequent to rare in Jefferson County that were observed during the 2010/11 survey include:

- 1) Purple oat grass (*Schizachne purpurascens*). There is only one specimen listed for this species in Jefferson County at six local herbaria.
- 2) Cottongrass (*Eriophorum angustifolium*). There is currently only one location known for this plant in Jefferson County (Meyer Ranch).
- 3) Red wind flower (*Anemone multifida*). Only two herbarium specimens for Jefferson County were located with the most recent specimen from 1916. A specimen was photographed at Beaver Ranch at Conifer Community Park in 2011.
- 4) Utah sweetvetch (*Hedysarum boreale* subsp. *boreale*). So far this species is only documented from four herbarium records and all of them are from the same location near Chatfield in Jefferson County.



Red wind flower growing along a trail in Jefferson County. Photo: Pam Smith

Historic (H Ranked) Plant Species

There are three rare plant records for Jefferson County that have not been observed in at least 20 years: blue-eyed grass (*Sisyrinchium demissum*), lavender hyssop (*Agastache foeniculum*) and American current (*Ribes americanum*). Attempts to locate these species in 2010/11 based on location records were not successful.

Rare Plant Communities

There are seven globally rare (G1 and G2) plant communities in Jefferson County that were documented/updated in 2010/11:

- Big Bluestem/Little Bluestem Xeric Tallgrass Prairie
- Big bluestem/Prairie Dropseed Xeric Tallgrass Prairie
- Needle-and-Thread Grass Mixed Foothill Shrubland
- Rocky Mountain Juniper/Mountain Mahogany Foothills Woodland/Scarp Woodland
- Blue Spruce/Water Birch Montane Riparian Woodland

- Narrowleaf Cottonwood/Drummond's Willow-Rocky Mountain Maple Woodland
- Ponderosa Pine/Mountain Mahogany/Big Bluestem Woodland



CNHP and Jefferson County crews at the edge of a Narrowleaf Cottonwood/Drummond's Willow-Rocky Mountain Maple Woodland plant community along Ralston Creek in Jefferson County, CO. Photo: Susan Panjabi.

One state rare (G4/S2?) plant community, the Limber Pine/Kinnikinnik (*Pinus flexilis*/*Arctostaphylos uva-ursi*) Woodland was observed in 1992 on private land. Permission was not granted to re-visit this site for the 2010/11 survey. Currently, this is the only occurrence in the County of this plant community, and it is one of only two in the entire State of Colorado. The habitat appears to be intact on more recent air photographs of the area.

Non-native Plant Species

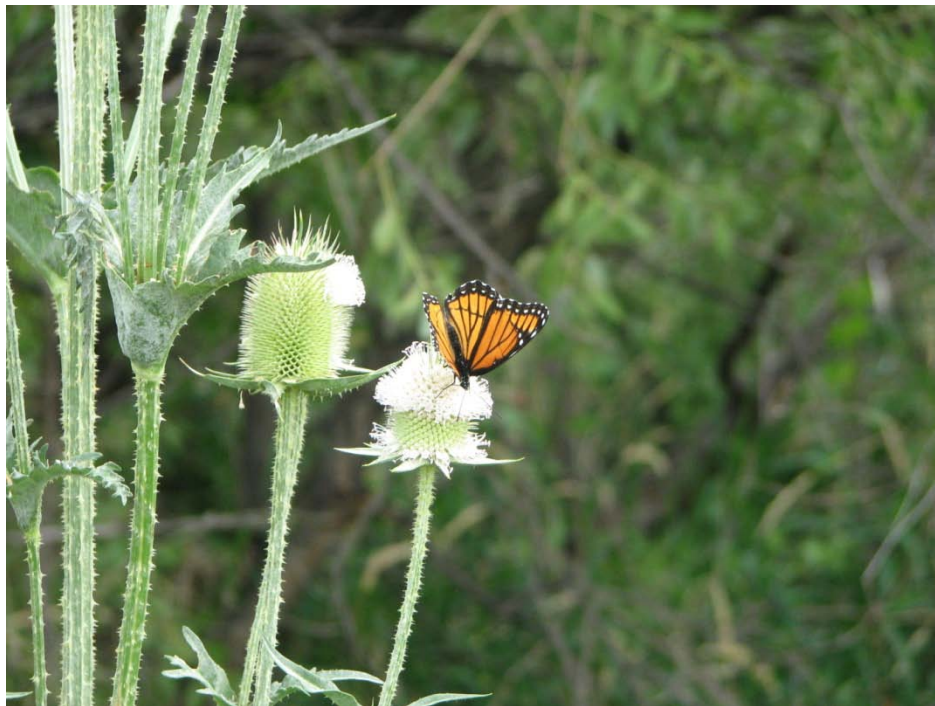
There are 997 plant taxa documented by the University of Colorado at Boulder herbarium (COLO) for Jefferson County, 185 of them are considered to be non-native (alien) plant species, or roughly five percent of the taxa listed. Noxious weeds that are regulated by Jefferson County and the State of Colorado that were observed during this survey are listed below in Table 9. List A species are designated by the State Commissioner of Agriculture for eradication. One List A species was 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; 19 List B species were observed in this survey. 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. Seven List C species were observed during this survey. In addition, there is a Colorado Weed Management Association (CWMA 2012) watch list for

species expected to be found in the state. There was one species found from this list during the survey.

Table 9. List of Noxious Weed Species Observed in Jefferson County in 2010/2011

Scientific Name (Weber & Wittmann 2001)	Scientific Name (Colorado Weed Management Association)	Common Name	Comment
A - LIST			
<i>Tithymalus myrsinites</i>	<i>Euphorbia myrsinites</i>	Myrtle Spurge	Clear Creek, Indian Gulch
B - LIST			
<i>Acosta diffusa</i>	<i>Centaurea diffusa</i>	Diffuse knapweed	Common
<i>Acosta maculosa</i>	<i>Centaurea maculosa</i>	Spotted knapweed	Mt. Vernon Canyon
<i>Breea arvensis</i>	<i>Cirsium arvense</i>	Canada thistle	Common
<i>Carduus nutans</i>	<i>Carduus nutans</i>	Musk thistle	Common
<i>Cirsium vulgare</i>	<i>Cirsium vulgare</i>	Bull thistle	Common
<i>Cynoglossum officinale</i>	<i>Cynoglossum officinale</i>	Hound's tongue	Common
<i>Dipsacus laciniatus</i>	<i>Dipsacus laciniatus</i>	Cutleaf teasel	Common
<i>Elaeagnus angustifolia</i>	<i>Elaeagnus angustifolia</i>	Russian-olive	Common
<i>Elytrigia repens</i>	<i>Elytrigia repens</i>	Quackgrass	Elk Meadow
<i>Hesperis matronalis</i>	<i>Hesperis matronalis</i>	Dame's rocket	Ken-Caryl Ranch
<i>Hyoscyamus niger</i>	<i>Hyoscyamus niger</i>	Black henbane	South Valley Park
<i>Linaria genistifolia</i> subsp. <i>dalmatica</i>	<i>Linaria dalmatica</i>	Toadflax	Common
<i>Linaria vulgaris</i>	<i>Linaria vulgaris</i>	Yellow toadflax	Common
<i>Onopordum acanthium</i>	<i>Onopordum acanthium</i>	Scotch thistle	Hildebrand
<i>Potentilla recta</i>	<i>Potentilla recta</i>	Sulfur cinquefoil	Common
<i>Saponaria officinalis</i>	<i>Saponaria officinalis</i>	Bouncingbet	Common
<i>Tamarix</i> sp.	<i>Tamarix</i> sp.	Salt cedar	Indian Gulch
<i>Thithymalus esula</i>	<i>Euphorbia esula</i>	Leafy spurge	Common
<i>Viticella orientalis</i>	<i>Clematis orientalis</i>	Oriental clematis	Mount Vernon Canyon
C - LIST			
<i>Anisantha tectorum</i>	<i>Bromus tectorum</i>	Downy brome/cheatgrass	Common
<i>Arctium minus</i>	<i>Arctium minus</i>	Burdock	Common
<i>Cichorium intybus</i>	<i>Cichorium intybus</i>	Chicory	Common

<i>Conium maculatum</i>	<i>Conium maculatum</i>	Poison hemlock	Common
<i>Erodium cicutarium</i>	<i>Erodium cicutarium</i>	Redstem filaree	Common
<i>Hypericum perforatum</i>	<i>Hypericum perforatum</i>	Common St. Johnswort	Coal Creek Canyon
<i>Sonchus arvensis</i>	<i>Sonchus arvensis</i>	Perennial sow-thistle	Common
<i>Verbascum thapsis</i>	<i>Verbascum thapsis</i>	Common mullein	Common (especially in burned areas)
CWMA WEED WATCHLIST			
NA	<i>Epilobium hirsutum</i>	Hairy willow-herb	South Valley Park



A monarch butterfly visiting cutleaf teasel (*Dipsacus laciniata*) a B-Listed noxious weed. Photo: Pam Smith

Non-native plants that are not on the weed list include many pasture grasses, home and garden species, many of which were planted for restoration or escaped to the wild. A list of non-native species that are not listed that were observed in Jefferson County includes:

- Alfalfa (*Medicago sativa*)
- Alsike clover (*Trifolium hybridum*)
- Alyssum (*Alyssum parviflorum*)
- Buckthorn (*Rhamnus cathartica*)
- Catnip (*Nepeta cataria*)
- Chinese elm (*Ulmus pumila*)
- Climbing bittersweet (*Solanum dulcamara*)
- Crested wheatgrass (*Agropyron desertorum* = *A. cristatum*)

- Deptford pink (*Dianthus armeria*)
- Field mint (*Mentha arvensis*)
- Hempnettle (*Galeopsis trifida*)
- Hoary alyssum (*Berteroa incana*)
- Intermediate wheatgrass (*Thinopyron intermedium*),
- Japanese brome (*Bromus japonicus*)
- Jerusalem oak goosefoot (*Teloxys botrys*)
- Jointleaf rush (*Juncus articulatus*)
- Kentucky bluegrass (*Poa pratensis*),
- Norway cinquefoil (*Potentilla norvegica*)
- Orchardgrass (*Dactylus glomerata*)
- Plantain (*Plantago major*)
- Redtop (*Agrostis gigantea*)
- Redtop (*Agrostis stolonifera*)
- Penneycress (*Thalaspis arvense*)
- Reed canary grass (*Phylaris arundinacea*)
- Salsify (*Tragopogon dubius*)
- Salsify (*Tragopogon pratensis*)
- Smooth brome (*Bromopsis* (or *Bromus*) *inermis*)
- Sweatpea (*Lathyrus latifolia*)
- Tall fescue (*Festuca gigantea*)
- Timothy (*Phleum pretense*)
- White sweetclover (*Melilotus albus*)
- Yellow sweetclover (*Melilotus officinale*)

Note on Smooth Brome

One of the most common non-native species found at nearly every site was smooth brome (*Bromopsis* (*Bromus*) *inermis*). Smooth brome is not on the noxious weed list, yet it appears to be one of the largest threats to ecosystems, besides development, in Jefferson County, particularly in wetlands. Smooth brome is very difficult to treat without causing problems to the surrounding environment. Unfortunately, the spread of smooth brome is being encouraged by weed treatment activities especially in wetlands. Canada thistle is very common in wetlands, and is a B-List noxious weed. It is often treated with herbicides that impact dicots. Smooth brome is a monocot. A recent report by Rondeau (2011) found in a six year monitoring effort for Canada thistle (*Cirsium arvense* also *Breea arvensis*) that although the treatments were successful in removing the Canada thistle it was replaced by smooth brome in wetlands where smooth brome was already in the area. In addition, they found the local native plants including woody species were being impacted as well over the six year study. Overall the result was a less desirable outcome than the situation being remedied from an ecological perspective. This is unfortunate because Canada thistle is a B-Listed plant; people are being required to treat it. If smooth brome is in the vicinity (which is often the case) a state listed noxious weed is being replaced by something that is even more difficult to control and arguably more damaging to the ecosystem. In the State of Colorado, smooth brome is available for use in seed mixes used by ranchers, homeowners and highway departments which is why it is not listed as an invasive species. This plant is considered to be an invasive species in at least ten other states (MN, OH, IN, IL, KY, TN, NB, WI, ND and MS), by Ivasives.org and The Nature Conservancy.

National Wetland Inventory (NWI) Mapping

Through the EPA-funded portion of this project, 20 original National Wetland Inventory paper topographic maps were scanned and digitized. Eight additional topographic quads had already been digitized prior to this project but two of those needed to be updated to include linear features. Of the 494,535 acres of Jefferson County, 2% are classified as wetlands according to the National Wetland Inventory maps (Figure 12). To further illustrate the distribution of the wetlands in the County, CNHP used Level IV ecoregions as defined by Omernik (1987) (Figure 13). 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 Jefferson County. The Crystalline Mid-Elevation Forests and Shrublands ecoregion encompasses the majority of wetlands and the Crystalline Subalpine Forests the least (Table 10).



Mid-elevation wetland forest and shrubland south of Blue Mountain in Jefferson County, CO. Photo: Pam Smith.

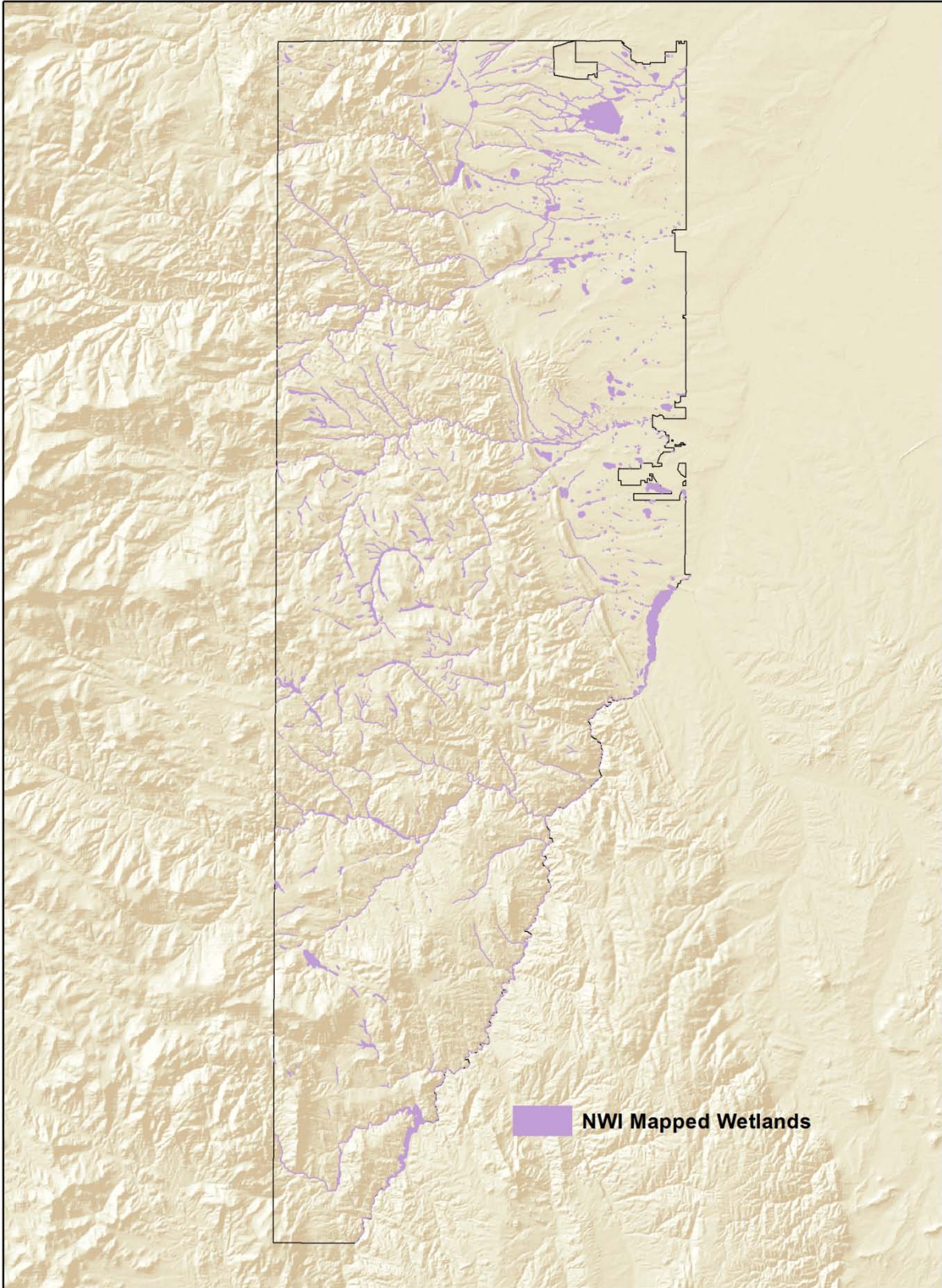


Figure 12. Overview of National Wetland Inventory (NWI) Mapped Wetlands in Jefferson County.

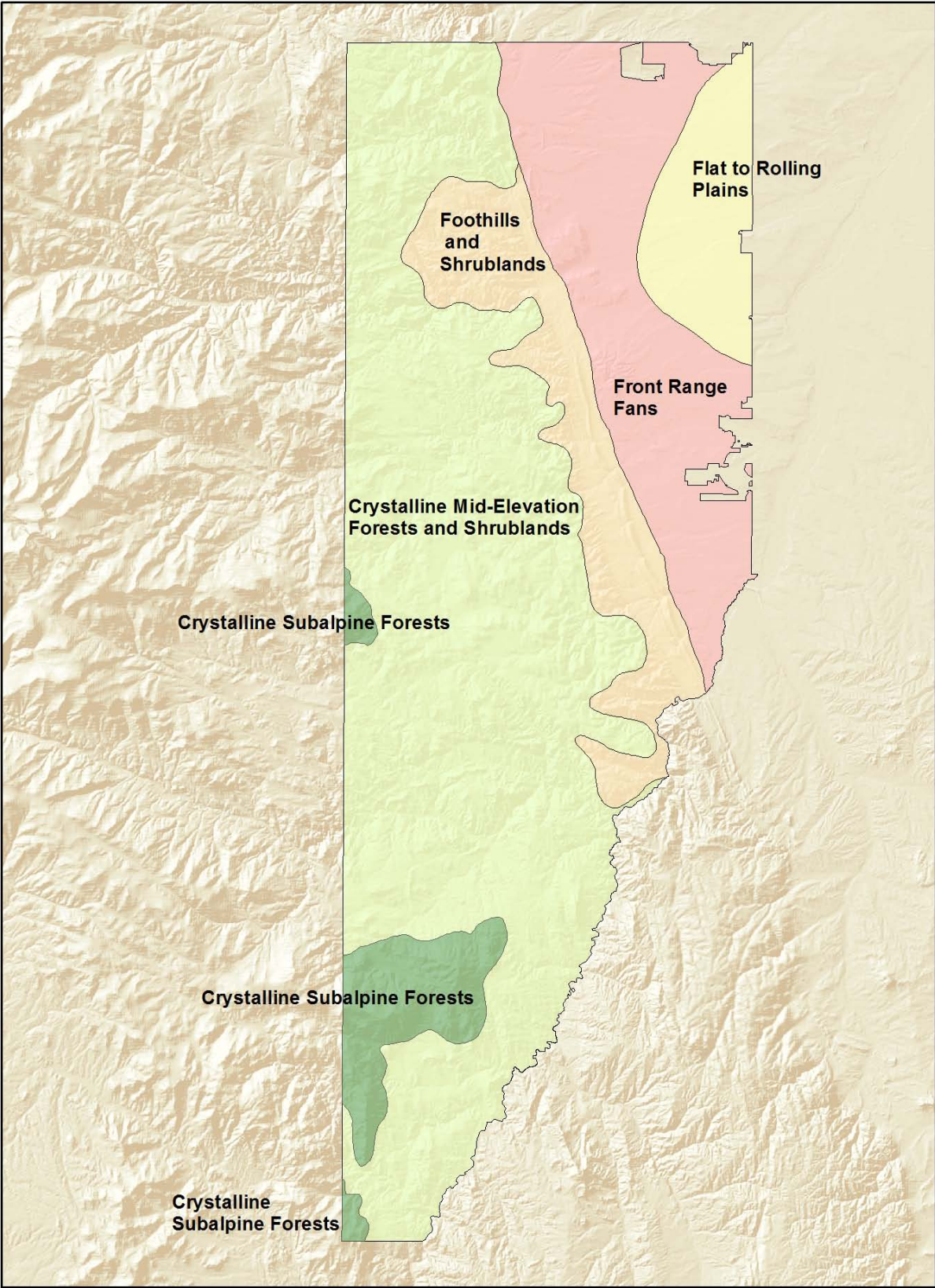


Figure 13. Omernik Ecoregions within Jefferson County.

Table 10. Total Acres within each Omernik Ecoregion with NWI Classification

NWI Classification (Cowardin et al. 1979)	Foothills Shrublands	Front Range Fans	Flats to Rolling Plains	Mid-Elevation Forests Shrublands	Subalpine Forests	NWI CLASSIFICATION TOTALS
L1	194	2856	291	630	0	3971
L2	0	58	36	2	183	279
PAB	0	111	13	0	0	124
PEM	38	568	144	1908	0	2658
PFO	52	339	10	12	3	416
PSS	31	173	23	571	126	924
PUB	72	412	137	138	7	766
PUS	8	67	22	6	0	103
R2	33	71	31	35	0	170
R3	50	0	0	351	0	401
R4	92	200	1	12	0	305
ECOREGION TOTALS	570	4855	708	3665	319	10117

- Laustrine 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 Lower Perennial (R2) —low gradient river and stream channels
- Riverine Upper Perennial (R3)—high gradient river and stream channels
- Riverine Intermittent (R4) — channel contains flowing water only part of the year
- 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%
- Palustrine Aquatic Bed (PAB) —vegetated wetlands dominated by plants attached to substrate or that float freely

The most commonly encountered wetlands during this survey were small first and second order rocky bottom mountain streams within the mid-elevation forests. Many of these areas supported high quality wetlands, mature wetland forests and often included weed free riparian systems with uncommon and rare plant species. The most heavily impacted wetlands are typically the larger order streams that pass through major urban areas and small order streams on ranch lands where cattle have been utilizing the wetlands and floodplains for forage and shade.



Buffalo Creek in Jefferson County. Photo: Pam Smith

Potential Conservation Areas

Forty-six Potential Conservation Areas (PCAs) were identified for Jefferson County (Table 11). The PCAs represent the immediate habitat needed for the viability of the critical biological elements. Before the project there were 36 PCAs identified in Jefferson County (Map 2). Seven PCAs listed in Table 11 that were designated previously were not updated in 2010/2011 due to low priority or lack of access to the properties. The date of the last survey is included (1994). Of the 40 PCAs presented in the report (Map 3);

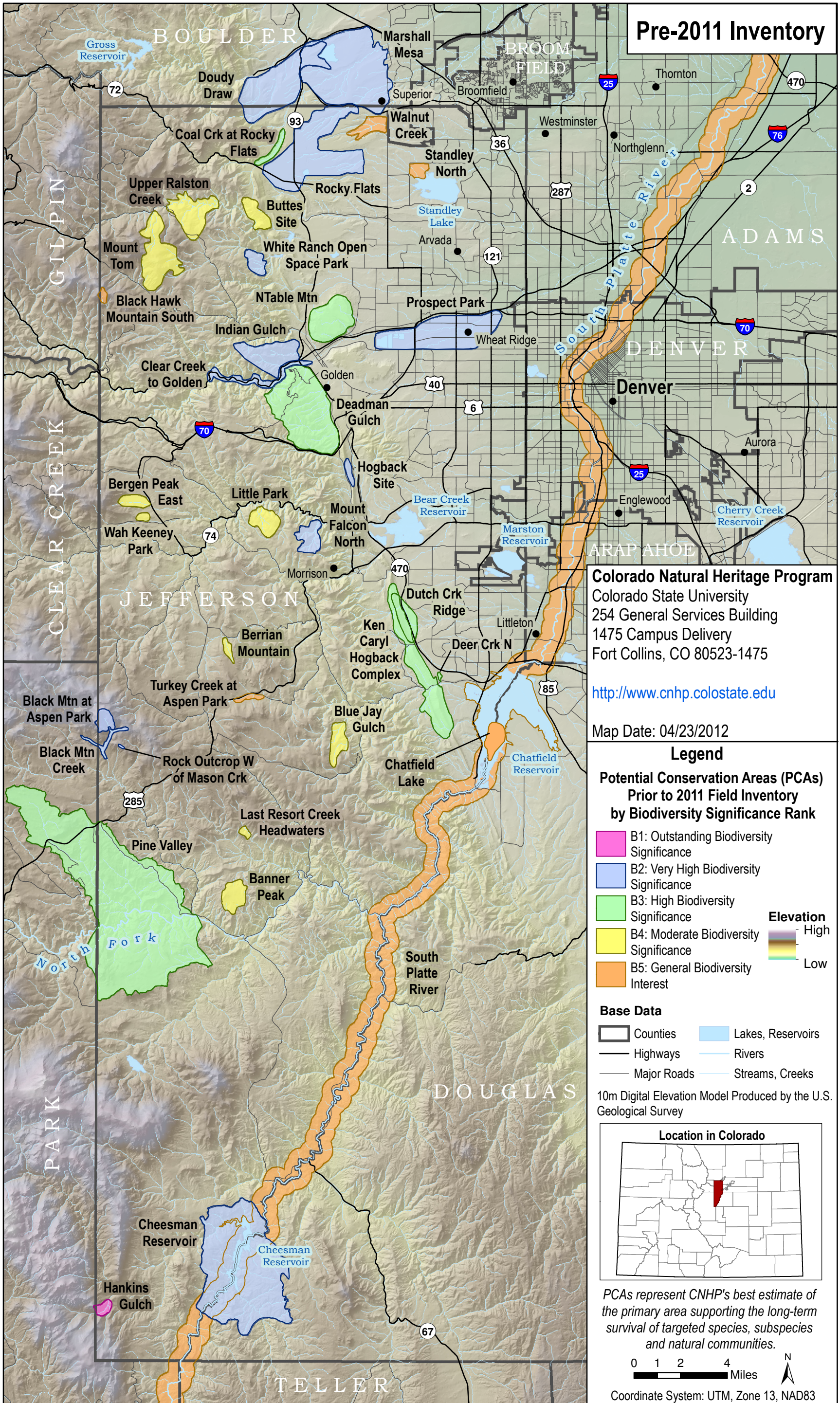
- 2 are of outstanding biodiversity significance (B1),
- 16 are of very high biodiversity significance (B2),
- 13 are of high biodiversity significance (B3),
- 5 are of moderate biodiversity significance (B4), and
- 4 are of general biodiversity significance (B5).

Table 11. Potential Conservation Areas in Jefferson County

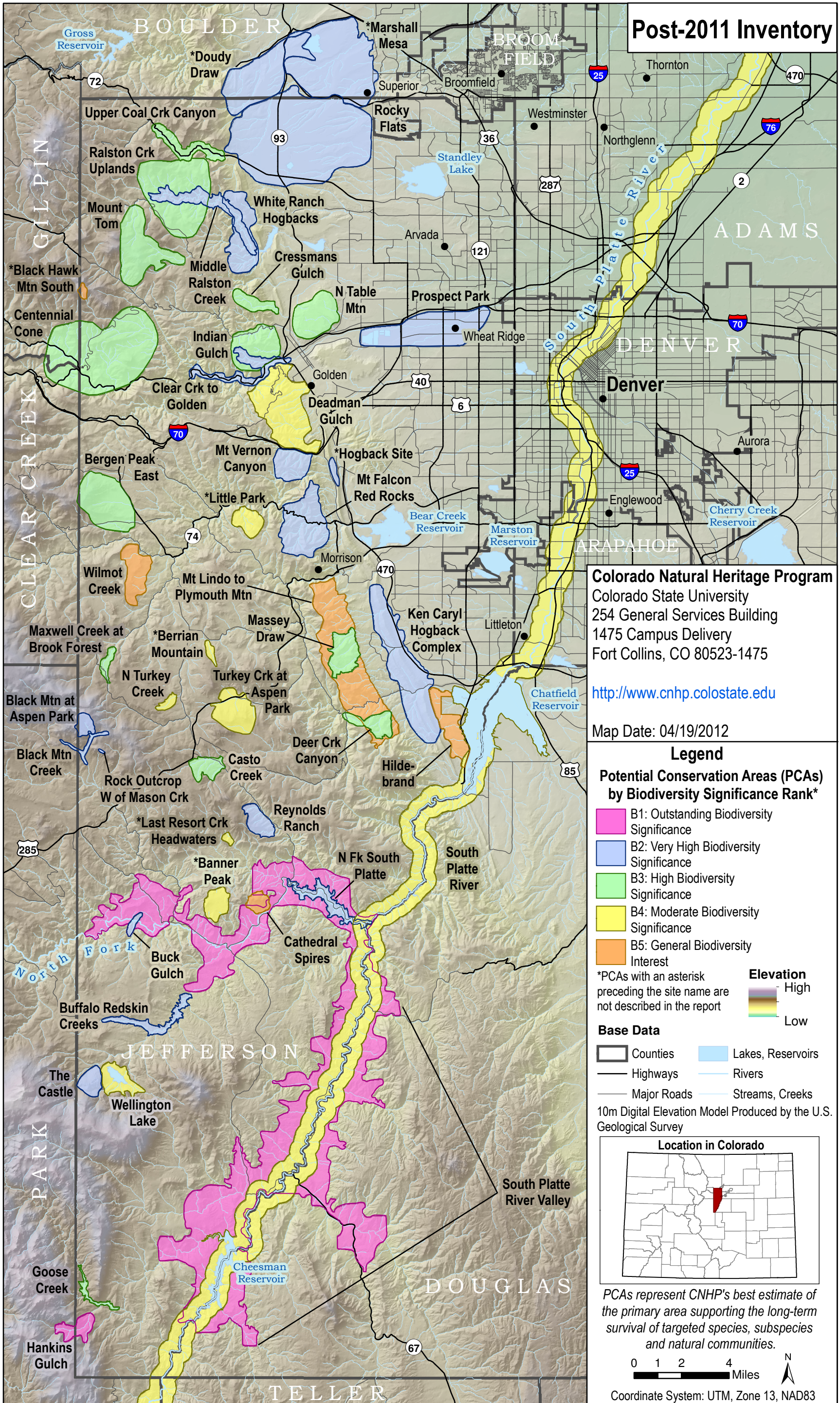
Site Name	Biodiversity Rank	Date (last observation)
Hankins Gulch	B1	2011
South Platte River Valley	B1	2011
Berrian Mountain	B2	1994
Black Mountain at Aspen Park	B2	2011
Black Mountain Creek	B2	2011
Buck Gulch	B2	2010
Buffalo Redskin Creeks	B2	2011
Clear Creek to Golden	B2	2010/2011
Hogback Site	B2	1994
Ken Caryl Hogback Complex	B2	2010
Middle Ralston Creek	B2	2011
Mount Falcon Red Rocks	B2	2011
Mount Vernon Canyon	B2	2011
North Fork South Platte	B2	2010/2011
Prospect Park	B2	2010
Reynolds Ranch	B2	2010
Rock Outcrop West of Mason Creek	B2	1996
Rocky Flats	B2	2011
The Castle	B2	2011
White Ranch Hogbacks	B2	2011
Bergen Peak East	B3	2011
Casto Creek	B3	2011
Centennial Cone	B3	2011
Cressmans Gulch	B3	2011
Deer Creek Canyon	B3	2010/2011
Goose Creek	B3	2011
Indian Gulch	B3	2010/2011
Massey Draw	B3	2010

Site Name	Biodiversity Rank	Date (last observation)
Maxwell Creek at Brook Forest	B3	2011
Mount Tom	B3	2011
North Table Mountain	B3	2010/2011
Ralston Creek Uplands	B3	2011
Upper Coal Creek Canyon	B3	2011
Banner Peak	B4	1994
Deadman Gulch	B4	2011
Last Resort Creek Headwaters	B4	1994
Little Park	B4	1994
North Turkey Creek	B4	2011
South Platte River	B4	2012
Turkey Creek at Aspen Park	B4	2011
Wellington Lake	B4	2011
Black Hawk Mountain South	B5	1994
Cathedral Spires	B5	2011
Hildebrand	B5	2011
Mount Lindo to Plymouth Mountain	B5	2011
Wilmot Creek	B5	2011

A number of PCAs were deleted or merged during the reassessment of the PCAs in Jefferson County for the 2010/2011 survey. Element rankings are updated as the database information is updated. In some instances the element ranks are dropped from full tracking status. PCAs were deleted if they no longer met the requirements to be a PCA. New elements were also discovered that resulted in either new PCAs or PCAs with updated boundaries for existing PCAs.



Map 2. CNHP Potential Conservation Areas in Jefferson County prior to the 2011 field inventory.



Map 3. CNHP Potential Conservation Areas in Jefferson County.

DISCUSSION

The mountains, foothills and plains of Jefferson County harbor globally rare biodiversity elements. The most imperiled elements on a global scale include the Pawnee montane skipper butterfly (*Hesperia leonardus montana*) and Rocky Mountain monkeyflower (*Mimulus gemmiparus*), that were documented in excellent (A-ranked) condition. These elements occur within the two B1 ranked Potential Conservation Areas (PCAs): South Platte River Valley and Hankins Gulch. The biodiversity of the Jefferson County foothills is reflected in eight PCAs with very high biodiversity significance (B2). Many of these contain several biodiversity elements that are globally imperiled or vulnerable (G2-G3) and harbor species that are common globally (G4 or G5) but rare within Colorado (S1-S2).



A section of the South Platte River PCA. Photo: Pam Smith.

Five new species were added to the Colorado Natural Heritage Program State tracking list as a result of this survey (*Physaria* x1, *Geranium bicknellii*, *Claytonia rubra*, *Physaria vitulifera* and an earthstar fungus *Mycenastrum corium* ssp. *ferrugineum*). The only known occurrences in the world of the Bell's twinpod hybrid (*Physaria* x1) and the earthstar fungus are located in Jefferson County. In addition, a significantly large number of state endemic plants and regional endemic species were also documented in Jefferson County. Nearby Boulder County has a much larger species list compared to Jefferson County

(including many alpine species that do not occur in Jefferson County), yet there are eight state endemic plant species in Jefferson compared to only three in Boulder County. In addition, only one G1(T1) ranked species occurs in Boulder while there are three G1(T1) ranked species that occur in Jefferson County.

The foothills transition zone on the Colorado Front Range is among the rarest and most threatened of the ecological zones in Colorado. The biological diversity of this zone is highlighted by eight B2-ranked PCAs in Jefferson County, and include the Clear Creek to Golden, Hogback Site, Ken Caryl Hogback Complex, Middle Ralston Creek, Mount Falcon Red Rocks, Mount Vernon Canyon, and White Ranch Hogbacks PCAs. A number of native grassland plant communities support populations of a number of different rare skipper butterfly species indicating occurrences of healthy and functioning foothills and grassland systems.



Hogback and grassland system along the foothills in Jefferson County: Photo by Pam Smith.

Jefferson County and adjacent Boulder County to the north along with Arapaho and El Paso Counties have some of the largest occurrences of piedmont grasslands in Colorado. The extensive occurrences of these grasslands harbor some of the richest species diversity in Jefferson County. In general, grasslands are regarded as among the most imperiled ecosystems in North America (Knopf and Samson 1997). Major threats include housing and urban development, agricultural conversion, altered fire regimes, and incompatible grazing regimes (Neely et al. 2006). Additional threats in Jefferson County include surface mining, invasive species, and road construction. Moir (1969) identified twelve tallgrass tracts in Jefferson and Boulder Counties in the late 1960's. These included big bluestem plant communities as well as needlegrass types (including *Nasella* and *Hesperostipa* dominated expressions). Bock and Bock (1998) reported that of the twelve tallgrass sites, only five remained. These have been purchased as open space by Jefferson County Open Space and by the City of Boulder (Bock and Bock 1998, Open Space and Mountain Parks 2008). Of the

other seven, five were lost to urbanization or incompatible grazing and two were in marginal condition. Additional needle-and-thread grasslands have been lost or demonstrate a downward trend in element occurrence ranks due to residential development, prairie dog impacts, or incompatible grazing regime (CNHP 2012). Jefferson County Open Space (2008) has identified as one of its goals the identification and mapping of this important habitat within the County. The Rocky Flats PCA updated in this report contains high quality piedmont grasslands that offer an excellent potential opportunity for the preservation or conservation of tallgrass prairie habitat in Jefferson County.

There are four federally listed threatened species that occur in Jefferson County and all of them were documented during this survey. The Ute ladies' tresses orchid (*Spiranthes diluvialis*) had been previously known in the county. A small range extension was documented along Clear Creek in 2011. A new federally threatened species, the Colorado butterfly plant (*Oenothera coloradensis* ssp. *coloradensis*) was documented by the US Fish and Wildlife Service in the northern section of Jefferson County very close to the Boulder County line in 2011 and was also confirmed by CNHP. The two listed threatened animal species documented previously and during the survey include the Pawnee montane skipper (*Hesperia leonardus montana*) and the Preble's meadow jumping mouse (*Zapus hudsonius preblei*).

The Pawnee montane skipper butterfly is considered globally critically imperiled (G4T1) due to its restricted range and loss of habitat due to wildfire. The South Platte River Valley PCA is the only site that supports populations of the Pawnee montane skipper in Jefferson County. Most of the butterfly's suitable habitat lies within the Pike National Forest, some falls within Jefferson County Open Space lands including Cathedral Spires and Pine Valley Ranch Parks, portions lay within Denver Water Board Property, and large areas of suitable habitat are on private lands along the North Fork of the South Platte River. These PCAs would be excellent areas to consider for future conservation efforts.



Colorado butterfly plant (left photo) and Ute ladies' tresses in Jefferson County, CO. Photos: Jill Handwerk and Pam Smith, respectively.

The National Wetland Inventory maps indicate that only 2% of Jefferson County land is considered to be wetlands and a large portion includes man-made water retention and delivery systems. Nonetheless, 33 of the 46 PCAs contain wetland plants, wetland dependent animals and/or plant communities. Wetlands, whether they are seeps, springs,

seasonal drainages, or large rivers add significantly to the biodiversity of the systems in Jefferson County. They are also often disturbed and imperiled areas. Mining activities, road building, agriculture, water diversions and urban development impact almost all the wetland areas in some way. Ralston Creek is one of the few major tributaries that does not have a major roadway running along most of the length of the river. The wetland resources are the most vital aspect of the Front Range ecosystems. Although wetlands in Jefferson County are rare they provide necessary elements to protect large land areas that support wildlife and humans. Efforts to support and protect the natural hydrology and water quality will go a long way towards providing a higher quality of life for people living along the Front Range.



High quality Aspen and blue spruce dominated wetland along a small first order stream in Jefferson County, CO. Photo: Pam Smith

The tall grass prairies, unique hogback systems, foothill canyons, mountain streams and spectacular mountains with massive granitic outcrops make Jefferson County a truly unique area with a remarkable richness of rare fauna, flora and high quality habitats that are worth preserving for future generations. Overall, the concentration and quality of imperiled elements and habitats attest to the fact that proactive conservation efforts to date in Jefferson County have preserved a number of important biological resources that are of both statewide and global significance. This is substantiated by conservation assessments conducted by other agencies in addition to findings from the 2010/2011 surveys by CNHP. Colorado Parks and Wildlife (Colorado State Parks and Colorado Division of Wildlife merged in 2011 are now known as Colorado Parks and Wildlife) has identified

five high priority habitats that intersect with Jefferson County. These are provided in Figure 14. High priority habitats include those habitats important to sustaining the diversity of wildlife in Colorado (Colorado Division of Wildlife 2006). The Southern Rocky Mountain Ecosystem Project has identified four important priority wildlife linkages in Jefferson County as part of a statewide assessment of wildlife linkages (Southern Rockies Ecosystem Project 2005) (Figure 14). The purpose of the assessment was to identify broad linkage zones that facilitate movement for Colorado's diverse array of wildlife species and to prioritize amongst them for further study. The Metro Area River and Streams Priority Landscape identified by the Colorado Conservation Partnership also includes portions of northeast Jefferson County (Colorado Conservation Partnership 2012). This priority landscape has been identified for its vital and irreplaceable waterways that support recreation, wildlife, and scenic and natural corridors for the communities of the Denver metropolitan area, providing a foundation for the area's quality of life. In addition, The Nature Conservancy (TNC) has completed assessments of the Central Shortgrass Prairie (Neely et al. 2006) and Southern Rocky Mountain (Neely et al. 2001) ecoregions and outlined 14 TNC priority areas within Jefferson County.



Big bluestem dominated grassland in Jefferson County Foothills. Photo: Pam Smith

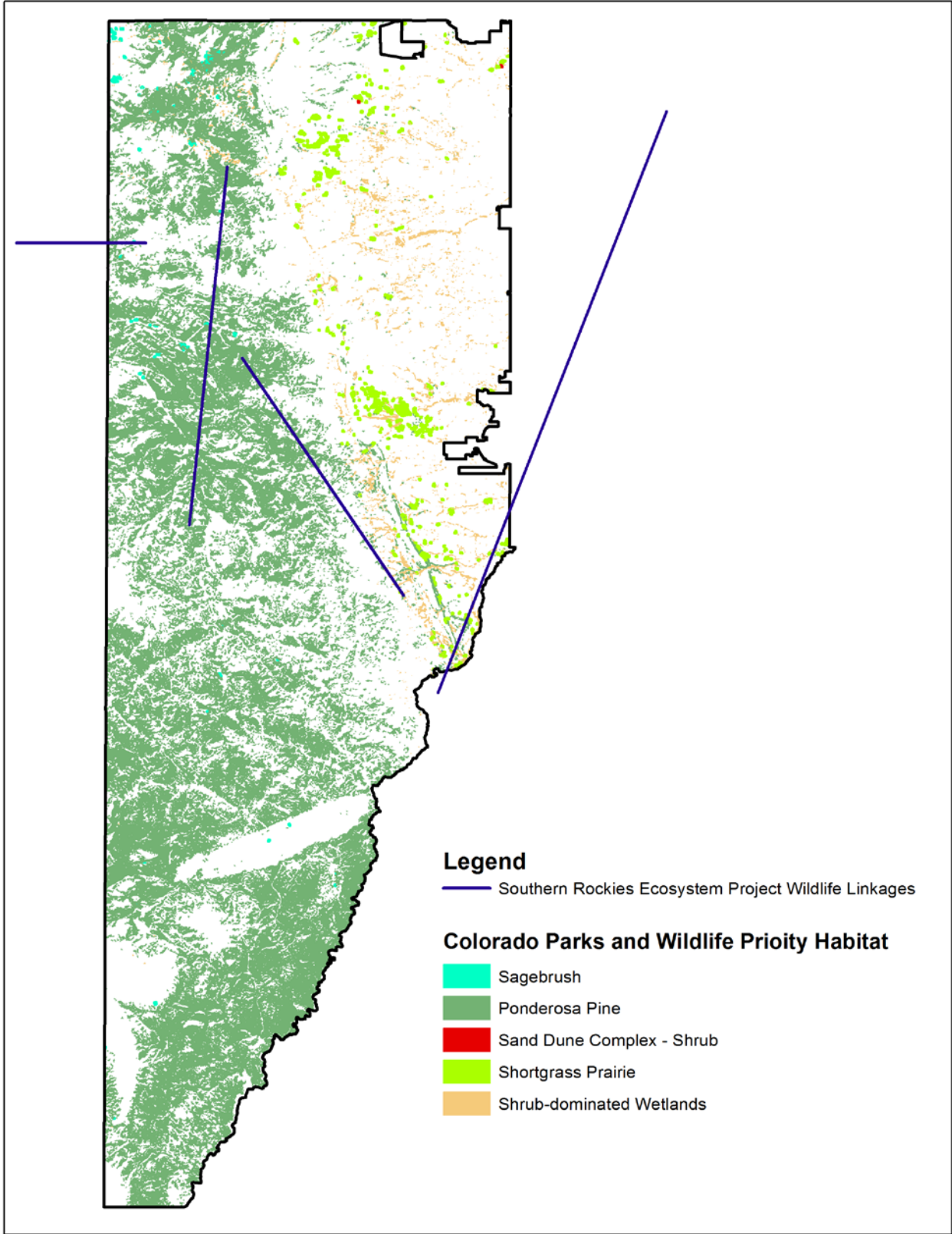


Figure 14. Colorado Parks and Wildlife priority habitat and the Southern Rockies Ecosystem Project priority wildlife linkages in Jefferson County.

Conservation Strategies

The Colorado Natural Heritage Program (CNHP) provides information to assist land managers in conserving plants, animals, and natural communities. The variety of land use patterns and the mosaic of biodiversity within and among areas present decision makers with complex challenges. Because of the diversity of plants and animals and their unique life histories, multiple approaches are necessary to preserve the full suite of species and communities. One such tool for the conservation of biodiversity is the Potential Conservation Area (PCA). A PCA is CNHP's best estimate of the primary area required to support the long-term survival of targeted species or natural communities and the following points are taken from CNHP's PCA Methodology Manual:

- The size and configuration of a PCA will be dictated by the conservation targets (i.e., those species, communities, or systems we seek to conserve at a given location) and their sustaining physical features and/or ecological processes.
- PCA refers to the ability of a conservation area to maintain healthy, viable targets over the long term (100 + years), including the ability of the targets to respond to natural or human-caused environmental change.
- PCAs do not necessarily preclude human activities, but their ability to function naturally may be greatly influenced by them.
- PCAs at all scales may require ecological management or restoration to maintain their functionality and long term persistence.



View along Coal Creek Canyon in Jefferson County Colorado. Photo: Pam Smith

The conservation of animal species presents certain issues that are not encountered when considering most plants or natural communities, including prioritization based upon global rarity (G-rank), mobility, and scale. When elements of biodiversity are prioritized by global rarity, plants will outnumber animals (especially vertebrate animals). For instance, Jefferson County supports 31 G1-G3 plant species and communities compared with six G1-G3 animals. This difference is due to many factors, but one result of this prioritization based on global rarity is that plants tend to receive higher conservation ranks than animals. Another issue is the mobility of animals, which creates additional complexity in making recommendations about what areas are required “to support the long-term survival of targeted species.” For some animal species, the geographic scale at which PCAs need to be drawn is so large as to make them impractical for effective conservation as well as obscure areas essential to other elements of biodiversity. PCAs of this size, although ecologically realistic, would not be appropriate for the scale at which most land-management agencies work.

The Zoology section of CNHP recommends and provides data for three broad approaches when considering the conservation of zoological elements: Coarse-filter habitat preservation, animal-based PCAs, and disturbance buffers around sensitive zoological features.

Coarse-filter habitat preservation for animals is typically best accomplished in association with another element, often globally-rare plants or plant communities. Data product: plant- or community-driven PCAs with associated animal EORs.

Animal-based Potential Conservation Areas are useful when the scale at which the animal lives is appropriate for the land-management organization and when there are no other coincident targets of concern that may be rarer on a global scale. Data product: animal-driven PCAs.

Disturbance buffers are appropriate when the scale at which the animal lives is too broad to be effectively managed in its entirety by any one organization. Data product: animal EORs and observation source features.

Recommendations

Conservation Strategies can be classified as three major types:

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

The first step in facilitating any of the conservation strategies suggested above is to identify the significant elements of biodiversity and their locations in the county. This report and the accompanying GIS data provide information necessary for this first step. The next step is to use this information to conserve these elements and the areas that support them. The

PCA descriptions within this report provide protection and management suggestions for most areas identified during the inventory. However, some general recommendations for conservation of biological diversity in Jefferson County are given here.

1. Develop and implement a plan for protecting the Potential Conservation Areas profiled in this report, with most attention directed toward areas with a biodiversity rank of B1, B2 and B3. The PCAs in this report provide a basic framework for implementing a comprehensive conservation program. The B1, B2 and B3 sites, because they have global biological significance, are in need of priority attention. Consider incentive-based programs such as purchasing development rights or outright purchase from willing owners of land for significant sites that are in need of protection. Support local organizations, such as land trusts, in purchasing or acquiring conservation easements for protection of biological diversity or open space. Explore opportunities to form partnerships to access state and federal funding for conservation projects, such as those offered through the Colorado Division of Wildlife (became Colorado Parks and Wildlife in 2011) or the Farm Bill. Continue to promote cooperation among local entities to preserve the county's biodiversity. Encourage county leadership to institutionalize consideration of significant biological resources in land use planning.



Grasslands on the western side of the Rocky Flats PCA (B2). Photo: Pam Smith

2. Use this report in the review of proposed activities in or near Potential Conservation Areas to determine whether or not activities adversely affect elements of biodiversity. All of the PCAs presented contain elements of biodiversity of state or global significance. Weighing the biodiversity represented by PCAs should allow planners and biologists to consider natural resource conservation when making land use decisions. Certain land uses on or near a site may affect the element(s) present there. Range-restricted species may be especially vulnerable to habitat destruction, while wetland and riparian areas are particularly susceptible to impacts from off-site activities if the activities affect water quality or hydrologic regimes. In addition, cumulative impacts from many small changes can have effects as profound and far-reaching as one large change. As proposed land use changes are considered, they can 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 can contact persons, organizations, or agencies with the appropriate biological expertise for input in the planning process. The Colorado Natural Heritage Program routinely conducts site-specific environmental reviews and should be considered a valuable resource. Also, CNHP is continually updating biodiversity data throughout the state and can provide up-to-date information in the area of concern. To contact CNHP's Environmental Review Coordinator call (970) 491-7331. Other key partners, such as the Colorado Division of Wildlife (now the Colorado Parks and Wildlife), can be valuable resources as well, particularly in evaluating potential impacts to biological resources not tracked by CNHP (e.g., game species).

3. Recognize the importance of larger, contiguous natural communities. While the PCAs identified in this report contain known locations of significant elements of natural diversity, protection of large areas in each vegetation type, especially where these are connected, may ensure that we do not lose species that have not yet been located. Work to protect large blocks of land in each of the major vegetation types in the county, and avoid fragmenting large natural areas unnecessarily with roads, trails, etc. Although large migrating animals like deer and elk are not tracked by CNHP as rare species, they are part of our natural diversity, and their needs for winter range and access to protected corridors to food and water should be taken into consideration. Fragmentation of the landscape also affects smaller animals and plants, opening more edge habitats and introducing exotic species. Encourage cluster developments that designate large common areas for preservation of natural communities, as an alternative to scattering residences over the landscape with a house on each 35-acre parcel. Work with developers early in the planning process to educate them about the benefits of retaining natural areas. Locate trails and roads to minimize impacts on native plants and animals. See Forman and Alexander (1998) for an excellent review of the literature on the ecological effects of roads. Also, see *Planning Trails with Wildlife in Mind* published by the State Trails Program (Colorado DNR 1998) for suggestions regarding planning trails with minimum impacts to wildlife.

4. Increase efforts to protect biodiversity by promoting cooperation and incentives among landowners, pertinent government agencies, and non-profit conservation organizations. Involve all stakeholders in land use planning. The long-term protection of natural diversity in Jefferson 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.



Local volunteer helping monitor rare plants in Jefferson County in 2011. Photo: Pam Smith

5. Promote wise management of the biodiversity resources that exist within Potential Conservation Areas. Development of a site-specific conservation plan is a necessary component of the long-term protection of a PCA. Because some of the most serious impacts to Jefferson County's ecosystems are at a large scale (e.g., altered hydrology, residential encroachment, and non-native species invasion), considering each area in the context of its surroundings is critical. Several organizations and agencies are available for consultation in the development of conservation plans, including the Colorado Natural Heritage Program, the Colorado Division of Wildlife (became the Colorado Parks and Wildlife in 2011), the Natural Resources Conservation Service, The Nature Conservancy, and various academic institutions. With the current rate of population growth in Colorado, rare and imperiled species will likely decline if not given appropriate protection or management attention. Coordinate with managers of public parks or other public lands that support sensitive biological resources. Engage local citizens, groups, and organizations (e.g., schools, 4-H clubs, Colorado Native Plant Society) in assisting with management and monitoring projects on public lands. Make a concerted effort to involve individual landowners in conservation dialogue, as applicable.

6. Stay informed and involved in public land management decisions. Approximately 20 percent of Jefferson County is publicly owned. The U.S. Forest Service owns approximately 13 percent of the County while city governments, the state, and Denver

Water own approximately one percent each. Many of the PCAs in Jefferson County are on public land and may be protected from development, but not from incompatible uses. Even ownership is not always secure, since federal and state agencies are becoming more and more involved in land exchanges. Encourage protection for the most biologically significant sites on public lands by implementing compatible management activities designated in Forest Management Plans, Grazing Management Plans, etc.

7. Commit to a comprehensive, centralized database for biodiversity data management. Prior to this survey, biodiversity information for rare, threatened, and endangered species was in disparate sources without uniform data standards or documentation. This survey effort compiled historical and current information into a standard format. Maintaining these data in light of continued monitoring and survey will require a data exchange mechanism that is cost-effective and efficient.

8. Continue inventories and monitoring where necessary, including inventories for species that cannot be surveyed adequately in one field season and continue inventories on lands that CNHP could not access in 2010-2011. Despite decades of investigations there are still new discoveries to be made. Not all targeted inventory areas can be surveyed during one project's duration 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 Jefferson County. Continuing to refine the classification of plant associations will allow assessing appropriate conservation targets. There are unique expressions of plant assemblages that occur in Jefferson County that do not have a strong connection to current NVC descriptions. Continuing to gather data to support refined descriptions is warranted. Enough information is likely known for piedmont grassland communities to encapsulate expression in Jefferson County relative to other geographic areas. Additional observations may be needed for other vegetation types like juniper woodland (*Juniperus scopulorum*) to further elucidate their pattern on the landscape.



Juniper woodland in the Mount Falcon Red Rocks PCA. Photo: Pam Smith

9. 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 (*Tamarix ramosissima*), Russian olive (*Elaeagnus angustifolia*), Dalmatian toadflax (*Linaria dalmatica*), purple loosestrife (*Lythrum salicaria*), and non-native fish species. Further, natural area managers, public agencies, and private landowners should be encouraged to remove these species from their properties. Enforce the use of weed-free forage on horse trails. Encourage the use of native species for revegetation and landscaping efforts. Ideally, seed should be locally harvested. This includes any seeding done on county road right-of-ways. The Colorado Natural Areas Program has published a book entitled Native Plant Revegetation Guide for Colorado (1998) that describes appropriate species to be used for revegetation. This resource is available on the World Wide Web at <http://parks.state.co.us/SiteCollectionImages/parks/Programs/CNAP/CNAPPublications/RevegetationGuide/revegetation.pdf>.

10. Encourage public education functions and publications. A significant early step in the process of conserving biodiversity is educating local citizens and other stakeholders on the value that such areas offer the public. As described in this report, Jefferson County is rich in animal and plant diversity and includes some of the most unique environments in Colorado. Conveying the value and function of these habitats and the species that inhabit them to the public can generate greater interest in conserving lands. Conducting forums or presentations that highlight the biodiversity of Jefferson County should increase awareness of the uniqueness of the habitats within the county. Similarly, providing educational pamphlets or newsletters that explain why these areas are so valuable can increase public interest and support for biodiversity conservation. Consider developing a community conservation website to provide information on natural resource, biological diversity, and conservation opportunities in Jefferson County. Enlist the assistance of local media in public education efforts.

11. Develop and implement comprehensive program to address loss of wetlands. In conjunction with the information contained in this report, information regarding the degree and trend of loss for all wetland types (i.e., salt meadows, emergent marshes, riparian forests, seeps/springs, etc.) should be sought and utilized to design and implement a comprehensive approach to the management and protection of Jefferson County wetlands. Encourage and support statewide wetland protection efforts such as CPW's Wetlands Program. County governments are encouraged to support research efforts on wetlands to aid in their conservation. Countywide education on the importance of wetlands could be implemented through the county extension service or other local agencies. Encourage communication and cooperation with landowners regarding protection of wetlands in Jefferson County.

SITES OF BIODIVERSITY SIGNIFICANCE

The 40 most important sites in Jefferson County are profiled in this section as Potential Conservation Areas (PCAs) with biodiversity ranks (Table 8, 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.

Hankins Gulch

Biodiversity Rank - B1: Outstanding 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: McCurdy Mountain

Size: 696 acres (282 ha)

Elevation: 8,395 - 10,080 ft. (2,559 - 3,072 m)

General Description: The site is located at the south end of Jefferson County and includes some land in eastern Park County. The site is 2-3 air miles northeast of South Tarryall Peak Summit along a third order stream that flows through Hankins Gulch, which bisects the site. The rugged and forested topography along Hankins Gulch includes rock overhangs, steep cliffs, rocky slopes, deeply shaded ravines in a mixed coniferous forest of the Tarryall Mountains. It is just at the edge of a large burn area that was part of the 2002 Hayman Fire. The drainage includes mature Douglas-fir (*Pseudotsuga menziesii*), and ponderosa pine (*Pinus ponderosa*) trees which are common on the slopes and in the valleys. The understory vegetation includes some uncommon plants: Weatherby's spike moss (*Selaginella weatherbiana*), lady fern (*Athyrium felix-femina* subsp. *angustum*) and fragile fern (*Cystopteris fragilis*). Common plants include a variety mosses, thinleaf alder (*Alnus incana*), raspberry (*Rubus ideaus*), Wood's rose (*Rosa woodsii*), Cow parsnip (*Heracleum sphondylium* subsp. *montanum*), twistedstalk (*Streptopus fassettii*), golden glow (*Rudbeckia ampla*), and bluestem willow (*Salix irrorata*). The geology of the area consists of Pikes Peak granite (Tweto 1979). Soils in the riparian area include gravelly sandy loams. The upland soils are largely sandy loams.

Key Environmental Factors: The protected steep and shady canyon sides with mossy seeps and shady overhangs provide the habitat for the rare plants. The surrounding topography, especially the steep valley, has protected the area from fire, and potentially from development by humans, because of the rugged terrain and intact hydrological features. The mature forest cover combined with the low level of anthropogenic disturbances are significant factors that contribute to the health and existence of the rare plants.

Climate Description: The Hankins Gulch site lies on the southwestern edge of Jefferson County and the habitats include upper montane and subalpine components. Weather station data from Bailey, CO which is north of the site, shows an average total precipitation of 16.6 inches from 1901 to 2012. Snowfall is greatest February through April and summer rains peak in April, May, July and August. The average annual maximum temperature is 58.2°F (14.5°C) and the average annual minimum is 24.9°F (-4°C, WRCC 2006).

Land Use History: Pikes Peak National Forest was one of the earliest National Forests established in the United States. The Wilderness designation for the Lost Creek Wilderness occurred in 1980. This area has been mainly used for recreational purposes. The Hayman Fire of 2002 burned much of the upland forested area in the vicinity.

Biodiversity Significance Rank Comments (B1): This site is drawn for an excellent (A-ranked) occurrence of a globally critically imperiled (G1/S1) plant species, budding monkeyflower (*Mimulus gemmiparus*). Although the population appears to be dramatically smaller than what was described in recent years by other observers, it matches almost exactly the observations made by scientists in 1992. This was a very dry year and these plants appear to fluctuate widely from year to year, apparently based on moisture. The populations have ranged between 1,500 to 100,000 plants, making this the largest known population in the state (CNHP 2011).

Natural Heritage element occurrences at the Hankins 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	<i>Mimulus gemmiparus</i>	budding monkeyflower	G1	S1			USFS	A	2011-08-31

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

Boundary Justification: The boundary includes a deep shady drainage that follows Hankins Gulch and forested slopes and streams that are part of the local watershed. The intact hydrological features of the area including the floodplains help support the rare plant populations. The undeveloped landscape supports essential ecological processes including local, natural migration, pollination, and dispersal that are all important to the long term persistence of the occurrence.

Protection Urgency Rank Comments (P4): The site is within the USFS Lost Creek Wilderness Area.

Management Urgency Rank Comments (M4): During the summer of 2011, Pikes Peak National Forest personnel re-routed a hiking trail that crosses through the rare plant population. The trail was moved to other side of creek to minimize disturbance by hikers. The existing trail was camouflaged by Park personnel which further helps to protect the rare plant occurrence from disturbance. In 1992, scientists observed violets and raspberry plants growing within the occurrence and recommended removal. In 2011, these same plants were observed in the occurrence but they do not seem to be overtaking or causing harm to the population and removal is probably not necessary at this time. A non-native species was also observed growing with the rare plants, shepherds purse (*Capsella bursa-pastoris*). This

is an annual species not considered to be a noxious weed or a threat at this time. The shepherd's purse plants will likely disappear if/when the moisture regime returns to what it has been in previous years. Hydrological changes upstream of the occurrence and large flooding events are probably the largest threats to the site.

Land Use Comments: Currently the area is used for non-motorized recreation.

Natural Hazard Comments: Steep cliffs.

Exotic Species Comments: *Capsella bursa-pastoris* was the only exotic species noted. It is not considered to be a noxious weed and will likely not persist when/if the precipitation goes up to more normal levels.

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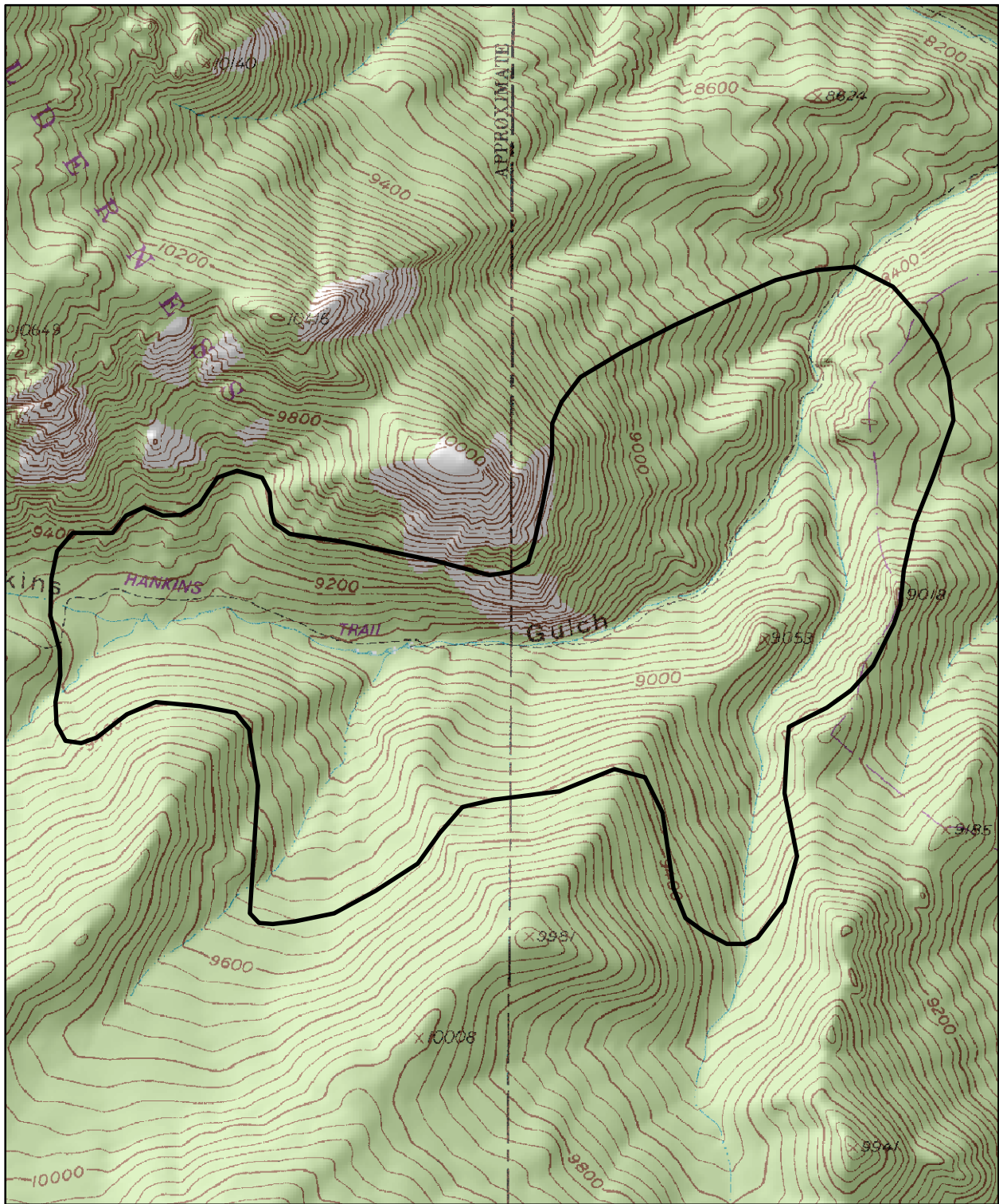
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Version Author: Smith, P.F.

Version Date: 03/05/2012



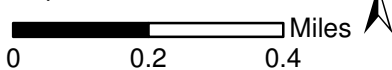
Colorado Natural Heritage Program

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 PCA Boundary

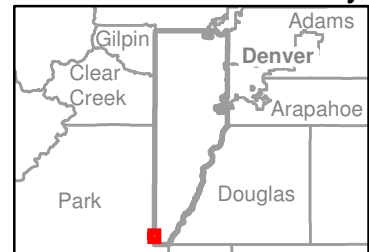
McCurdy Mountain, 39105-B4

Map Date: 02/28/2012



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

Location in Jefferson County



Map 4. Hankins Gulch Potential Conservation Area, B1: Outstanding Biodiversity Significance

South Platte River Valley

Biodiversity Rank - B1: Outstanding 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: Cheesman Lake, Bailey, Deckers, Pine, Westcreek, Platte Canyon, Green Mountain

Size: 43,625 acres (17,655 ha) **Elevation:** 6,600 - 7,800 ft. (2,012 - 2,377 m)

General Description: South Platte River Valley covers an extensive area surrounding Cheesman Reservoir and extending north along the South Platte River and North Fork of the South Platte River in Jefferson and Douglas counties, Colorado. The site stretches for approximately 20 miles along the South Platte River and for approximately 15 miles along the North Fork South Platte River. It also includes portions of the Buffalo Creek and Horse Creek drainages. The site boundary originates at the upper edge of the river floodplain, rising up the mountain slopes to approximately 7,800 feet (2,377 meters). The vegetation is dominated by open ponderosa pine (*Pinus ponderosa*) savanna woodland with a sparse cover of blue grama (*Chondrosium gracile*) and other grasses and forbs including prairie gayfeather (*Liatris punctata*). On north-facing slopes there are limited patches of mixed ponderosa pine - Douglas-fir (*Pseudotsuga menziesii*) forest or occasionally just Douglas-fir forest. However, the site purposely avoids areas of thick forest where Douglas-fir occurs. Within these areas of savanna woodland is found the Pawnee montane skipper butterfly (*Hesperia leonardus montana*). On the west end of the site, within the South Fork South Platte River drainage, lies a riparian corridor, where willows (*Salix* spp.) with a lush understory of herbaceous vegetation including common hop (*Humulus lupulus*) dominate. Here, in the riparian corridor, is found a population of the hops azure butterfly (*Celastrina humulus*). There are also high quality plant communities that are found in these wetlands. The bedrock geology consists of Jurassic sedimentary rocks of the Morrison and Wanakah Formations including sandstones, shale, limestone and gypsum. Also present are igneous and metamorphic rocks of the Precambrian Age including gneiss, schist and granite. Soils are mostly derived from Pikes Peak Granite. On mountain side slopes and at mountain summits are found shallow, excessively well drained soils that are stony, gravelly and loamy. At the northeast edge of the site, these mountain side soils are derived from igneous and metamorphic rocks and the resulting soils are moderately deep, well drained and are formed in gravelly to sandy loam material. Along the river corridors are found deep, excessively drained and very gravelly sandy loam soils derived from alluvium of Pikes Peak granite origin.

Key Environmental Factors: Important factors supporting the Pawnee montane skipper at this site include ground fires, which maintain open canopy ponderosa pine savanna and the high erosion rate of exposed granitic soils that create conditions suitable for the butterfly larval host plant (blue grama) and primary adult nectar source (prairie gayfeather). The Pikes Peak granite at the site forms gravelly and loamy soils that support ponderosa pine savanna woodland with a sparse understory of grasses and forbs including blue grama and prairie gayfeather.

Climate Description: Mean annual precipitation at the site is 15-20 inches per year. The mean annual temperature is 41-47 degrees F and annual precipitation averages 16 inches, with 65 percent occurring from April to September. Summer thundershowers are common, and sometimes severe and can occur with little warning. Snow melts rapidly, especially on southern exposures, and rarely lasts more than a day or two on the ground. The frost-free season ranges from 55 to 125 days.

Land Use History: Ranching, mining and open space recreation are the major land uses that have historically occurred on the site. Portions of the site surrounding and including Cheesman Reservoir have been owned and managed by the Denver Water Board since the turn of the century and the reservoir and its waters are managed to supply portions of the Denver metropolitan areas water supply.

Biodiversity Significance Rank Comments (B1): The site supports excellent (A-ranked) and good (B-ranked) occurrences of the federally Threatened and globally imperiled (G4T1/S1) Pawnee montane skipper butterfly (*Hesperia leonardus montana*). This subspecies of skipper butterfly is endemic to Colorado, and restricted to the granitic soils of the South Platte Canyon, in an area of about 38 square miles. As of 2011, there are six occurrences of the butterfly in Colorado, five are within this site (including an imprecise, historical record not attached to the site), and three of these occurrences are the highest quality populations of the butterfly currently documented. Additionally, the site also includes a good (B-ranked) occurrence of the globally imperiled (G2G3/S2) hops azure butterfly (*Celastrina humulus*). Two plant communities also occur in this site and include an excellent (A -ranked) occurrence of the state rare (G4/S3) Rocky Mountain willow (*Salix monticola*) / mesic forbs shrubland and a good (B-ranked) occurrence of a state imperiled (G4?/S2) water birch (*Betula occidentalis*) / starry false lily of the valley (*Maianthemum stellatum*) shrubland.

Natural Heritage element occurrences at the South Platte River Valley PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Insects	Celastrina humulus	Hops Feeding Azure	G2G3	S2				B	1998-07-14
Insects	Hesperia leonardus montana	Pawnee Montane Skipper	G4T1	S1	LT			A	2005-09-07
Insects	Hesperia leonardus montana	Pawnee Montane Skipper	G4T1	S1	LT			D	2010-09-02
Insects	Hesperia leonardus montana	Pawnee Montane Skipper	G4T1	S1	LT			A	1994-08-18
Insects	Hesperia leonardus montana	Pawnee Montane Skipper	G4T1	S1	LT			B	2010-09-02
Natural Communities	Salix monticola / Mesic Forbs Shrubland	Montane Riparian Willow Carr	G4	S3				A	1996-06-24
Natural Communities	Betula occidentalis / Maianthemum stellatum Shrubland	Foothills Riparian Shrubland	G4?	S2				B	1996-06-24

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

Other Values: The site includes Cheesman Reservoir, currently used only for fishing. Roads within the property can be utilized by hikers. At this time, it is off-limits to cyclists, although the potential exists. Potential also exists for the use of sail and motor boats, and other types of water recreation, as well as camping within the forest and ORV use within the property. The South Platte Canyon area also has potential for reservoir and dam construction. Building of cabins is a possibility, although the soils are unstable. The steepness of some slopes and the unstable nature of the soil may limit timber cutting.

Boundary Justification: The boundary is drawn to include the ponderosa pine savanna woodland below approximately 7,800 feet (2,377 meters) where an understory of blue grama exists. This habitat is suitable for the Pawnee montane skipper butterfly and the boundary is meant to represent the worldwide distribution of the butterfly's habitat. The boundary is based on data collected on the Pawnee montane skipper butterfly in the South Platte River Valley in the 1980s (ERT 1986) and from 2002 to 2010 (Sovell 2011). The west end includes riparian habitat components suitable for the hops azure butterfly, a population of which occurs on this portion of the site.

Protection Urgency Rank Comments (P3): It is estimated that stresses may reduce the viability of the Pawnee montane skipper butterfly in the site if protection action is not taken. Overall, about 25% percent of the site is privately owned, however almost all of this private property is along the North Fork of the South Platte in the vicinity of Highway 285, where exurban development is rapidly increasing. It is difficult to estimate the impact residential development may have on the Pawnee montane skipper butterfly, but development would result in loss of blue grama and prairie gayfeather, the larval host plant and main adult nectar source of the butterfly, ultimately resulting in declines in butterfly population size. Consequently, portions of the site along the North Fork of the South Platte River should be purchased for open space designation or considered for protection in a conservation easement. Protecting the ponderosa pine savanna woodland from development is the important issue and negotiation with private landowners in the upper west portion of the site to accomplish this is encouraged. The remaining 75% percent of the site is either on Pike National Forest property, Denver Water Board property, or is Jefferson County Open Space (Pine Valley Ranch Park, Cathedral Spires Park).

Management Urgency Rank Comments (M3): Fire suppression and forest overgrowth may lead to loss of understory growth, i.e. blue grama, the larval host plant, and prairie gayfeather, the primary adult nectar source of *Hesperia leonardus montana*. Fire suppression has also reduced the mosaic of open sunny areas within the ponderosa pine forest, which are vital for the continued existence of *H. l. montana*. Consequently, thinning the ponderosa pine would benefit the Pawnee montane skipper. In addition, forest thinning would reduce the risk of large catastrophic fires that could occur because dense surface fuels have accumulated and dense forest stands have resulted from past activities of fire suppression. The Haymen Fire of 2002 was a catastrophic fire that led to extirpation of the *H. l. montana* population from the area of Cheesman Reservoir. Subsequent re-colonization within the area has been limited and the population size was at less than 1/acre in 2011, 2.5/acre less than recorded in the 1980s and the population was severely impacted by both the Hayman Fire and the drought of 2002. Egg laying by *H. l. montana* has been documented within the Cheesman area since the fire, but monitoring of *H. l. montana* from 2002-2011 in the fire area suggests the it is marginal habitat for *H. l. montana*.

Land Use Comments: The main land uses in the area include recreation, ranching, and mining. Cheesman Reservoir lies within the site at its south end. Some of the USFS forest property contain hiking and mountain biking trails.

Natural Hazard Comments: The site contains rough steep terrain and steep drops requiring caution when hiking.

Exotic Species Comments: Exotics include Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*), common mullein (*Verbascum thapsus*), Canada thistle (*Breea arvensis*), musk thistle (*Carduus nutans*) and dock (*Rumex* sp.). Also, *Bromopsis inermis*

appears somewhat problematic along some waterways, as it appears to be displacing the sedges (*Carex* spp.) growing in some areas.

Off-Site Considerations: Off-site there are other dams (Antero Reservoir), Forest Service campgrounds and private campgrounds. Some building of new housing is apparent in the area, especially on the northwest end of the site, where exurban development is occurring near Highway 285.

Information Needs: Monitor nearby Buffalo Creek burn area (burned in June 1996) for recovery progress. Monitoring of the old growth ponderosa pine occurrence and butterfly populations in the Hayman Fire of 2002 is needed to understand how the butterfly an forest is recovering. More research and analysis is required to identify what density of tree cover is most suitable for Pawnee montane skipper populations.

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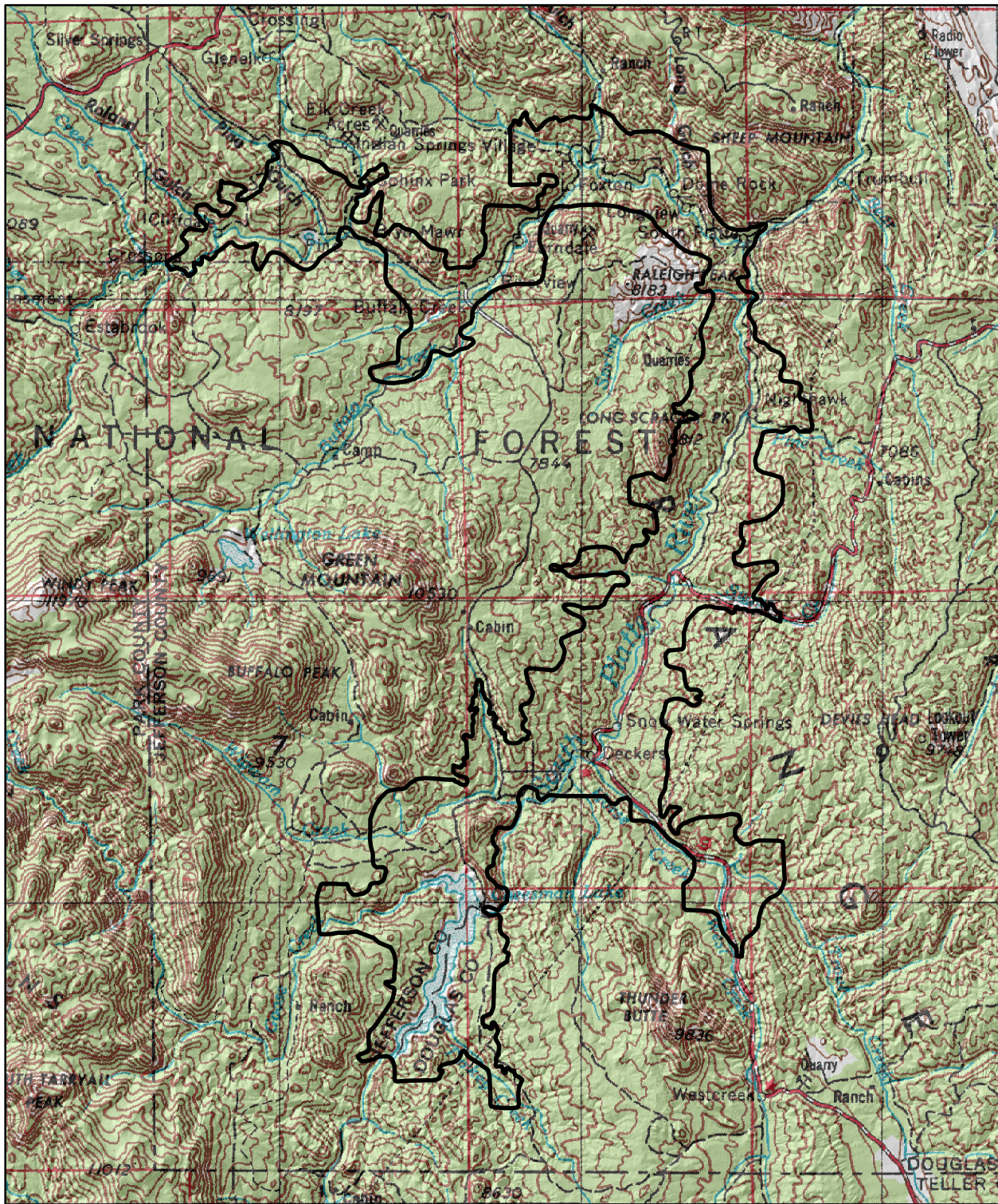
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Version Author: Sovell, J.R.

Version Date: 12/14/2011



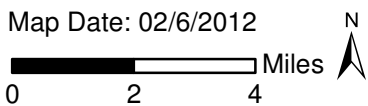
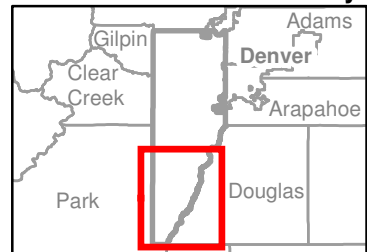
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 PCA Boundary

Denver, 39104-A1

1x2 Degree Digital Raster
 Graphic Produced by the
 U.S. Geological Survey

Location in Jefferson County



Map 5. South Platte River Valley Potential Conservation Area, B1: Outstanding Biodiversity Significance

Black Mountain at Aspen 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: Meridian Hill

Size: 390 acres (158 ha)

Elevation: 9,100 - 10,600 ft. (2,774 - 3,231 m)

General Description: This site is located about five air miles west of the town of Aspen Park near the western boundary of Jefferson County. There is a very small section of the site in Park County on the west side of the site. The area to the south of the summit of Black Mountain includes numerous spectacular cliffs and outcrops of granite. The riparian areas which include the headwaters of Black Mountain Creek, are characterized by quaking aspen (*Populus tremuloides*) meadows, montane lodgepole pine (*Pinus contorta*) and Douglas-fir (*Pseudotsuga menziesii*) forests, subalpine forests of limber pine (*Pinus flexilis*) and Engelmann spruce (*Picea engelmannii*), rock outcrop communities, and a waterfall/granitic seep community. Near the headwaters of Black Mountain Creek are also limited areas of an interesting shrubland consisting of waxflower (*Jamesia americana*) and oceanspray (*Holodiscus dumosus*). Near the northernmost extent of Staunton State Park and the Black Mountain Creek headwaters is an occurrence of a globally rare plant that is endemic to Colorado, the budding monkeyflower (*Mimulus gemmiparus*). Three large sub-populations of the rare James' teleonix (*Telesonix jamesii*) were found on the numerous cliffs and outcrops of granite flanking the south slopes of Black Mountain. They were found in cracks on cliffs, boulder fields, and granitic gravel. The occurrences are surrounded by subalpine forests of Engelmann spruce, lodgepole pine, limber pine, and patches of quaking aspen. Mat-forming plant species such as spotted saxifrage (*Ciliaria austromontana*), alumroot (*Heuchera bracteata*), twisted fruit whitlowwort (*Draba streptocarpa*), and chiming bells (*Mertensia lanceolata*), with James' teleonix, are the major components of the rock outcrop plant community. Boulder fields below and adjacent to cliffs also support James' teleonix, and shrublands of waxflower and currant (*Ribes* sp.). Most cliffs are south to southwest-facing. The site also includes abundant animal life, providing nesting and foraging area for Northern Goshawks (*Accipiter gentilis*), Juncos (*Junco hyemalis*), Northern Flickers (*Colaptes auratus*), Chickadees (*Poecile* spp.) and others. Igneous and metamorphic rock outcrops dominate the area and include gravelly soils derived from the Pikes Peak granite (Tweto 1979). To a lesser extent the Legault-Tolvar-Rock and the Raleigh-Rock outcrop complexes with 50-70% slopes are found along the edges of the site with the Legault-Hiwan-Rock outcrop complex with 30-50% slopes found in the northernmost section (USDA NRCS 2008).

Key Environmental Factors: The unaltered hydrological features of the park are significant and contribute to the health of the rare wetland plants and plant communities. The physical topography and the unaltered landscape provide a high diversity of habitats for both plants and animals.

Climate Description: Staunton State Park lies on the western edge of the central portion of Jefferson County and the habitats include upper montane and subalpine components. Weather station data from Bailey, CO which is just south and west of the site, shows an average total precipitation of 16.6 inches from 1901 to 2012. Snowfall is greatest February through April and summer rains peak in April, May, July and August. The average annual maximum temperature is 58.2°F (14.5°C) and the average annual minimum is 24.9°F (-4°C, WRCC 2006).

Land Use History: Roughly half of this occurrence is on Staunton State Park which was homesteaded in the past. Staunton State Park has not been open to the public for about 10 years. The remaining landscape in the north section is owned by private landowners and the U.S. Forest Service.

Biodiversity Significance Rank Comments (B2): This site contains a good (B-ranked) occurrence of the globally critically imperiled (G1/S1) budding monkeyflower (*Mimulus gemmiparus*) and an excellent (A-ranked) occurrence of the globally imperiled (G2/S2) James' teleonix (*Telesonix jamesii*). The budding monkeyflower is a globally rare Colorado endemic, with a limited distribution in the Front Range and Tarryall Mountains (CNHP 2011). It has only been found in Larimer, Jefferson, and Grand counties. It occurs in granite seeps, outcrops, and slopes, and on wet banks and rocks between 8,400 and 10,500 feet in elevation. Granitic seeps are evidently extremely rare in the park. Six granitic seeps have been found in the site thus far (Spackman et al. 1999). In 1992, Duff et al. found two budding monkeyflower populations with a total of about 600 individuals, in 1999, Spackman et al. found only one population of budding monkeyflower with about 100 individuals; and Smith et al, in 2011 found two populations, with about 350 plants. These plants are annuals and their populations tend to fluctuate widely apparently depending on precipitation and moisture. Three large sub-populations of James' teleonix (*Telesonix jamesii*) were found on the numerous cliffs and outcrops of granite flanking the south slopes of Black Mountain. These occurrences contain collectively approximately 3,000 individuals.

Natural Heritage element occurrences at the Black Mountain at Aspen 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	Mimulus gemmiparus	budding monkeyflower	G1	S1			USFS	B	2011-09-09
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				A	2011-09-09

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

Other Values: Within the site were an amazing variety of plant species that ranked a 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): budding monkeyflower (*Mimulus gemmiparus*), limber pine (*Pinus flexilis*), shooting star (*Dodecatheon pulchellum*), James' telesonix (*Telesonix jamesii*), oceanspray (*Holodiscus discolor*), alum-root (*Heuchera bracteata*), Front Range alum-root (*Heuchera hallii*), spotted saxifrage (*Ciliaria austromontana*), twisted fruit whitlowwort (*Draba streptocarpa*), and milkflower willow herb (*Epilobium lactiflorum*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. Therefore, the presence of species with high FQI values (7-10) is indicative of the high quality of this area.

Boundary Justification: The boundary is drawn to include the extent of the occurrences of James' telesonix and budding monkeyflower. Adjacent potential habitat is included where suitable rock outcrops and cliffs were noted. Because budding monkeyflower could be extirpated by alterations to the hydrological regime of Black Mountain, it is particularly important that no changes are made that would affect the source of water for the seep and waterfall that supports it. Management decisions within the upper Black Mountain Creek valley will affect both of the element occurrences within this site. The habitats that are included provide for the local ecological processes of natural migration, pollination and dispersal, which are important to the long term persistence of the occurrence. Private lands which are included for the northeast section of the site were not surveyed in 2011. Only lands specified within a permit granted by the Colorado State Parks were surveyed. The boundary was digitized while referencing a digital color orthophoto quad and a 1:24,000 digital quad.

Protection Urgency Rank Comments (P3): This site is publicly owned and managed by the U.S. Forest Service and by Staunton State Park. Areas to the east are also on private land. Recreational and housing development are definable threats. Most of this site is on state land (Staunton State Park) or federal land (Pike National Forest). However, the northeastern portion lies on private land, and one occurrence of James' telesonix is located in this part of the site. Since a large part of the land is part of Staunton State Park which will be opening to the public in 2012, and on public Federal lands, now is an excellent time to provide protection for the rare plants.

Management Urgency Rank Comments (M2): Management actions are recommended to prevent the loss of the budding monkeyflower (*Mimulus gemmiparus*) occurrence. Recommended actions include limiting recreation access to the budding monkeyflower habitat and instituting a monitoring program for the occurrence. Trail development is a management threat. A conservation action plan should be developed to ensure the protection of the population in Staunton State Park. The population in the park is probably only extant currently because the area has been closed to the public for so long. Without a concerted effort to protect these rare plant occurrences, it will likely be extirpated by hikers visiting the waterfalls, rock outcrops and seeps where they are found. The area where these plants are found is quite scenic and would naturally attract many visitors if a trail were constructed in this area. The ledge on which the budding monkeyflower resides is readily accessible from the creek. Because the plant is quite small and innocuous, even well intentioned, careful hikers could trample it through no fault of their own. Two children playing under this waterfall for half an hour would be capable of destroying all of one year's viable plants. One recommendation for managing this population is to not build a trail through the valley of upper Black Mountain Creek. It is also recommended that signs warning hikers about the plant be installed in the area of the occurrence. Park educational efforts should inform visitors about this rare and interesting plant. Because budding monkeyflower could be extirpated by alterations to the hydrological regime of Black Mountain, it is also particularly important that no changes are made that would affect the source of water for the seep and waterfall that supports it. Management decisions within the upper Black Mountain Creek valley will affect both of the element occurrences within this site. The largest population of budding monkey flower occupies an area of approximately 1 square meter, and is extremely vulnerable to trampling or alteration of the site. In addition to being very rare, it is a very unusual plant because it is the only species of *Mimulus* that can reproduce vegetatively. It accomplishes this with modified leaf petioles that form pockets containing dormant embryonic shoots. It seldom produces flowers but when it does they are seen in mid-July. The lack of flowers in this species makes it extremely difficult to find, and the potential for inadvertently trampling it is high.

Land Use Comments: Much of the area (about 50 percent) has been off limits to the public for the last 10 years.

Natural Hazard Comments: Steep terrain with sheer cliffs and boulderfields.

Exotic Species Comments: None observed.

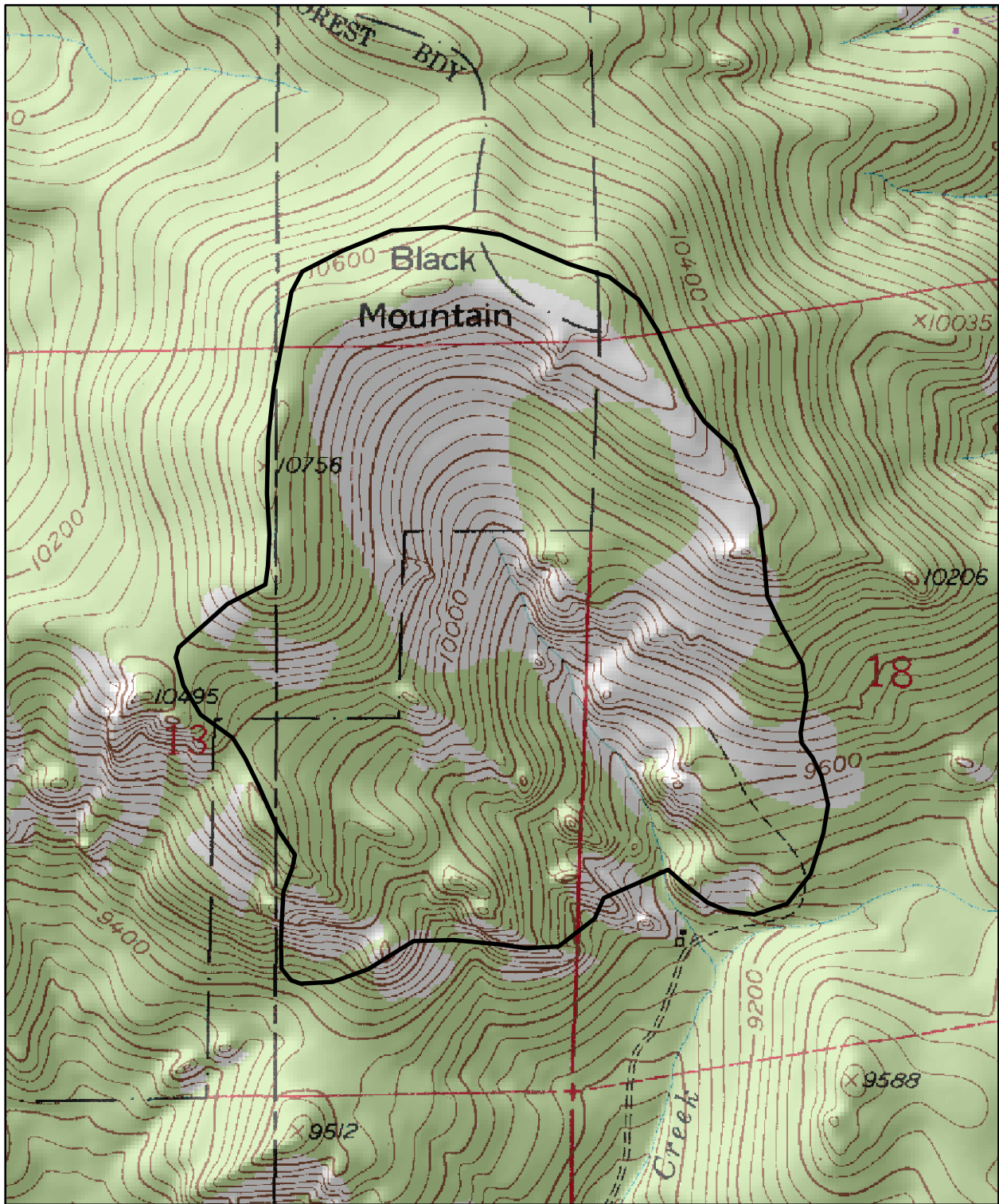
Information Needs: Need to carefully survey additional potential habitat.

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Version Author: Smith, P.F.

Version Date: 03/05/2012



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 PCA Boundary

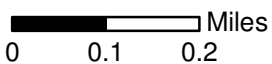
Meridian Hill, 39105-E4

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

Location in Jefferson County



Map Date: 02/28/2012

 Miles



Map 6. Black Mountain at Aspen Park Potential Conservation Area, B2: Very High Biodiversity Significance

Black Mountain Creek

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P1: Immediately Threatened/Outstanding Opportunity

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

U.S.G.S. 7.5-minute quadrangles: Conifer, Meridian Hill

Size: 273 acres (110 ha)

Elevation: 8,420 - 10,052 ft. (2,566 - 3,064 m)

General Description: This site is located about five air miles southwest of the Town of Aspen Park. It includes an extensive riparian system within the park that remains in good condition overall. It ranges in elevation from 10,000 feet near the headwaters of Black Mountain Creek and its northeast tributary to 8,400 feet near the southern border of the original Staunton property. It is contiguous with the Black Mountain site to the north, which includes the headwaters of Black Mountain Creek. Much of the existing network of roads in the park follows the creeks and their tributaries. The main thoroughfare through the park runs along the north bank of the west fork of Black Mountain Creek. A rough two-track road also runs north-south along Black Mountain Creek's west bank to an old timber mill near the north park boundary. The riparian zone is somewhat narrow and is dominated by blue spruce (*Picea pungens*) and other conifers in most places. Along Black Mountain Creek, between the confluence with the west fork of Black Mountain Creek to the south and the timber mill to the north, the riparian area is dominated by blue spruce and river birch (*Betula occidentalis*). This globally rare association is found only in deep, moist canyons of the Colorado Front Range. Outside the park this association is greatly imperiled by the rapid development of the Front Range. As such, this community represents one of the Park's most valuable natural heritage resources. The understory of the blue spruce / river birch community has a rich flora of mesic forbs including native orchids (*Limnorchis stricta*) and graminoids. In addition, pockets of peat (*Helodium blandowii*) wetlands were observed along the creek and included a state rare rush (*Juncus vaseyi*) and an uncommon grass (*Poa leptocoma*) and fontinalis (*Fontinalis* sp.) moss in the flowing creek. Some of the species found along the creek were elephantella (*Pedicularis groenlandica*), twisted stalk (*Streptopus fassettii*), chiming bells (*Mertensia ciliata*), shooting star (*Dodecatheon pulchellum*), cow parsnip (*Heracleum sphondylium*), scouring rush (*Equisetum* sp.), strawberry (*Fragaria virginiana*), arrowleaf ragwort (*Senecio triangularis*), woodrush (*Luzula parviflora*), sword leaf rush (*Juncus ensifolius*) and bluejoint reedgrass (*Calamagrostis canadensis*). In addition to blue spruce and river birch, the overstory contains Engelmann spruce (*Picea engelmannii*), quaking aspen (*Populus tremuloides*), Drummond's willow (*Salix drummondiana*), alder (*Alnus incana*), and wild rose (*Rosa woodsii*). The adjacent upland areas support mixed coniferous forests of lodgepole pine (*Pinus contorta*), Douglas-fir (*Pseudotsuga menziesii*), and limber pine (*Pinus flexilis*), with a sparsely

vegetated understory of wintergreen (*Pyrola asarifolia*), golden banner (*Thermopsis divaricarpa*), harebell (*Campanula rotundifolia*), scorpionweed (*Phacelia heterophylla*), groundsel (*Packera* sp.), and penstemon (*Penstemon virens*). The site also includes abundant animal life including diverse bird life and nesting and foraging area for Northern Goshawks (*Accipiter gentilis*), Juncos (*Junco hyemalis*), Northern Flickers (*Colaptes auratus*), Chickadees (*Poecile* spp.) and others. Fish were observed in the drainage. The site has a low percentage of non-native species and has a good potential to provide habitat for rare plant species. The geology for the majority of the site is Pikes Peak granite (Tweto, 1979). The soils in the Black Creek drainage consist of Earcree gravelly sandy loam with 9 to 15% slopes. The uplands include igneous and metamorphic rock outcrops and the Raleigh-Rock outcrop complex with 50-70 percent slopes. The Raleigh very gravelly sandy loams with 30-50% slopes cross Black Creek in two parallel strips (USDA NRCS 2008).

Key Environmental Factors: The largely unaltered hydrological features of the park are significant and contribute to the health of the rare wetland plants and plant communities. The physical topography and the fairly unaltered landscape provide a high diversity of habitats for both plants and animals.

Climate Description: Staunton State Park lies on the western edge in the central portion of Jefferson County and the habitats include upper montane and subalpine components. Weather station data from Bailey, CO which is just south and west of the site, between 1901 and 2012 shows an average total precipitation of 16.6 inches. Snowfall is greatest February through April and summer rains peak in April, May, July and August. The average annual maximum temperature is 58.2°F (14.5°C) and the average annual minimum is 24.9°F (-4°C - WRCC 2006).

Land Use History: This occurrence is located entirely within Staunton State Park which has not been open to the public for about 10 years. The original landowners homesteaded the property. A timber mill operated in the north section of the site. Two-track dirt roads were constructed next to the drainages in the park. Water diversion structures that were used historically are located in the south part of the occurrence.

Biodiversity Significance Rank Comments (B2): This site contains a good (B-ranked) occurrence of a globally imperiled (G2/S2) blue spruce / water birch (*Picea pungens* / *Betula occidentalis*) riparian community. Additionally, there is an excellent (A-ranked) occurrence of the common (G4/S4) *Calamagrostis canadensis* (bluejoint bluejoint) montane wet meadow and an extant occurrence of the state imperiled (G5?/S1) Vasey bulrush (*Juncus vaseyi*). Three of only nine documented occurrences in the State of Colorado of the blue spruce / water birch riparian communities are found in Jefferson County. In the State of Colorado there are also only nine occurrences of the state rare Vasey bulrush and this occurrence in Jefferson County represents the only one that has been documented in the last twenty years (CNHP 2011). Within the Canada bluejoint montane wet meadows

were pockets of very interesting peat wetlands on both sides of Black Creek that were dominated by a peat moss (*Helodium blandowii*). These pockets contained an uncommon grass species and the rare Vasey bulrush.

Natural Heritage element occurrences at the Black Mountain 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	<i>Picea pungens</i> / <i>Betula occidentalis</i> Woodland	Montane Riparian Woodland	G2	S2				B	2011-09-08
Natural Communities	<i>Calamagrostis canadensis</i> Western Herbaceous Vegetation	Montane Wet Meadows	G4	S4				A	2011-09-08
Vascular Plants	<i>Juncus vaseyi</i>	Vasey bulrush	G5?	S1				E	2011-09-08

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

Other Values: Within the site were an amazing variety of plant species that ranked a 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): hair-like sedge (*Carex capillaris*), softleaf sedge (*Carex disperma*), marsh bluegrass (*Poa leptocoma*), water birch (*Betula occidentalis*), slender bog orchid (*Limnorchis stricta*), shooting star (*Dodecatheon pulchellum*), hemlock parsley (*Conioselinum scopulorum*), starry false lily of the valley (*Maianthemum stellatum*), chiming bells (*Mertensia ciliata*), twisted stalk (*Streptopus fassettii*), arrowleaf ragwort (*Senecio triangularis*), swamp wintergreen (*Pyrola asarifolia*), dwarf red blackberry (*Cylactis pubescens*), woodrush (*Luzula parviflora*), and limber pine (*Pinus flexilis*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. Therefore, the presence of species with high FQI values (7-10) is indicative of the high quality of this area.

Boundary Justification: The boundary is drawn to include the riparian areas associated with the Black Mountain Creek watershed with the exception of Upper Black Mountain Creek near Black Mountain, which is included within the Black Mountain site. A narrow band of upland forest and rock outcrops adjacent to the creek channel are included because any activities or management changes near the creek will have impacts on the community that must be considered. The roads are included because of their particularly high potential for altering ecological processes within the riparian area. Pollution from surface runoff, increased erosion, narrowing of the riparian zone, trampling of vegetation, and weed dispersal are all exacerbated by the presence of roads. Hydrological processes originating outside the planning boundary, including water quality, quantity, and timing should be managed to maintain site viability.

Protection Urgency Rank Comments (P1): A large portion of the site is part of Staunton State Park which will be opening to the public in 2012. Now is an excellent time to provide protection for the rare plants and plant communities in the riparian areas. The eastern end of the site is potentially threatened by housing developments in the future.

Management Urgency Rank Comments (M2): Management actions are essential to prevent the loss of the occurrence. Currently, exotic species are uncommon in the areas away from the roadways. Other public properties have seen large numbers of visitors in riparian areas in recent times due to higher densities of people. Damage, especially to wetlands and riparian areas has been occurring. One of the largest threats is the construction of campsites and footpaths (authorized and unauthorized) in or near riparian areas which tend to remove the streamside vegetation and cause bank destabilization downstream of the damage. Open areas where trees have been cleared along the streambanks tend to have large percentages of non-native plants including noxious weeds. Equestrian use near the riparian zones can be especially damaging. Placing recreational trails, picnic areas and campsites away from the drainages with the rare communities and plant species would be one of the best measures to protect these areas. Restricted recreation access and the conversion of the 4WD road on Black Mountain Creek to a trail or consider re-routing around the trail away from the creek area with the rare plants and plant communities would go a long way in protecting the area. In most places this road is very close to the creek, and it has already impacted the riparian area in many places. Fill from the road has buried many parts of the creek bed and the road bed is heavily eroded. This has resulted in an unnatural narrowing of the riparian area in some places and siltation of the creek. Future use of this road for ORV recreation will have a serious detrimental effect on the integrity of the blue spruce / water birch community. If the trail can't be completely re-routed, in places where the roadbed is too close to the creek, the future trail should be moved uphill and the road recontoured and stabilized. A survey of the small peat wetlands located near the creek would likely yield additional rare species and the extent of the rare Vasey bulrush could be evaluated.

Land Use Comments: Currently, the majority of the land within Staunton State Park has only been accessible to park employees that are building trails and infrastructure for the opening of a new State Park in 2012. The private lands to the west are ranchlands.

Natural Hazard Comments: Steep terrain, loose rocky slopes, old timber mill with piles of discarded wood and abandoned structures.

Exotic Species Comments: Throughout most of the site few weeds were observed. However, along the southern part of the Black Mountain Creek site weeds were particularly prevalent in disturbed areas. Exotic species observed include musk thistle (*Carduus nutans*), Canada thistle (*Breca arvensis*), toadflax (*Linaria vulgaris*),

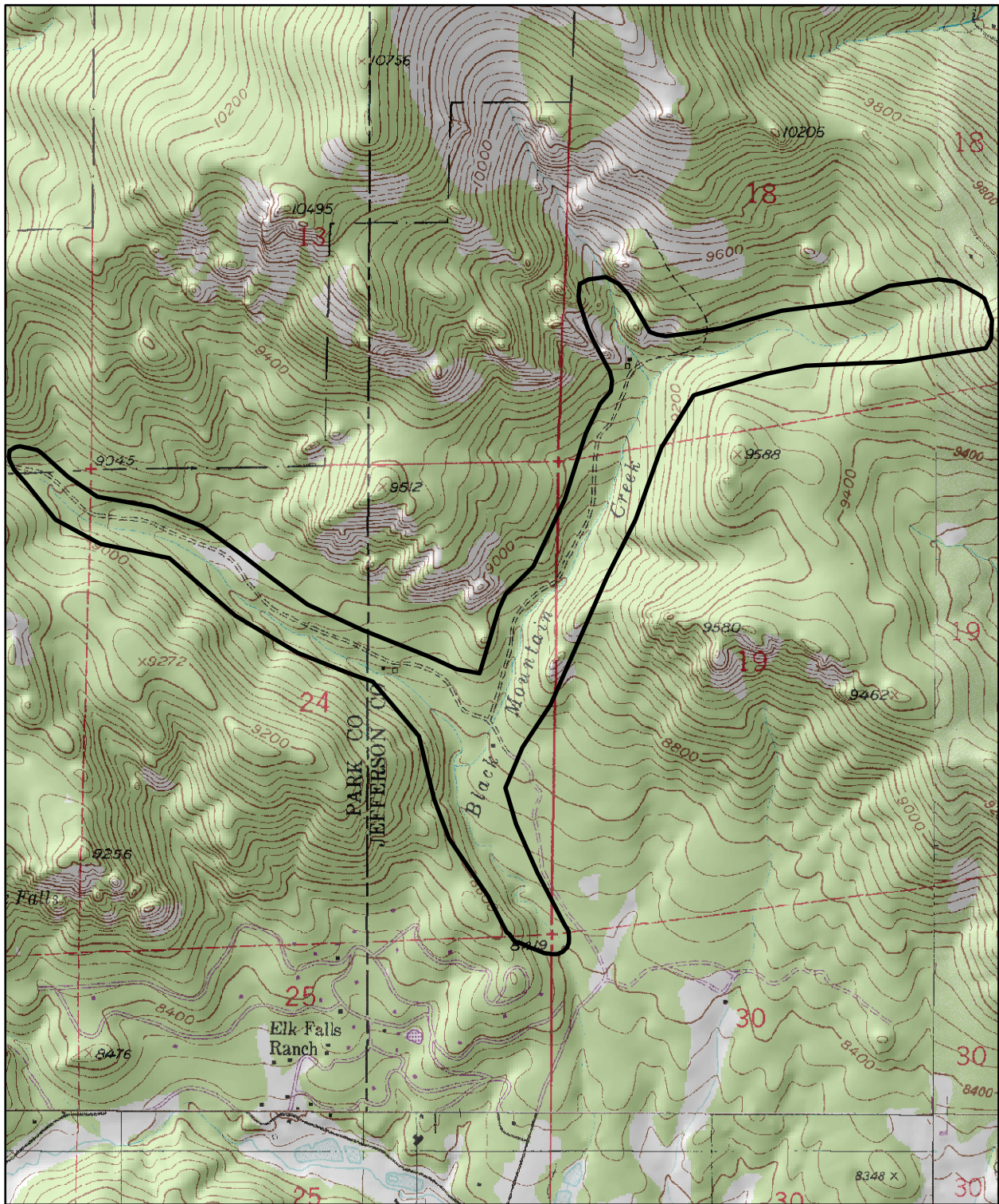
cheatgrass (*Anisantha tectorum*), salsify (*Tragopogon dubius*), smooth brome (*Bromopsis inermis*), and orchard grass (*Dactylis glomerata*). Weeds in this area pose a risk to the rest of the park, as they could readily spread to uninfested areas with increased visitation. Weed treatments near wetlands should be approached with care so that damage is not done to the existing rare plants and communities.

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Version Author: Smith, P.F.

Version Date: 03/05/2012


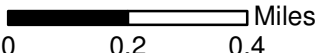


Colorado Natural Heritage Program
 Colorado State University
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 Fort Collins, CO 80523-1475
<http://www.cnhp.colostate.edu>

 PCA Boundary

Meridian Hill, 39105-E4
 Conifer, 39105-E3

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

Map Date: 02/28/2012

 Miles

Location in Jefferson County



Map 7. Black Mountain Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Buck Gulch

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: Pine

Size: 167 acres (68 ha)

Elevation: 6,850 - 7,520 ft. (2,088 - 2,292 m)

General Description: Buck Gulch includes several first to third order streams that flow north from nearby forested uplands on the north side of Redskin Mountain that join the North Fork of the South Platte River about 1.5 miles west of the Town of Pine. At this confluence, the wide flat floodplain of the North Fork of the South Platte bisects the site. The surrounding upland areas are in good condition and consist of large areas of unfragmented coniferous forest dominated by ponderosa pine (*Pinus ponderosa*) that are probably less than one hundred years old. The uplands are dry to moist and support forests and woodlands that include ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), mountain mahogany (*Cercocarpus montanus*), and Rocky Mountain juniper (*Juniperus scopulorum*). Mountain muhly (*Muhlenbergia montana*), blue grama (*Chondrosum gracile*), little bluestem, (*Schizachyrium scoparium*), fringed sage (*Artemisia frigida*), hairy golden aster (*Heterotheca villosa*), woolly cinquefoil (*Potentilla hippiana*) and yucca (*Yucca glauca*) were very common in the understory and openings. These floodplains are dominated by areas of non-native pasture grasses, erosional areas and modified streambanks. There is also a four wheel drive road and an adjacent area with an old railroad bed that follows the north shore of the river. The North Fork of the South Platte drainage has also been diverted to make ponds in the floodplains and one of these ponds is located in the site. There are small patches of the floodplain that do support the growth of native wetland vegetation including coyote willows (*Salix exigua*), chokecherry (*Padus virginiana*), yellow avens (*Geum aleppicum*), raspberry (*Rubus ideaus*), desert ragwort (*Senecio eremophilus*) and wild hops (*Humulus lupulus*). The geology is comprised entirely of Pikes Peak granite (Tweto 1979). In the forested uplands as much as 70 percent of the understory was bare ground covered with loose, decaying granite gravel with very sparse plant growth and included very steep topography. These upland soils are dominated by the Resort-Sphinx gravelly sandy loams with 15-50 percent slopes, Sphinx-Resort-Rock outcrop complex with 50-70 percent slopes and to a lesser extent the Raleigh very gravelly sandy loams with 30-50 percent slopes. The dominant soil type on the valley bottom is Rosane sandy loam with 0-3 percent slopes (USDA NRCS 2008).

Key Environmental Factors: The physical topography including the steep, loose gravelly soils, forest cover and the large granite outcrops all provide the habitat for

the rare plants that were found in the upland plant communities. The occurrence of natural wildfires and the protection of the lands as open space for over 30 years has allowed for the recovery of the forest vegetation and supported ecological processes that continue to support the rare plants that currently exist. Ecological processes including hydrology, natural migration, pollination, fire and dispersal are all important to the long-term persistence of the plant species and their habitats.

Climate Description: The nearby weather station at Bailey, CO recorded an average annual precipitation of 16.65 inches from 1901 to 2011. Snowfall is greatest in December through March and summer rains peak in March and April. The average annual maximum temperature is 58.2°F (14.6°C) and the average annual minimum temperature is 24.9°F (-3.9°C WRCC 2006).

Land Use History: The riparian corridor has been developed over the past one hundred years for homesteads, agriculture, railroads, vacation lodging and ranching. Evidence of homesteading, grazing and light agriculture exists on the property. Homesteaders and ranchers have built houses, roads and developed the floodplain area. The North Fork of the South Platte was diverted to form ponds that were used to harvest ice blocks for the railroad that passed through the area until the 1920's. Roughly 75% of the area lies on Jefferson County Open Space that was purchased in 1986, making it one of the earliest acquired open spaces in the county.

Biodiversity Significance Rank Comments (B2): The site supports a good (B-ranked) occurrence of the globally imperiled (G2/S2) Front Range milkvetch (*Astragalus sparsiflorus*) and fair (C-ranked) occurrences of the globally vulnerable (G3/S3) Rydberg twinpod (*Physaria vitulifera*) and Jeweled blazingstar (*Nuttallia speciosa*). The population of the Front Range milkvetch represents one of only eight locations known from the state, most of which are historical or do not have population data (CNHP 2011). The Rydberg twinpod and the Jeweled blazingstar are both endemic to the State of Colorado.

Natural Heritage element occurrences at the Buck 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	<i>Astragalus sparsiflorus</i>	Front Range milkvetch	G2	S2				B	2010-07-10
Vascular Plants	<i>Nuttallia speciosa</i>	Jeweled blazingstar	G3	S3				C	2010-07-10
Vascular Plants	<i>Physaria vitulifera</i>	Rydberg twinpod	G3	S3				C	2010-07-10

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

Other Values: The Rocky Mountain aletes (*Aletes anisatus*) is a species of concern that is currently not actively tracked (CNHP watchlist), it was found in the upland

areas of the drainage. It is also a Colorado endemic species. In addition, the site includes three upland plant species: spider milkweed (*Asclepias asperula*), ballhead ipomopsis (*Ipomopsis congesta*), and mountain muhly (*Muhlenbergia montana*) that ranked a 7 or higher, on the Colorado Floristic Quality Index (FQI) Coefficient of Conservation (Rocchio 2007); Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. Therefore, the presence of species with high FQI values is indicative of the high quality of this area and the recovery occurring post logging and fire.

Boundary Justification: The boundary is drawn to include the known occurrences of rare plants and their habitats which include the upland slopes surrounding the local drainages. Many of the rare plants are found in uplands that are in the vicinity of riparian areas. Although some of the land included is private, only public lands or lands with written permission were accessed. The boundary was digitized while referencing a digital color orthophoto quad and a 1:24,000 digital quad.

Protection Urgency Rank Comments (P4): Land ownership is roughly 75% Jefferson County Open Space with the remainder on private land in the south section. This is one of the earliest county acquisitions and the land within the site is in very good condition in the upland areas. The floodplain areas appear to be recovering from land uses that predate the County ownership. Conservation easements on nearby private lands could be helpful to maintain the integrity of the lands within the site.

Management Urgency Rank Comments (M4): The alien plant species that were encountered during this survey did not include any species on the B-list of noxious weeds from the Colorado Weed Management Association (2009). Smooth brome grass, while an invasive species, is difficult to treat without causing damage to the habitat was most common in the most disturbed parts of the floodplain. Common mullein is on the C list of Colorado noxious weeds and was present on roadsides and in the recently burned areas which also included the rare plant species. Spot spraying the common mullein in the rare plant areas may or may not be beneficial. The soils are very loose gravels and the disturbances caused by walking over the rare species or the use of off-road vehicles to access the sites by weed treatment crews could cause disturbances that exacerbate the weeds and damage the existing rare plants. At this time monitoring populations of rare plants (many are located so they can be observed from existing trails) might be the least destructive and most helpful way to determine whether treating the common mullein would be beneficial.

Land Use Comments: Currently, these areas are recovering from past land uses since the land was purchased as County Open Space. Fishing for rainbow, brown, brook and cutthroat trout is a popular use (Colorado Trout Hunters website), hiking, biking and equestrian uses are heavy in the summer and Pine Lake is used for ice skating in the winter.

Natural Hazard Comments: Steep outcrops, loose gravels on steep terrain, and lightening are some common hazards.

Exotic Species Comments: Alien plant species included: smooth brome (*Bromopsis inermis*), common mullein (*Verbascum thapsus*), split lip hempnettle (*Galeopsis bifida*), and cheatgrass (*Anisantha tectorum*).

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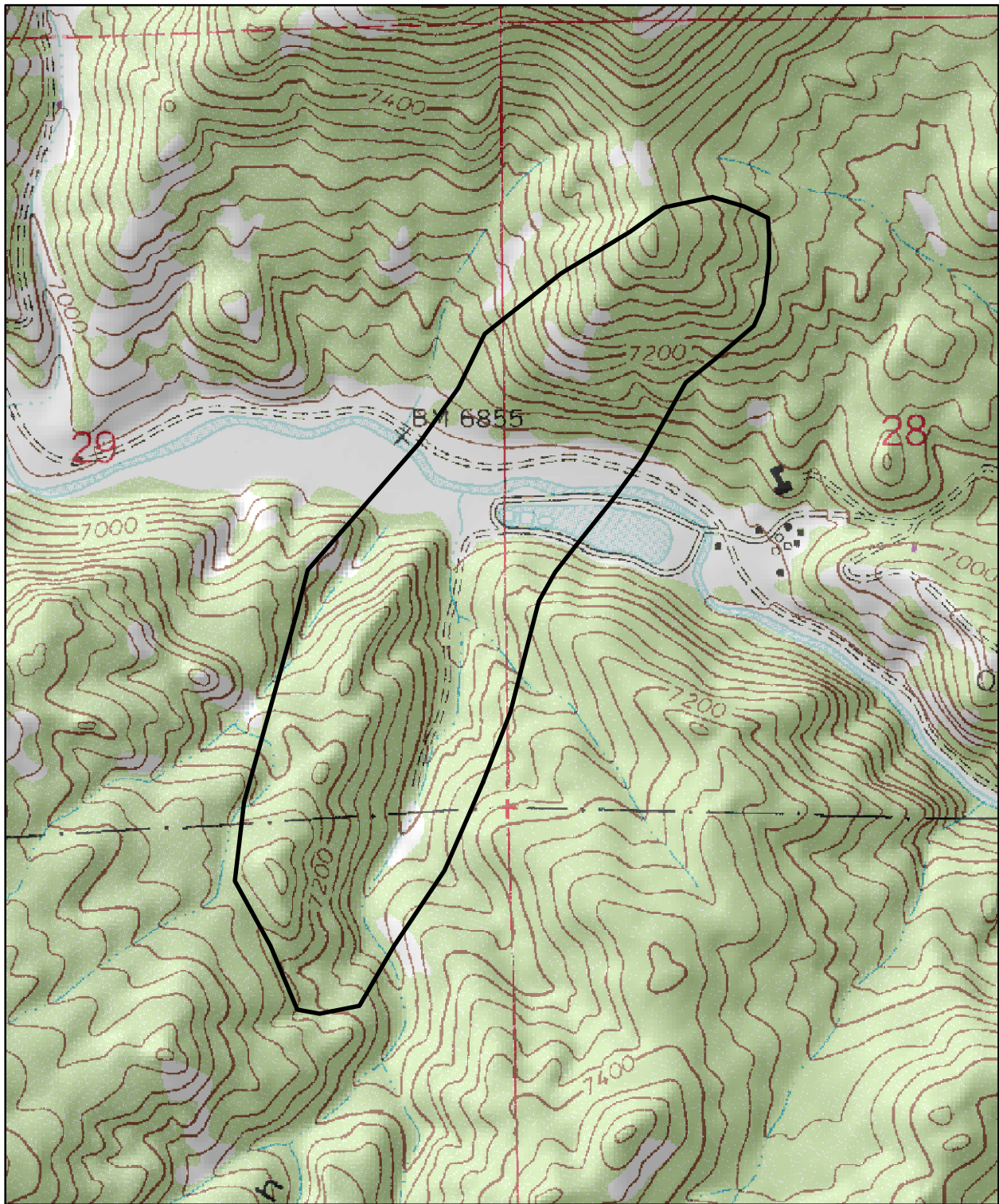
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Version Author: Smith, P.F.

Version Date: 02/24/2012



Colorado Natural Heritage Program

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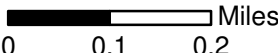
 PCA Boundary

Pine, 39105-D3

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

Location in Jefferson County



Map Date: 02/24/2012 
 Miles
 0 0.1 0.2

Map 8. Buck Gulch Potential Conservation Area, B2: Very High Biodiversity Significance

Buffalo Redskin Creeks

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: Windy Peak, Green Mountain

Size: 835 acres (338 ha)

Elevation: 7,000 - 7,800 ft. (2,134 - 2,377 m)

General Description: The site follows a narrow riparian corridor with a dense cover of blue spruce (*Picea pungens*) and water birch (*Betula occidentalis*) along Redskin and Buffalo creeks in the Pikes Peak National Forest. Redskin and Buffalo creeks both originate in the mountains just 2-3 miles west of the western border of Jefferson County and join together 5-6 miles from their points of origin. At their confluence Buffalo Creek becomes a third order stream and flows to the northeast following a Forest Service Road. Ponderosa pine (*Pinus ponderosa*) dominates on the steep-sided canyons that include large picturesque tors of Pikes Peak granite (Tweto 1979). Forest openings with large areas of healthy grasslands dominated by Arizona fescue (*Festuca arizonica*), mountain muhly (*Muhlenbergia montana*) and needle and thread grass (*Hesperostipa comata*) were observed in the upland areas of the drainages. Most of the occurrence is in excellent condition with overhanging vegetation, shaded banks and low impacts from nearby dirt roads. The drainages have a large diversity of vegetation in the understory and include large moss covered areas and populations of slender bog orchids (*Limnorchis stricta*), dwarf red blackberry (*Cylactis pubescens*), and liverworts on the flood plains. In the less impacted sections of the streams the bottoms are gravelly with moss covered rocks and boulders lining the streams. The water is clear with sands, gravel and large boulders in the stream. The upland soils consist of sandy loams and loamy sands near the valleys.

Key Environmental Factors: The topography and hydrological features are significant factors that support the rare plant community that occurs in this drainage. The anthropogenic disturbances have not compromised the hydrology of the system within the site.

Climate Description: The weather station at Cheesman, CO between 1902 and 2011 recorded an average annual precipitation of 15.89 inches. Snowfall is greatest in March and April, spring/summer rains peak in July and August. The average annual maximum temperature is 62.7°F (17.0°C) and the average annual minimum temperature is 28.6°F (-1.9°C, WRCC 2006).

Land Use History: During the 1800's much of the land that makes up the Pikes Peak National Forest was logged, burned and overhunted until the early 1900's when it

became part of the National Forest System. Grazing, stream alterations and road building have impacted the area. Upstream and just outside the western boundary of the site, impacts from a private residence and ranch appear to have altered the hydrology. In addition, private property along Buffalo Creek contains an area where the floodplain has been mowed on both sides of the occurrence for about a half mile on both sides of the stream leaving only a narrow band of riparian vegetation and no tree cover. In 1996, the Buffalo Creek Fire burned portions of the Buffalo Creek drainage so that the canopy cover is broken for about a quarter of a mile on Buffalo Creek. There is also a large beaver dam on Buffalo Creek about one mile from the east border of the site.

Biodiversity Significance Rank Comments (B2): This site is drawn for a good (B-ranked) occurrence of a blue spruce / water birch (*Picea pungens* / *Betula occidentalis*) montane riparian woodland that is both globally and state imperiled (G2/S2). This is a large occurrence that follows first and third order streams for a distance over four miles. Most of the area is in very good condition with a thick band of overhanging vegetation that shades the stream. The narrow canyons are deep and cool with floodplains that support a lush assortment of native plant species. The uplands that are located away from the disturbed roadsides are in excellent condition and include large areas of native grass dominated meadows in a matrix with the surrounding ponderosa pine (*Pinus ponderosa*) woodlands.

Natural Heritage element occurrences at the Buffalo Redskin Creeks 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	<i>Picea pungens</i> / <i>Betula occidentalis</i> Woodland	Montane Riparian Woodland	G2	S2				B	2011-09-02

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

Other Values: Within the site were eleven plant species that ranked a 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): dwarf red blackberry (*Cylactis pubescens*), red baneberry (*Actaea rubra*), slender bog orchid (*Limnorchis stricta*), Parry's bellflower (*Campanula parryi*), starry false lily of the valley (*Maianthemum stellatum*), hemlock parsley (*Conoselinum scopulorum*), enchantress' nightshade (*Circaea alpina*), mountain muhly (*Muhlenbergia montana*), tall fringed bluebells (*Mertensia ciliata*) and water birch (*Betula occidentalis*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats within the site.

Boundary Justification: The boundary is drawn to include the known occurrence of a rare plant community. The boundary is based on the immediate watershed which

also encompasses intact upland communities of forests and grasslands. The largely intact hydrology supports many ecological processes especially flooding, natural migration, pollination and dispersal that are essential to the long-term persistence and integrity of the occurrence.

Protection Urgency Rank Comments (P3): The property is publicly owned and managed by Pikes Peak National Forest. Special designation could go a long ways towards maintaining the integrity of the site and to allow it to continue to recover from the fire.

Management Urgency Rank Comments (M3): Since the rare plant community was originally surveyed (McMullen and Van Wie 1996) noxious weeds have become established. High visitor use to riparian areas can be detrimental to the stream vegetation cover and hydrological features. Any activities that impact the soils or hydrology will degrade the rare plant community here. The stream bottoms are very sandy in places suggesting there is runoff from the roadways into the creeks in some areas. Noxious weeds and pasture grasses are present especially where there has been disturbance and/or the removal of the overstory tree cover. The area near the Buffalo Campground is almost devoid of vegetation in the understory because of heavy visitor use and the nearby streambanks are eroding likely as a result. Avoiding the placement of future campgrounds, roads, bridges and trails in the riparian areas and floodplains is an excellent way to prevent damages to the occurrence.

Land Use Comments: Today much of the area is used primarily for recreation including camping and hiking. Many of the Forest Service roads have high volumes of vehicular traffic to access the camping and the trail system. Both Redskin and Buffalo creeks have roads that run alongside them within the site. Impacts to the stream were obvious at the campgrounds and included moderately to severely eroded and sloughing banks. The streambanks within the campgrounds were almost completely devoid of vegetation. The nearby roadway had a number of invasive weed species present, especially in non-shaded portions where the tree cover had been removed.

Natural Hazard Comments: Very steep and rugged terrain.

Exotic Species Comments: The quantity of non-native species in the more protected part of the drainage was very low. However, areas near roads, bridges, agricultural areas, private houses and campgrounds have non-native and noxious weed species present. Noxious weed species (B-List - Colorado Weed Management Association 2010) found included: Canada thistle (*Breca arvensis*), bull thistle (*Cirsium vulgare*), yellow toadflax (*Linaria vulgaris*), and musk thistle (*Carduus nutans*). It is interesting to note that none of these noxious weed species (observed in 2011) were noted in the original survey of this community conducted 15 years ago (McMullen and Van Wie 1996). Other non-native species that can invade wetlands that were noted in both 1996 and 2011 include two species of pasture grasses, smooth brome (*Bromopsis*

inermis) and Kentucky bluegrass which often invade riparian areas. Common dandelion (*Taraxacum officinale*), common mullein (*Verbascum thapsis*) and creeping bentgrass (*Agrostis stolonifera*) were also observed in both studies in the disturbed areas.

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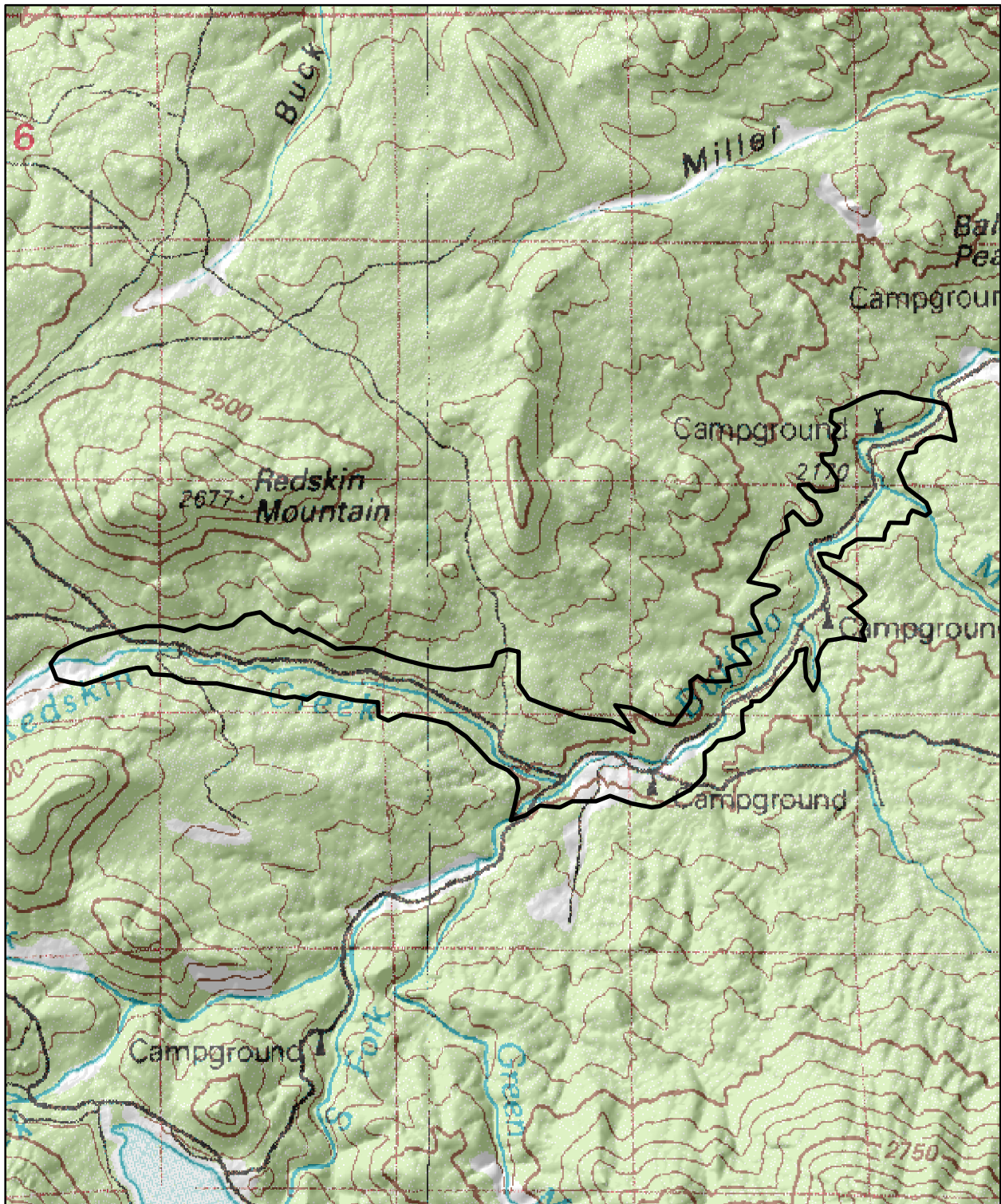
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Version Author: Smith, P.F.

Version Date: 02/17/2012



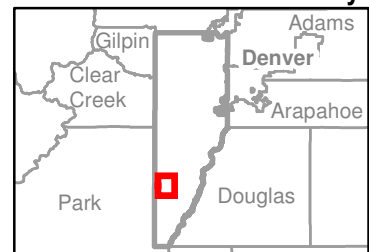
Colorado Natural Heritage Program
 Colorado State University
 1475 Campus Delivery
 Fort Collins, CO 80523-1475
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 PCA Boundary


Bailey, 39105-A1

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

Location in Jefferson County



Map Date: 01/10/2012

 Miles
 0 0.2 0.4



Map 9. Buffalo Redskin Creeks Potential Conservation Area, B2: Very High Biodiversity Significance

Clear Creek to Golden

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: Golden, Morrison, Evergreen, Ralston Buttes

Size: 1,279 acres (517 ha)

Elevation: 5,700 - 6,800 ft. (1,737 - 2,073 m)

General Description: The Clear Creek to Golden site follows the Clear Creek drainage from the intersection of State Hwy 93 and U.S. Hwy 6 in Golden about 5 miles west (along Hwy 6) to Guy Gulch. It also includes part of Indian Gulch which joins Clear Creek about 0.65 miles west of the Hwy 93 and Hwy 6 intersection. From the Continental Divide, Clear Creek passes through the towns of Silver Plume, Georgetown and Idaho Springs before it reaches the site which lies just on the eastern border of the Rocky Mountain foothills. Numerous tributaries feed into Clear Creek by the time it reaches the east side of the foothills. The topography is very rugged with steep slopes of woodlands, shrublands and grasslands, which include large outcrops and steep canyon walls. The riparian wetlands provide habitat for native wetland plants and include several populations of a federally listed Threatened species Ute ladies' tresses (*Spiranthes diluvialis*). Common overstory species along Clear Creek include cottonwoods (*Populus deltoides* subsp. *monilifera*, *P. angustifolia*, *P. x acuminata*), Douglas-fir (*Pseudotsuga menziesii*), blue spruce (*Picea pungens*) and box elder (*Negundo aceroides*), in the forested sections of the river. Common riparian shrubs include thinleaf alder (*Alnus incana*), water birch (*Betula occidentalis*), coyote willow (*Salix exigua*), chokecherry (*Padus virginiana* subsp. *melanocarpa*), and hackberry (*Celtis reticulata*). Wild grape (*Vitis riparia*), wild hops (*Humulus lupulus* subsp. *americanus*) and poison-ivy (*Toxicodendron rydbergii*) are also very common woody plants in the canyon bottoms. The open floodplain areas are most heavily impacted by invasive weeds. However, there are areas where native vegetation and rare plants thrive. Common native herbaceous plants observed include goldenglow (*Rudbeckia ampla*), bog orchids (*Limnorchis hyperborea*, *L. stricta*), arctic rush (*Juncus arcticus*), switch grass (*Panicum virgatum*), monkey flower (*Mimulus glabratus*), and a wide variety of sedges and grasses. The surrounding steep and rocky uplands include ponderosa pine (*Pinus ponderosa*), Rocky Mountain juniper (*Juniperus scopulorum*), skunkbush (*Rhus trilobata*) and mountain mahogany (*Cercocarpus montanus*). Needle-and-thread grass (*Hesperostipa comata*) dominated grasslands with big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), and a variety of wildflowers occur on the steep canyon slopes. Rydberg's twinpod (*Physaria vitulifera*), a Colorado endemic was also observed on the steep upland slopes. Several mule deer and a mountain lion were observed in 2010 as well as a mountain lion den and scat in the

same vicinity. The construction of Hwy 6 and railroad tracks which follow Clear Creek Canyon include some of the major anthropogenic disturbances evident along the drainage. Historic mining excavations are also evident along the steep slopes. The geology of Indian Gulch differs from the geology of Clear Creek Canyon. Along Indian Gulch, felsic and hornblendic gneisses, derived primarily from volcanic rocks are predominant while along the canyon, metamorphic rocks derived primarily from sedimentary rocks are more common with lesser amounts of granitic rocks (Tweto 1979). The upland soils consist of Ratake-Cathedral-Rock outcrop complex, with 25-100 percent slopes. The wetland areas include cryofluvents with 0-5 percent slopes, cumulic cryoborolls, loamy, with 0 to 5 percent slopes, and torrifuvents, very gravelly, with 0 to 3 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Although the area has been significantly impacted by road and railroad construction and historical mining activities, the land on the steep and rugged slopes and on some parts of the riparian areas supports healthy native plant communities. Topography and hydrology that have not been severely altered by human activities provide the functioning ecological systems.

Climate Description: The nearby weather station at Evergreen recorded an average annual precipitation of 18.7 inches between 1961 and 2011. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7°F (15.9°C) and the average annual minimum temperature is 27.2° F (-2.7° C, WRCC 2006).

Land Use History: A major roadway, U.S. Hwy 6 was built along the Clear Creek Canyon bottom. Mining activities were especially prevalent during the early Colorado gold rush of 1859. A railroad was constructed in addition to the highway. The steep slopes prevented more developments and alterations by humans compared to other less steep drainages along the Front Range.

Biodiversity Significance Rank Comments (B2): This site includes a good (B-ranked) and a fair (C-ranked) occurrence of a globally imperiled (G2G3/S2) and federally listed plant species, Ute ladies' tresses (*Spiranthes diluvialis*). The downstream occurrence in good condition is the type locality. A poor (D-ranked) occurrence of a globally vulnerable state endemic (G3/S3) species, Rydberg twinpod (*Physaria vitulifera*) was located on the upland slopes of the drainages. The Ute ladies' tresses populations have fluctuated over the years, apparently related to moisture and precipitation. A new range extension was added to the population in 2011 as a new sub-population was located. Although the Clear Creek drainage has been developed with bridges, a major highway, railroad and mining activities in this area, the hydrology is still functioning well, with flooding events allowing floodplains to continue to support native wetland vegetation.

Natural Heritage element occurrences at the Clear Creek to Golden 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	<i>Spiranthes diluvialis</i>	Ute ladies' tresses	G2G3	S2	LT			B	2011-08-17
Vascular Plants	<i>Spiranthes diluvialis</i>	Ute ladies' tresses	G2G3	S2	LT			C?	1994-08-12
Vascular Plants	<i>Physaria vitulifera</i>	Rydberg twinpod	G3	S3				D	2011-08-27

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

Other Values: CNHP failed to find an occurrence of a state rare plant, the blue-eyed grass (*Sisyrinchium demissum*) during the 2011 survey. The occurrence was last observed in 1994. Within the site are seven plants that ranked 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): box elder (*Negundo aceroides*), water birch (*Betula occidentalis*), bog orchids (*Limnorchis hyperborea*, *L. stricta*), Ute ladies' tresses (*Spiranthes diluvialis*), big bluestem (*Andropogon gerardii*), and Rocky Mountain maple (*Acer glabrum*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: The boundary is drawn to include the known occurrences of two rare plants including a federally Threatened species. These plants are found on the floodplains or on the surrounding slopes along Clear Creek and Indian Gulch. The land is largely on lands owned by Jefferson County Open Space interspersed with areas of private lands. Only public lands were accessed for this survey.

Protection Urgency Rank Comments (P3): The property is a mix of private land and lands owned largely by Jefferson County Open Space.

Management Urgency Rank Comments (M2): Much of the large anthropomorphic disturbances occurred in the past with the construction of the highways and historical mining activities. Much of the land is now slated to be used as recreational areas giving these areas more time to recover. Although most local ecological processes are included in the boundary, the largest scale forces that support the plants originate upstream; therefore, watershed management strategies that support the conservation of the elements will be necessary for long-term viability. Weeds are present and smooth brome was likely planted or has invaded the wetlands along the canyon from the surrounding lands. Three non-native species found in the site are garden escapes: oriental clematis (*Viticella orientalis*), sweat pea (*Lathyrus latifolius*) and myrtle spurge (*Tithymalus myrsinites*). The sweat pea, which is often planted for bank stabilization is known to be an aggressive weed in some situations. This is

likely the case for the plants growing in the vicinity of the federally Threatened plants at this site. Because the sweet pea has an extensive root system, weed management activities should be very carefully considered. The federally Threatened species that grow in the area are also very sensitive to a variety of herbicides. The sweet pea plants need open sunny areas to thrive while the rare plants can tolerate some shading. Continued monitoring is likely a good plan for the time being keeping in mind the rare plants numbers fluctuate widely from year to year. The myrtle spurge was found in dense patches in the canyon bottom along the lower section of Indian Gulch and along Clear Creek near the newly constructed bridge and trails. Social trails and evidence of humans camping on the shore were prevalent along the flood plain areas of Clear Creek. A state rare plant that was documented in 1994, blue-eyed grass (*Sisyrinchium demissum*) was not relocated despite attempts to find it in 2011. The habitat in the location where the plant was observed historically appears to be in an area that has since been developed as a trail. The surrounding habitat no longer appears to be suitable and this species could potentially be extirpated from this area.

Land Use Comments: U.S. 6 is a major highway that runs along the entire site. A large amount of the land along the Clear Creek corridor is used for recreation: rock climbing, bouldering, fishing, rafting, kayaking and hiking. Some areas appear to be used by people making small camps on the shore of the creek.

Natural Hazard Comments: Very steep, rugged terrain, sheer cliffs, loose rocky slopes, lightning, mountain lions and rattlesnakes are also potential threats.

Exotic Species Comments: One A-List noxious weed species (Colorado Weed Management Association 2009) was observed: myrtle spurge (*Euphorbia myrsinites*). Populations were observed near the bridge, and along the paved trails as well as Indian Gulch in the lowest reaches near Clear Creek. These areas are heavily disturbed by construction and other human activities and this has likely contributed to the spread of this invasive weed. Two B-List exotic species were found in the impacted wetlands and upland areas: oriental clematis (*Viticella orientalis*), and saltcedar (*Tamarix* sp.). Sweet pea (*Lathyrus latifolius*) is a garden escape which has been widely planted for erosion control. It has been known to become invasive and this appears to be the case in the floodplain area along Clear Creek where it grows in very dense patches climbing over other vegetation. Smooth brome (*Bromopsis inermis*) is another widely planted non-native species that is invasive in wetlands that was often encountered. Both of these plants also grow within the population of federally Threatened species. Treatments are difficult for both of these invasive species as they have very deep root systems. The threatened species is sensitive to many herbicides and pulling up the roots could further disrupt the system. Careful analysis and observations must be made by people experienced with both the invasive species as well as the rare species before any treatments should be considered. Monitoring is perhaps the best strategy currently as the populations seem to be doing well despite the weeds and social trails and there is a local

volunteer group monitoring the populations. Management in the floodplain area is a complex issue, for example there is a very similar area (10 miles downstream with the same threatened species) where social trails were perceived to be a problem in the rare orchid populations so a fence was constructed to keep the fisherman and others out. The social trails disappeared but so too did the orchids. The area experienced more shrub growth as a result of keeping out foot traffic and the orchids have not been seen in 10 years. It is a fine balance of disturbance, shading and sunlight that may need to be considered.

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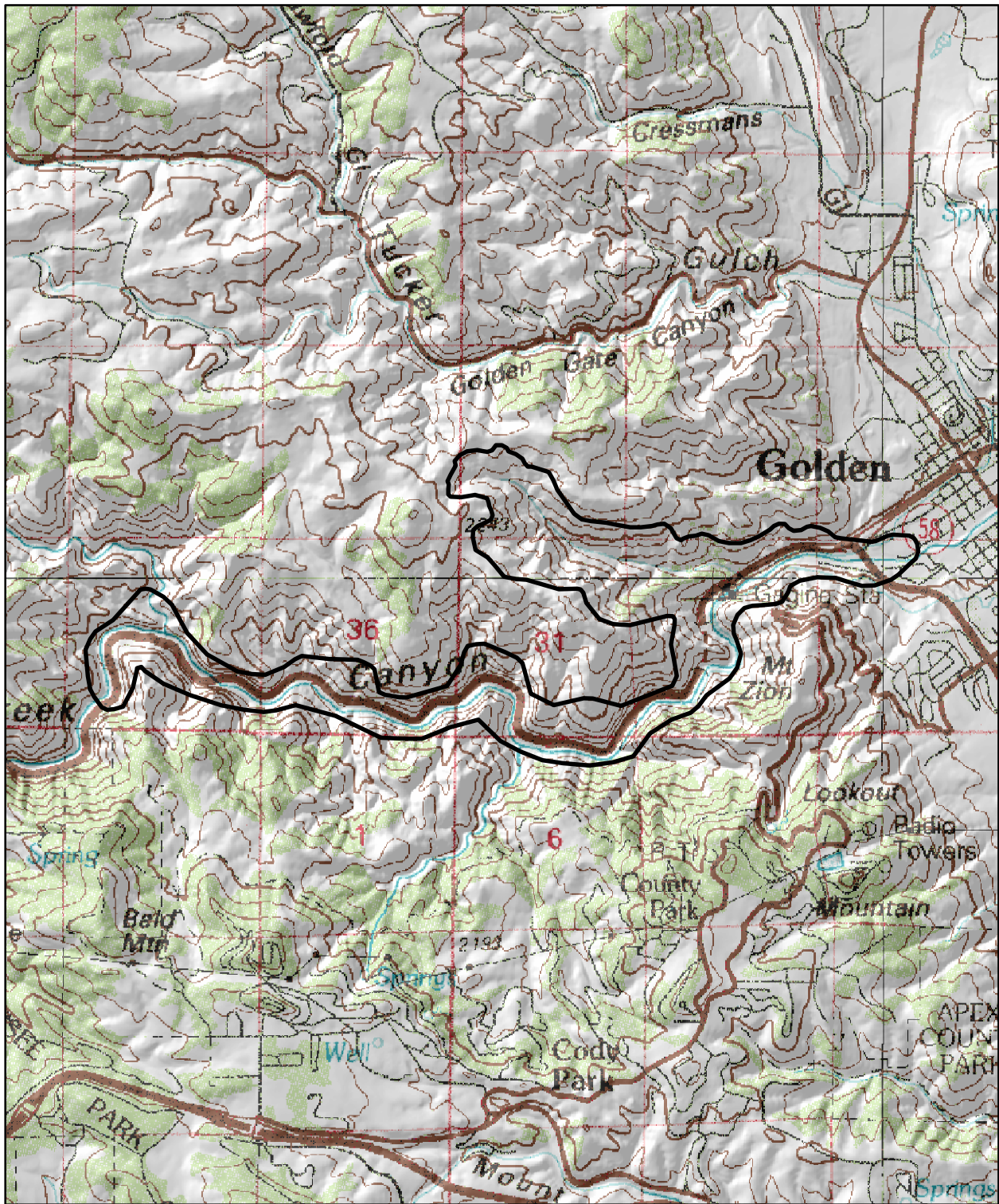
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Version Author: Smith, P.F.

Version Date: 02/28/2012



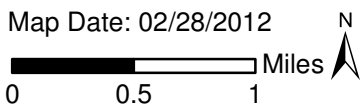
Colorado Natural Heritage Program
 Colorado State University
 1475 Campus Delivery
 Fort Collins, CO 80523-1475
<http://www.cnhp.colostate.edu>

 PCA Boundary

Denver West, 39105-E1

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

Location in Jefferson County



Map 10. Clear Creek to Golden Potential Conservation Area, B2: Very High Biodiversity Significance

Ken Caryl Hogback Complex

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: Indian Hills, Littleton

Size: 4,629 acres (1,873 ha)

Elevation: 5,800 - 6,540 ft. (1,768 - 1,993 m)

General Description: The Ken Caryl hogback complex is a linear corridor formed by two parallel hogbacks that run north-south and are separated by a narrow valley. The hogback ridges provide habitat for rare plants and healthy grassland and shrub communities on the outcrops of Dakota sandstone and Niobrara shale. Two major roads, Ken Caryl Avenue and Deer Creek Canyon Road cut through the hogbacks in the north and south portions of the site. A major state highway, C-470 crosses through the northern section and is just east of the hogback complex in the southern part of the site. Several perennial streams dissect the hogbacks, although Dutch Creek is the only perennial stream not adjacent to a road. On the hogbacks xeric tallgrass prairie (*Andropogon gerardii* - *Schizachyrium scoparium*) is found along the lower slopes with shrub communities dominated by mountain mahogany (*Cercocarpus montanus*), skunkbrush (*Rhus aromatica* subsp. *trilobata*) and Gambel's oak (*Quercus gambelii*) with scattered ponderosa pines (*Pinus ponderosa*) and Rocky Mountain juniper (*Juniperus scopulorum*). Black-tail prairie dog (*Cynomys ludovicianus*) communities, rare butterflies including the Ottoe skipper (*Hesperia ottoe*) and Arogos skipper (*Atrytone arogos*), northern leopard frog (*Lithobates pipiens*) and a nesting Prairie Falcon (*Falco mexicanus*) are also found in the valley and on the hogbacks. In addition, a Long-eared Owl (*Asio otus*) was documented nesting in the Gambel's oak woodland associated with the hogbacks.

Key Environmental Factors: Physical topography including hogbacks, streams, sandstone and shale outcrops are all factors that contribute to the existing habitats that support the diversity of plants, animals and plant communities that currently exist. In addition, the surrounding large land areas that have been not been developed are also a significant factor.

Climate Description: The Ken Caryl hogbacks are located at the edge of the foothills on the east side of the Rocky Mountains in central Jefferson County. The climate supports more xeric vegetation due to the location in the rain shadow of the nearby mountains. The nearby weather station at Kassler, CO between 1918 and 2010 recorded an average annual precipitation of 17.6 inches. Snowfall is greatest in February through April and summer rains peak in April and May. The average annual maximum temperature is 65.9°F (18.8 °C) and the average annual minimum

is 36.4°F (2.4°C, WRCC 2006).

Land Use History: Native Americans, homesteaders and ranchers have made use of this landscape for hundreds of years. Agriculture and ranching have impacted large areas especially the grassy valleys. Fire suppression has also been a factor in the history of this site. In 1989, the hogback areas were initially recognized as significant natural features and were given priority as high quality areas for education, recreation and conservation (Pague et al. 1993). A large portion of the land is County Open Space, private open space and lands owned by the Foothills Recreation District. The Open Space managers have provided weed and prairie dog management for over a decade that has supported the natural environment in these areas

Cultural Features: Several archaeological sites have been located in the area by the Colorado Archaeological Society. More than 1,000 Woodland Indian artifacts have been found. The Bradford House III archaeological site was put on the National Register of Historic Places in 1980. New sites are being explored.

Biodiversity Significance Rank Comments (B2): Most significant, are the excellent (A-ranked) and good (B-ranked) occurrences of Bell's twinpod hybrid (*Physaria* x1), a globally critically imperiled (G1Q/S1) plant. Currently, the only known populations in the world of this species are within this site. The hogback complex supports two fair (C-ranked) occurrences of a globally imperiled (G2?/S2) big bluestem-little bluestem (*Andropogon gerardii-Schizachyrium scoparium*) xeric tallgrass plant community, found in the northern and southern sections on the hogback slopes. Some of the patches include dense stands of big and little bluestem (*Schizachyrium scoparium*) while some areas have more scattered populations forming a mosaic with other native grasses and forbs. The site also supports two occurrences of globally vulnerable and state rare butterflies, the Ottoe skipper (G3G4/S2) and Arogos Skipper (G3/S2). A rare grass, the forked threeawn (*Aristida basiramea*), is known from two locations along sandstone outcrops of these hogbacks. Forked threeawn is globally stable but very rare in the state (G5/S1), a fair (C-ranked) and a historical (H-ranked) occurrence have been documented on the hogbacks. A poor (D-ranked) occurrence of a globally stable but state critically imperiled species (G5/S1), red stemmed spring beauty (*Claytonia rubra*), which is currently known from less than five known locations in the state (CNHP 2011), was also found on the hogbacks.

Natural Heritage element occurrences at the Ken Caryl Hogback Complex 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	Lithobates pipiens	Northern Leopard Frog	G5	S3		SC	BLM/ USFS	E	2000-99-99
Insects	Atrytone arogos	Arogos Skipper	G3	S2				E	2010-07-14
Insects	Hesperia ottoe	Ottoe Skipper	G3G4	S2			USFS	E	2010-07-23
Natural Communities	Physaria x 1		G1Q	S1				B	2010-06-01
Natural Communities	Physaria x 1		G1Q	S1				A	2010-07-25
Natural Communities	Andropogon gerardii - Schizachyrium scoparium Western Great Plains Herbaceous Vegetation	Xeric Tallgrass Prairie	G2?	S2				C	1992-08-20
Natural Communities	Andropogon gerardii - Schizachyrium scoparium Western Great Plains Herbaceous Vegetation	Xeric Tallgrass Prairie	G2?	S2				C	1992-09-09
Vascular Plants	Aristida basiramea	forktip three - awn	G5	S1				C	2010-07-25
Vascular Plants	Aristida basiramea	forktip three - awn	G5	S1				H	1986-09-03
Vascular Plants	Claytonia rubra		G5	S1				D	2010-06-29

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

Other Values: Within the site is also a historical (H-ranked) occurrence of the state vulnerable northern leopard frog (G5/S3). In addition, a Long-eared Owl (*Asio otus*) was documented nesting in the Gambel's oak woodland associated with the hogbacks. Long-eared Owls are not tracked but are an uncommon and notable species indicative of the quality of the habitat. Note on *Physaria x1*: The newly identified hybrid species *Physaria x1* was genetically determined to be a cross between two rare plants that are both Colorado endemics, Rydberg twinpod (*Physaria vitulifera*) and Bell's twinpod (*Physaria bellii* - Kothera et al. 2007). In the Natural Heritage Inventory conducted in 1992-93 (Pague et al. 1993), these plants

were identified as Bell's twinpod (*Physaria bellii*), although, different surveyors noted the plants at this site appeared to be hybrid species and noted research should be conducted on these plants. Resulting from the genetic work of Kothera (2007) and the geographical study of a local scientist, Bill Jennings (2004), the Natural Heritage Program was able to assess the new ranges of the twinpod species in Colorado. Since the 1993 report, these observations have been genetically verified from samples collected at this site. Although the hybrid has been verified, it has not yet been formally named in the literature and is currently listed in the Natural Heritage Program database as *Physaria x1*.

Boundary Justification: The boundary includes the parallel hogbacks and their slopes. It includes all known xeric tallgrass prairie remnants located in the valley and on the lower slopes of the hogbacks and the known populations of rare plants and animals. A disjunct group of hills to the east of the hogbacks, just east of I-470, is included because of a dense population of the rare Bell's twinpod hybrid. This is a very large site and was originally drawn during the first Natural Heritage Inventory of Jefferson County twenty years ago (Pague et al.1993). The new boundaries match closely to those drawn previously except that populations of what was then identified as Bell's twinpod (*Physaria bellii*) were not all included. The new boundary incorporates these areas because new and existing populations of the twinpod (now recognized as a hybrid) were observed in areas in between these hogbacks. The ecological processes such as hydrology, natural migration, dispersal and pollination are all supported by the surrounding habitat which is important to the long-term persistence of the occurrences. The boundary was digitized while referencing digital color orthophoto quad and a 1:24,000 digital quad.

Protection Urgency Rank Comments (P4): Currently a significant part of the area is managed open space and is owned by Jefferson County and Ken-Caryl Ranch which includes both public and private open space lands. Martin Marietta Corporation and other private lands are located within the site, and include areas that were not surveyed because access was not granted. Significant occurrences of *Physaria x1* are located on properties owned by the Foothills Park & Recreation District (Dutch Creek Greenbelt) and the Ken-Caryl Ranch Metropolitan District (Deer Creek). The Jefferson County Open Space Recreation Campus and Meadows Golf Club also own properties nearby that could be important to the long term survival of the occurrences. The Dakota Hogback area is owned by the Ken-Caryl Ranch Foundation and is protected as Natural Wildlife Habitat. Acquiring any available adjacent lands is beneficial to help assure the integrity of natural areas. Efforts to accomplish this appear to have occurred since the original Natural Heritage Survey (Pague 1993 et al.).

Management Urgency Rank Comments (M4): Since the original Natural Heritage Survey when the hogbacks were identified as significant natural features, efforts by Open Space Managers have been focused on protecting these communities. Thoughtful weed management and prescribed burns appear to be working well in

the northern section of the hogbacks. Conservation of the tallgrass prairie also benefits the rare butterflies which exploit tall grasses, utilizing them as larval host plants. Sustainable prairie dog management is also a result of these efforts. Current management in the north section appears to be adequate and the area seems to be well-protected as part of a private county open space. The southern section contains more invasive weed species especially the areas with agricultural impacts. The largest threats to the natural plant communities and rare plants in this conservation area are the development of new trails, power lines, access points or anything that disturbs the soil layers, or hydrology. Fire suppression is also a factor but is probably necessary in portions because of the high density of residential areas. Weed treatments may be helpful for some of the B-listed noxious species in the southern hogback slopes especially on the eastern side.

Land Use Comments: The majority of the lands are managed as open space with non-motorized trails throughout the area. Some of the areas are not easily accessible and are afforded more protection. A few grasslands are actively mowed for hay in the southern portion of the site on the eastern slopes. A large portion is owned by a private corporation. Residential developments are very dense in the surrounding landscape as is typical for the Rocky Mountain Front Range. Associated with the heavy residential developments are a number of very heavily used roads.

Natural Hazard Comments: Steep terrain, loose rocky slopes, lightning and rattle snakes are the typical dangers that one would expect on this terrain.

Exotic Species Comments: An excellent example of good weed and prairie dog management has been occurring on the managed lands in the hogbacks on the northern section of the site especially in the vicinity of the tallgrass prairie. A concerted effort of weed management including controlled burns has been used with success to promote native vegetation. In addition, methods have been designed to sustain the prairie dog population. The exotics on the south section are probably of greatest concern and include Scotch thistle (*Onopordum acanthium*), musk thistle (*Carduus nutans*), diffuse knapweed (*Acosta diffusa*), toadflax (*Linaria vulgaris*), and Canada thistle (*Breea arvensis*) which are all B-Listed noxious weeds (Colorado Weed Management Association 2009). However, the planted pasture grasses especially smooth brome (*Bromopsis inermis*), orchard grass (*Dactylus glomerata*) and Kentucky bluegrass (*Poa pratensis*) have invaded and dominate many of the disturbed and agricultural areas and streambanks located along the drainages. The pasture grasses are difficult to control without damaging other aspects of ecosystems and are not included on noxious weed lists. Other common exotics include cheatgrass (*Anisantha tectorum*), and common mullein (*Verbascum thapsus*) which are often so widespread in modern landscapes (C-listed species) that they are difficult to treat effectively.

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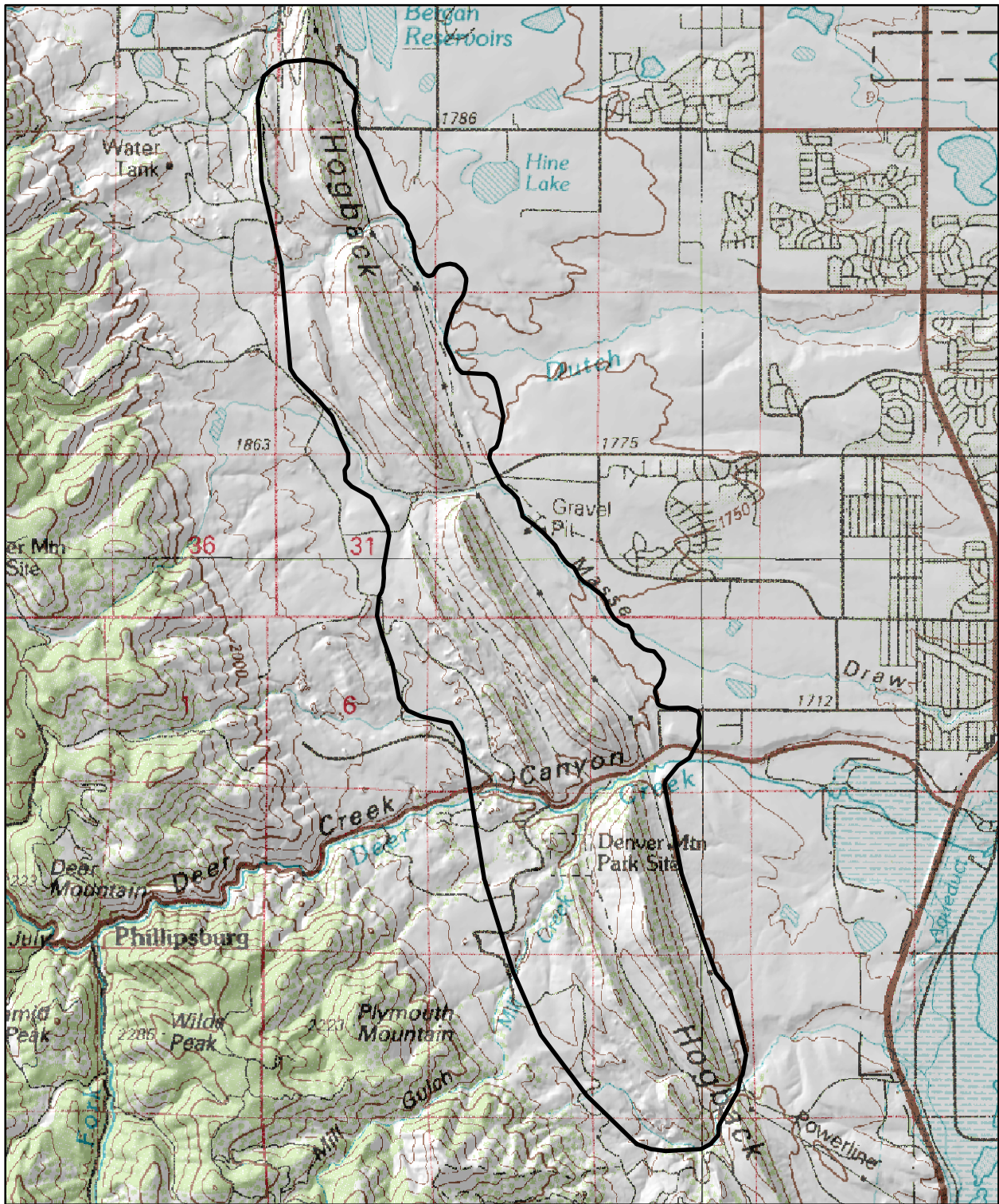
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Version Author: Smith, P.F. and J.R. Sovell

Version Date: 02/24/2012



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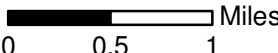
 PCA Boundary

Denver West, 39105-E1

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

Location in Jefferson County



Map Date: 01/19/2012 
 Miles

Map 11. Ken Caryl Hogback Complex Potential Conservation Area, B2: Very High Biodiversity Significance

Middle Ralston Creek

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P2: Threat/Opportunity 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: Ralston Buttes

Size: 1,656 acres (670 ha)

Elevation: 6,070 - 7,900 ft. (1,850 - 2,408 m)

General Description: The Middle Ralston Creek site is part of the valley drainage created by Ralston Creek. Originating at roughly 6,000 feet at Ralston Reservoir near the start of Colorado's eastern plains, the site rises to 7,900 feet at its west boundary. It consists of steep rugged mountain terrain that rises to both sides of Ralston Creek. The western half of the site is dominated by forests and open woodland. A large portion of the west side consists of pine forest including stands of pure ponderosa pine (*Pinus ponderosa*) or mixed stands of ponderosa pine and Douglas-fir (*Pseudotsuga menziesii*). Here there are also patches of more open areas of rock outcrops with sparse Rocky Mountain juniper (*Juniperus scopulorum*) and ponderosa pine. In the eastern half of the site, the percentage of pine forest is reduced, there is more open juniper woodland, and mountain mahogany (*Cercocarpus montanus*) shrubland becomes more prevalent. Also, large patches of meadow grassland create a mosaic with the pine forest, shrubland and open juniper woodland. Along Ralston Creek, there are riparian communities consisting of plains cottonwood (*Populus deltoides*), narrowleaf cottonwood (*P. angustifolia*), aspen (*Populus tremuloides*), thinleaf alder (*Alnus incana*), water birch (*Betula occidentalis*), Rocky Mountain maple (*Acer glabrum*) and willows (*Salix exigua*, *S. bebbiana*, *S. drummondiana*) or Colorado blue spruce (*Picea pungens*) and Douglas-fir with lush understories of herbaceous vegetation such as shooting star (*Dodecatheon pulchellum*), golden banner (*Thermopsis divaricarpa*), bog orchid (*Limnorchis hyperborea*), agrimony (*Agrimonia striata*), goldenglow (*Rudbeckia ampla*), scouring rush (*Equisetum arvense*), Canadian white violet (*Viola rydbergii*), Fendler's waterleaf (*Hydrophyllum fendleri*), giant goldenrod (*Solidago gigantea*), fowl manna grass (*Glyceria striata*), sedges and mosses. Within these lush riparian areas of willows and dense herbaceous ground cover occurs the rare Preble's meadow jumping mouse (*Zapus hudsonius preblei*). The site's extensive length and east-west orientation results in a complex geology. On the eastern edge of the site, the bedrock geology consists of Triassic, Permian and Pennsylvanian sedimentary rocks including siltstone, sandstone and conglomerate of the Lykin, Lyons, and Fountain Formations. Precambrian sedimentary, igneous, and metamorphic gneisses, schist and migmatite dominate the rest of the site. Soils originate from the rock formations and at high elevations consist of exposed bedrock, boulders and talus slopes. Below this on the mountain slopes there are shallow to deep and well drained stony, gravelly, and sandy to loamy colluvium

soils derived from sedimentary, igneous, and metamorphic rocks of the underlying formations. Finally, within the creek bed there are deep and well drained soils derived from loamy alluvium.

Key Environmental Factors: The lush stands of willow and herbaceous vegetation create a vegetative structure suitable for habitation by Preble's meadow jumping mouse. Ralston Creek is one of the very few major drainages that does not have a major roadway following the entire length of the riparian zone.

Climate Description: The nearby weather station at Ralston Reservoir between 1978 and 2012 recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March, spring/summer rains peak in April-August. The average annual maximum temperature is 63.0°F (17.2°C) and the average annual minimum temperature is 38.9° F (3.8° C, WRCC 2012). The frost-free season is about 168 days.

Land Use History: Ranching, uranium mining and open space recreation.

Biodiversity Significance Rank Comments (B2): This site supports a good (B-ranked) occurrence of a globally imperiled (G2?/S1) narrowleaf cotton wood / bluestem willow - Rocky Mountain maple (*Populus angustifolia* / *Salix drummondiana* - *Acer glabrum*) woodland, a good (B-ranked) occurrence of a globally vulnerable (G3/S3) narrowleaf cottonwood - Douglas-fir (*Populus angustifolia* - *Pseudotsuga menziesii*) riparian forest and extant and fair (C-ranked) occurrences of the globally imperiled (G5T2/S1) and Federally Threatened Preble's meadow jumping mouse (*Zapus hudsonius preblei*). There is also a fair (C-ranked) occurrence of a globally vulnerable (G3/S3) plant, Rydberg twinpod (*Physaria vitulifera*). The narrowleaf cottonwood / bluestem willow - Rocky Mountain maple woodland community is only the second known location in the state at this time, as well as the only known occurrence in Jefferson County (CNHP 2011).

Natural Heritage element occurrences at the Middle Ralston 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	<i>Zapus hudsonius preblei</i>	Meadow Jumping Mouse Subsp	G5T2	S1	LT	ST		E	2011-08-17
Mammals	<i>Zapus hudsonius preblei</i>	Meadow Jumping Mouse Subsp	G5T2	S1	LT	ST		C	1997-07-14
Natural Communities	<i>Populus angustifolia</i> / <i>Salix drummondiana</i> - <i>Acer glabrum</i> Woodland		G2?	S1				B	2011-07-14
Natural Communities	<i>Populus angustifolia</i> - <i>Pseudotsuga menziesii</i> Woodland	Montane Riparian Forest	G3	S2				B	2011-06-07
Vascular Plants	<i>Physaria vitulifera</i>	Rydberg twinpod	G3	S3				C	2011-07-26

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

Other Values: Within the site were eight plants that ranked between 7-10 on the Colorado Floristic Quality Index (Rocchio 2007): water birch (*Betula occidentalis*), Rocky Mountain maple (*Acer glabrum*), agrimony (*Agrimonia striata*), bog orchid (*Limnorchis hyperborea*), shooting star (*Dodecatheon pulchellum*), Canada white violet (*Viola rydbergii*), starry false lily of the valley (*Maianthemum stellatum*), and Fendler's waterleaf (*Hydrophyllum fendleri*), Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: This site includes two rare plant communities and the riparian and upland grassland habitat components used by the Preble's meadow jumping mouse (PMJM). The site includes the riparian area and a 1,000-foot (300-meter) buffer. Based on telemetry studies and trapping results in other areas where PMJM are found, these boundaries should provide the necessary habitat components for long-term stability of the population found there. It includes all known PMJM captures in this drainage, plus additional habitat upstream and downstream of these captures. The buffer distance of 300 meters is intended to be conservative, likely including a greater amount of upland community than most mice will utilize, but sufficient in all circumstances to ensure persistence of jumping mice. A more refined boundary for this site would include the 100-year floodplain and an additional 100 meters of adjacent upland habitat. Until these data layers are

available for all areas within the site, the present boundary should provide for the persistence of the PMJM in this area. The largeness of this site provides a degree of protection from stochastic and site-specific events that may affect portions of the population.

Protection Urgency Rank Comments (P2): It is estimated that stresses may reduce the viability of the Preble's meadow jumping mice in the site if protection action is not taken. Overall, about 35 percent of the site is privately owned while the remaining 65 percent is either Jefferson County Open Space (White Ranch Park; Ternstrom, Weidner, and recent Pearce acquisitions) or within Golden Gate State Park. Although this area currently has relatively little urbanization, residential development continues to grow. It is important to understand the impact residential development may have on reducing the amount of riparian and upland habitat available to Preble's meadow jumping mice. In areas of Colorado that have intensive urban development Preble's meadow jumping mice are no longer found.

Management Urgency Rank Comments (M4): Current management seems to favor the persistence of the Preble's meadow jumping mice at this site, but new management actions may be needed in the future to maintain the current quality of the occurrences. Management concerns include maintenance of natural seasonal creek flows required to maintain the riparian vegetation. It is likely that the Preble's meadow jumping mouse (PMJM) populations along Ralston Creek have always been small to moderate in number because the riparian systems are narrower and more confined than in other parts of the mouse's range. However, some habitat has been lost due to water development including Ralston Reservoir, uranium mining at the Schwartzwald Mine, agricultural uses (livestock grazing and hay meadows) on the western half of the site, and recreational activity on the east half. Thus, management effort is needed to maintain the habitat quality; attempts to maintain or expand the density and extent of riparian shrublands may increase the PMJM population size.

Land Use Comments: Recreation, uranium mining and ranching are common land uses.

Natural Hazard Comments: The site contains rough steep terrain and steep drops requiring caution when hiking in the site.

Exotic Species Comments: Weedy species include a number of pasture grasses that are more prevalent in open areas. Some reaches of Ralston Creek show less impacts from grazing. Smooth brome (*Bromopsis inermis*), dandelion (*Taraxacum officinale*), Kentucky bluegrass (*Poa pratensis*), orchard grass (*Dactylus glomerata*), and reed canary grass (*Phalaris arundinacea*) were found in the more disturbed sections.

Off-Site Considerations: Exurban development has occurred south of the site.

Information Needs: Additional biological surveys to identify the size and extent of

the Preble's jumping mouse population within the site would assist with managing the population. More information on the extent of the rare plant communities which could also be found along the smaller tributaries would be beneficial.

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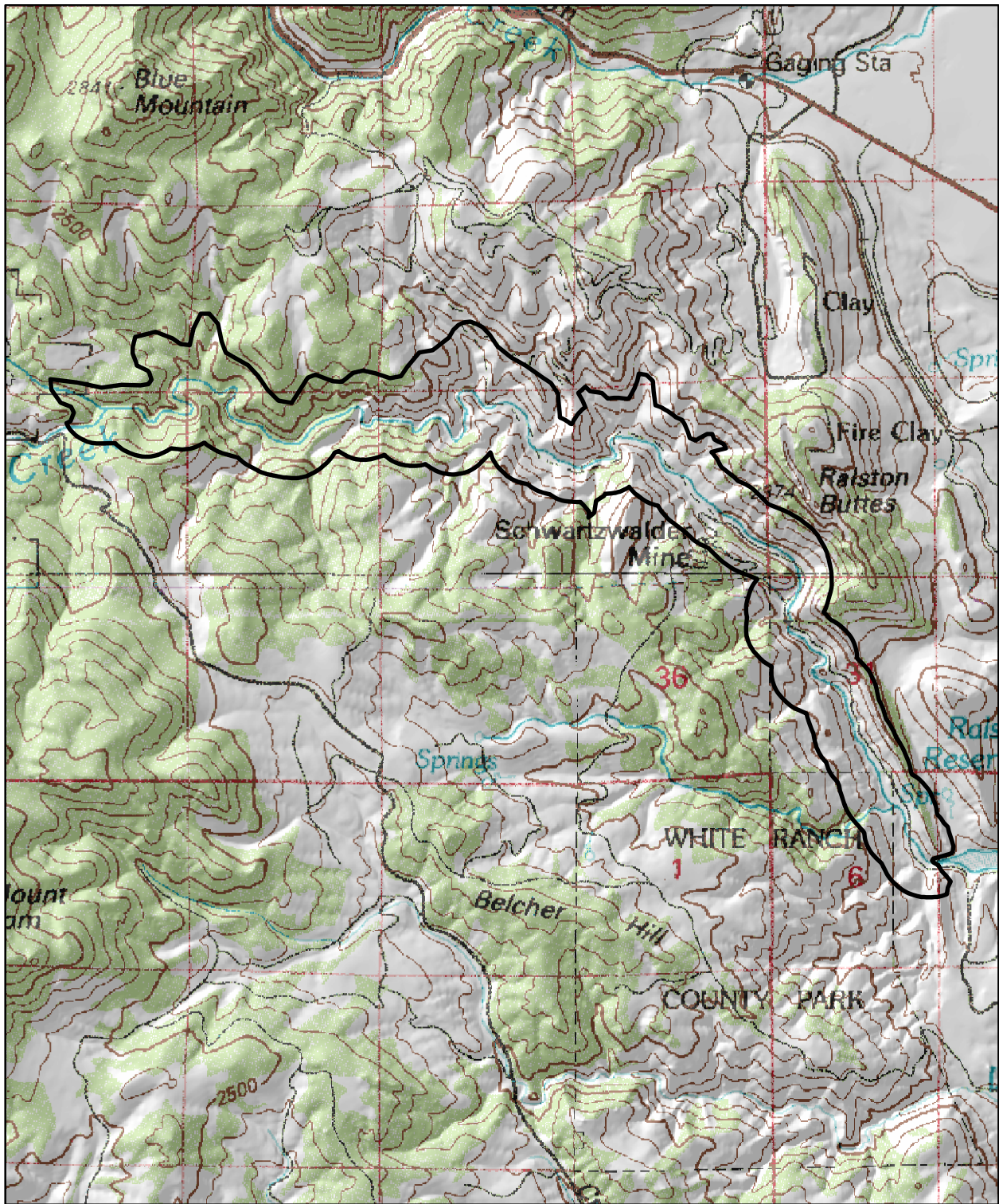
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Version Date: 01/06/2012

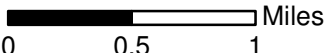



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 PCA Boundary
 Denver West, 39105-E1
 30x60 Minute Digital Raster
 Graphic Produced by the
 U.S. Geological Survey

Location in Jefferson County



Map Date: 01/10/2012
 Miles


Map 12. Middle Ralston Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Mount Falcon Red Rocks

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: Morrison

Size: 2,789 acres (1,129 ha)

Elevation: 5,904 - 7,881 ft. (1,800 - 2,402 m)

General Description: The Mount Falcon Red Rocks site occupies an area of rugged foothills and slopes on the eastern edge of the Front Range. The site covers a large part of the Matthews-Winters and Mount Falcon County Open Space Parks and is bisected from east to west at its approximate mid-point by the Bear Creek Canyon. The topography of the area consists largely of a number of north to south ridges and valleys and includes numerous rock outcrops on the side slopes and intermittent streams in the valley bottoms. Vegetation includes xeric mixed grass meadows on mostly east and south-facing slopes with deeper soils. Low shrublands of mountain mahogany (*Cercocarpus montanus*), Gambel's oak (*Quercus gambelii*), skunkbush sumac (*Rhus trilobata*), Oregon grape (*Mahonia repens*) and juniper (*Juniperus scopulorum*) occur on some of the more rocky east and south-facing sites. Common herbs include blue grama grass (*Chondrosium gracile*), western wheat grass (*Pascopyrum smithii*), woolly brome (*Bromopsis lanatipes*), smooth white aster (*Symphotrichum porteri*), Fremont's goosefoot (*Chenopodium fremontii*), native thistle (*Cirsium undulatum*), native sunflower (*Helianthus pumilus*), fringed sage (*Artemisia frigida*) and yucca (*Yucca glauca*). Woodlands and forests of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) occur in the more southern portions of the site on west and north-facing slopes. The bottom of the larger drainages supports riparian communities of plains cottonwood (*Populus deltoides*), narrowleaf cottonwood (*Populus angustifolia*), Rocky Mountain maple (*Acer glabrum*), and numerous mesic forbs and graminoids. A drainage in the southern section of the site includes an area with mature Douglas-fir trees with a Geyer's sedge (*Carex geyeri*) understory and a rich diversity of plants including mountain ash (*Sorbus scopulina*), wild sarsaparilla (*Aralia nudicaulis*), littleseed ricegrass (*Piptatherum micranthum*), hazelnut (*Corylus cornuta*), water birch (*Betula occidentalis*), and the western rattlesnake plantain orchid (*Goodyera oblongifolia*). A spikemoss (*Selaginella underwoodii*) and a fern were observed on the rock outcrops (*Woodsia oregana*). An abundance of bird species were observed in the diverse habitats: grasslands, shrublands, savanna, riparian forests, and evergreen forests. The soils, which are derived from gneisses that are primarily from volcanic rocks, include very steep slopes (Tweto 1979). The central part of the site is dominated by the Rock outcrop-Cathedral-Ratake complex that includes slopes from 50-100 percent. The remainder of the site is largely comprised of Grimstone-Hiwan-rock outcrops that

have 30-60 percent slopes and Ratake-Cathedral-Rock outcrops with 25-60 percent slopes including some north slopes, with lesser amounts of Allens Park variant-Ratake-Rock outcrop complex with 30- 50 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Large expanses of open lands that have not been fragmented and riparian valleys with intact hydrology are important factors that contribute to the diversity of the site.

Climate Description: Total annual precipitation averages approximately 20 inches per year. The average annual temperature is 45 degrees F, while the average annual maximum temperature is 60 degrees F, and the average annual minimum temperature is 32 degrees F.

Land Use History: Historically the area supported grazing and extractive industries such as quarrying, sand and gravel mining, and logging. Presently the area is primarily used for recreation on public lands and residential development on private lands. Much of the land within this site is within Jefferson County Park and Open Space lands.

Cultural Features: Several historic structures or the remnants thereof, occur within the site. These include the Summer White House, and the Falcon Castle Ruins, among others.

Biodiversity Significance Rank Comments (B2): This site contains a good (B-ranked) occurrence of a globally imperiled (G2/S2) mountain mahogany / needle-and-thread grass (*Cercocarpus montanus* / *Hesperostipa comata*) mixed foothills shrubland community, a good (B-ranked) occurrence of the globally imperiled (G2/S2) Rocky Mountain juniper / mountain mahogany (*Juniperus scopulorum* / *Cercocarpus montanus*) scarp woodland community, and a good (B-ranked) occurrence of a state vulnerable (G4?/S3) lower montane Douglas-fir / Geyer's sedge (*Pseudotsuga menziesii* / *Carex geyeri*) forest community.

Natural Heritage element occurrences at the Mount Falcon Red Rocks 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	Cercocarpus montanus / Hesperostipa comata Shrubland	Mixed Foothill Shrublands	G2	S2				B	2011-09-14
Natural Communities	Juniperus scopulorum / Cercocarpus montanus Woodland	Foothills Pinyon - Juniper Woodlands/Scar p Woodlands	G2	S2				B	2011-09-14
Natural Communities	Pseudotsuga menziesii / Carex geyeri Forest	Lower Montane Forests	G4?	S3				B	2011-09-23

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

Other Values: Within the site were nine plants observed that ranked between 7-10 on the Colorado Floristic Quality Index (Rocchio 2007): water birch (*Betula occidentalis*), Rocky Mountain maple (*Acer glabrum*), wild sarsaparilla (*Aralia nudicaulis*), littleseed ricegrass (*Piptatherum micranthum*), mountain ash (*Sorbus scopulina*), western rattlesnake plantain orchid (*Goodyera oblongifolia*), hazelnut (*Corylus cornuta*), Wood's lipfern (*Woodsia oregana*), and Underwood's spikemoss (*Selaginella underwoodii*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: The boundaries include element occurrences of three plant associations and additional area of suspected target vegetation based on review and analysis of satellite imagery. The area contained within the site should preserve ecological processes and land important to ensure survival of the occurrences.

Protection Urgency Rank Comments (P4): Approximately 80% of the site is owned by Jefferson County Open Space. Land protection actions are largely complete and the need for additional actions is not anticipated.

Management Urgency Rank Comments (M4): No management actions are needed in the foreseeable future.

Land Use Comments: Largely used for recreational trails (non-motorized).

Natural Hazard Comments: Very steep slopes.

Exotic Species Comments: Cheatgrass (*Anisantha tectorum*), alyssum (*Alyssum*

parviflorum) and Japanese brome (*Bromus japonicus*) are widespread. Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*) is a B-Listed noxious weed (CWMA 2012) that was common in disturbed upland shrub areas and Canada thistle (*Breca arvensis*) was noted in patches in the riparian areas.

References

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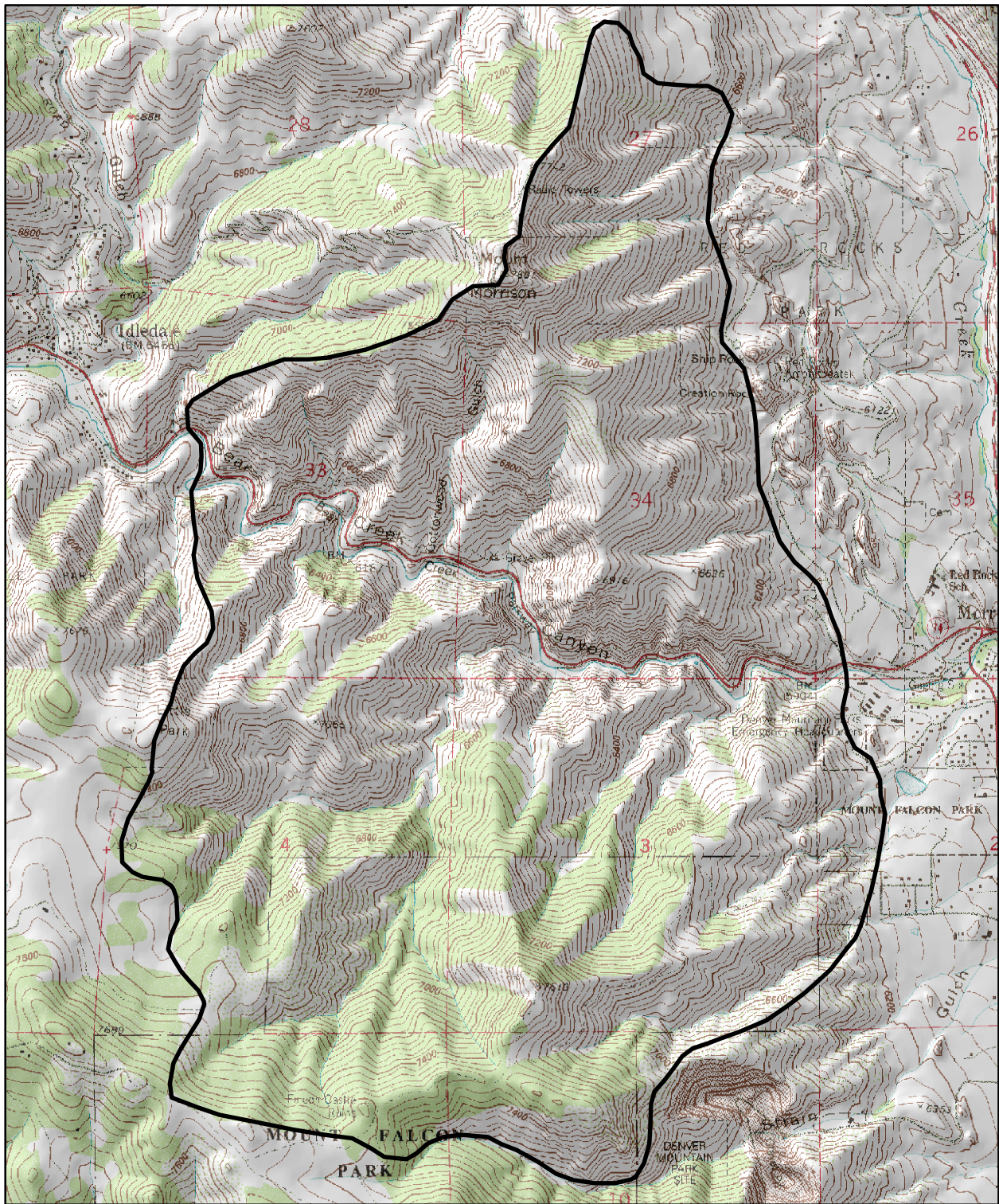
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Version Author: Stevens, J.E. and P.F. Smith

Version Date: 01/18/2012



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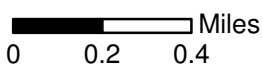
Morrison, 39105-F2

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

Location in Jefferson County



Map Date: 01/19/2012

 Miles
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Map 13. Mount Falcon Red Rocks Potential Conservation Area, B2: Very High Biodiversity Significance

Mount Vernon Canyon

Biodiversity Rank - B2: Very 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: Morrison

Size: 1,124 acres (455 ha)

Elevation: 5,900 - 7,673 ft. (1,798 - 2,339 m)

General Description: Mount Vernon Creek is a large stream that originates 3.5 miles west of the site on the east side of Genesse Mountain which lies just west of the Town of Mount Vernon. The eastern side of the site begins near the point where Mount Vernon Creek Canyon meets the base of the foothills and extends westward one mile and follows the I-70 corridor. The streambanks on the south side of I-70 form the northern boundary of the site. The area on the north side of Mount Vernon Creek is very steep, loose and rocky and has been heavily impacted by the construction of I-70. A pipeline traverses the southern side from east to west. The southern part of the site contains almost a full square mile of rolling ranch lands with ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) woodlands covering the ridge tops with shrublands and a rare plant community, the Great Plains mixed grass prairie on the slopes. Mountain mahogany (*Cercocarpus montanus*) shrublands cover the dry slopes with common prairie grass species including big bluestem (*Andropogon gerardii*), needle-and-thread grass (*Hesperostipa comata*), blue grama (*Chondrosum gracile*), western wheat (*Pascopyrum smithii*), Canada bluegrass (*Poa compressa*) and sleepygrass (*Achnatherum robustum*). Forbs include hairy golden aster (*Heterotheca villosa*), fringed sage (*Artemisia frigida*), silver sage (*Artemisia ludoviciana*), Indian paintbrush (*Castilleja integra*), wild geranium (*Geranium caespitosum*), winged buckwheat (*Eriogonum alatum*) and largeflower Townsend daisy (*Townsendia grandiflora*). Other shrubs include Gambel's oak (*Quercus gambelii*), buckbrush (*Ceanothus fendleri*), Wood's rose (*Rosa woodsii*) and currants (*Ribes* spp.). Several small first and second order drainages cross the site and feed into Mount Vernon Creek. These wetlands add to the biodiversity. Some of the wetland woody plants include coyote willow (*Salix exigua*), water birch (*Betula occidentalis*), boxelder (*Negundo aceroides*), Rocky Mountain maple (*Acer glabrum*), chokecherry (*Padus virginiana* subsp. *melanocarpa*), narrowleaf cottonwood (*Populus angustifolia*), Plains cottonwood (*Populus deltoides* subsp. *monilifera*), blue spruce (*Picea pungens*) and snowberry (*Symphoricarpos alba*). A rare shrub, the yellow hawthorn (*Crataegus chrysocarpa*), was also found in one of the small drainages. Common wetland plants in the herbaceous layer include bulrushes (*Scirpus* spp.), Nebraska sedge (*Carex nebrascensis*), woolly sedge (*Carex pellita*), Arctic rush (*Juncus arcticus*), poverty rush (*Juncus tenuis*), beaked sedge (*Carex utriculata*), wild mint (*Mentha arvensis*), and Fendler's waterleaf (*Hydrophyllum fendleri*). The geology is comprised of volcanic gneisses (Tweto 1979). Upland woodland soils consist of

Grimstone-Hiwan-Rock outcrop complex, with 30-60 percent slopes and the Legault-Tolvar-Rock outcrop complex with 50-70 percent slopes. Shrubland soils include the Ratake-Cathedral-Rock outcrop (with north slopes) complex, with 25-60 percent slopes, Ratake-Liniger stoney sandy loams with 30-60 percent slopes and the Allens Park variant-Ratake-Rock outcrop complex, with 30-50 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Although the area has been significantly impacted by road building in the north section, cattle grazing throughout and pipeline construction along the south side, the land in between is fairly unaltered with the forested ridges, shrublands and prairie grasslands along the slopes with the small unaltered first and second order drainages which provide the landscape for the plant communities.

Climate Description: The nearby weather station at Evergreen between 1961 and 2011 recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7°F (15.9°C) and the average annual minimum temperature is 27.2° F (-2.7° C, WRCC 2006).

Land Use History: A major roadway, I-70, was built along the northern section of the site and a pipeline traverses the south end of the site. The land surrounding the property is developed with residences to the west while the main portion of the site has been used mainly for livestock grazing.

Biodiversity Significance Rank Comments (B2): The site supports a good (B-ranked) occurrence of a globally critically imperiled (G1G2/S1S2) *Hesperostipa comata* Great Plains mixed grass prairie and a poor (D-ranked) occurrence of the state critically imperiled (G5/S1) yellow hawthorn (*Crataegus chrysocarpa*). The mixed grass prairie community that occurs at this site is included in one of the most severely altered systems in the Southern Rocky Mountains ecoregion. It is unusual to find excellent occurrences of the system (Ecological Integrity Assessments CNHP) and protecting existing good occurrences like this one is important.

Natural Heritage element occurrences at the Mount Vernon 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	Hesperostipa comata Colorado Front Range Herbaceous Vegetation	Great Plains Mixed Grass Prairie	G1G2	S1S2				B	2011-07-20
Vascular Plants	Crataegus chrysocarpa	yellow hawthorn	G5	S1				D	2011-07-21

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

Other Values: Within the site are five plants that ranked 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): Fendler's waterleaf (*Hydrophyllum fendleri*), box elder (*Negundo aceroides*), water birch (*Betula occidentalis*), Macoun's buttercup (*Ranunculus macounii*), bog orchid (*Limorchis hyperborea*), buckbrush (*Ceanothus fendleri*) and Rocky Mountain maple (*Acer glabrum*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: The boundary is drawn to include the known occurrence of a rare prairie grassland community and a rare riparian shrub species. The area includes undeveloped rolling hills, valleys with small drainages, and floodplains that run along the south side of Mount Vernon Canyon. Ecological processes including hydrology, natural migration, pollination and dispersal are supported by the surrounding habitats and are important to the long-term persistence of the occurrences. The land is largely on private property which was accessed with written permission from the landowners. A small portion on the east side is owned by Jefferson County Open Space.

Protection Urgency Rank Comments (P2): The property is private and part of the Mother Cabrini Shrine property.

Management Urgency Rank Comments (M3): Much of the large anthropomorphic disturbances occurred in the past with the construction of I-70 and the gas pipeline corridor. Weeds are present and smooth brome was likely planted or has invaded the wetlands along Mount Vernon Canyon from the surrounding lands. Currently, the land is leased to ranchers by the owners. The largest impacts are the disturbances caused by cows in the wetlands and heavy grazing in some areas.

Land Use Comments: The land is leased for cattle ranching.

Natural Hazard Comments: Very steep, rugged terrain and loose rocky slopes. Lightening and rattlesnakes are also potential threats.

Exotic Species Comments: No A-List noxious weeds were observed. A large number of B-List exotic species were found in the impacted wetlands and upland areas along Mount Vernon Creek: cutleaf teasel (*Dipsacus laciniata*), Canada thistle (*Breca arvensis*), musk thistle (*Carduus nutans*), hound's tongue (*Cynoglossum officinale*), spotted knapweed (*Acosta maculosa*), diffuse knapweed (*Acosta diffusa*), bouncing bet (*Saponaria officinalis*), and oriental clematis (*Viticella orientalis*). All of these weeds occur in the very disturbed and open areas in the Mount Vernon Creek drainage. List C noxious weeds observed include: poison hemlock (*Conium maculatum*) and common mullein (*Verbascum thapsus*). Other exotic plants observed include: smooth brome (*Bromopsis inermis*), dandelion (*Taraxacum officinale*), catnip (*Nepeta cataria*), watercress (*Nasturtium officinale*), alyssum (*Alyssum parviflorum*), cheat grass (*Anisantha tectorum*), and Japanese brome (*Bromus japonicus*).

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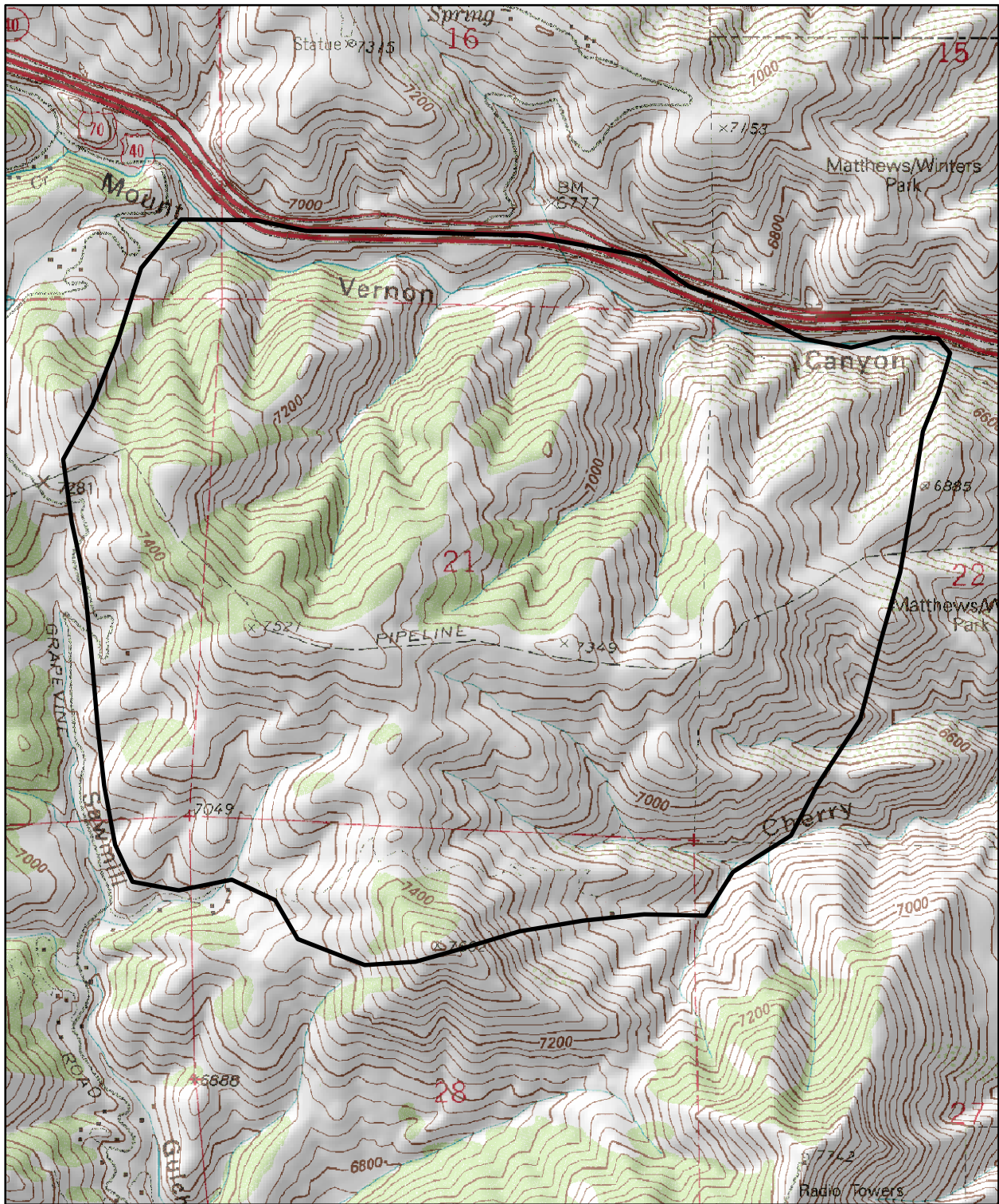
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Version Author: Smith, P.F.

Version Date: 02/29/2012



Colorado Natural Heritage Program
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<http://www.cnhp.colostate.edu>

 PCA Boundary

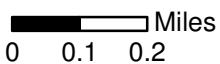
Morrison, 39105-F2

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 Graphic Produced by the
 U.S. Geological Survey

Location in Jefferson County



Map Date: 03/22/2012

 Miles
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Map 14. Mount Vernon Canyon Potential Conservation Area, B2: Very High Biodiversity Significance

North Fork South Platte

Biodiversity Rank - B2: Very High 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: Platte Canyon

Size: 1,081 acres (438 ha)

Elevation: 6,000 - 6,700 ft. (1,829 - 2,042 m)

General Description: The North Fork South Platte is a major tributary to the South Platte River. The entire length of the river is 50 miles beginning at the Continental Divide in northwest Park County and flowing southeast. The headwaters are close to the headwaters for the South Platte River and both originate in the Rocky Mountains southwest of Denver. The North Fork of the South Platte drains a rugged area of the Front Range just south of the Clear Creek basin. US 285 follows the river until the Town of Bailey, where it cuts south through the foothills. The North Fork South Platte site begins at the north section of CR 96 between Foxton and South Platte and covers about four linear miles ending at its confluence with the South Platte River joining it from the west. The basin of the river is separated from South Park by Kenosha Pass. The area is rugged with massive and steep outcrops that make for stunning views. The geology is comprised entirely of Pikes Peak granite (Tweto 1979). The uplands are dry to moist and support forests and woodlands that include ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), mountain mahogany (*Cercocarpus montanus*), and Gambel's oak (*Quercus gambelii*) with grassland and shrubland communities interspersed throughout. The drainage has multiple first to third order drainages that empty into the river along the four mile stretch. The tributary slope in this section is about 1-2% and it has a moderate sinuosity. A road runs along the floodplain the entire length of the site along the river. The floodplain is very narrow and is constricted by the very steep topography and by the road. Grazing occurs on the narrow floodplains. There are forested islands in the wider sections of the river. Vegetation cover is lush in spots supporting an array of wetland vegetation. Non-native species are patchy and inhabit the most disturbed areas near parking pull-offs and roadsides. Impacts from grazing and road construction are evident on the north side of the river and include erosion and modified streambanks. Wetland shrubs dominate some areas with a dense understory of forbs and graminoids. Sections of forested wetlands occur especially on the islands where there is an uncommon plant community, a ponderosa pine (*Pinus ponderosa*) and thinleaf alder (*Alnus incana*) woodland. Wetland shrubs are particularly dense near the confluence with the South Platte River at the Town of South Platte. Soils are gravelly, rocky and include igneous and metamorphic rock outcrops. The dominant soil type on the valley bottom is Rosane sandy loam with 0 to 3 percent slopes and to a lesser extend the Gerber variant very gravelly sandy loam with 5 to 9 percent slopes. The uplands include a large area of

Resort-Sphinx very gravelly sandy loams with 15-50 percent slopes, with lesser amounts of the Raleigh very gravelly sandy loams with 30-50 percent slopes and the Ratake-Liniger stony sandy loams with 30-60 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Physical topography including the drainages, intact hydrology (lack of dams or other diversion structures), steep rocky slopes and rock outcrops are important to the site. In addition, ecological processes especially flooding, and a fairly low to moderate degree of anthropogenic disturbances are all factors that contribute to the existing habitats that support the diversity that currently exists.

Climate Description: The nearby weather station at Strontia Springs Dam, CO between 1984 and 2010 recorded an average annual precipitation of 21.1 inches. Snowfall is greatest in December through February and summer rains peak March through June. The average annual maximum temperature is 63.0°F (17.2°C) and the average annual minimum temperature is 29.5°F (-1.4°C - WRCC 2006).

Land Use History: The land has been utilized in the past by residential dwellers including agricultural uses especially grazing for horses and cattle on the floodplain. Small towns exist within the site including Dome Rock, Longview and South Platte. The development is primarily residences with small acreages. The largest disturbance to the area is the roadway that was constructed along the northern side of the river. There are large tracts of undeveloped rugged lands that surround the site. Within the boundary there does not seem to have been major water diversions, dams or anthropogenic disturbances upstream. However, mining impacts have occurred upstream in the past from mineral deposits and mine tailings that washed down from the headwaters and from Geneva Creek rendering sections of the river upstream sterile in the past. Currently, these areas are recovering and now support a viable trout fishery for rainbow, brown, brook and cutthroat trout (Colorado Trout Hunters 2011).

Biodiversity Significance Rank Comments (B2): This site is drawn for both wetland and upland element occurrences and it includes seven rare plants, and two rare plant communities. The biodiversity rank is based on a good (B-ranked) occurrence of a globally imperiled (G2/S2) ponderosa pine / thinleaf alder (*Pinus ponderosa* / *Alnus incana*) woodland. There is also a fair (C-ranked) occurrence of the globally imperiled (G2/S2) Front Range milkvetch (*Astragalus sparsiflorus*), a good (B-ranked) occurrence of the globally critically imperiled (G4T1Q/S1) golden columbine (*Aquilegia chrysantha* var. *rydbergii*), good (B-ranked) occurrences of the globally vulnerable (G3/S3) Jeweled blazingstar (*Nuttallia speciosa*) and Rydberg twinpod (*Physaria vitulifera*), and poor (D-ranked) occurrences of the globally vulnerable *Alnus incana* / mesic forb shrubland and the state rare (G5/S1) variegated scouringrush (*Hippochaete variegata*). As of 2011, in the State of Colorado there are only 10 known occurrences of the golden columbine; two of them are historical (H-ranked) and have not been relocated in over 100 years; one is ranked as extant

with no information on the population size and this is the only record from Jefferson County. The occurrence of Front Range milkvetch is one of only a total of eight occurrences in the State of Colorado (CNHP 2011). This includes five occurrences which are historical and have not been observed in more than 20 years.

Natural Heritage element occurrences at the North Fork South Platte 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	<i>Pinus ponderosa</i> / <i>Alnus incana</i> Woodland	Ponderosa Pine / Thin Leaf Alder	G2	S2				B	1996-06-11
Natural Communities	<i>Alnus incana</i> / Mesic Forbs Shrubland	Thinleaf Alder / Mesic Forb Riparian Shrubland	G3	S3				D	2011-05-27
Vascular Plants	<i>Astragalus sparsiflorus</i>	Front Range milkvetch	G2	S2				C	2010-07-10
Vascular Plants	<i>Nuttallia speciosa</i>	Jeweled blazingstar	G3	S3				B	2011-05-27
Vascular Plants	<i>Nuttallia speciosa</i>	Jeweled blazingstar	G3	S3				C	2010-07-10
Vascular Plants	<i>Physaria vitulifera</i>	Rydberg twinpod	G3	S3				B	2011-05-27
Vascular Plants	<i>Aquilegia chrysantha</i> var. <i>rydbergii</i>	golden columbine	G4T1Q	S1			BLM/USFS	B	2011-06-20
Vascular Plants	<i>Hippochaete variegata</i>	variegated scouringrush	G5	S1				D	2011-06-20

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

Other Values: The Rocky Mountain aletes (*Aletes anisatus*) is a state endemic and a species of concern that is currently not tracked (CNHP watchlist); it was found in the upland areas of the drainage of the South Platte. A historical (H-ranked) occurrence of lavender hyssop (*Agastache foeniculum*), a globally secure but state critically imperiled species was observed in the area in 1878 according to a herbarium specimen label but it was not observed in 2010 or 2011 after searching appropriate habitats. In addition to the tracked plants, this site includes six plant species that ranked an 7 or above the Colorado Floristic Quality Index (FQI) Coefficient of Conservation (Rocchio 2007); Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. These plants include the golden columbine (*Aquilegia chrysantha* var. *rydbergii*), water birch (*Betula occidentalis*) littleseed ricegrass (*Piptatherum micranthum*), subalpine larkspur (*Delphinium barbeyi*), mountain muhly (*Muhlenbergia montana*) and purple meadow-rue (*Thalictrum dasycarpum*). The presence of species

with these high FQI values is indicative of the high quality of this area.

Boundary Justification: The boundary is drawn to include the known occurrences of significant plant species and communities. Smaller drainages, forested wetlands, floodplains, uplands, valley bottoms and seeps are included in the boundary based on the immediate watershed which also encompasses the upland areas of significance. The slopes and valleys provide habitat for essential ecological processes including hydrology, natural migration, pollination and dispersal which are important to the long term integrity and persistence of the occurrences. Although some of the land included is private, only public lands or lands with written permission were accessed.

Protection Urgency Rank Comments (P2): Land ownership includes the Denver Water Board and Pike National Forest with a small parcel of private land in the north section and road right-of-ways on CR 96.

Management Urgency Rank Comments (M2): This is a large site that contains high quality lands along a major state drainage. The wetland plant communities and the population of *Hippochaete variegata* are heavily impacted by grazing and human impacts on the floodplain of the North Fork of the South Platte River. The rare thinleaf alder (*Alnus incana*) / mesic forbs shrubland was first noted in 1996. In 2011, the quality rank was downgraded due to the widening and paving of CR 96. These disturbances have likely exacerbated the noxious weeds and continue to degrade the floodplain. Grazing by horses and cattle, construction of parking pull-offs, picnicking and fire pits should be discouraged in the floodplain where possible, to reduce erosion and the spread of noxious weeds. Weed treatments should not include broadcast roadside spraying because of the rare wetland plant species. Spot treatments for the bouncingbet (*Saponaria officinalis*) and Canada thistle (*Breca arvensis*) populations (B List noxious weeds-Colorado Weed Management Association 2010) would be more selective and more protective of the nearby native plants and animals.

Land Use Comments: The land along the roadway and the river is used for fishing, and grazing livestock. Much of the upland areas that are not private residences are used largely for recreation, especially fishing.

Natural Hazard Comments: Steep outcrops, small landslides in loose gravels of cut road banks on steep terrain, lightening and high water flows of the river are potential hazards.

Exotic Species Comments: Alien plant species included: smooth brome (*Bromopsis inermis*); common mullein (*Verbascum thapsus*); bouncingbet (*Saponaria officinalis*); yellow sweet clover (*Melilotus officinale*); and Canada thistle (*Breca arvensis*). Horses and cattle are being grazed on the floodplain areas which likely exacerbate weed populations.

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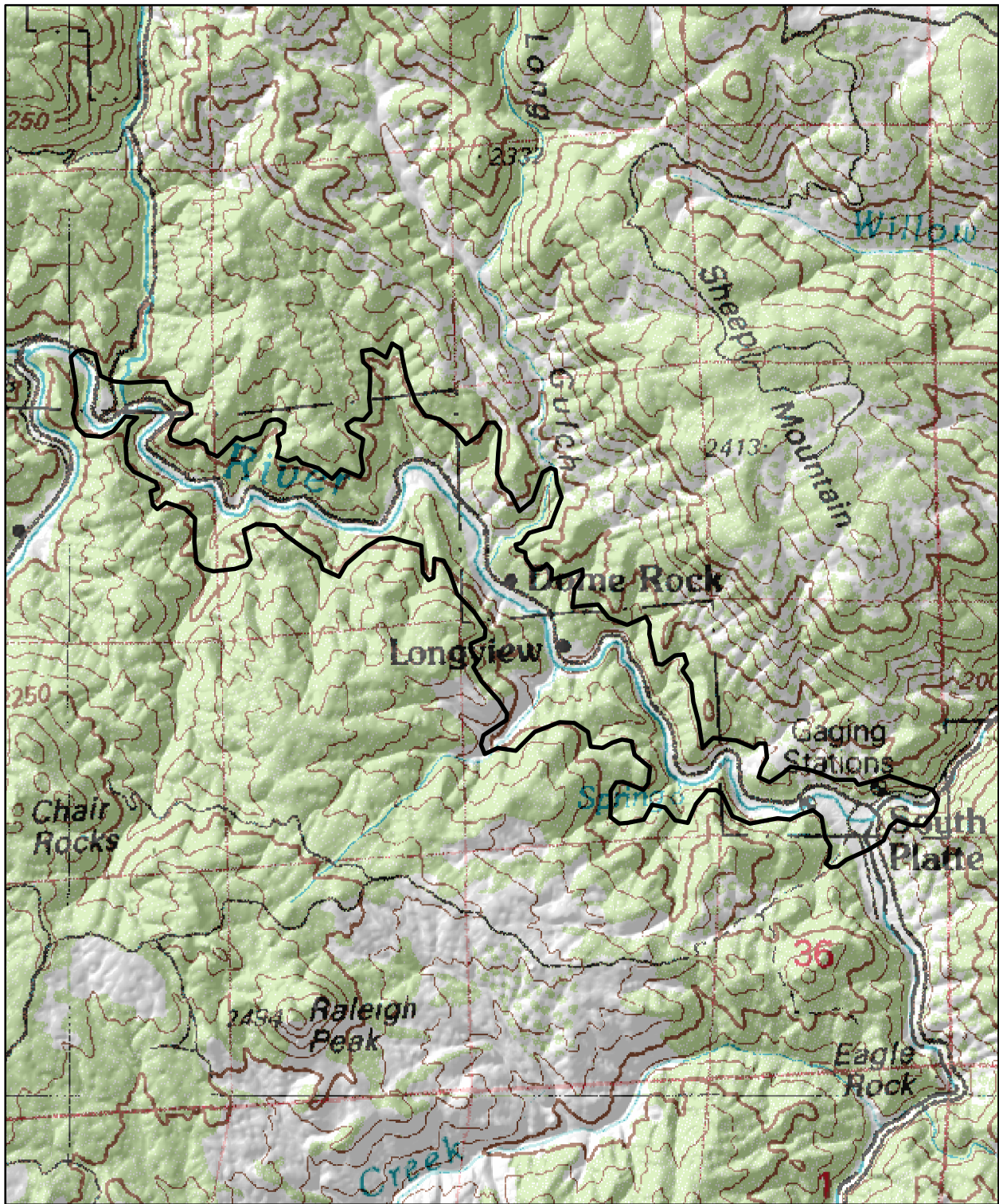
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Version Author: Smith, P.F.

Version Date: 02/17/2012



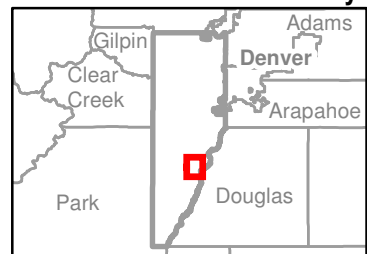
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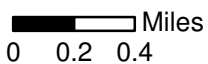
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Location in Jefferson County



Map Date: 01/10/2012

 Miles
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Map 15. North Fork South Platte Potential Conservation Area, B2: Very High Biodiversity Significance

Prospect Park

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: Arvada, Golden

Size: 3,861 acres (1,562 ha)

Elevation: 5,280 - 5,450 ft. (1,609 - 1,661 m)

General Description: The site is located along Clear Creek about 2.5 air miles east of Golden at the base of the Front Range foothills. The floodplain has been developed extensively upstream and downstream of the site. Gravel pits, urban developments, roads and trails are common throughout. In areas where the floodplains have vegetation and seasonal moisture from flooding, there is a matrix of native plants and remnants of plant communities that likely would have existed on the floodplains pre-development. These areas exist on parts of the Greenbelt where residential development has not proliferated. The dominant vegetation types are cottonwood riparian woodlands and non-native grasslands dominated by smooth brome (*Bromopsis inermis*). Common species in the vegetated parts of the floodplains include Plains cottonwood (*Populus deltoides* subsp. *monilifera*), narrowleaf cottonwood (*Populus angustifolia*), thinleaf alder (*Alnus incana*), water birch (*Betula occidentalis*), coyote willow (*Salix exigua*), narrowleaf cattail (*Typha angustifolia*), slenderleaf false foxglove (*Agalinis tenuifolia*), cutleaf teasel (*Dipsacus laciniatus*), Canada goldenrod (*Solidago canadensis*), arctic rush (*Juncus arcticus*), three-square bulrush (*Schoenoplectus pungens* = *Scirpus americanus*), and redtop (*Agrostis gigantea*). Cottonwood riparian woodlands and habitat for Ute ladies'-tresses (*Spiranthes diluvialis*), a federally Threatened species, are found within the site. A meadow in the Greenbelt supports a newly described subspecies of an earthstar fungus (*Mycenastrum corium* subsp. *ferrugineum* - Miller et al. 2005). There are many former creek channels which are typically dominated by wetland vegetation such as cattails (*Typha* spp.) and coyote willow. Small creeks flow across the floodplain throughout the summer that are fed by seeps along the ridge to the south and by storm water runoff. Many of these creeks flow through dense vegetation that is virtually impenetrable, such as thickets of common buckthorn (*Rhamnus cathartica*), poison ivy (*Toxicodendron rydbergii*) and nightshade (*Solanum dulcamara*). Two areas in the site have components of rare communities. These include the Plains cottonwood - chokecherry woodland and the Plains cottonwood - snowberry (*Symphoricarpos* sp.) woodland. Non-native species are extremely common and include many noxious weed species. Some areas have been surveyed since the 1990's and it is interesting to note that northern green orchid (*Limnorchis hyperborea*), great blue lobelia (*Lobelia siphilitica*), and salt spring checkerbloom (*Sidalcea neomexicana*) were common associates of *Spiranthes diluvialis*. None of these plants were observed during the

2000 or 2010 surveys associated with the orchids. The geology is diverse across the Clear Creek valley including modern and quaternary alluviums some with large amounts of gravels. On the south side of the creek, in the vicinity of the gravel mines, sedimentary rock dominates with sandstones, mudstones, claystones and conglomerates of the Denver and Arapahoe formations (Tweto 1979). The upland soils consist of the Nunn-Urban and Engelwood-Urban land complexes with 0 to 2 percent slopes. The wetland floodplains include gravel pits filled with water (ponds), Torrifluvents, very gravelly with 0 to 3 percent slopes, Alda loam with 0 to 2 percent slopes and Loveland variant gravelly sandy loam with 0-2 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Floodplains that still support native vegetation cover, and other hydrological features that support periodic flooding and intact ecological processes which support the rare plants dependent on them.

Climate Description: Between 1962 and 2012 the nearby weather station at Lakewood recorded an average annual precipitation of 16.43 inches. Snowfall is greatest in March, spring/summer rains peak in April-July. The average annual maximum temperature is 63.6°F (17.6°C) and the average annual minimum temperature is 36.4° F (2.44° C, WRCC 2012).

Land Use History: This section of Clear Creek has been extensively developed as an urban corridor. Gravel mines, homesteads, factories, farms, city buildings, dense residential developments, roads, trails, city parks and open space are some of the developments that have occurred in the vicinity of the river floodplain.

Biodiversity Significance Rank Comments (B2): This site includes a good (B-ranked) occurrence of a globally imperiled (G2G3/S2) and federally Threatened plant species, the Ute ladies' tresses (*Spiranthes diluvialis*). Counts of over 400 individuals have been obtained in past years for two large subpopulations (Smith and Anderson 2010). In addition, a new to science subspecies of an earthstar fungus was discovered at the site. The new subspecies was officially described by Miller et. al. in 2005. Currently this is the only known occurrence in the world of this subspecies of earthstar (*Mycenastrum corium* ssp. *ferrugineum*), which is considered to be both globally and state critically imperiled (G5T1/S1).

Natural Heritage element occurrences at the Prospect 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
Nonvascular Plants	<i>Mycenastrum corium</i> ssp. <i>ferrugineum</i>	earthstar	G5T1	S1				E	2001-02-25
Vascular Plants	<i>Spiranthes diluvialis</i>	Ute ladies' tresses	G2G3	S2	LT			B	2010-08-21

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

Other Values: Two areas in the site have components of very rare communities. These include the Plains cottonwood (*Populus deltoides* subsp. *monilifera*) - chokecherry (*Prunus virginiana*) woodland and the Plains cottonwood - snowberry (*Symphoricarpos* sp.) woodland. However, these examples may be remnants of the community type that naturally occurred there. Although their quality is poor, these areas could serve as references for restoration of these community types in other parts of the greenbelt where conditions would be appropriate for their establishment. Historically, an occurrence of the state rare American currant (*Ribes americanum*) was documented, but it has not been relocated since the early 1900's. In addition, there are six plants that ranked 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): slenderleaf false foxglove (*Agalinis tenuifolia*), water birch (*Betula occidentalis*), great blue lobelia (*Lobelia siphilitica*), slender green orchid (*Limorchis hyperborea*), Ute ladies' tresses (*Spiranthes diluvialis*), and prairie cordgrass (*Spartina pectinata*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: The boundary encompasses a broad area known to support *Spiranthes*, including potential areas for expansion that include appropriate habitat. Due to the occasional presence of potential habitat along the riparian corridor of Clear Creek, and the presence of several small subpopulations, all of the corridor east to a historically known location for the state-rare *Ribes americana* is included. The extensive cottonwood riparian woodland in the floodplain is circumscribed due to the potential for restoration to high quality natural communities throughout the area. The area west of the Miller Trailhead is included due to the presence of a new to science subspecies of an earthstar fungus (*Mycenastrum corium* subsp. *ferrugineum*). In general, the entire floodplain, both private and public portions, between Youngsfield Street and 44th Street, is included to encompass a functional portion of the riparian system on which the plants depend.

Protection Urgency Rank Comments (P3): This site is protected as Open Space by the City of Wheat Ridge, but receives heavy user impacts due to its urban setting. Although the center of the site is protected from residential development, it is

difficult to ensure the security of the biological resources within it due to the heavy use and non-point source impacts impinging upon it by the surrounding urban area. Edge effects render the area vulnerable to weed invasion and pollutants. Part of the site is City of Wheat Ridge Open Space but private lands have limited protection from alteration.

Management Urgency Rank Comments (M3): Noxious weeds are extremely common throughout this urban riparian area. The City of Wheat Ridge has been very involved in monitoring and treating noxious weeds in the Greenbelt. Many of the noxious weeds occur in the wetlands with the threatened orchid populations. The orchids are very sensitive to many herbicides. Some of the noxious weeds have extensive root systems and pulling them up could impact the orchids. Careful analysis and observations must be made by people experienced with both the invasive species as well as the rare species before any treatments should be considered. Monitoring is perhaps the best strategy currently as the populations seem to be doing well despite the weeds and social trails. Management in the floodplain area is a complex issue; it is a fine balance of disturbance, shading, moisture and sunlight that need to be considered. A recent study (Rondeau et al. 2011) determined that treating wetlands with herbicides that target dicots (typically used for Canada thistle) were selective for monocots after the thistles were removed. Unfortunately, in areas where smooth brome was present (which is the case in many impacted wetlands including this one) it replaced the Canada thistle and even though the result was the removal of the thistles a less desirable ecological situation resulted. The study showed the smooth brome once it became established appeared to impact the native vegetation. Populations of the orchids and the weeds fluctuate widely and oftentimes it is related to the amount of moisture. Floodplain moisture levels also fluctuate. Canada thistle cannot compete once a certain level of moisture occurs but finding the balance is very tricky in areas where you can't control the hydrology. Monitoring these populations is helpful and considering removing flower heads of the noxious species might be the most effective treatments. Two areas in the site have components of rare communities. These include the Plains cottonwood - chokecherry woodland and the Plains cottonwood - snowberry woodland. The size of these areas is small and the condition is affected by the presence of non-native and invasive species. However, these examples may be remnants of the community type that naturally occurred there. Although their quality is poor, these areas could serve as references for restoration of these community types in other parts of the greenbelt where conditions would be appropriate for their establishment.

Land Use Comments: Much of the land is part of the Wheat Ridge Greenbelt and is used for recreation including hiking, biking and fishing activities. Residential and urban developments surround the area.

Natural Hazard Comments: Extensive populations of poison ivy and buckthorn that are virtually impenetrable can be encountered off the trail system.

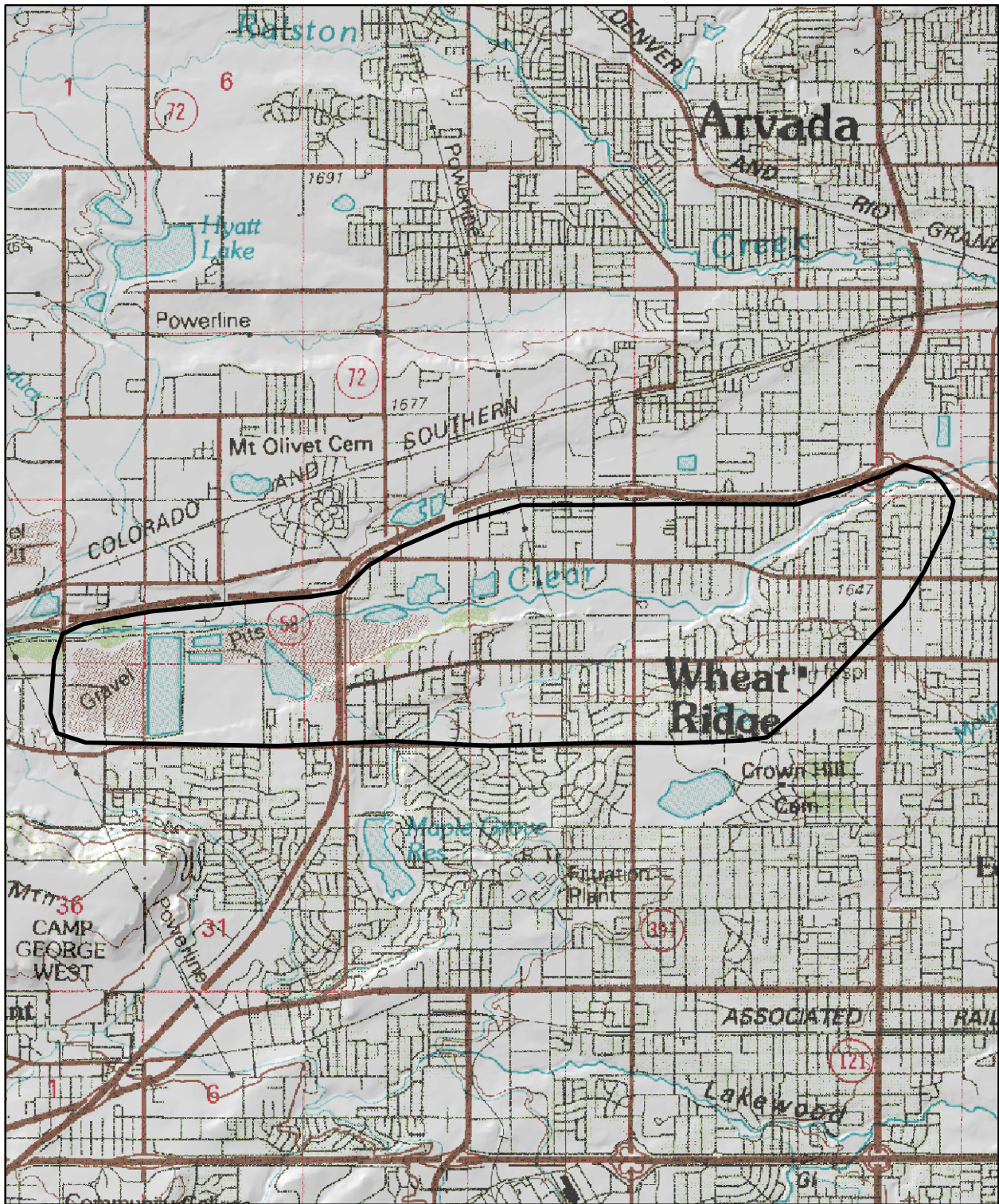
Exotic Species Comments: B-List exotic species (Colorado Weed Management Association 2009) were found in the impacted wetlands and upland areas: cutleaf teasel (*Dipsacus laciniata*), Russian olive (*Elaeagnus angustifolia*), Canada thistle (*Breca arvensis*), diffuse knapweed (*Acosta diffusa*), yellow toadflax (*Linaria vulgaris*) and leafy spurge (*Euphorbia esula*). C-List: common mullein (*Verbascum thapsus*). Other non-native species include: smooth brome (*Bromopsis inermis*), redtop (*Agrostis gigantea*), bittersweet nightshade (*Solanum dulcamara*), rabbitfootgrass (*Polypogon monspeliensis*), redtop (*Agrostis gigantea*), alfalfa (*Medicago sativa*), plantain (*Plantago major*) and sweetclover (*Melilotus alba*). Many of the noxious weeds occur in the wetlands with the threatened orchids.

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Version Author: Smith, P.F.

Version Date: 03/21/2012



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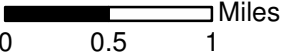

 PCA Boundary

Denver West, 39105-E1

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

Location in Jefferson County



Map Date: 02/28/2012
 Miles


Map 16. Prospect Park Potential Conservation Area, B2: Very High Biodiversity Significance

Reynolds Ranch

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: Pine, Platte Canyon

Size: 750 acres (303 ha)

Elevation: 7,800 - 8,050 ft. (2,377 - 2,454 m)

General Description: This site is centrally located in Jefferson County about four air miles southeast of the Town of Conifer in rugged terrain with ridges dominated by coniferous forests. About half of the site lies in the northwest section of Reynolds Park Open Space and the remainder is on private land. The area is characterized by steep rocky slopes that are found along the south side of Kennedy Gulch. The rugged topography provides dramatic views of the surrounding forested landscapes and includes grasslands, shrublands and mature forested lands. The upland plant species include a variety of mature conifers such as ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), and Douglas-fir (*Pseudotsuga menziesii*). Mountain mahogany (*Cercocarpus montanus*), Rocky Mountain juniper (*Juniperus scopulorum*), Gambel's oak (*Quercus gambelii*), mountain muhly (*Muhlenbergia montana*), and fringed sage (*Artemisia frigida*) are dominants in the shrubland and grassy areas. The site has a low percentage of non-native species and a fair amount of open gravely granitic soils that have good potential to provide habitat for rare plant species. The geology for the majority of the site is granite including Silver Plume and Sherman granite types (Tweto, 1979). The soils in the center of the site are very dry and sandy and include steep slopes and rock outcrops including Rogert-Herbman-Rock outcrop complex with 30-70 percent slopes with Grimstone-Hiwan-Rock outcrop complex with 30-60 percent slopes underlying the surrounding uplands (USDA NRCS 2008).

Key Environmental Factors: Physical topography and the unaltered landscape provide the mature forests and openings that promote a high diversity of habitats and species.

Climate Description: Reynolds Ranch is located in the mountains along the eastern slope of the Rocky Mountains and includes the upper foothills to montane zones. Weather station data from Bailey, CO which is west of the site, shows an average total precipitation of 16.6 inches from 1901 to 2010 (15.4 inches is reported at the South Platte station further to the east). Snowfall is greatest in March and April and summer rains peak in May, July and August. The average annual maximum temperature is 58.2°F (14.5°C) and the average annual minimum is 24.9°F (-4°C - WRCC 2006)

Land Use History: The land has been used largely as a ranch. Although this was one of the earliest developed areas in the region, the landscape looks fairly undisturbed. Prior to 1913 a Mormon settlement was established in this area, that was eventually operated as a dude ranch until 1942. Reynolds Park Open Space records also indicate there was a pack train trail that crossed the area, which people used to access the mines further up Kennedy Gulch. The park was acquired by Jefferson County Open Space in parcels between 1975 and 2001 (Jefferson County Open Space Website accessed 12-2011).

Biodiversity Significance Rank Comments (B2): This site is drawn for a good (B-ranked) occurrence of Front Range milkvetch (*Astragalus sparsiflorus*), a globally and state imperiled species (G2/S2). This species is rare and is vulnerable to extinction throughout its range. The Front Range milkvetch is endemic to Colorado and is typically found in or on the edge of ponderosa pine forests. As of 2011, there are only eight known locations for this species in the state, two of which were newly discovered in Jefferson County in 2010. This population is one of only two good (B-ranked) occurrences in the state, there are no excellent (A ranked) occurrences at this time.

Natural Heritage element occurrences at the Reynolds Ranch 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	<i>Astragalus sparsiflorus</i>	Front Range milkvetch	G2	S2				B	2010-07-19

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

Other Values: Within the site were two interesting plant species that are not tracked by CNHP but they ranked a 7 or above on the Colorado Floristic Quality Index (Rocchio, 2007): Short's milkvetch (*Astragalus shortianus*) and the fairly slipper orchid (*Calypso bulbosa*), respectively. Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. Therefore, the presence of species with high FQI values (7-10) is indicative of the high quality of this area.

Boundary Justification: The boundary is drawn to include the known occurrence of a significant rare plant species, the Front Range milkvetch (*Astragalus sparsiflorus*). The site provides habitat to include the local ecological processes of natural migration, pollination and dispersal, which are important to the long term persistence of the occurrence. Private lands are included to the northwest of the County Park. They were not surveyed but appear to be suitable habitat on aerial photographs.

Protection Urgency Rank Comments (P4): The land within the site includes private

lands and property owned and managed by Jefferson County Open Space.

Management Urgency Rank Comments (M4): No actions are required currently, but it is recommended that any new developments take into consideration the rare species.

Land Use Comments: The land is managed as open space with recreational trails for hikers, bikers and equestrian riders throughout the area. Some of the areas are not easily accessible and are afforded more protection. These large sections with no trails offer excellent protection to animals and plants. A recent wild fire burned in the vicinity in 2012.

Natural Hazard Comments: Steep terrain, loose rocky slopes and rattle snakes.

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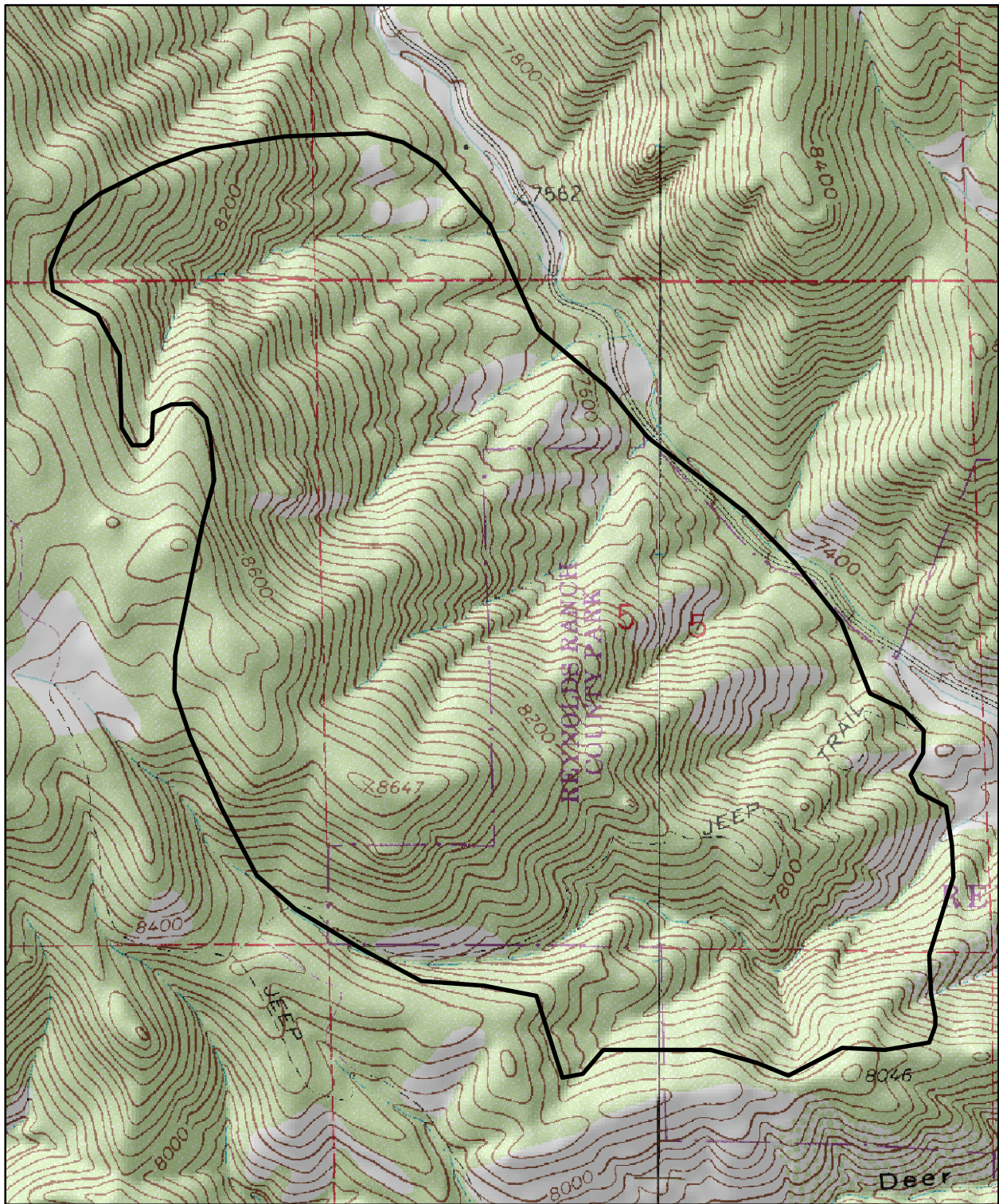
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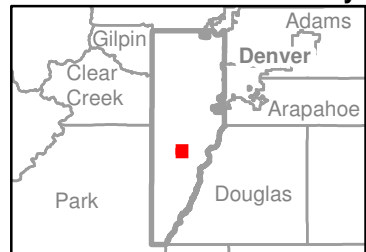
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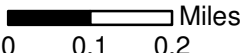



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 PCA Boundary
 Platte Canyon, 39105-D2
 Pine, 39105-D3

Location in Jefferson County



Map Date: 01/10/2012
 Miles


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

Map 17. Reynolds Ranch Potential Conservation Area, B2: Very High Biodiversity Significance

Rock Outcrop West of Mason 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: Meridian Hill

Size: 16 acres (6 ha)

Elevation: 9,200 - 9,462 ft. (2,804 - 2,884 m)

General Description: The rugged, steep slopes are representative of many other areas within Staunton State Park. Granite cliffs and outcrops interspersed with coniferous forest on south to southwest-facing slopes occur in other areas of the park as well. This area is relatively inaccessible at present. The rock outcrops of pink granite are hundreds of feet tall and overlook the valleys of Mason and Black Mountain creeks. James' telesonix (*Telesonix jamesii*) was found in organic soil that has accumulated in cracks in the rocks. This occurrence contains approximately 200 individuals, most of which are inaccessible on cliff faces. Though they are located in pristine habitat, the size of this population is small relative to the other occurrences found in the park. Other components of this rock outcrop community are lichens, waxflower (*Jamesia americana*), oceanspray (*Holodiscus discolor*), grassfern (*Asplenium septentrionale*), and fleabane (*Erigeron vetensis*). The surrounding forest is dominated by limber pine (*Pinus flexilis*), lodgepole pine (*Pinus contorta*), and Douglas-fir (*Pseudotsuga menziesii*). Possible nesting sites for Peregrine Falcons (*Falco peregrinus anatum*) were identified in this area during the inventory, but no eyeries were found. Elevation ranges from 9,200 to 9,462 feet, over a total area of 15 acres.

Biodiversity Significance Rank Comments (B2): This site contains a good (B-ranked) occurrence of the globally imperiled (G2/S2) James' telesonix (*Telesonix jamesii*).

Natural Heritage element occurrences at the Rock Outcrop West of Mason 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	<i>Telesonix jamesii</i>	James' telesonix	G2	S2				B	1999-09-14

** 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 all of the known

occurrences of James' telesonix in this area of Staunton State Park. It also includes a small amount of adjacent potential habitat on rock outcrops and cliffs to allow the rare plants to move into suitable habitat over time.

Protection Urgency Rank Comments (P4): This site is relatively inaccessible and is entirely contained in the Staunton State Park. The natural heritage resources within it are on cliff faces and are thus in little jeopardy.

Management Urgency Rank Comments (M4): At present (1999), this area is not in need of management decisions to maintain the viability of the James' telesonix population. However, if usage patterns within the park result in high visitation to this area after it is opened to the public, an assessment of the human impacts on the rare plants will be warranted. As in the other sites in the park where James' telesonix is found (Elk Falls and Black Mountain), rock climbing poses the greatest potential threat to this species. Thus any new climbing routes should avoid areas that support James' telesonix populations. Climbers should be informed through signage, brochures, and park personnel of the potential for impacting plants while climbing.

Exotic Species Comments: No exotic species were noted. The area around Mason Creek is quite weedy, with toadflax (*Linaria vulgaris*) and thistles possibly spreading into the forest to the east of this site. In 1999 no weeds were found further than 30 meters up the slopes adjacent to Mason Creek.

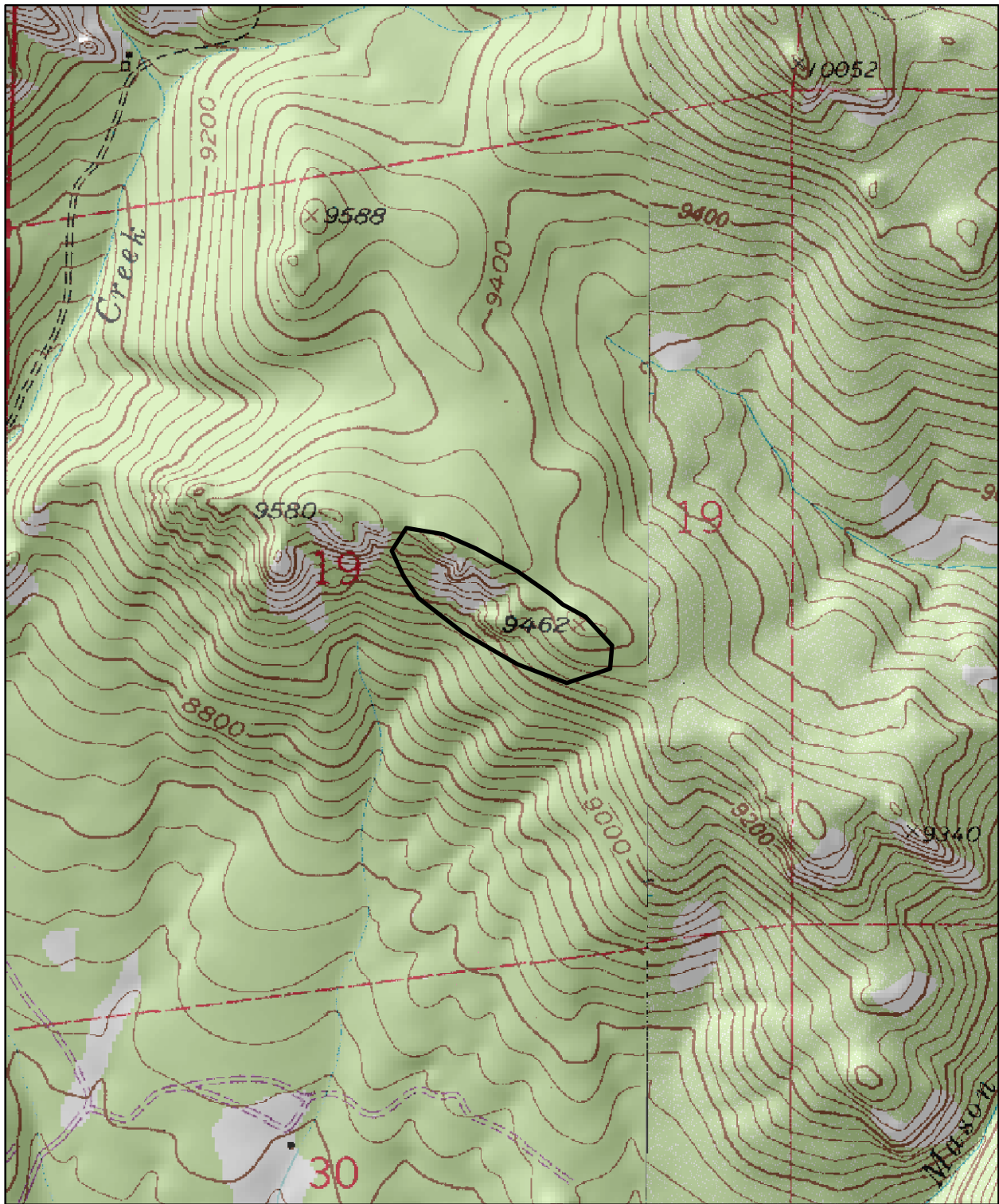
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Version Author: Spackman, S.C. and D.G. Anderson

Version Date: 07/22/1999



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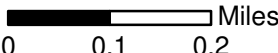
 PCA Boundary

Meridian Hill, 39105-E4

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

Location in Jefferson County



Map Date: 04/09/2012 
 Miles
 0 0.1 0.2

Map 18. Rock Outcrop West of Mason Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Rocky Flats

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: Golden, Eldorado Springs, Louisville, Ralston Buttes

Size: 12,045 acres (4,874 ha) **Elevation:** 5,650 - 7,280 ft. (1,722 - 2,219 m)

General Description: The site lies about four air miles due south of the City of Boulder at the north boundary of Jefferson County (extending slightly into Boulder County). The town of Plainview is located on the northwest boundary of the site. Highway 93 crosses the west side from north to south and intersects with Highway 72, which runs east to west across the south end of the site. The western side includes native grasslands that sweep up into the nearby foothills where ponderosa pine (*Pinus ponderosa*) and shrubs including mountain mahogany (*Cercocarpus montanus*) become more prevalent. The eastern side contains grasslands that continue from the western side that are found on nearly level plateaus that extend out from the base of the foothills. These areas include an ancient soil type (Rocky Flats alluvium) that supports an extensive occurrence of two rare xeric tall grass prairie communities. These communities are largely dominated by big bluestem (*Andropogon gerardii*) and little bluestem (*Schizachyrium scoparium*) with lesser amounts of prairie dropseed (*Sporobolus heterolepis*), western wheat grass (*Pascopyron smithii*), Indiangrass (*Sorghastrum nutans*) and mountain muhly (*Muhlenbergia montanus*). Wetlands include several intermittent drainages that cross the western portion of the site that flow into Coal Creek, which flows across the south end. The intermittent drainages provide habitat for wetland plant species and include a state rare shrub, the yellow hawthorn (*Crataegus chrysocarpa*) that dominates two of the drainages. Leadplant (*Amorpha fruticosa*) also dominates some parts of the intermittent drainages as well. Other wetlands, including the Coal Creek riparian area, have supported populations of a rare amphibian, the northern leopard frog, and also include a federally listed Threatened species, the Preble's meadow jumping mouse. A new occurrence of a second federally listed Threatened plant species was also documented at the site in 2011 by the US Fish and Wildlife Service, the Colorado butterfly plant (*Oenothera coloradensis* ssp. *coloradensis*). The site also supports a population of black-tail prairie dogs and has also been known to support at least five rare species of butterflies. The soils are dominated by Flatirons sandy loams, stony sandy loams and very cobbly sandy loams with the slopes ranging from 9-15% on the west side of the site and 0-5 percent on the eastern side (USDA NRCS 2008). The geology of the site where the grasslands dominate consists largely

of Pleistocene aged gravels and Rocky Flats alluvium while Niobrara and Pierre shale underlie the foothill slopes (Tweto 1979).

Key Environmental Factors: Several key factors likely contribute to the diversity and occurrences of a large number of rare plants, plant communities and animals at the site. The large unbroken extent of the grassland habitats with unique ancient soils that include very sandy, cobbly and gravelly soils are also significant. The rocky soil likely played a role in protecting the soils from being plowed for agriculture, which is likely another important factor contributing to the continued existence of the xeric tall grass prairie. Historically, grazing was the main land use for much of the site so overall anthropogenic influences were small in some areas. Some of the wetland hydrology on the west portion of the site was also protected. However, the eastern side (east of Highway 93) is highly disturbed and only areas with low levels of disturbance or reclaimed areas support rare plants and animals.

Climate Description: The nearby weather station at Ralston Reservoir between 1978 and 2011 recorded an average annual precipitation of 18.6 inches. Snowfall is greatest in November, December and March and spring/summer rains peak in April-June and August. The average annual maximum temperature is 63.0°F (17.2° C) and the average annual minimum temperature is 38.9°F (3.8°C, WRCC 2006).

Land Use History: Livestock ranching was the main land use for much of the area and continues in some areas. The western portion is mined (near Rainbow Cut) and a railroad runs through the northwest side. The area on the west and central part has been open space land since 1995. During the latter half of the 20th century, the eastern side of the site was used for excavation of limestone for cement manufacture, sand and gravel mining. This area was also part of the U.S. Department of Energy Rocky Flats Nuclear Weapons facility. The Rocky Flats plant was closed and has been converted to an Environmental Technology Site. Part of the Rocky Flats facility is under management by the U.S. Fish and Wildlife Service.

Cultural Features: Some of the site is regulated by EPA and CDPHE under the Superfund Act.

Biodiversity Significance Rank Comments (B2): This site supports many rare plant, plant community and animal occurrences and includes two federally listed Threatened species. There are four occurrences (two good, B-ranked, one fair, C-ranked, and one poor, D-ranked) of the globally imperiled (G5T2/S1) federally listed Threatened Preble's meadow jumping mouse (*Zapus hudsonius preblei*). There is a good (B-ranked) occurrence of the western bluestem (*Andropogon gerardii* - *Schizachyrium scoparium*) tallgrass prairie community that covers a significant land area at the site and a good (B-ranked) occurrence of the globally imperiled (G2/S1S2) big bluestem - prairie dropseed (*Andropogon gerardii* - *Sporobolus heterolepis*) western foothills herbaceous vegetation. These communities include a large variety of other rare native prairie species, some that are typically found in the

montane and subalpine zones. Rare plant species include: the only excellent (A-ranked) occurrence of the golden hawthorn (*Crataegus chrysocarpa*) in the state (CNHP 2012); a fair (C-ranked) occurrence of a state imperiled (G5/S2S3) plant, the dwarf wild indigo (*Amorpha nana*); a poor (D-ranked) occurrence of a globally imperiled (G3T2/S1) federally listed Threatened species, the Colorado butterfly plant (*Oenothera coloradensis* ssp. *coloradensis*); and an extant occurrence of a state critically imperiled (G5/S1) forked threeawn grass (*Aristida basiramea*). Rare butterflies have been documented over the years and include: a good (B-ranked) and a fair (C-ranked) occurrence of the globally vulnerable and state imperiled (G3G4/S2) Ottoe Skipper (*Hesperia ottoe*); a fair (C-ranked) occurrence of the globally imperiled (G2G3/S2) hops feeding azure (*Celastrina humulus*); a good (B-ranked) and a fair (C-ranked) occurrence of the globally vulnerable (G3/S2) Argos skipper (*Atrogene argos*); and an extant occurrence of the globally vulnerable (G3/S1) regal fritillary (*Speyeria idalia*). There is one good (B-ranked) and one extant occurrence of the northern leopard frog (*Lithobates pipiens*) and a good (B-ranked) occurrence of the state vulnerable (G4/S3) black-tailed prairie dog (*Cynomys ludovicianus*).

Natural Heritage element occurrences at the Rocky Flats 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	Lithobates pipiens	Northern Leopard Frog	G5	S3		SC	BLM/USFS	E	1993-99-99
Amphibians	Lithobates pipiens	Northern Leopard Frog	G5	S3		SC	BLM/USFS	B	1998-07-27
Insects	Celastrina humulus	Hops Feeding Azure	G2G3	S2				C	1995-06-26
Insects	Atrytone arogos	Arogos Skipper	G3	S2				C	1995-07-19
Insects	Atrytone arogos	Arogos Skipper	G3	S2				B	1998-07-27
Insects	Speyeria idalia	Regal Fritillary	G3	S1			USFS	E	1998-07-13
Insects	Hesperia ottoe	Ottoe Skipper	G3G4	S2			USFS	C	1991-07-99
Insects	Hesperia ottoe	Ottoe Skipper	G3G4	S2			USFS	B	1998-07-27
Mammals	Cynomys ludovicianus	Black - tailed Prairie Dog	G4	S3		SC	BLM/USFS	BC	2011-09-15
Mammals	Zapus hudsonius preblei	Meadow Jumping Mouse Subsp	G5T2	S1	LT	ST		D	1993-07-27
Mammals	Zapus hudsonius preblei	Meadow Jumping Mouse Subsp	G5T2	S1	LT	ST		C	1993-08-11
Mammals	Zapus hudsonius preblei	Meadow Jumping Mouse Subsp	G5T2	S1	LT	ST		B	1994-09-21
Mammals	Zapus hudsonius preblei	Meadow Jumping Mouse Subsp	G5T2	S1	LT	ST		B	1997-10-01
Natural Communities	Andropogon gerardii - Sporobolus heterolepis Western Foothills Herbaceous Vegetation	Xeric Tallgrass Prairie	G2	S1S2				B	2011-09-15

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	Andropogon gerardii - Schizachyrium scoparium Western Great Plains Herbaceous Vegetation	Xeric Tallgrass Prairie	G2?	S2				B	2011-08-23
Vascular Plants	Oenothera coloradensis ssp. coloradensis	Colorado butterfly plant	G3T2	S1	LT			D	2011-07-19
Vascular Plants	Amorpha nana	dwarf wild indigo	G5	S2S3				C	2011-09-15
Vascular Plants	Aristida basiramea	forktip three - awn	G5	S1				E	1994-09-01
Vascular Plants	Crataegus chrysoarpa	yellow hawthorn	G5	S1				A	2011-09-16

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

Other Values: A study conducted by Hazlett (1999) documented a small population of a globally secure but state rare (G5/S2) occurrence of frostweed (*Crocantemum bicknellii*) in the xeric tallgrass prairie community on the western portion of the site. The mesic tallgrass community that occurs on the relict soil of Pleistocene age has been studied by Buckner and Odasz (2012; in press). They indicate the uppermost piedmont terrace is an alluvium that dates to as much as 2.1 million years ago. There are few areas with soils that are this ancient where the soil layer has not been eroded away. They also note that while the dominant species of the tallgrass prairie community are similar to that of others on younger soils, there are important differences in the associated species, in the species richness, in the species diversity, and in its invasibility. Buckner and Odasz also found that the species that co-dominate the community on the Pleistocene relict soils are more representative of montane and subalpine grasslands and that these grasslands are more resistant to invasive species moving into these areas. In addition, the tallgrass prairie communities support a diverse array of grassland birds including uncommon species like the Grasshopper Sparrow (*Ammodramus savannarum*), Lark Bunting (*Calamospiza melanocorys*), Ferruginous Hawk (*Buteo regalis*), MacGillivray's Warbler (*Opomis tolmiei*), and Brewer's Sparrow (*Spizella brewerii*). The area also likely provides essential migratory stopover habitat for these and more common species. In addition, there is a naturally-formed lake that lies in the eastern section of the site.

Boundary Justification: The boundary is drawn to include the known occurrences of two significant plant communities, several rare plants, and a plethora of rare animals. Two of these occurrences are federally listed Threatened species; Preble's

meadow jumping mouse (*Zapus hudsonius preblei*) and the Colorado butterfly plant (*Oenothera coloradensis* ssp. *coloradensis*). The local mosaic of plant communities includes forested woodlands, shrublands, intermittent drainages and a variety of other wetlands, including river floodplains. Across the areas of unfragmented landscape, ecological processes that are linked to the hydrology, natural migration of organisms, and potential pollinators and their habitats are allowed to function with minimal disruption. The size of the site is important to the long-term persistence of the occurrences. Other potential landscapes were included based on aerial photography, satellite imagery and maps of the soils and topography (especially those areas on private lands). The boundary was digitized while referencing a one meter digital color orthophoto quad and a 1:24,000 digital quad. Although some of the land within the site is private, only public lands or private lands with written permission were accessed.

Protection Urgency Rank Comments (P3): The western and central sections of the site are largely owned by Jefferson and Boulder County Open Space. Lands toward the east side are owned by the Colorado State Land Board and the Federal Government. The U.S. Fish and Wildlife Service own lands at the former Rocky Flats Nuclear Weapons Facility and include sections that are being reclaimed. Privately owned portions of the site on the east side of Highway 93 are being excavated for limestone, sand and gravel. The southern and eastern part of the site is within the corridor of the proposed Northwest Turnpike.

Management Urgency Rank Comments (M4): The avoidance of land disturbing actions that may impact the rare animals and introduce or facilitate establishment of invasive plant species would be beneficial. There appears to have been a controlled burn on the western property and heavy machinery was also used in the area perhaps to clear logs. The density of weeds in this burned area is significantly higher than the surrounding unburned areas. Weed management success can vary from place to place. Fire management should be considered carefully before it is implemented again in the area because of the increase in weed density. Common mullein and cheatgrass populations were clearly much greater in the burned areas. The lands owned by Jefferson and Boulder County Open Space will likely be used for recreation including hiking, equestrian use and mountain biking. The biggest threat is development (road building, excessive use on current trails) and new trails that would fragment the upland plant communities encourage weeds on the surrounding slopes or disrupt the hydrological features. Fire appears to encourage weeds in the eastern section. With careful planning some of the impacts can be alleviated. The eastern section which was highly disturbed is being reclaimed in some areas and actively mined and excavated in other areas. A potential highway corridor could be constructed in the southeast portion. Continued monitoring of the rare plants, animals and plant communities and efforts to reduce activities that disturb soil or the local hydrology would help protect the occurrences. Climate change and pollution are threats that exist for all areas.

Land Use Comments: The cement manufacturing and sand and gravel operations are still active and continue to expand on the eastern side. The western sections are used for open space (many areas not yet available to the public) and grazing. Two major roadways cross the property and a Highway 72 follows Coal Creek. The railroad and mine on the northwest corner of the site appear to still be actively used.

Exotic Species Comments: State B-listed noxious weeds (Colorado Weed Management Association 2009) that were observed at the site include: diffuse knapweed (*Acosta diffusa*), Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*); scotch thistle (*Onopordum acanthium*), sulfur cinquefoil (*Potentilla recta*), and Canada thistle (*Breca arvensis*). State C-listed species include common mullein (*Verbascum thapsus*), cheatgrass (*Anisantha tectorum*) and common St. Johnswort (*Hypericum perforatum*). Other non-native species that were common include smooth brome grass (*Bromopsis inermis*), orchard grass (*Dactylus glomerata*), redtop (*Agrostis gigantea*), Kentucky bluegrass (*Poa pratensis*), alyssum (*Alyssum parviflorum*), and Japanese brome grass (*Bromopsis japonicas*).

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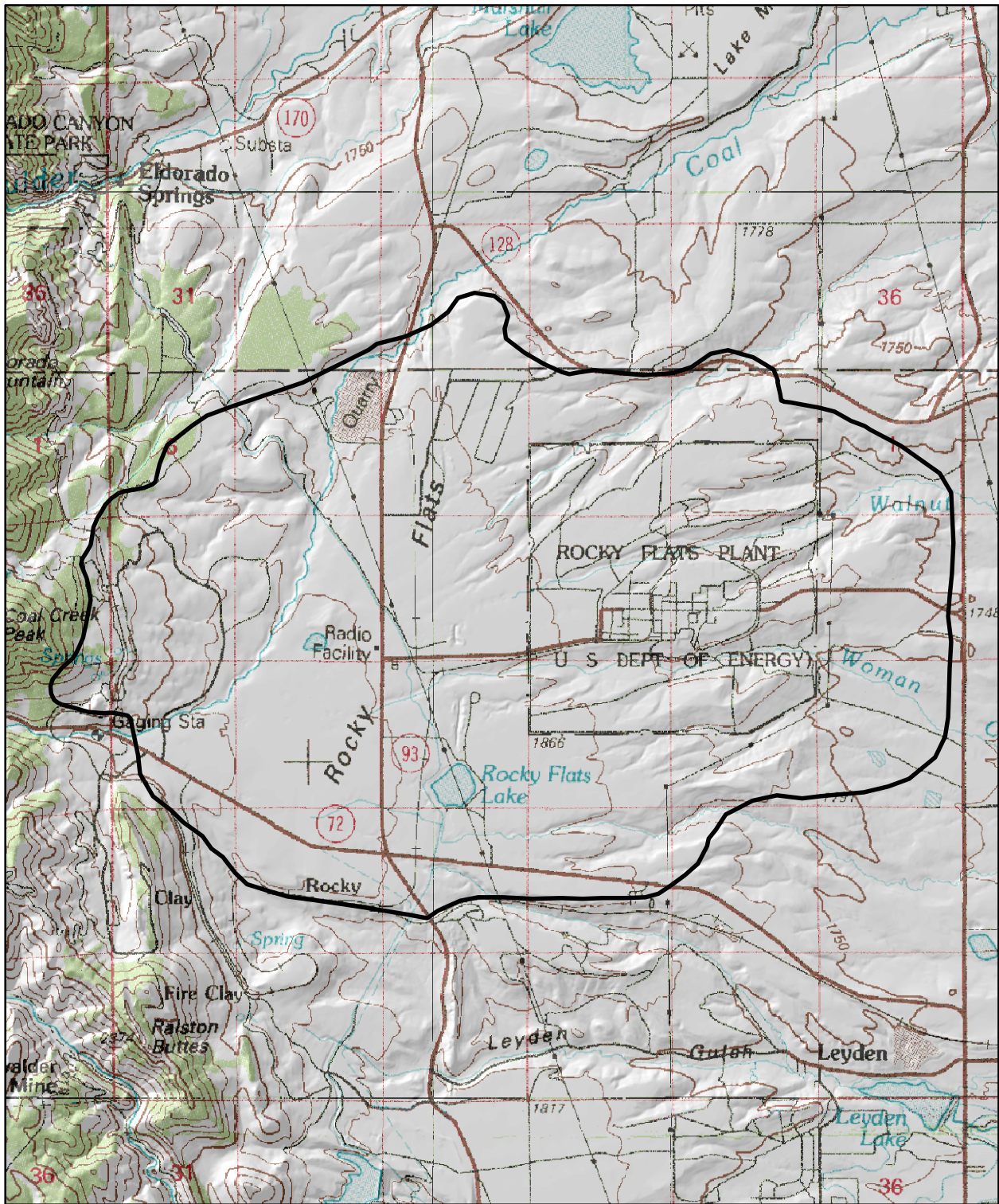
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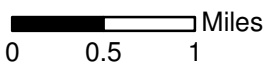
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Map Date: 01/19/2012



 PCA Boundary

Denver West, 39105-E1

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

Location in Jefferson County



Map 19. Rocky Flats Potential Conservation Area, B2: Very High Biodiversity Significance

The Castle

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: Windy Peak

Size: 602 acres (244 ha)

Elevation: 8,080 - 9,691 ft. (2,463 - 2,954 m)

General Description: The site is located in southwest Jefferson County west of Wellington Lake where it surrounds one of the tallest and most distinctive peaks in the area, known as The Castle. The surrounding steep and rocky slopes are largely covered with coniferous forests of ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), and Douglas-fir (*Pseudotsuga menziesii*) interspersed with massive tors of Pikes Peak granite (Tweto 1979). American waxflower (*Jamesia americana*), common juniper (*Juniperus communis*), ninebark (*Physocarpus monogynus*), prince's pine (*Chimaphila umbellata* subsp. *occidentalis*), and wild strawberry (*Fragaria virginiana* subsp. *glauca*) are common throughout the area. The cracks in the large outcrops contain small seeps that provide habitats for uncommon and rare herbaceous plant species and ferns including Rocky Mountain columbine (*Aquilegia saximontana*), James' telesonix (*Telesonix jamesii*), Front Range alumroot (*Heuchera hallii*), Rocky Mountain aletes (*Aletes anisatus*), grassfern (*Asplenium septentrionalis*), slender lipfern (*Cheilanthes feei*), and Weatherby's spikemoss (*Selaginella weatherbiana*). The soils consist of sand, sandy loams and gravels interspersed between the massive outcrops of granite. Bare gravelly soils with little herbaceous vegetation were common in the forested understory and openings.

Key Environmental Factors: The steep, loose gravelly soils, the matrix of forest cover and the large granite outcrops with cracks and small wet seeps as well as the north-facing aspect of the site provide the habitats and microhabitats where the rare plants were observed.

Climate Description: The nearby weather station at Bailey, CO between 1901 and 2011 recorded an average annual precipitation of 16.65 inches. Snowfall is greatest in December through March and summer rains peak in March and April. The average annual maximum temperature is 58.2°F (14.6°C) and the average annual minimum temperature is 24.9°F (-3.9°C, WRCC 2006).

Land Use History: Pikes Peak National Forest was one of the earliest National Forests established in the United States. The Wilderness designation for the Lost Creek Wilderness occurred in 1980.

Biodiversity Significance Rank Comments (B2): This site supports an excellent

(A-ranked) occurrence of James' telesonix (*Telesonix jamesii*) that was originally observed in 1976 and was revisited in 2011. This species is considered to be both globally and state imperiled (G2/S2). In addition, a fair (C-ranked) occurrence of a globally and state vulnerable (G3/S3) species, the Rocky Mountain columbine (*Aquilegia saximontana*) was documented.

Natural Heritage element occurrences at the The Castle 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	<i>Telesonix jamesii</i>	James' telesonix	G2	S2				A	2011-07-18
Vascular Plants	<i>Aquilegia saximontana</i>	Rocky Mountain columbine	G3	S3				C	2011-07-18

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

Other Values: Within the site there were also four plant species of conservation concern (CNHP watchlist) that were documented in 2011: Front Range alumroot (*Heuchera hallii*), Rocky Mountain aletes (*Aletes anisatus*), grassfern (*Asplenium septentrionalis*), and Weatherby's spikemoss (*Selaginella weatherbiana*). Slender lipfern (*Cheilanthes feei*) is an uncommon fern that was also found in the site and has only been documented from one record in Jefferson County. This fern is considered to be globally secure but it has not yet been ranked for the State of Colorado (CNHP 2011). In addition, the site includes a very large number of plant species (nine) that ranked a 7 or higher, on the Colorado Floristic Quality Index (FQI) Coefficient of Conservation (Rocchio 2007): littleseed ricegrass (*Piptatherum micranthum*), limber pine (*Pinus flexilis*), Weatherby's spikemoss (*Selaginella weatherbiana*), Front Range alumroot, Rocky Mountain aletes, grassfern, James' telesonix, Rocky Mountain columbine, and slender lipfern. Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values and the fact that no exotic species were observed at this site is indicative of the high quality of this area.

Boundary Justification: This site was drawn to include two rare plants and four plant species of concern that were documented on and around the large distinctive granite outcrops and slopes. The forested lands that surround the outcrops also support essential ecological processes including local, natural migration, pollination, and dispersal that are all important to the long term persistence of the occurrences. Although some of the land included is private, only public lands or lands with written permission were accessed.

Protection Urgency Rank Comments (P3): The southern portion of the site is on land that is part of the Lost Creek Wilderness in Pikes Peak National Forest; the northern section of the site is on Pikes Peak National Forest but not within the wilderness area. The northern section also includes a small portion of private ranch

land where the original observation for James' telesonix was observed. The private land was not surveyed in 2011.

Management Urgency Rank Comments (M3): Exotic species are not a threat in this area at this time. Potential threats do include fire, recreation, timber harvest, fuels reduction, construction, climate change, and pollution.

Land Use Comments: The land is used mainly for recreational purposes. The adjacent private land in the site is a ranch.

Natural Hazard Comments: Steep outcrops, loose gravels on steep terrain, and lightening.

Exotic Species Comments: None observed.

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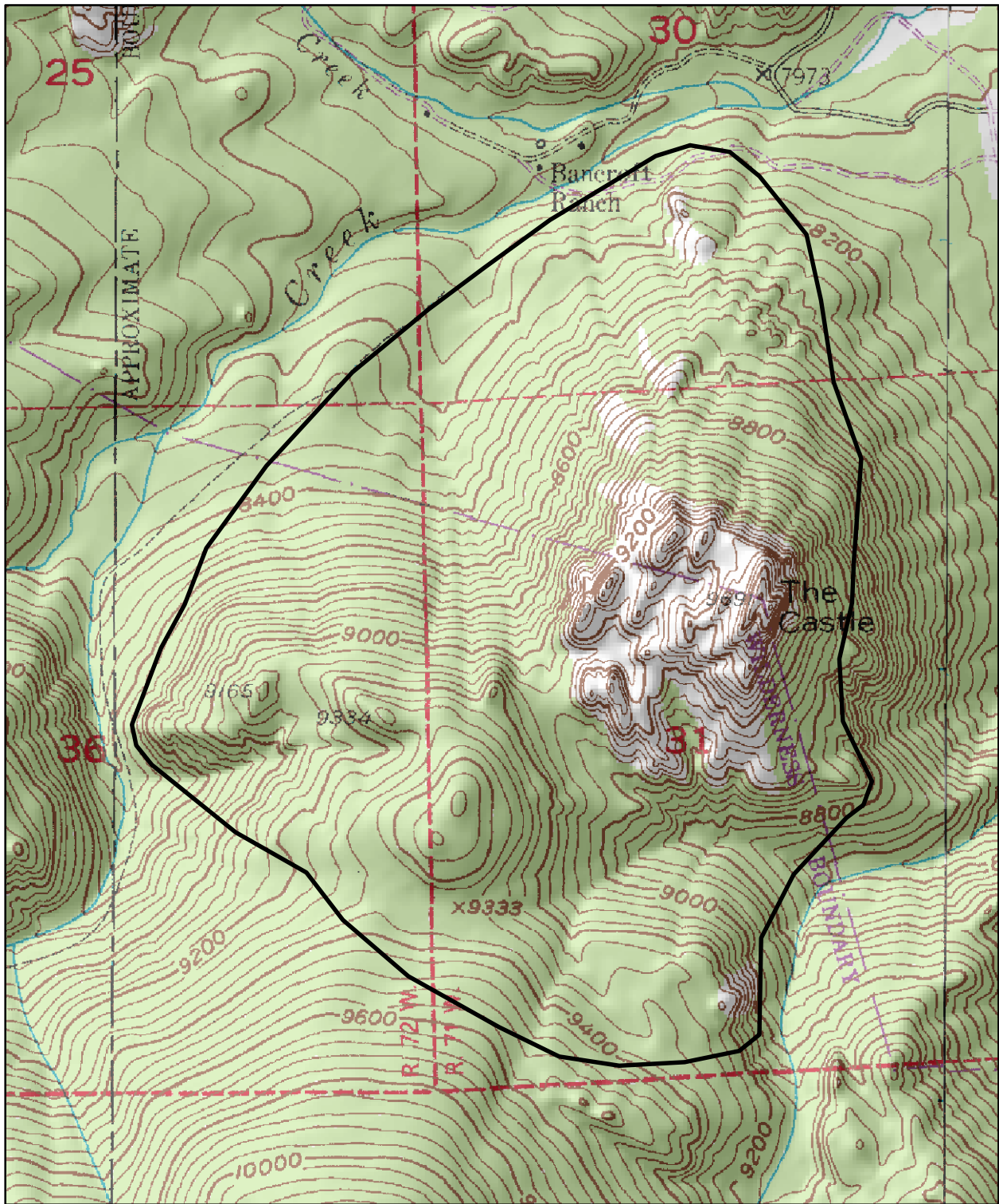
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Version Date: 02/17/2012



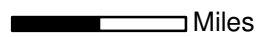
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 PCA Boundary

Windy Peak, 39105-C4

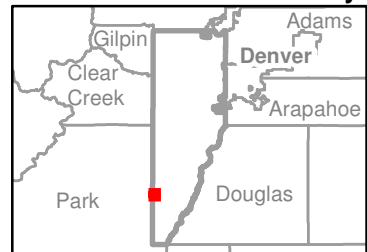
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 Graphic Produced by the
 U.S. Geological Survey

Map Date: 01/10/2012

 Miles
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Location in Jefferson County



Map 20. The Castle Potential Conservation Area, B2: Very High Biodiversity Significance

White Ranch Hogbacks

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: Ralston Buttes

Size: 2,235 acres (904 ha)

Elevation: 6,080 - 7,720 ft. (1,853 - 2,353 m)

General Description: This site is characterized by the north-south trending Ralston Creek Valley and the hogbacks and foothills that frame it on the east and west sides. The east side of the site is bounded on the southern end by a single large hogback that rises gently from the east side and drops precipitously to the west where Ralston Creek flows. West of the creek, rocky foothills rise quickly to over 7,000 feet. At the north end of the site, the hogback on the east side becomes more massive, rises to over 7,700 feet, and forms the Ralston Buttes, a series of rocky crags that cap the high point on the ridge. Vegetation includes xeric mixed grass meadows on mostly east and south-facing slopes with deeper soils. Mixed shrublands of mountain mahogany (*Cercocarpus montanus*) and juniper (*Juniperus scopulorum*) occur on the west and south-facing slopes with coarser more rocky soils. These can both occur on all aspects depending on the specific site. Woodlands and forests of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) occur in the narrow canyons and draws and on some west and north-facing slopes at higher elevations. The bottom of Ralston Creek and some of the larger side drainages support riparian communities of Plains cottonwood (*Populus deltoides*), Rocky Mountain maple (*Acer glabrum*), skunkbush sumac (*Rhus trilobata*), sandbar willow (*Salix exigua*), and numerous mesic forbs and graminoids. The geology consists of the Lyons, Lykins and Fountain Formations on the eastern half of the site with sandstones and conglomerates. On the western side biotitic gneiss, schist and migmatite derived principally from sedimentary rocks are prevalent (Tweto 1979). The soils are complex, the most common soil type is the Ratake-Cathedral-Rock outcrop complex with 25-60 percent slopes which are particularly predominant in the southern section. The north section contains Ustorthents, cool-Rock outcrop complex with 15-50 percent slopes and the eastern section is comprised largely of Argiustolls-Rock outcrop complex with 15 to 60 percent slopes (USDA NRCS 2008).

Key Environmental Factors: The unfragmented landscape that includes the intact hydrological features which support the rare plant communities and animals is probably one of the most important factors.

Climate Description: The nearby weather station at Ralston Reservoir between 1978 and 2011 recorded an average annual precipitation of 18.6 inches. Snowfall is greatest in November, December and March and spring/summer rains peak in

April-June and August. The average annual maximum temperature is 63.0°F (17.2°C) and the average annual minimum temperature is 38.9°F (3.8°C, WRCC 2006).

Land Use History: Historically the site was a working ranch and supported livestock grazing and extractive uses such as quarrying and logging. In the early 1950's, the Schwartzwalder Uranium Mine was established in the Ralston Creek Valley toward the north end of the site. The underground mine has a relatively small surface footprint and included an access road, several on-site roads, a main facilities area, and a waste rock disposal area.

Biodiversity Significance Rank Comments (B2): This site contains a good (B-ranked) occurrence of a globally imperiled (G2/S2) Rocky Mountain juniper / mountain mahogany (*Juniperus scopulorum* / *Cercocarpus montanus*) scarp woodland community, a good (B-ranked) occurrence of a globally imperiled (G2/S2?) foothills ponderosa pine scrub woodland community (*Pinus ponderosa* / *Cercocarpus montanus* / *Andropogon gerardii*), and a fair (C-ranked) occurrence of the globally apparently secure (G4/S2B) American Peregrine Falcon (*Falco peregrinus anatum*).

Natural Heritage element occurrences at the White Ranch Hogbacks 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	<i>Falco peregrinus anatum</i>	American Peregrine Falcon	G4T4	S2B		SC	BLM/USFS	E	2011-07-14
Natural Communities	<i>Juniperus scopulorum</i> / <i>Cercocarpus montanus</i> Woodland	Foothills Pinyon - Juniper Woodlands/Scarp Woodlands	G2	S2				B	2011-09-15
Natural Communities	<i>Pinus ponderosa</i> / <i>Cercocarpus montanus</i> / <i>Andropogon gerardii</i> Wooded Herbaceous Vegetation	Foothills Ponderosa Pine Scrub Woodlands	G2	S2?				B	1992-08-04

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

Other Values: An imprecise record of mottled dusky wing (*Erynnis martialis*), a globally rare butterfly, was documented at Ralston Butte in 1989. Current information on population levels are not available.

Boundary Justification: The boundaries are drawn to include the element occurrences of the two plant associations and the Peregrine Falcon, and additional area estimated to provide habitat or contain the target vegetation based on review and analysis of satellite imagery. The area contained within the site should provide the ecological processes and resources needed to ensure the survival of the

occurrences.

Protection Urgency Rank Comments (P4): Approximately 90% of the site is within the White Ranch Open Space owned by Jefferson County Open Space. Land protection actions are largely complete and the need for additional actions is not anticipated. No protection actions are needed in the foreseeable future.

Management Urgency Rank Comments (M3): New fire management and invasive species management actions may be needed in the next five years. Wildfire has the potential to eliminate the occurrences entirely, whereas invasive species have the potential to severely degrade the quality of the occurrences. Open space management plans should address these two important issues on at least a five year cycle.

Land Use Comments: The uranium mine is currently non-operational and is undergoing site remediation. Most of the original infrastructure has been removed and facilities are in place or being planned to capture and treat contaminated discharges from the mine shafts and the waste rock deposits. The site is almost completely contained within the Jefferson County White Ranch Open Space Park and is primarily used for recreation. Large lot residential development occurs on the private lands that are within and surrounding the site.

Natural Hazard Comments: Mine shafts, mine tailings, radioactive materials, scree slopes, bears, steep canyonsides and poison ivy are all found in the site.

Exotic Species Comments: A number of non-native plant species were observed at the site. List-B species according to the Colorado Weed Management weed list include: musk thistle (*Carduus nutans*) and Canada thistle (*Breca arvenis*). List-C species include cheatgrass (*Anisantha tectorum*) and common mullein (*Verbascum thapsis*). Other non-native species include: smooth brome (*Bromopsis inermis*), orchard grass (*Dactylus glomerata*), reed canary grass (*Phalaris arundinacea*), Kentucky bluegrass (*Poa pratensis*), and Japanese brome (*Bromopsis japonicus*). Many of these species are in disturbed areas, the pasture grasses were planted in some of the floodplain areas.

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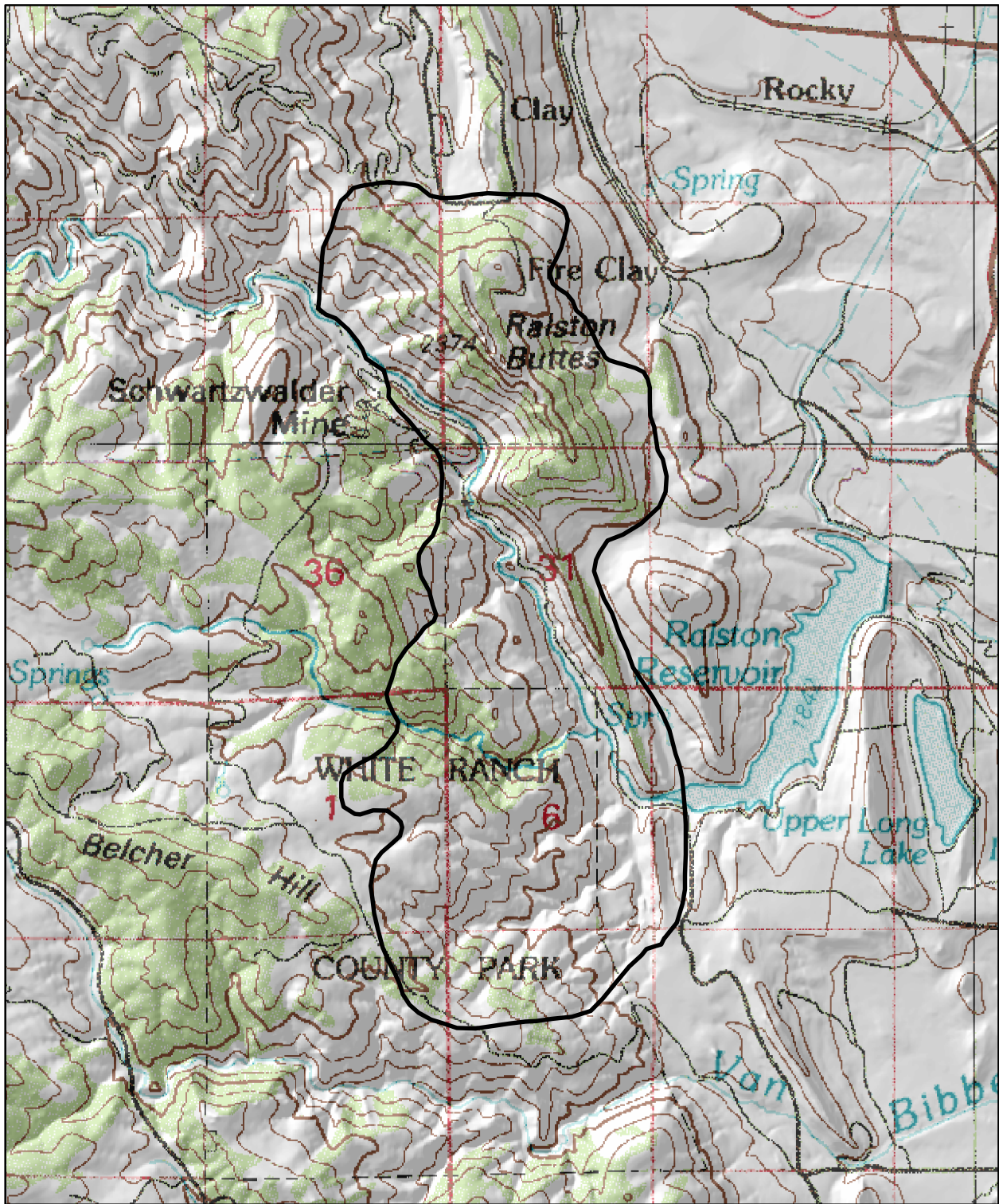
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Version Author: Stevens, J.E. and P.F. Smith

Version Date: 01/18/2012



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 PCA Boundary

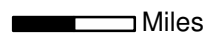
Denver West, 39105-E1

30x60 Minute Digital Raster
 Graphic Produced by the
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Location in Jefferson County



Map Date: 01/19/2012

 Miles
 0 0.2 0.4



Map 21. White Ranch Hogbacks Potential Conservation Area, B2: Very High Biodiversity Significance

Bergen Peak East

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: Evergreen, Squaw Pass

Size: 2,792 acres (1,130 ha)

Elevation: 7,500 - 9,700 ft. (2,286 - 2,957 m)

General Description: The site is located in western Jefferson County southwest of the Town of Bergen Park, just north of Evergreen, where it surrounds Bergen Peak, one of the tallest peaks in the area. The surrounding steep and rocky slopes are largely covered with mixed coniferous forests of ponderosa pine (*Pinus ponderosa*), and Douglas-fir (*Pseudotsuga menziesii*). The east-facing slopes and drainages at the base of Mount Bergen have large open grasslands that form a matrix with distinctive wetland and upland plant communities. The first order streams were dominated by Douglas-fir and water birch (*Betula occidentalis*) with a rich understory of native forbs and graminoids that differed from the open wet meadow habitats. These shady drainages included Rocky Mountain maple (*Acer glabrum*), Bebb willow (*Salix bebbiana*), and thinleaf alder (*Alnus incana*) in the shrub layer. The herbs included black snakeroot (*Sanicula marilandica*), Dewey's sedge (*Carex dewyana*), milkflower willow herb (*Epilobium lactiflorum*), starry false lily of the valley (*Maiantehmum stellatum*) and fragile fern (*Cystopteris fragilis*). The upland plant communities include grasslands dominated by Parry's oatgrass (*Danthonia parryi*) and a variety of native grasses and forbs. The upland grasslands on the western side grade into patches of ponderosa pine woodlands that form a savannah-like community along the lower slopes of Bergen Peak which also includes large areas of Parry's oatgrass dominated grasslands. The areas near springs and adjacent to Bergen Creek, which drains the east side of the mountain, consist of wet meadows with large areas dominated by Nebraska sedge (*Carex nebrascensis*) and a variety of other sedges including *C. bebbii*, *C. utriculata*, *C. lanuginosa*, and five species of rushes (*Juncus* spp.), at least nine different wetland grass species, a nice variety of wetland forbs. Both upland and wetland communities are very species rich. The common geology consists of metamorphic rocks that include gneiss, schist and migmatite that are derived primarily from sedimentary rocks (Tweto 1979). The wetland soils were dark and mottled, the upland soils were dry and sandy with the riparian stream soils dominated by loamy sands. The mapped soils in the upper forested reaches are comprised of Grimstone-Hiwan-Rock outcrop complex with 30-60% slopes. The upland meadow soils are comprised of Troutdale-Rogert-Kittredge complex with 15-30 percent slopes, and the Rogert-Herbman-Rock outcrop complex with 30-70 percent slopes. The wetland soils are comprised of the Troutdale-Sprucedale gravelly sandy loams with 3-5% slopes and the sedge meadow soils are comprised

of Venable loams with 3-9% slopes and are found along the Bergen Creek drainage (USDA NRCS 2008).

Key Environmental Factors: The local topography and low degree of anthropogenic developments and disturbances especially to the local hydrological features have allowed for the variety of upland and wetland habitats and ecological functions that support rare plant and plant communities in this area.

Climate Description: The nearby weather station at Evergreen between 1961 and 2011 recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7°F (15.9°C) and the average annual minimum temperature is 27.2°F (-2.7°C WRCC 2006).

Land Use History: Homesteading, farming and ranching were common throughout this region. Historically the upland meadows have been mowed for hay, but now are mowed for weed control. In 1977 the land was acquired as open space property.

Biodiversity Significance Rank Comments (B3): This site supports a good (B-ranked) occurrence of a globally vulnerable (G3/S3) Douglas-fir (*Pseudotsuga menziesii*) / water birch (*Betula occidentalis*) woodland, a good (B-ranked) occurrence of a globally vulnerable (G3/S3) Parry's oatgrass (*Danthonia parryi*) herbaceous vegetation, and an excellent (AB-ranked) occurrence of a globally apparently secure state vulnerable (G4/S3) Nebraska sedge meadow community. There is also a small (D-ranked) population of a globally vulnerable and state rare (G3/S1S2) plant species, the Southern Rocky Mountain cinquefoil (*Potentilla ambigens*). The grasslands, woodlands and wet meadows form a mosaic of communities that account for the amazing array of plant diversity observed in the site.

Natural Heritage element occurrences at the Bergen Peak East 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	<i>Danthonia parryi</i> Herbaceous Vegetation	Montane Grasslands	G3	S3				B	2011-08-03
Natural Communities	<i>Pseudotsuga menziesii</i> / <i>Betula occidentalis</i> Woodland	Montane Riparian Forest	G3?	S3				B	2011-08-03
Natural Communities	<i>Carex nebrascensis</i> Herbaceous Vegetation	Wet Meadows	G4	S3				AB	2011-08-03
Vascular Plants	<i>Potentilla ambigens</i>	Southern Rocky Mountain cinquefoil	G3	S1S2				D	2010-08-14

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

Other Values: The shady drainages that flow off of Bergen Peak include at least six plant species that ranked a 7 or higher, on the Colorado Floristic Quality Index (FQI) Coefficient of Conservation (Rocchio 2007): water birch (*Betula occidentalis*), Bebb's sedge (*Carex bebbii*), slimstem reedgrass (*Calamagrostis stricta*), black snakeroot (*Sanicula marilandica*), starry false lily of the valley (*Maianthemum stellatum*), and wood rush (*Luzula parviflora*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values is indicative of the high quality of this area.

Boundary Justification: This site was drawn to include one rare plant and three rare plant community occurrences. The boundary includes the surrounding mountain slopes and ridgelines which include habitat and drainages that support the occurrences. The boundary was digitized while referencing a digital color orthophoto quad and a 1:24,000 digital quad. Although some of the land included is private, only public lands or lands with written permission were accessed.

Protection Urgency Rank Comments (P3): The majority of the property is owned and managed by Jefferson County Open Space.

Management Urgency Rank Comments (M3): Exotic species are a considerable threat in this area. Pasture grasses are problematic especially close to the eastern side of the property where some of these grasses were likely introduced for hay. These species are very difficult to treat and treatments can do more harm especially in wetlands. Efforts to protect the remaining intact areas from disturbances (off road vehicles, trail building) will help these areas. The county is actively treating noxious

weeds on the property including Canada thistle (*Breca arvensis*) and musk thistle (*Carduus nutans*). Potential threats also include recreation, timber harvest, fuels reduction, construction, climate change, and pollution.

Land Use Comments: The majority of the land is used mainly for non-motorized recreational purposes. The adjacent private lands include residences and roadways.

Exotic Species Comments: Smooth brome (*Bromus inermis*), timothy grass (*Phleum pratense*), and Kentucky bluegrass (*Poa pratensis*) are common in the grasslands. Other common weeds observed include: red top (*Agrostis gigantea*), horseweed (*Conyza canadensis*), and wild mint (*Mentha arvensis*). Three B-Listed species were observed: Canada thistle (*Breca arvensis*), musk thistle (*Carduus nutans*) and quackgrass (*Elytrigia repens*); no A-Listed weeds were observed (CWMA 2012).

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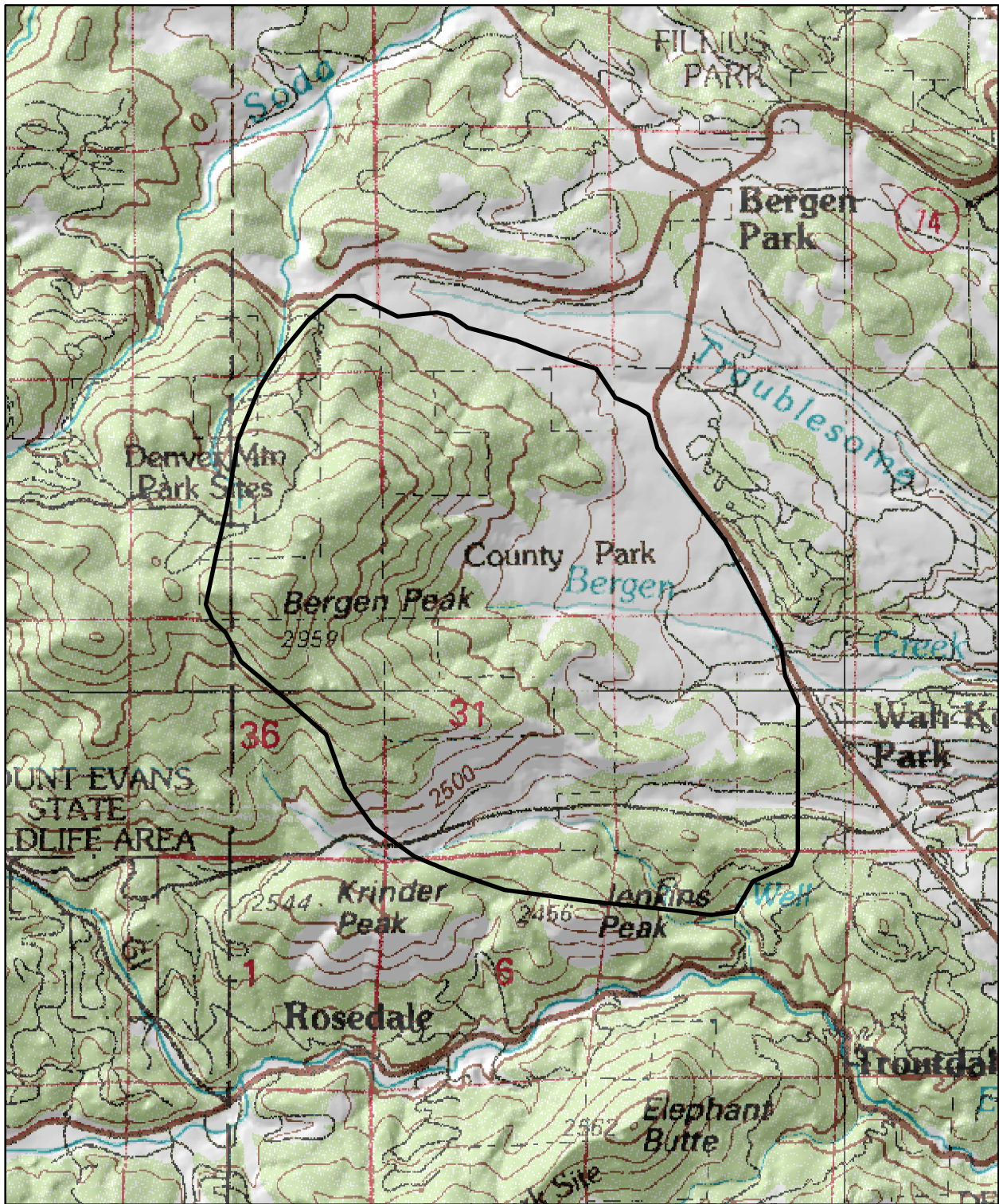
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Version Author: Smith, P.F.

Version Date: 03/05/2012



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 PCA Boundary

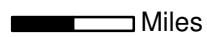
Denver West, 39105-E1

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

Location in Jefferson County



Map Date: 02/24/2012

 Miles
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Map 22. Bergen Peak East Potential Conservation Area, B3: High Biodiversity Significance

Casto Creek

Biodiversity Rank - B3: High Biodiversity Significance

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: Conifer, Pine

Size: 686 acres (277 ha)

Elevation: 7,960 - 8,600 ft. (2,426 - 2,621 m)

General Description: Centrally located in Jefferson County, this site includes a rich forested area in the montane zone with steep and rugged topography. It includes a number of small first order streams that flow north into Casto Creek which follows Kennedy Gulch. The north-facing slopes and drainages contain a diverse array of plant species including many state rare plants. The habitats are varied with willow carrs and wet meadows dominating the vegetation along Casto Creek. The willow community is very thick in some areas along Casto Creek especially further from the roadway. Coyote Creek, one of the north-facing drainages, is an excellent example of a lightly impacted first order stream. The north-facing aspect has likely contributed to the very high biodiversity of the drainage. Blue spruce (*Picea pungens*), thinleaf alder (*Alnus incana*) and mature quaking aspen (*Populus tremuloides*) are the dominant tree species along the drainage. The intact floodplain of the upper reaches of Coyote Creek was especially rich in herbaceous growth with a very low presence of non-native plants. The upland vegetation consists of forested hillsides with ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*) and a rich herbaceous layer in the moist shady areas that included Canada violet (*Viola rydbergii*), Fendler's waterleaf (*Hydrophyllum fendleri*), starry false lily of the valley (*Maianthemum stellatum*), musk-root (*Adoxa moschatellina*), fairy slipper orchid (*Calypso bulbosa*), Hall's ragwort (*Ligularia bigelovii* var. *hallii*), roughleaf ricegrass (*Oryzopsis asperifolia*), Rocky Mountain sedge (*Carex saximontana*), blue clematis (*Atrogene occidentalis*), Hudson Bay anemone (*Anemone multifida* subsp. *globosa*), alpine milkvetch (*Astragalus alpinus*), wood lily (*Lilium philadelphicum*) and beautiful cinquefoil (*Potentilla pulcherrima*). The most common upland soils are the Grimstone-Hiwan-Rock outcrop complex, 30-70 percent slopes with lesser amounts of Legault-Hiwan stony loamy sands, 15-30 percent and Rogert-Herbman-rock outcrop complex, 30-70 percent slopes. The soils in the wetland areas and along Casto Creek drainage consist of Rosane-Venable fine sandy loams, 0-3 percent slopes. The soils along Coyote Creek consist largely of Kittredge-Venable complex with 0-5 percent slopes (USDA NRCS 2008). The geology consists of igneous granitic rocks that are 1, 350-1,480 million years old (Tweto 1979).

Key Environmental Factors: The topography, especially the north-facing aspect of the drainages, the unaltered hydrological features and light anthropogenic changes

are the significant factors that support the rare plant communities and rare plants that occur in these drainages. The fact the area has not been grazed since the 1960's is also significant.

Climate Description: The nearby weather station at Evergreen between 1961 and 2011 recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7 degrees F (15.9 °C) and the average annual minimum temperature is 27.2 °F (-2.7° C, WRCC 2006).

Land Use History: Livestock grazing and residential developments are common throughout this region. Casto Creek has been impacted by both human and historical beaver activity. Much of the area was a YMCA Camp for many years and portions of the area have not been grazed since the 1960's. Mining activities have occurred in the vicinity. The area along Casto Creek (Kennedy Gulch) is the most heavily impacted by road building, hiking trails, and road maintenance. In addition, there are impoundments created by landowners located just upstream of the site that affect the hydrology of Casto Creek. Beavers were likely important in the past, but no activity was observed in 2011.

Biodiversity Significance Rank Comments (B3): The site supports a good (B-ranked) occurrence of a globally vulnerable (G3/S3) blue spruce / thinleaf alder (*Picea pungens* / *Alnus incana*) woodland and a fair (C-ranked) occurrence of a globally vulnerable (G3/S3) Rocky Mountain willow / beaked sedge (*Salix monticola* / *Carex utriculata*) riparian willow carr. Rare plant species include a poor (D-ranked) occurrence of an apparently secure globally and state critically imperiled species (G4/S1), Torrey sedge (*Carex torreyi*), with fewer than five occurrences known from Colorado and a new county record (CNHP 2011). A fair (C-ranked) occurrence of Peck's sedge (*Carex peckii*), a state critically imperiled (G4G5/S1) species that is also a new Jefferson County record (CNHP 2011). There is an excellent occurrence of a globally secure but state imperiled (G5?/S2S3) species, Sprengel's sedge (*Carex sprengelii*). This is one of only four known populations in the state (CNHP 2011). Two rare plants that are both globally secure but critically imperiled in the state (G5/S1) include the Rocky Mountain sedge (*Carex saximontana*) and the variegated scouring rush (*Hippochaete variegata*). The shaded upper reaches of the drainages were in excellent condition and include healthy mature aspen groves on the floodplains. The concentration of five plant species that are state critically imperiled and two new county records also contributes to the biodiversity significance of this area.

Natural Heritage element occurrences at the Casto 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	<i>Picea pungens</i> / <i>Alnus incana</i> Woodland	Montane Riparian Forests	G3	S3				B	2011-06-23
Natural Communities	<i>Salix monticola</i> / <i>Carex utriculata</i> Shrubland	Montane Riparian Willow Carr	G3	S3				C	2011-08-10
Vascular Plants	<i>Carex torreyi</i>	Torrey sedge	G4	S1				D	2011-08-10
Vascular Plants	<i>Carex peckii</i>	Peck sedge	G4G5	S1				C	2011-06-23
Vascular Plants	<i>Carex saximontana</i>	Rocky Mountain sedge	G5	S1				E	2011-06-23
Vascular Plants	<i>Hippochaete variegata</i>	variegated scouringrush	G5	S1				E	2011-08-09
Vascular Plants	<i>Carex sprengelii</i>	Sprengel's sedge	G5?	S2S3				A	2011-06-23

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

Other Values: A small population of a species of conservation concern (CNHP watchlist), wood lily (*Lilium philadelphicum*) was documented. Also within the site were four plants that ranked a 10 on the Colorado Floristic Quality Index (Rocchio 2007): musk-root (*Adoxa moschatellina*), Sprengel's sedge (*Carex sprengelii*), Peck's sedge (*Carex peckii*) and Hudson Bay anemone (*Anemone multifida*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. In addition, there were fourteen plants that ranked a 7-9 on the Colorado Floristic Quality Index: Arctic raspberry (*Cylactis pubescens*), a new Jefferson County record, Torrey sedge (*Carex torreyi*), Rocky mountain sedge (*C. saximontana*), softleaf sedge (*C. disperma*), creepingroot violet (*Viola rydbergii*), Hall's ragwort (*Ligularia bigelovii* var. *hallii*), bush honeysuckle (*Distegia involucrata*), fairy slipper orchid (*Calypso bulbosa*), sulphur Indian paintbrush (*Castilleja sulphurea*), roughleaf ricegrass (*Oryzopsis asperifolia*), false lily of the valley (*Maianthemum amplexicaule*), Fendler's waterleaf (*Hydrophyllum fendleri*), wood lily (*Lilium philadelphicum*) and wood rush (*Luzula parviflora*). The presence of such a large number of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: The boundary was drawn to include the known occurrences of two rare plant communities and five rare plants. The potential extent and habitats have been included in the boundary which is based on the immediate watershed which also encompasses intact upland communities. The ecological processes including hydrology, natural migration, pollination and dispersal are also important

to the long term existence of these rare plants and rare plant communities. The hydrology, topography, lack of anthropogenic disturbances, especially the lack of livestock grazing, and surrounding characteristics of the landscape are the most significant features supporting the rare plant communities and rare plants. The boundary was digitized while referencing digital color orthophoto quad and a 1:24,000 digital quad.

Protection Urgency Rank Comments (P1): The property is owned by Jefferson County Open Space and managed by Conifer Community Park. Construction projects are occurring on the property and in the vicinity of the site.

Management Urgency Rank Comments (M1): Roads were being bulldozed across Coyote Creek and zip lines were being installed in 2011. Some of the areas where these developments were taking place include areas where there are rare plants and rare plant communities. A thorough survey is essential to protecting these resources as these developments are occurring to protect the integrity of this exceptionally diverse wetland area. The installation of additional trails and creek crossings within the rare plant community or other activities that would influence the hydrology of the area would likely damage or impact the amazing biodiversity of the Coyote Creek area. A thorough biological inventory and perhaps a special designation would help land managers understand the significance of the area and help to determine best management practices. Weed treatments for Canada thistle in the wetlands should be reconsidered especially if an herbicide that kills dicots is being used which is typically the case. Smooth brome is very common in the area and recent studies (Rondeau et al. 2011) indicate that smooth brome (a monocot) replaces the Canada thistle creating a much less desirable ecological outcome. Treatments for Canada thistle are required by the county but herbicide use must be carefully considered in areas where smooth brome can replace the thistles. Manual removal of thistle heads might be a better choice. Changing the hydrology to allow more water in the area can help but is often difficult to accomplish.

Land Use Comments: This area is used for recreation and activities include hiking, day camps, frisbee golf and zip lines. There are cabins for overnight guests, a chapel and areas where large community events are held that bring in large numbers of visitors. Horses and dogs are allowed on the trails.

Exotic Species Comments: The quantity of non-native species in the shaded less disturbed areas were very low. However, in the disturbed areas near roads, on open floodplains, near buildings and trails, the non-native plants were common. Alien plant species included: smooth brome (*Bromopsis inermis*), dandelion (*Taraxacum officinale*), musk thistle (*Carduus nutans*), Timothy grass (*Phleum pratense*), Kentucky bluegrass (*Poa pratensis*), hoary alyssum (*Berteroa incana*), wild mint (*Mentha arvensis*), common mullein (*Verbascum thapsis*) and Canada thistle (*Breea arvensis*). Canada thistle and musk thistle are the only two Colorado B-listed noxious plants noted (Colorado Weed Management Association 2010). Herbicide treatments were

occurring in the wetland areas along Foxton Road for Canada thistle control.

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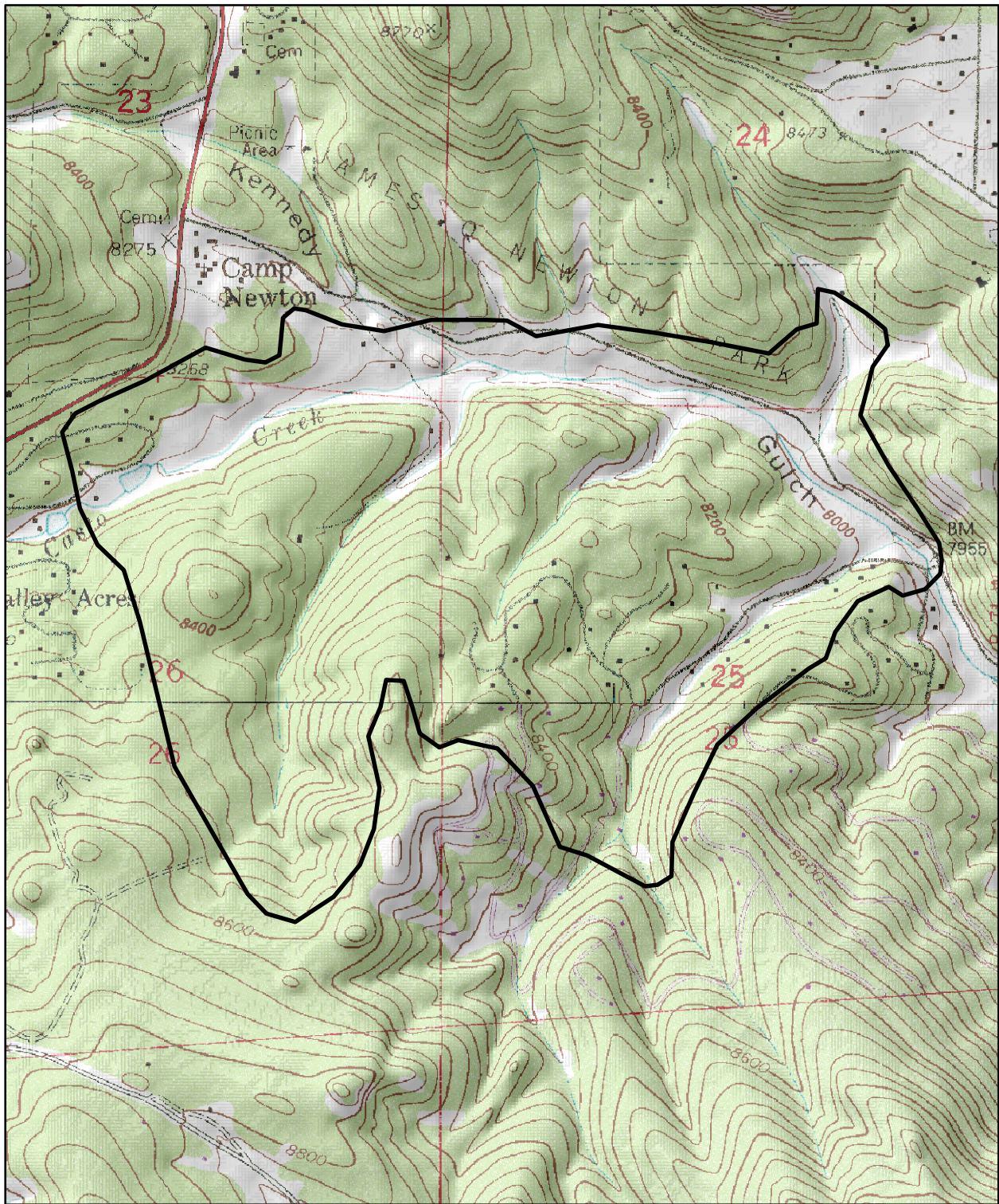
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Version Author: Smith, P.F.

Version Date: 02/26/2012



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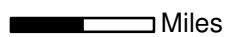
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 Conifer, 39105-E3

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

Location in Jefferson County



Map Date: 01/10/2012

 Miles
 0 0.1 0.2



Map 23. Casto Creek Potential Conservation Area, B3: High Biodiversity Significance

Centennial Cone

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: Black Hawk, Evergreen, Squaw Pass, Ralston Buttes

Size: 8,068 acres (3,265 ha)

Elevation: 6,995 - 8,640 ft. (2,132 - 2,633 m)

General Description: The site lies on the northwest border of Jefferson County. Centennial Cone is a prominent feature and is the highest peak in the area which lies on the east side of the site. The uplands are varied and include very large areas of intact shrubland and woodland communities. Narrow rocky canyons, some with small streams are common. Rocky Mountain juniper (*Juniperus scopulorum*) and mountain mahogany (*Cercocarpus montanus*) dominate large sections forming a matrix with ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*) and grassland communities. Clear Creek and North Clear Creek are major drainages that flow through the western portion of the site. The topography is varied and includes steep and undulating landscapes and lowland valleys. The geology for the majority of the site is metamorphic rock including felsic and hornblende gneisses that are derived principally from volcanic rocks. To a lesser extent biotitic gneiss, schist and migmatites are found in the southern part and they are derived principally from sedimentary rocks (Tweto 1979). The soils are largely composed of the Ratake-Cathedral very stony sandy loams with 25-60 percent slopes. The south and western slopes are composed of Rock outcrop-Cathedral-Ratake complex with 50-100 percent slopes. The soils of the slopes on Centennial Cone include the Grimstone-Hiwan-Rock outcrop complex with 30-60 percent slopes. The valley soils are composed largely of the Liniger-Ratake complex with 15-30 percent slopes (USDA NRCS 2008).

Key Environmental Factors: The large unbroken extent of upland habitat is the key factor for the rare plant community occurrence. The varied and rugged topography plays an important role supporting and protecting habitats for plant and animal species.

Climate Description: The nearby weather station at Evergreen between 1961 and 2011 recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7 °F (15.9 °C) and the average annual minimum temperature is 27.2 °F (-2.7° C, WRCC 2006).

Land Use History: The past land use has consisted primarily of homesteading, ranching and mining. Large scale developments above ground have not been a major factor on the landscape. Old mine shafts and tailing piles are evident in areas. The largest human disturbance evident on the landscape aside from ranching is the major roadway that follows the Clear Creek and North Clear Creek Drainages.

Biodiversity Significance Rank Comments (B3): This site supports a fair (C-ranked) occurrence of a globally imperiled (G2/S2) Rocky Mountain juniper / mountain mahogany (*Juniperus scopulorum* / *Cercocarpus montanus*) woodland community. Although this area is ranked fair, it is very likely that the occurrence is much larger than the area surveyed based on reviews of aerial photographs. A fair (C-ranked) occurrence of a Colorado endemic species that is a globally and state vulnerable species (G3/S3), the Rydberg twinpod (*Physaria vitulifera*), was found, as was a very small (C-ranked) occurrence of a globally vulnerable species (G3/SU), the Rocky Mountain phacelia (*Phacelia denticulata*).

Natural Heritage element occurrences at the Centennial Cone 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	<i>Juniperus scopulorum</i> / <i>Cercocarpus montanus</i> Woodland	Foothills Pinyon - Juniper Woodlands/Scar p Woodlands	G2	S2				C	2011-07-01
Vascular Plants	<i>Phacelia denticulata</i>	Rocky Mountain phacelia	G3	SU				C	2011-07-01
Vascular Plants	<i>Physaria vitulifera</i>	Rydberg twinpod	G3	S3				C	2011-08-17

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

Other Values: The Rocky Mountain phacelia is a new county record for Jefferson County and its state ranking has not yet been assigned. Although few Rocky Mountain phacelia plants were observed it is likely there are more in the area where there is potential habitat. In addition, there is an occurrence of a watch listed state endemic, the Rocky Mountain aletes (*Aletes anisatus*) in the Douglas-fir woodland on Centennial Cone.

Boundary Justification: The boundary is drawn to include the known occurrence of a significant plant community and three rare plant species including their potential extent and habitats. The local mosaic of plant communities includes drainages, forested wetlands, floodplains, uplands, valley bottoms and seeps. These occurrences are included in the boundary based on the immediate watershed. Across the unfragmented landscape, ecological processes that are linked to the hydrology, natural migration of organisms, and potential pollinators and their

habitats are allowed to function with minimal disruption. The size of the site is important to the long-term persistence of the occurrences. Other potential landscapes were included based on aerial photography (especially those areas on private lands). The boundary was digitized while referencing a one meter digital color orthophoto quad and a 1:24,000 digital quad. Although some of the land within the site is private, only public lands or lands with written permission were accessed.

Protection Urgency Rank Comments (P3): The southeast portion is owned by Jefferson County Open Space and the rest is private. Acquiring any available adjacent lands may be beneficial to help assure the integrity of the area.

Management Urgency Rank Comments (M4): The land in Jefferson County is largely owned by Jefferson County Open Space and is used for hiking, equestrian use and mountain biking. It appears grazing and mining on the majority of the area within the site has been discontinued. The surrounding privately owned lands appear to mainly be used for grazing and small residences. The biggest threat is development (road building, excessive use on current trails) that would fragment the upland plant communities or encourage weeds on the surrounding slopes. Climate change and pollution are threats that exist for many large landscape communities.

Land Use Comments: Major roadways have been constructed along the major rivers (Clear Creek and North Clear Creek) that are in the southwestern section of the site. Currently, no large scale residential developments or intense fragmentation of the woodland habitats are apparent on the landscape. Apparently, mining is no longer occurring in the area.

Natural Hazard Comments: Old mine shafts, steep rugged, loose terrain, bears and mountain lions.

Exotic Species Comments: State B-listed noxious weeds (Colorado Weed Management Association 2009) that were observed at the site include: musk thistle (*Carduus nutans*), Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*), and Canada thistle (*Breca arvensis*). Other non-native species that were common include: smooth brome grass (*Bromopsis inermis*), common mullein (*Verbascum thapsus*), alyssum (*Alyssum parviflorum*), Japanese brome grass (*Bromopsis japonicas*), and cheatgrass (*Anisantha tectorum*).

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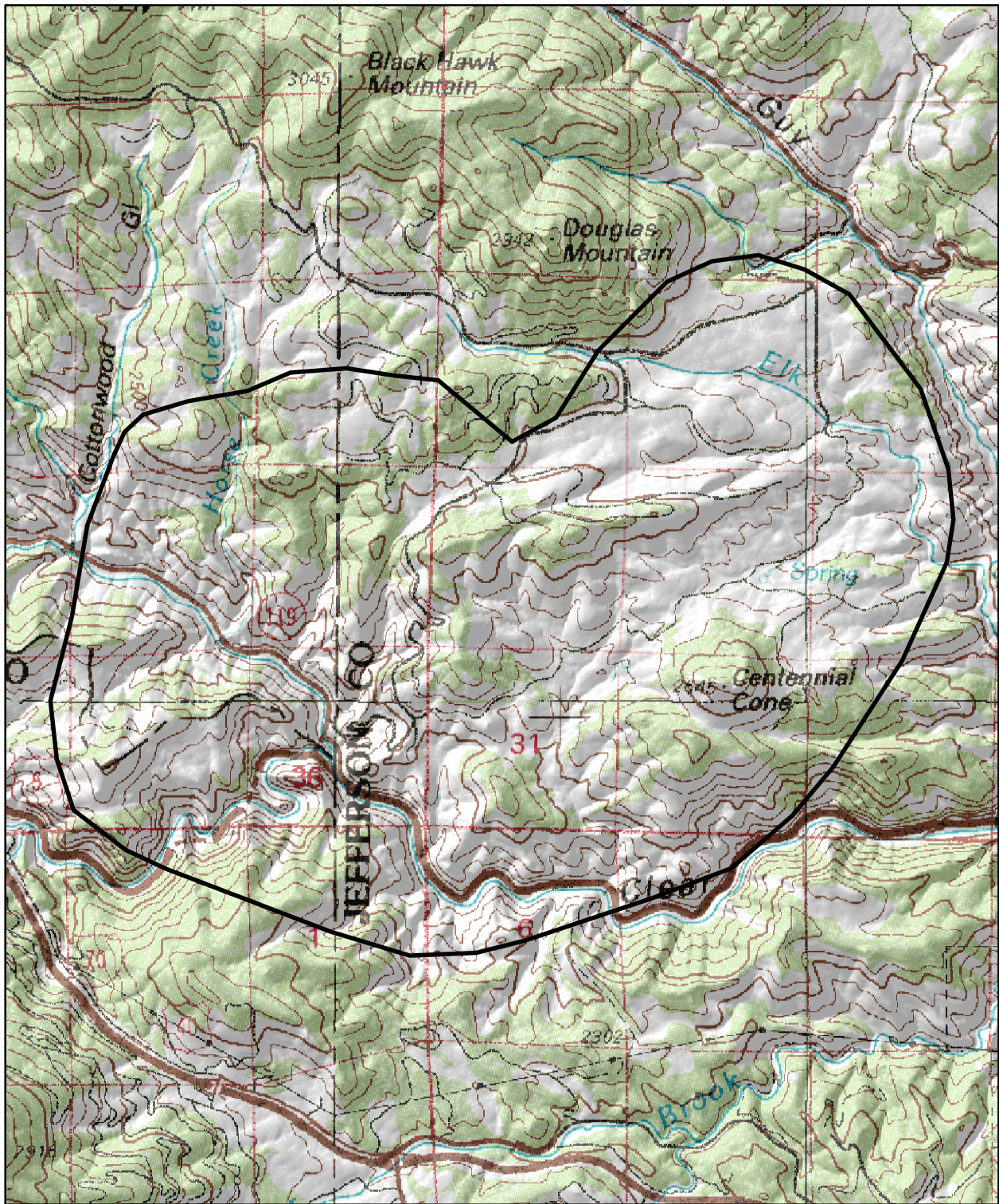
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Version Author: Smith, P.F.

Version Date: 02/23/2012



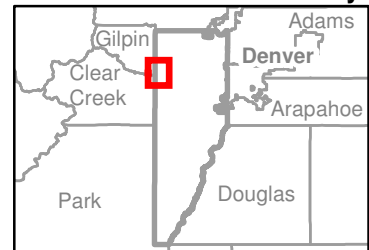
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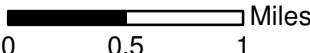
 PCA Boundary

Denver West, 39105-E1

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

Location in Jefferson County



Map Date: 01/10/2012 
 Miles

Map 24. Centennial Cone Potential Conservation Area, B3: High Biodiversity Significance

Cressmans Gulch

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: Golden, Ralston Buttes

Size: 626 acres (253 ha)

Elevation: 6,135 - 7,390 ft. (1,870 - 2,252 m)

General Description: The Cressmans Gulch site encompasses steep, rugged, granitic slopes of the gulch and surrounding mountain sides with 20 to 65 percent slopes. Cressmans Gulch is a deep, steep walled drainage with dense, shady, riparian growth along its bottom. The upslope vegetation patterns are distinct due to the steep terrain and contrasting aspects. The slopes are primarily forested with ponderosa pine (*Pinus ponderosa*) at low elevations and on south-facing slopes, and with mixed conifer forest codominated by Douglas-fir (*Pseudotsuga menziesii*) on north-facing slopes. The ponderosa pine forest tends to have a more open understory with sparse shrubs including mountain mahogany (*Cercocarpus montanus*) and grasses including needle-and-thread grass (*Hesperostipa comata*). The site contains large open areas of grass and forb rangeland, species include wheatgrass (*Pascopyrum smithii*), blue grama (*Chondrosium gracile*), some cheatgrass (*Anisantha tectorum*) and dandelion (*Taraxacum officinale*), but the dominant grass is smooth brome (*Bromopsis inermis*). Rock outcrops and talus slopes with sparse vegetation including stonecrop (*Sedum lanceolatum*) occur sporadically within the site. At lower elevations, areas containing sparse juniper and sagebrush are present. Cressmans Gulch is a moist, shady, spring and rain fed drainage, and the herbaceous understory tends to be quite lush with mosses, ferns, and other shade-tolerant forbs. The riparian vegetation of the gulch includes cottonwood (*Populus angustifolia*), Rocky Mountain willow (*Salix monticola*), water birch (*Betula occidentalis*), coyote willow (*Salix exigua*), and Rocky Mountain maple (*Acer glabrum*). The moist microclimate and higher humidity of the drainage creates suitable conditions for riparian plants like liverworts, mosses, Rocky Mountain woodsia (*Woodsia scopulina*), field horsetail (*Equisetum arvense*), western white clematis (*Clematis ligusticifolia*), Canada goldenrod (*Solidago canadensis*), common selfheal (*Prunella vulgaris*) and common hop (*Humulus lupulus*). Common hop is the larval host plant for a rare butterfly, the hops azure (*Celastrina humulus*) and a colony of the butterfly was observed in Cressmans Gulch. The geology in the north section of the site consists of biotitic gneiss, schist and migmatite derived primarily from sedimentary rocks while the south section is felsic and hornblendic gneisses that are derived principally from volcanic rocks (Tweto 1979). Soils in the uplands consist mainly of Ratake-Cathedral very stony sandy loam and Ratake-Cathedral-Rock

outcrop complex, both with 25 to 60 percent slopes. The canyon bottom consists of Trag sandy loam with 9-25 percent slopes (USDA NRCS 2008).

Key Environmental Factors: The hydrology supports a deep, shaded rocky ravine and the moist climate of this drainage supports common hop which is the food source for the rare butterfly occurrence.

Climate Description: The nearby weather station at Ralston Reservoir between 1978 and 2011 recorded an average annual precipitation of 18.6 inches. Snowfall is greatest in November, December and March and spring/summer rains peak in April-June and August. The average annual maximum temperature is 63.0°F (17.2° C) and the average annual minimum temperature is 38.9°F (3.8°C, WRCC 2006). The frost-free season is about 175 days. The steepness of the mountains along the Colorado Front Range creates an orographic effect where the mountains above the plains receive greater precipitation than the surrounding area.

Land Use History: Agriculture, ranching and mining were common past land uses.

Biodiversity Significance Rank Comments (B3): This site supports an extant occurrence of the globally imperiled (G2G3/S2) hops feeding azure (*Celastrina humulus*).

Natural Heritage element occurrences at the Cressmans 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
Insects	<i>Celastrina humulus</i>	Hops Feeding Azure	G2G3	S2				E	2011-07-07

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

Boundary Justification: This boundary includes the Cressmans Gulch watershed on both the north and south-facing slopes down to the valley bottom, where the hops azure butterfly and its habitat and larval host plant are found in the riparian zone. Integrity of the riparian plant community upon which the butterfly is dependent is affected by influences occurring higher up in the watershed. Consequently, the site is drawn to protect water flow and to maintain the seasonal timing and level of flows from both spring runoff, surface flows following rain events, and ground water recharge and subsequent discharge into Cressmans Gulch.

Protection Urgency Rank Comments (P3): This site is contained completely within private property. Consequently, purchase of the site and its protection as open space or the placement of conservation easements on the private property should be considered and/or encouraged. White Ranch and Mount Galbraith Parks surround the site and this piece of private property is the last remaining in the area and a

likely spot for exurban development.

Management Urgency Rank Comments (M4): Current grazing management is compatible with the persistence of the element in the site, but management actions may be needed in the future to maintain the current quality of the element occurrence. Current management actions beneficial to continued viability of the hops azure butterfly include moderate to light grazing. Current levels of grazing assist in preventing erosion of the steep sides of the gulch leading to subsequent loss of the herbaceous plant community, protection of the water resource from nutrient loading, and prevention of the introduction of nonnative plants with potential to replace the native plant community.

Land Use Comments: Ranching and livestock grazing including the development of cattle ponds within the Cressmans Gulch watershed include some of the current land uses.

Natural Hazard Comments: Steep terrain, rattlesnakes and lightening are common hazards at the site.

Exotic Species Comments: Exotics include: B-List species: hound's tongue (*Cynoglossum officinale*), Canada thistle (*Breea arvensis*), leafy spurge (*Tithymalus esula*), Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*). C-List species include: common St. Johnswort (*Hypericum perforatum*) and cheatgrass (*Anisantha tectorum* - Colorado Weed Management Association 2011). Other non-native species observed include: hoary alyssum (*Berteroa incana*), Kentucky blue grass (*Poa pratensis*), tall fescue (*Festuca arundinacea*), crack willow (*Salix fragilis*), smooth brome (*Bromopsis inermis*), and dandelion (*Taraxacum officinale*).

Off-Site Considerations: Exurban development is occurring in the foothills within the vicinity of the site. The surrounding area has been extensively mined and an old uranium mine lies within the boundary of the site.

Information Needs: Long-term monitoring of hops azure colony would add important information about the population biology of this species at the site and assist with managing the population.

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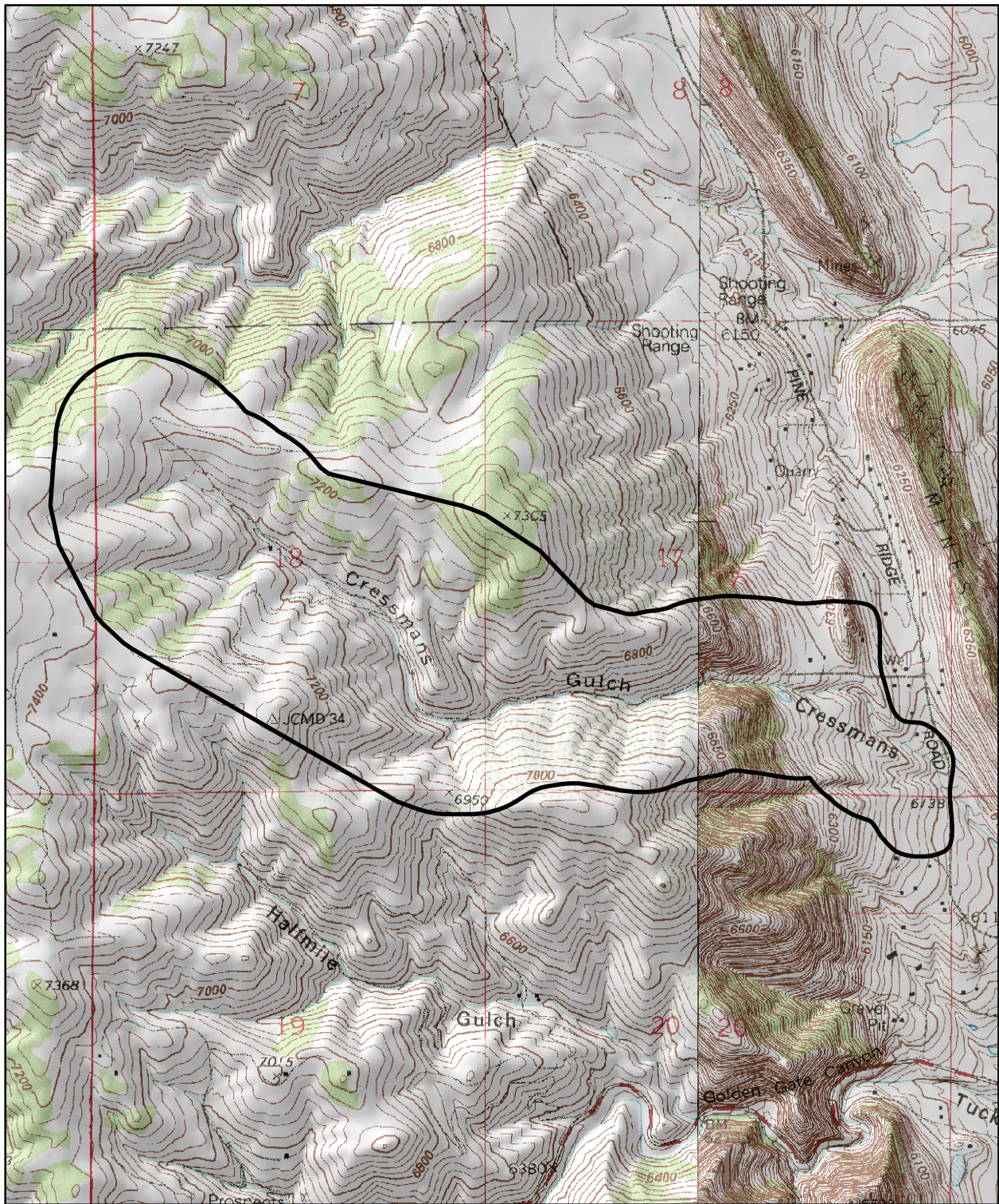
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Version Author: Sovell, J.R. and P.F. Smith

Version Date: 02/16/2012

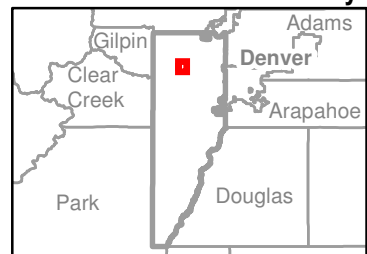


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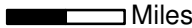
 PCA Boundary

Golden, 39105-G2
 Ralston Buttes, 39105-G3

Location in Jefferson County



Map Date: 01/10/2012

 Miles
 0 0.1 0.2



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

Map 25. Cressmans Gulch Potential Conservation Area, B3: High Biodiversity Significance

Deer Creek Canyon

Biodiversity Rank - B3: 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: Indian Hills

Size: 821 acres (332 ha)

Elevation: 6,600 - 7,295 ft. (2,012 - 2,224 m)

General Description: The Deer Creek Canyon site is located on the eastern edge of the Front Range foothills in central Jefferson County, on the south side of Deer Creek, a major drainage that runs along Deer Creek Canyon. The south fork of Deer Creek joins Deer Creek at Phillipsburg at the northwest tip of the site. The rugged terrain within the site contains several steep north-facing first order streams including Rattlesnake Gulch. Plymouth Mountain and Bill Couch Mountain provide steep forested slopes and valleys. Pyramid Peak and Wilds Peak are located just outside the south boundary of the site influencing the hydrology of the western side. Plymouth Creek is a second order stream that originates just west of Plymouth Mountain and flows northeast across the central part of the site. Ponderosa pine (*Pinus ponderosa*) was common with Douglas-fir (*Pseudotsuga menziesii*) important on the north-facing mountain slopes and drainages. A Douglas-fir / Geyer's sedge (*Pseudotsuga menziesii* / *Carex geyeri*) forest is also found on the north-facing slopes and covers over 400 acres. The varied topography provides a matrix of wetland and upland habitats that support an exceedingly diverse array of plant species. More open areas support mountain mahogany (*Cercocarpus montanus*) and Gambel's oak (*Quercus gambelii*) shrublands with grassland communities interspersed throughout. The drainages are steep, rocky, well-defined, often very narrow, and forested. The understory is shady, cool and supports a wide variety of native vegetation. The cool canyons and north-facing slopes support quaking aspen (*Populus tremuloides*), beaked hazelnut (*Corylus cornuta*), water birch (*Betula occidentalis*), alder (*Alnus incana*), bluestem willow (*Salix irrorata*), thimbleberry (*Rubacer parviflorum*) and Rocky Mountain maple (*Acer glabrum*). The upland and riparian geology is composed of metamorphic rock including felsic and hornblende gneisses, all derived primarily from volcanic rocks (Tweto, 1979). A number of soil types are found in this area including the Ratake-Cathedral Rock outcrop complex with 25-60 percent slopes, Grimstone-Hiwan-Rock outcrop complex with 30-60 percent slopes, Ratake-Liniger stony sandy loams with 30-60 percent slopes and the Allens Park variant-Ratake-Rock outcrop complex (USDA NRCS 2008).

Key Environmental Factors: Physical topography, unaltered drainages, undeveloped surrounding landscapes, functioning ecological processes and natural flooding cycles and are all factors that contribute to the existing habitats that

support the diversity of the plants and plant communities that currently exist.

Climate Description: Jefferson County is oriented along the Front Range so that the eastern portion is in the high plains and the western side sweeps up into the montane and subalpine ecological zones. Deer Creek Canyon is situated just at the base of the foothills. The nearby weather station at Kassler, CO between 1918 and 2010 recorded an average annual precipitation of 17.6 inches. Snowfall is greatest in February through April and summer rains peak in April and May. The average annual maximum temperature is 65.9°F (18.8 °C) and the average annual minimum is 36.4°F (2.4°C, WRCC 2006).

Land Use History: The land within the site has been lightly utilized in the past with very few anthropogenic disturbances evident on the landscape today. Homesteading, mining residential development and farming have occurred in this area.

Biodiversity Significance Rank Comments (B3): This site supports an excellent (A-ranked) occurrence of a globally vulnerable and state critically imperiled (G3/S1) quaking aspen and beaked hazelnut (*Populus tremuloides* / *Corylus cornuta*) forest community. There were a number of rare or uncommon plant species documented in this area including an excellent (A-ranked) occurrence of red stemmed spring beauty (*Claytonia rubra*) and a fair (C-ranked) population of Bicknell's geranium (*Geranium bicknellii*). Both of these plants are globally secure but imperiled in the state (G5/S1 and G5/S2, respectively).

Natural Heritage element occurrences at the Deer Creek 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	Populus tremuloides / Corylus cornuta Forest	Montane Riparian Forests	G3	S1				A	2011-06-28
Vascular Plants	Claytonia rubra		G5	S1				A	2011-06-28
Vascular Plants	Geranium bicknellii		G5	S2				C	2010-07-02

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

Other Values: A Douglas-fir / Geyer's sedge (*Pseudotsuga menziesii* / *Carex geyeri*) forest, which is a CNHP partially tracked community, is found on the north-facing slopes in good condition and covers over 400 acres. In addition, there were seven species that ranked an 8 or above on the Colorado Floristic Quality Index (Rocchio 2007): Dewey's sedge (*Carex deweyana*), water birch (*Betula occidentalis*), wild sarsaparilla (*Aralia nudicaulis*), beaked hazelnut (*Corylus cornuta*), western

rattlesnake plantain orchid (*Goodyera oblongifolia*), small enchanter's nightshade (*Circaea alpina*), and black snakeroot (*Sanicula marilandica*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. Therefore, the presence of species with high FQI values is indicative of the high quality of this area. Undeveloped high quality lands are especially uncommon in the state along the Front Range. There was a fairly dense population of native hops (*Humulus lupulus*) along Plymouth Creek which provides excellent habitat for rare butterflies.

Boundary Justification: The boundary was drawn to include the known occurrences of significant plant species and communities as well as their potential extent and habitats. Cool air drainages, forested wetlands, uplands, and valley bottoms are included in the boundary based on the immediate watershed which also encompasses the upland areas of significance. The ecological processes such as hydrology, natural migration, dispersal and pollination are all supported by the surrounding habitat both within and surrounding the site. These lands are important to the long-term persistence of the occurrences. The boundary was digitized while referencing a digital color orthophoto quad and a 1:24,000 digital quad.

Protection Urgency Rank Comments (P4): Currently the area is managed open space and is owned by Jefferson County. Acquiring any available adjacent lands may be beneficial to help assure the integrity of the area.

Management Urgency Rank Comments (M4): Current management appears to be adequate and the area seems to be well protected as part of county open space. The largest threat to the natural plant communities and rare plants is development of new trails, power lines, access points or anything that disturbs the soil layers or wetland hydrology. There is a small parking area off Deer Creek Road that allows visitors limited access to one of the drainages containing a rare plant community. The small size of the roadside parking area helps to limit visitation and is a good management strategy to keep use at levels that are sustainable. As long as no new developments including trail building, adding parking or other land disturbances, no actions are required at this time.

Land Use Comments: The land is managed as open space with trails used for non-motorized recreation located throughout the area. Some of the areas are not easily accessible and are afforded more protection. There was light residential development in the steep mountain valley along the south fork of Deer Creek (along Deer Creek Canyon Road).

Natural Hazard Comments: Steep terrain, loose rocky slopes and rattlesnakes.

Exotic Species Comments: Orchard grass (*Dactylis glomerata*), a pasture grass and dandelion (*Taraxacum officinale*) were noted. Overall very few non-native plants were observed at the site.

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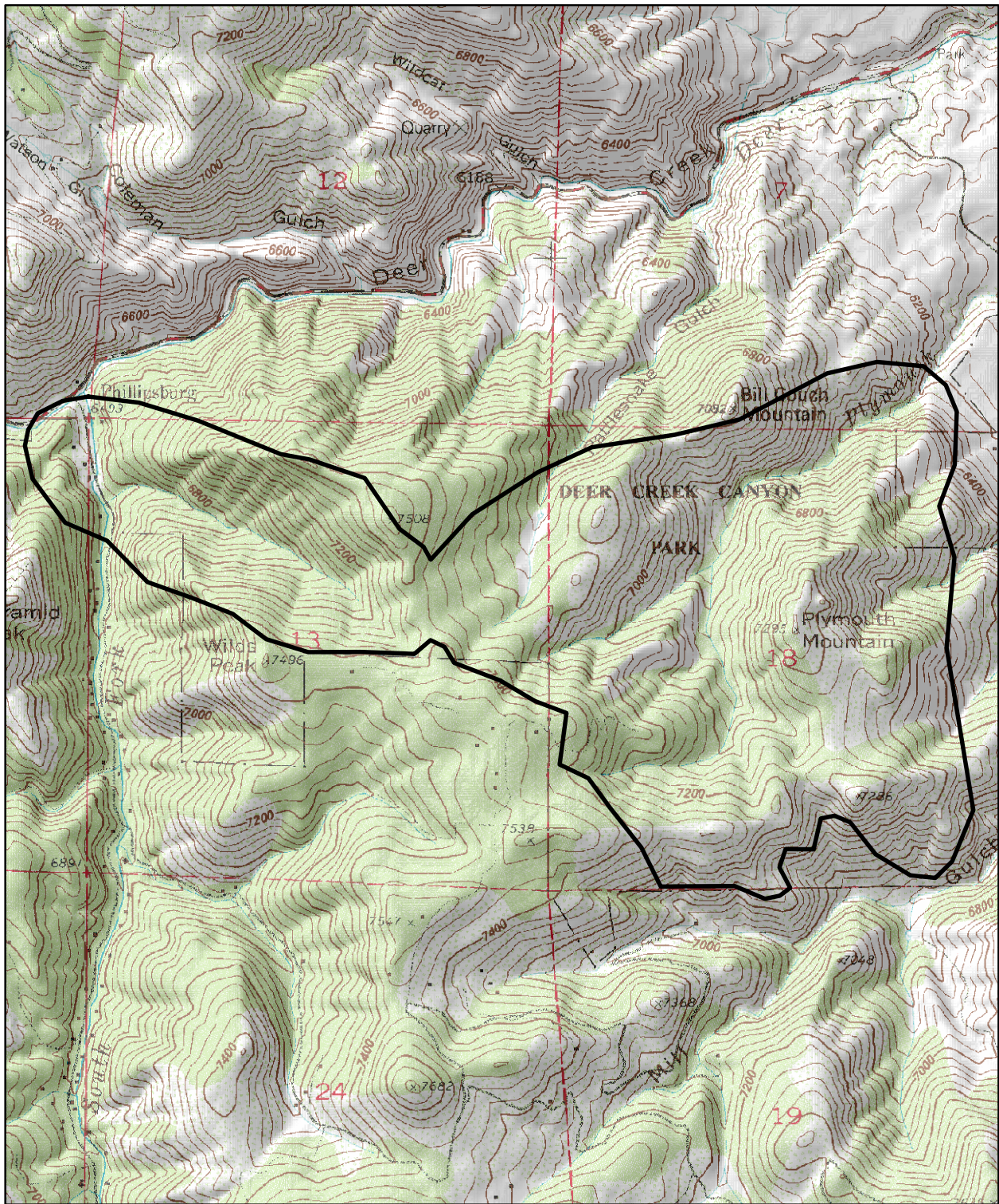
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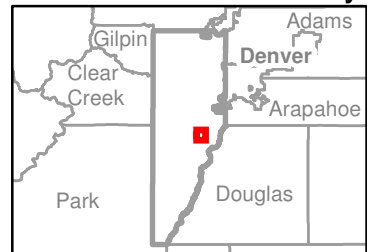
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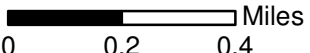
 PCA Boundary

Indian Hills, 39105-E2

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

Location in Jefferson County



Map Date: 01/10/2012 
 Miles

Map 26. Deer Creek Canyon Potential Conservation Area, B3: High Biodiversity Significance

Goose Creek

Biodiversity Rank - B3: High Biodiversity Significance

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

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

U.S.G.S. 7.5-minute quadrangles: Cheesman Lake, McCurdy Mountain

Size: 284 acres (115 ha)

Elevation: 7,800 - 8,400 ft. (2,377 - 2,560 m)

General Description: The site is located in southern Jefferson County about two air miles due west of Sheeprock Mountain and three miles west of Cheesman Lake along a three mile section of Goose Creek. The creek flows south in the north section of the site and bends to the southeast in the southern section. The north section of the drainage is much steeper than the southern section and flows through dramatic sheer cliffs. The surrounding steep cliffs, and rocky slopes are covered with coniferous forests of ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), and Douglas-fir (*Pseudotsuga menziesii*). Mountain muhly (*Muhlenbergia montana*), sleepygrass (*Achnatherum robustum*), fringed sage (*Artemisia frigida*), American waxflower (*Jamesia americana*), and common juniper (*Juniperus communis*) are also common in upland areas. The southern section is not as steep as the northern section and contains large open flat floodplains. The forests along Goose Creek are dominated by blue spruce (*Picea pungens*), Douglas-fir and quaking aspen (*Populus tremuloides*). A highly diverse shrub layer was found in the shady understory and included: bush-cranberry (*Viburnum edule*), red osier dogwood (*Cornus sericea*), snowberry (*Physocarpus albus*), bluestem willow (*Salix irrorata*), Bebb willow (*Salix bebbiana*), Wood's rose (*Rosa woodsii*), thinleaf alder (*Alnus incana*), Rocky Mountain maple (*Acer glabrum*), water birch (*Betula occidentalis*) and black chokecherry (*Padus virginiana* subsp. *melanocarpa*). The herbaceous layer was also highly diverse and included: starry false lily of the valley (*Maianthemum stellatum*), purple oat grass (*Schizachne purpurascens*), American mannagrass (*Glyceria grandis*), and alpine timothy (*Phleum alpinum*). The floodplains support montane willow carr plant communities dominated by Rocky Mountain willow (*Salix monticola*), bluestem willow, and a variety of other plants including shrubby cinquefoil (*Pentaphylloides floribunda*), bluejoint grass (*Calamagrostis canadensis*), water sedge (*Carex aquatilis*), woolly sedge (*Carex lanuginosa*), mountain rush (*Juncus arcticus*), Torrey rush (*Juncus torreyi*), interior rush (*Juncus interior*), longstyle rush (*Juncus longistylis*), rough bentgrass (*Agrostis scabra*), fowl mannagrass (*Glyceria striata*), Porter's melicgrass (*Melica porteri*), woolly brome grass (*Bromopsis lanatipes*), and scouring rush (*Equisetum arvense*). The geology consists of Pikes Peak granite (Tweto 1979) with massive sheer cliffs common along the northern part of the site along the drainage. The soils include sand, sandy loams, gravels and loamy sands.

Key Environmental Factors: The intact hydrological features and healthy vegetation

cover along Goose Creek are essential to the integrity of the rare wetland plant communities.

Climate Description: The nearby weather station at Bailey, CO between 1901 and 2011 recorded an average annual precipitation of 16.65 inches. Snowfall is greatest in December through March and summer rains peak in March and April. The average annual maximum temperature is 58.2°F (14.6°C) and the average annual minimum temperature is 24.9°F (-3.9°C, WRCC 2006).

Land Use History: Pikes Peak National Forest was one of the earliest National Forests established in the United States and the Wilderness designation for the Lost Creek Wilderness occurred in 1980. The area has been used largely for recreation including fishing, camping, hiking and horse riding. The Hayman Fire in 2002 burned the slopes of the drainages in the southern section of the site. However, the riparian forests directly adjacent to Goose Creek did not burn.

Biodiversity Significance Rank Comments (B3): The site supports a good (B-ranked) occurrence of the globally vulnerable (G3/S3) Douglas-fir / water birch (*Pseudotsuga menziesii* / *Betula occidentalis*) riparian forest and a fair (C-ranked) occurrence of the globally vulnerable (G3/S3) Rocky Mountain willow / Canada bluejoint grass (*Salix monticola* / *Calamagrostis canadensis*) willow carr.

Natural Heritage element occurrences at the Goose 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	<i>Salix monticola</i> / <i>Calamagrostis canadensis</i> Shrubland	Montane Willow Carr	G3	S3				C	2011-09-01
Natural Communities	<i>Pseudotsuga menziesii</i> / <i>Betula occidentalis</i> Woodland	Montane Riparian Forest	G3?	S3				B	2011-09-01

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

Other Values: The site has a very high diversity and includes seven plant species that ranked a 7 or higher on the Colorado Floristic Quality Index (FQI) Coefficient of Conservation (Rocchio 2007): Water birch (*Betula occidentalis*), melic grass (*Melica porteri*), purple oat grass (*Schizachne purpurascens*), red osier dogwood (*Swida sericea*), bluestem willow (*Salix irrorata*), Rocky Mountain maple (*Acer glabrum*), and starry false lily of the valley (*Maianthemum stellatum*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. Therefore, the presence of species with high FQI values is indicative of the high quality of this area.

Boundary Justification: The boundary is drawn for two rare wetland plant communities. The local watershed was used to draw the boundaries of the site. The intact hydrological features of the area including the floodplains help support the rare riparian shrub and forest communities. The undeveloped landscape supports essential ecological processes including local, natural migration, pollination, and dispersal that are all important to the long term persistence of the occurrences.

Protection Urgency Rank Comments (P2): The western portion of the site is on the Lost Creek Wilderness in Pikes Peak National Forest; the eastern section is on Pikes Peak National Forest. Although, these are publically owned and managed for non-motorized recreation, the volume of use by visitors is high and impacting the wetland plant communities.

Management Urgency Rank Comments (M1): Both rare plant communities were previously surveyed and determined to be in excellent condition with no non-native species observed by Colorado Natural Heritage Program biologists in 1996 (McMullen and Van Wie 1996). In 2011, both of these rare plant communities are significantly impacted from heavy visitor use. In addition, new occurrences of noxious weeds are apparent and problematic in areas. Some of the largest disturbances include camping along the riparian areas in both designated and non-designated sites, social trails from fisherman and others exploring the stream banks. The heavy visitor uses are disturbing the vegetation cover and are also creating habitats for non-native and invasive plant species. Today these communities are in good to fair condition, largely because of these impacts. In addition to the threats from high visitor use and impacts to the stream bank, threats to these communities also include fire, timber harvest, fuels reduction, climate change, and pollution. Discouraging the use of the campgrounds and especially the use of non-designated campgrounds in the riparian areas will help protect the remaining vegetation. Weed treatments for the B-Listed (Colorado Weed Management Association 2009) species may be beneficial if the off-trail disturbances are also eliminated or greatly reduced and avoiding the use of herbicides in wetland areas.

Land Use Comments: Currently, recreational activities are the most common land uses. Hiking trails, campgrounds (many apparently not legal), picnic areas and social trails for fishing are evident throughout the area.

Natural Hazard Comments: Steep outcrops and cliffs are potential hazards.

Exotic Species Comments: It is interesting to note that CNHP survey records from 1996 state no exotic species were observed within the Montane Willow Carr or the Montane Riparian Forests along Goose Creek. For the 2011 survey we noted disturbed stream banks and a variety of alien plant species, including B Listed noxious weed species for the State of Colorado: Canada thistle (*Breca arvensis*) and toadflax (*Linaria vulgaris*). Additional exotic species noted in 2011 include: redtop

(*Agrostis gigantea*), wayfaring tree (*Viburnum lantana*), and common mullein (*Verbascum thapsis*).

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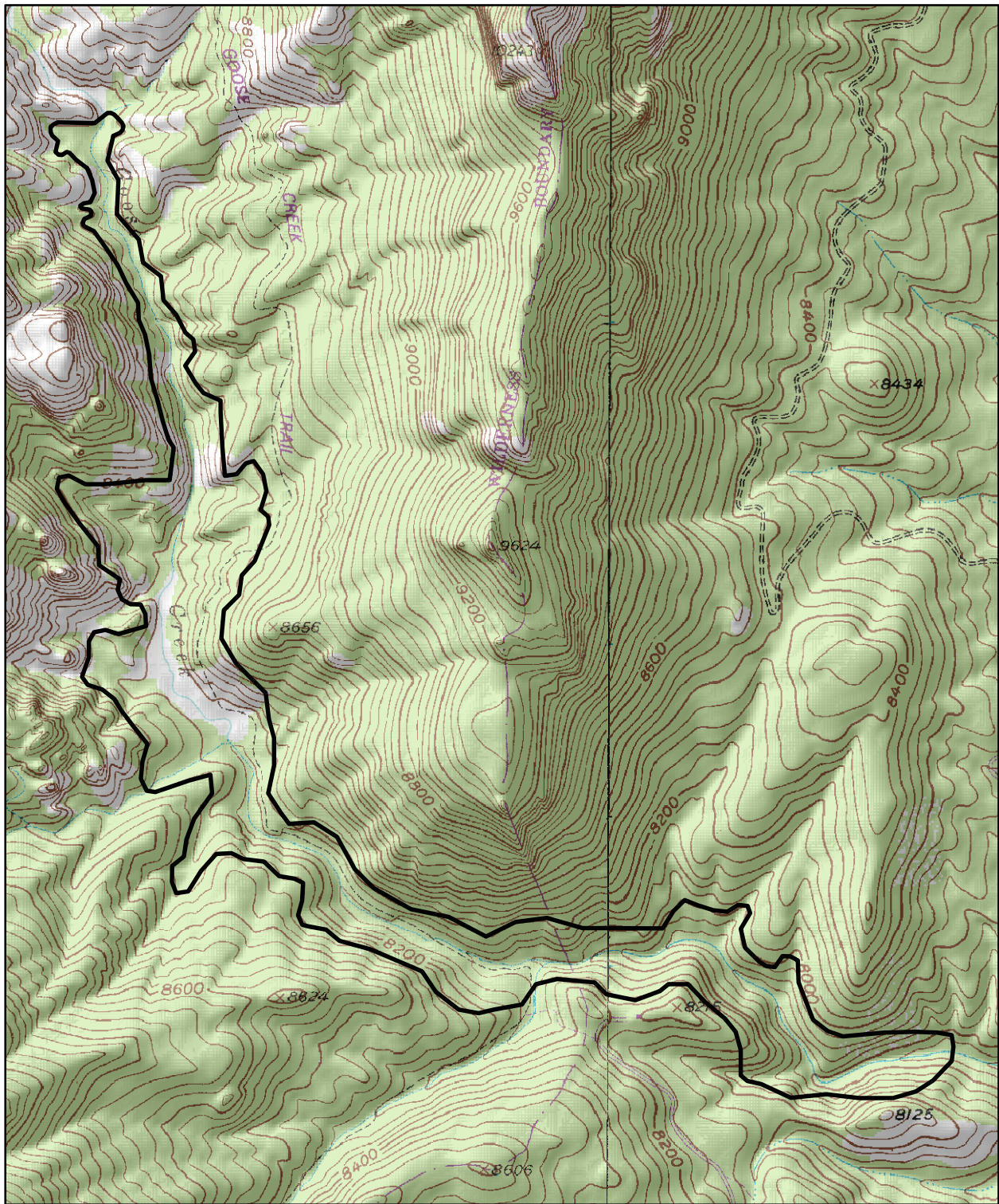
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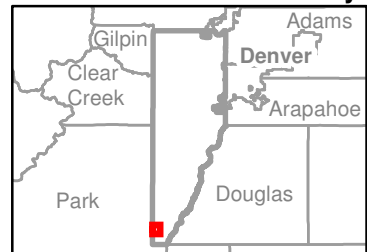
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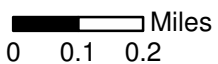
 PCA Boundary

Cheesman Lake, 39105-B3
 McCurdy Mountain, 39105-B4

Location in Jefferson County



Map Date: 01/10/2012

 Miles
 0 0.1 0.2



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

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

Indian Gulch

Biodiversity Rank - B3: 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: Golden, Evergreen, Ralston Buttes

Size: 2,025 acres (820 ha)

Elevation: 6,100 - 7,400 ft. (1,859 - 2,256 m)

General Description: The Indian Gulch site lies northwest of the intersection of State Hwy 93 and U.S. Hwy 6 in Golden. Mount Galbraith peak is centrally located in the site and Indian Gulch drains an area on the southern section of the site, which enters into Clear Creek about 0.65 miles west of the Hwy 93 and Hwy 6 intersection near the City of Golden. Golden Gate Canyon Road cuts across the northern end of the site. Three rare plant communities were found along the ridgetops and slopes. The upland slopes within this site provide an excellent example of the lower timberline transition zone. The topography is extreme: Indian Gulch, itself, drops over 1300 ft. in elevation in less than 1.5 miles, with very steep slopes and cliffs in excess of 100 feet. These dry low elevation slopes are dominated by plant communities that include a mountain mahogany (*Cercocarpus montanus*) / needle-and thread grass shrub community with patches of skunkbush sumac (*Rhus trilobata*). Ponderosa pine (*Pinus ponderosa*), Rocky Mountain juniper (*Juniperus scopulorum*) are scattered among the shrublands that include large patches of big bluestem (*Andropogon gerardii*). Other common species include little bluestem (*Schizachyrium scoparium*), western wheat (*Pascopyrum smithii*), mountain muhly (*Muhlenbergia montana*), Oregon grape (*Mahonia repens*), fringed sage (*Artemisia frigida*), hairy golden aster (*Heterotheca villosa*) and snowberry (*Symphoricarpos* sp.). In the northern section there is a Rocky Mountain juniper / mountain mahogany community. In addition, mature ponderosa pine stands which are uncommon have been observed at higher elevations. The wetland areas along Indian Gulch are part of an overlapping Potential Conservation Area (Clear Creek to Golden PCA). The majority of the soils include the Ratake-Cathedral-Rock outcrop complex, with 25 to 60 percent slopes including the north slope complexes. The Allens Park variant-Ratake-Rock outcrop complex with 30 to 50 percent slopes are found on the ridgetops and very large outcrops of igneous and metamorphic rocks are found on the south slopes of Indian Gulch (USDA NRCS 2008). The geology includes metamorphic rock, largely gneisses that are derived primarily from volcanic rocks (Tweto 1979).

Key Environmental Factors: The extreme topography and surrounding landscapes to the north, east and west that have not been severely altered by human activities provide the functioning ecological systems that support the rare plant communities. Ranching has been the predominant land use in the immediate area with some areas

experiencing very low to no grazing in recent years.

Climate Description: Between 1961 and 2011, the nearby weather station at Evergreen, recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7°F (15.9°C) and the average annual minimum temperature is 27.2° F (-2.7° C, WRCC 2006).

Land Use History: A major roadway, U.S. Hwy 6, was built along the Clear Creek Canyon which is just outside the southern border of the site. Mining activities were especially prevalent during the early Colorado gold rush of 1859 in the area. Ranching was a major land use. In March, 2011 a large fire (about 1,200 acres) burned in Indian Gulch which was caused by humans. Fire retardants were sprayed from helicopters to protect homes in the vicinity.

Biodiversity Significance Rank Comments (B3): This site includes one rare plant and three rare plant community occurrences. There is a good to fair (BC-ranked) occurrence of globally imperiled (G2/S2?) ponderosa pine / mountain mahogany / big bluestem (*Pinus ponderosa* / *Cercocarpus montanus* / *Andropogon gerardii*) foothills ponderosa pine scrub woodland, a fair (C-ranked) mountain mahogany / needle-and-thread grass (*Cercocarpus montanus* / *Hesperostipa comata*) mixed montane shrubland that is also globally imperiled (G2/S2), and a fair (C-ranked) occurrence of the globally imperiled (G2/S2) Rocky Mountain juniper / mountain mahogany (*Juniperus scopulorum* / *Cercocarpus montanus*) foothills juniper woodland. A good (B-ranked) occurrence of a globally vulnerable state endemic (G3/S3) plant species, Rydberg twinpod (*Physaria vitulifera*) was also documented within the site. The gulches support wetland species that increase the biodiversity of the area and contribute to a rich fauna. Although signs of past grazing are evident and the landscape is not pristine, the cover is largely in excellent shape. Areas in the Front Range foothills that have not been developed or over grazed are not common. In addition, there are a relatively low percentage of non-native plants in much of the site.

Natural Heritage element occurrences at the Indian 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	<i>Cercocarpus montanus</i> / <i>Hesperostipa comata</i> Shrubland	Mixed Foothill Shrublands	G2	S2				C	2010-08-27
Natural Communities	<i>Juniperus scopulorum</i> / <i>Cercocarpus montanus</i> Woodland	Foothills Pinyon - Juniper Woodlands/Scarp Woodlands	G2	S2				C	2011-07-19
Natural Communities	<i>Pinus ponderosa</i> / <i>Cercocarpus montanus</i> / <i>Andropogon gerardii</i> Wooded Herbaceous Vegetation	Foothills Ponderosa Pine Scrub Woodlands	G2	S2?				BC	1992-09-02
Vascular Plants	<i>Physaria vitulifera</i>	Rydberg twinpod	G3	S3				B	2011-07-19

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

Other Values: During the 2011 survey, a mountain lion, a den and scat were observed in the area as well as mule deer. A mature stand of ponderosa pine was also located within the site and, historically, rare butterflies have been observed. There are three plants that ranked 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): big bluestem (*Andropogon gerardii*), Front Range beardtongue (*Penstemon virens*), and mountain muhly grass (*Muhlenbergia montana*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: The boundary is drawn to include the known occurrences of three rare plant communities, a mature stand of ponderosa pine forest, and one rare plant population. These occurrences were all located on the dry upland slopes of the gulches and ridges. The local watershed boundaries and slightly beyond were used as the best approximation to protect the integrity of the ecosystem. The boundary was drawn using 1 meter aerial photographs. About 50 percent of the land in the site is private and we were not given permission to survey the properties. Only public lands were accessed for this survey.

Protection Urgency Rank Comments (P4): The property within the site is a mix of private and public lands with about 50 percent of the land in private ownership and

50 percent located on Jefferson County Open Space property.

Management Urgency Rank Comments (M4): The area that is owned by Jefferson County Open Space appears to be stable, especially the areas away from major roadways and historical anthropogenic disturbances. The management plans are largely for non-motorized recreation and very few developments. We were not able to survey surrounding private lands but they appear to continue to be mainly used for ranching as they were since the original surveys in 1992. It would be interesting to see how the plant communities fair in the future after the fire of 2011 that burned approximately 1,200 acres in Indian Gulch. Invasive weeds were not a major concern in the upland areas.

Land Use Comments: The public can access a few areas within the site that are owned by Jefferson County Open Space which is currently largely used for non-motorized recreation including rock climbing, bouldering, mountain biking and hiking. The majority of the surrounding private lands are ranches.

Natural Hazard Comments: Very steep, rugged terrain, sheer cliffs, loose rocky slopes, lightening, mountain lions and rattlesnakes are all potential threats.

Exotic Species Comments: One A-List noxious weed species (Colorado Weed Management Association 2009) myrtle spurge (*Euphorbia myrsinites*) was observed at the base of Indian Gulch in the lowest reaches near Clear Creek. This area which is close to U.S. Hwy 6 is one of the more disturbed areas. This plant fills the canyon bottom in places. B-List exotic species were found in the impacted upland areas and include: toadflax (*Linaria genistifolia* subsp. *dalmatica*), oriental clematis (*Viticella orientalis*), and saltcedar (*Tamarix* sp.) but no dense populations were noted. One C-List species, St. Johnswort (*Hypericum perforatum*), was also noted in the lower parts of the drainage. Other non-native species include: smooth brome (*Bromopsis inermis*), Kentucky bluegrass (*Poa pratensis*) cheatgrass (*Anisantha tectorum*), Japanese brome (*Bromus japonicas*), and alyssum (*Alyssum parviflorum*).

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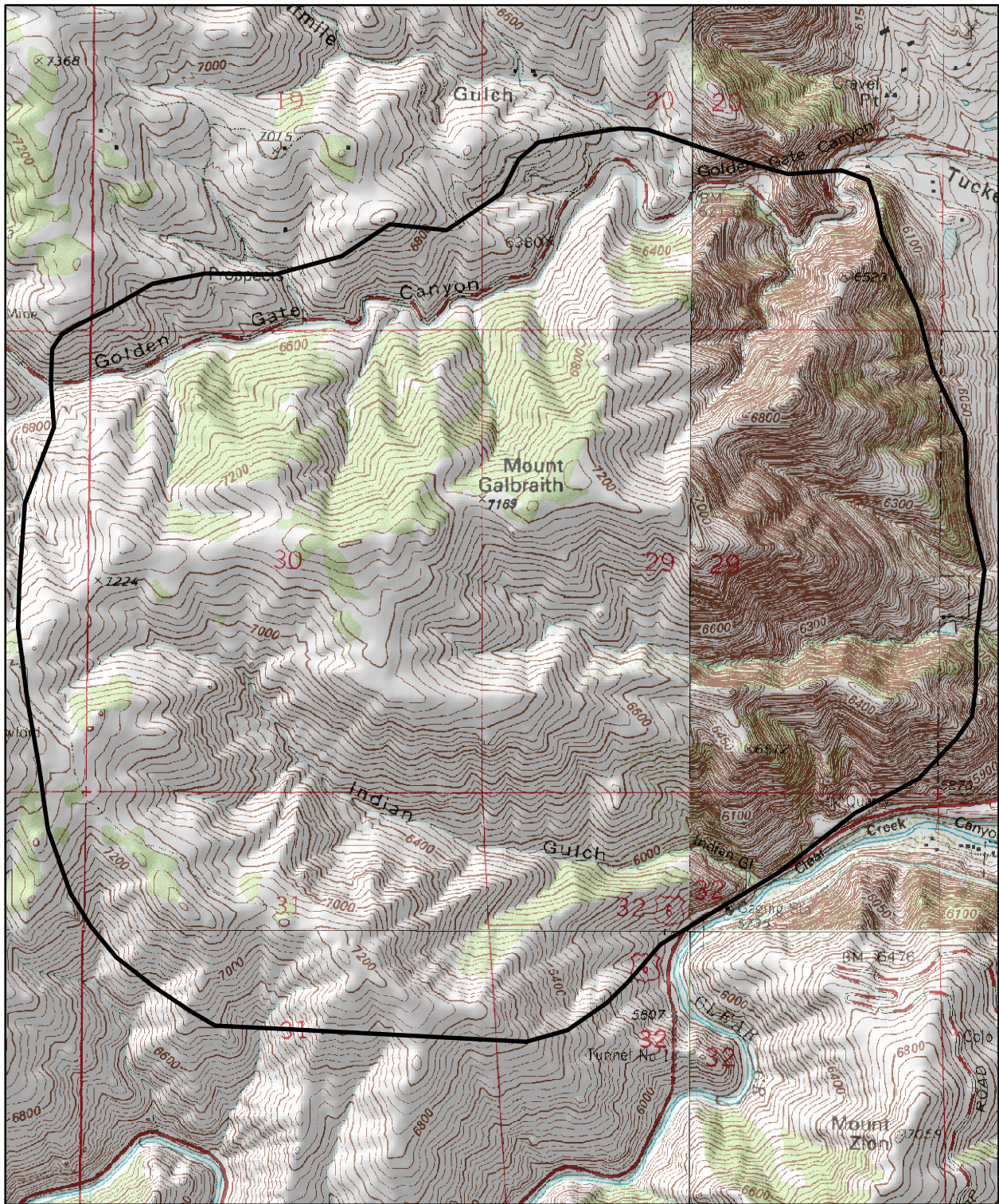
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Version Author: Smith, P.F.

Version Date: 02/27/2012

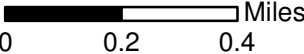



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 PCA Boundary
 Evergreen, 39105-F3
 Golden, 39105-G2
 Ralston Buttes, 39105-G3

Location in Jefferson County



Map Date: 02/28/2012
 Miles


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

Map 28. Indian Gulch Potential Conservation Area, B3: High Biodiversity Significance

Massey Draw

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: Indian Hills

Size: 1,193 acres (483 ha)

Elevation: 6,400 - 7,533 ft. (1,951 - 2,296 m)

General Description: The Massey Draw site is located on the eastern edge of the Front Range foothills in central Jefferson County on private open space land. The foothills in this area are largely undeveloped. There is a large area containing first and second order streams that flow eastward. The undeveloped eastward-facing, forested and steep cool canyon habitats characterize most of the site. The uplands are dry with rugged topography and support forests and woodlands that include ponderosa pine (*Pinus ponderosa*), mountain mahogany (*Cercocarpus montanus*), and Gambel's oak (*Quercus gambelii*) with grassland and shrubland communities interspersed throughout. Massey Draw and three unnamed smaller drainages originate from the higher slopes to the west and traverse the area towards the east. The drainages are steep, rocky, well-defined, often very narrow and forested. The understory is shady, cool and supports a wide variety of native vegetation. The wetlands also include valley bottoms and seeps. The cool canyons support quaking aspen (*Populus tremuloides*), beaked hazelnut (*Corylus cornuta*), water birch (*Betula occidentalis*), and Douglas-fir (*Pseudotsuga menziesii*) in the overstory. The valley bottoms form three separate depressions where aspen trees dominate and Oven Birds (*Sciurus aurocapilla*) were heard throughout the summer. A dense layer of tall forbs including Porter's licorice-root (*Ligusticum porteri*) dominate these low wet areas. The geologic substrate is mostly metamorphic rock including gneiss, schist and migmatite, all derived primarily from volcanic rocks (Tweto 1979). A number of soil types including Legault-Tolvar-Rock outcrop complex with 50-70 percent slopes, Ratake-Cathedral-Rock outcrop complex with 25-60 percent slopes, Ratake-Cathedral very stony sandy loams with 25-60 percent slopes and the Grimstone-Peeler-Rock outcrop complex with 30-50 percent slopes are found in the steep uplands. The dominant soils near the drainages and lowland depressions are sandy loams including the Trag sandy loam with 9-25 percent slopes, Liniger-Ratake complex with 15-30 percent slopes and Ratake-Liniger sandy loams with 30-60 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Physical topography, unaltered drainages, undeveloped surrounding landscapes and ecological processes including wildfires and flooding are all factors that contribute to the existing habitats that support the diversity of rare animals, plants and plant communities that currently exist.

Climate Description: Jefferson County is oriented along the Front Range so that the eastern portion is in the high plains and the western side sweeps up into the montane and subalpine ecological zones. Massey Draw is situated just at the base of the foothills and the climate is more tempered from extremes that are prevalent on the plains or higher in the mountains. Precipitation is low because of the location on the eastern slope in the rain shadow of the Rocky Mountains. The nearby weather station at Kassler, CO between 1918 and 2010 recorded an average annual precipitation of 17.6 inches. Snowfall is greatest in February through April and summer rains peak in April and May. The average annual maximum temperature is 65.9°F (18.8°C) and the average annual minimum is 36.4° F (2.4°C, WRCC 2006)

Land Use History: The land within the site has been lightly utilized in the past with very few anthropogenic disturbances evident on the landscape today. Occupation by Native Americans, homesteading, ranching and associated agriculture has occurred in the area. The Murphy Gulch wildfire occurred in 1978 burning 3,300 acres encompassing the entire site (Wildfire History Golden District Region). Some of the burned areas were re-seeded by airplanes with seed mixes that included non-native species (personal communication: Gary Norton, Ken-Caryl Open Space Ranger). Large residential and agricultural developments have impacted the surrounding landscape.

Biodiversity Significance Rank Comments (B3): The site supports a good (B-ranked) occurrence of the globally vulnerable (G3/S1) *Populus tremuloides* / *Corylus cornuta* riparian forest, a good to fair (BC-ranked) occurrence of a globally secure (G5/S4) *Pinus ponderosa* / *Quercus gambelii* woodland and a fair (C-ranked) occurrence of the state rare (G5/S2) plant, *Geranium bicknellii*.

Natural Heritage element occurrences at the Massey Draw 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	<i>Populus tremuloides</i> / <i>Corylus cornuta</i> Forest	Montane Riparian Forests	G3	S1				B	2010-06-29
Natural Communities	<i>Pinus ponderosa</i> / <i>Quercus gambelii</i> Woodland	Foothills Ponderosa Pine Scrub Woodlands	G5	S4				BC	1992-09-03
Vascular Plants	<i>Geranium bicknellii</i>		G5	S2				C	2010-08-06

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

Other Values: In three wetlands located in valley bottoms, several species of conservation concern, that is, species that are currently secure but could be

imperiled if they continue to be lost, were found and include: Blue Ridge carrion-flower (*Smilax lasioneura*); wood lily (*Lilium philadelphicum*); and the bird's foot violet (*Viola pedatifida*), the latter observed by Ken-Caryl staff. Oven Birds (*Seiurus aurocapilla*), which are globally secure but imperiled in the state, were nesting in these valley bottom wetlands. In addition, within this occurrence there were five plant species in the wetlands that ranked an 8 or above on the Colorado Floristic Quality Index (FQI) Coefficient of Conservation (Rocchio 2007): wood lily (*Lilium philadelphicum*), water birch (*Betula occidentalis*), wild sarsaparilla (*Aralia nudicaulis*), red baneberry (*Actaea rubra*) and black snakeroot (*Sanicula marilandica*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. Therefore, the presence of species with these high FQI values is indicative of the high quality of this area. High quality undeveloped lands like these are especially uncommon along the Front Range.

Boundary Justification: The boundary is drawn to include the known occurrences of significant plant species and communities as well as their potential extent and associated habitats. Cool air drainages, forested wetlands, uplands, valley bottoms and seeps are included in the boundary based on the immediate watershed which also encompasses the upland areas of significance. The boundary is intended to include lands that are important to the ecological processes such as hydrology, natural migration, pollination and dispersal. Most of the land included in this site is private and areas were accessed with written permission from the landowners.

Protection Urgency Rank Comments (P3): The majority of the land is managed as private open space for the local residents and is owned by Jefferson County Open Space. Some of the adjacent land is private but open space lands are also included in this private development.

Management Urgency Rank Comments (M2): The trails are currently being redesigned and this would be an appropriate time to make sure the routes have the lowest impacts on these vulnerable elements. The managing staff has been proactive and has conducted biological surveys for rare plants and animals in the areas slated to be developed. Recommendations have been made not to create new stream crossings in some of these areas. A survey of the riparian communities would be helpful to assess the full extent of the quaking aspen / beaked hazelnut community.

Land Use Comments: The majority of the land is managed as a private open space and is used for recreational activities including hiking, biking and equestrian uses.

Natural Hazard Comments: Steep terrain, rattle snakes and lightening.

Exotic Species Comments: Alien plant species were most common in the uplands especially near trails and include smooth brome (*Bromopsis inermis*), Kentucky bluegrass (*Poa pratensis*), cheatgrass (*Anisantha tectorum*), musk thistle (*Carduus nutans*), common mullein (*Verbascum thapsus*), alyssum (*Alyssum parviflorum*),

Canada thistle (*Breca arvensis*), toadflax (*Linaria genistifolia* subsp. *dalmatica*, *L. vulgaris*), timothy (*Phleum pratense*) and common St. Johnswort (*Hypericum perforatum*). The burned area that was re-seeded with a number of non-native plants has likely contributed to the exotic species. However, the managing staff is knowledgeable and heavily involved in weed management for invasive species that are found on the properties and are actively controlling noxious weeds and monitoring progress. The cool canyons had few to no noxious weeds present.

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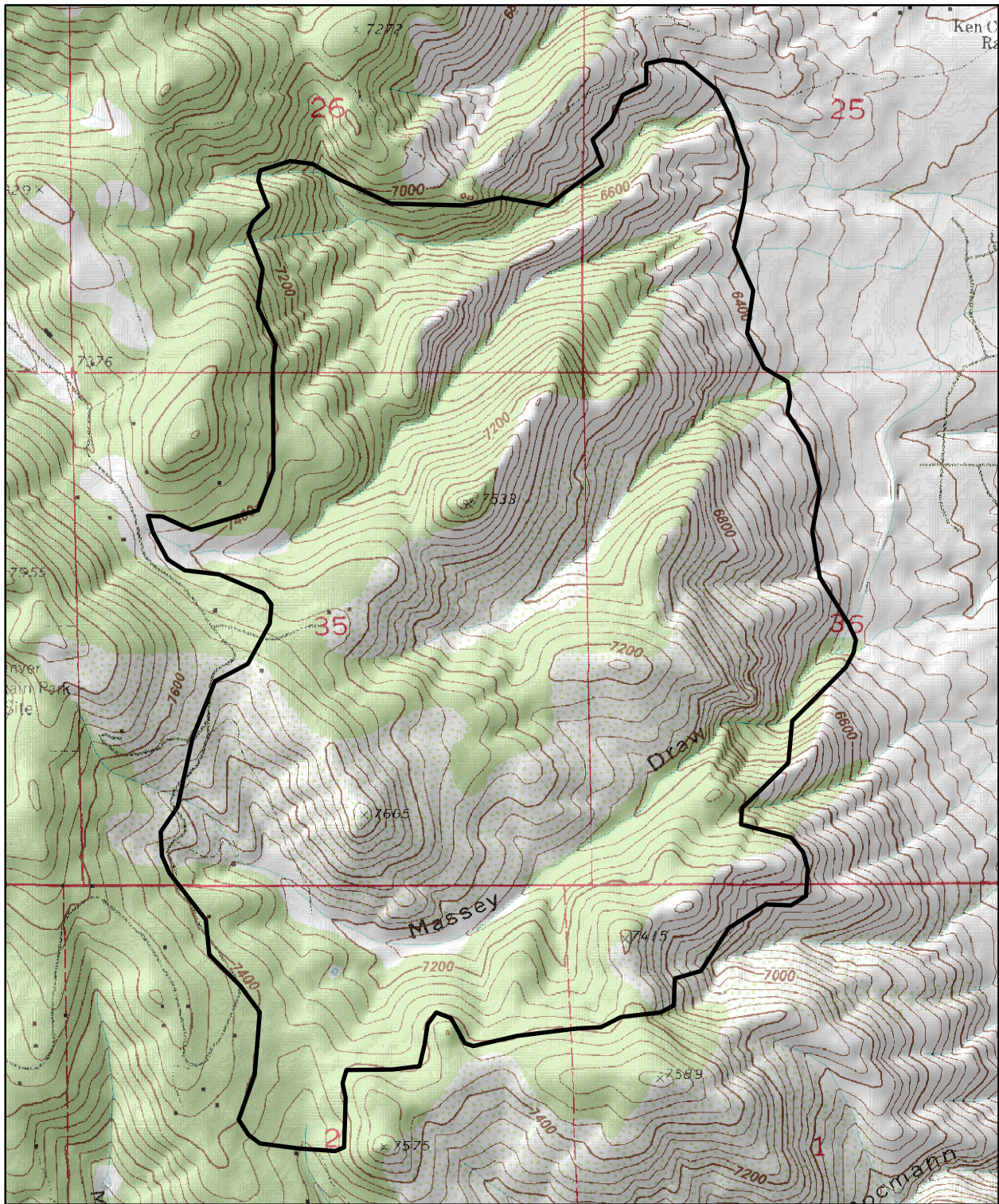
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Version Author: Smith, P.F.

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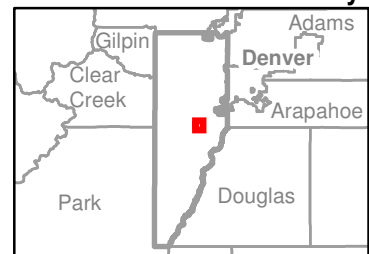
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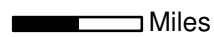
Indian Hills, 39105-E2

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

Location in Jefferson County



Map Date: 01/10/2012

 Miles
 0 0.1 0.2



Map 29. Massey Draw Potential Conservation Area, B3: High Biodiversity Significance

Maxwell Creek at Brook Forest

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: Conifer, Meridian Hill

Size: 291 acres (118 ha)

Elevation: 7,800 - 8,600 ft. (2,377 - 2,621 m)

General Description: Maxwell Creek is a very rocky, steep sided first order perennial stream that originates near Black Mountain Peak which is located in west central Jefferson County. Maxwell Creek flows north following a road for a short distance and then diverges away from the road where it flows through steep valleys that include very large granitic outcrops, cliffs, plunge pools and waterfalls. Upstream and just outside the site to the north, the Creek has been dammed forming small impoundments. The stream has very low sinuosity due to the steep grade and the surrounding narrow, steep, and rocky topography where some areas have no floodplain deposits. The Creek bottom is varied containing gravel, cobbles, sand and boulders. Thinleaf alder (*Alnus incana*) is the dominant shrub species along most of the streambank with blue willow (*Salix drummondiana*), Bebb willow (*Salix bebbiana*), bush honeysuckle (*Distegia involucrata*), bush-cranberry (*Viburnum edule*), elderberry (*Sambucus microbotrys*), and common juniper (*Juniperus communis*) also growing along the stream. Blue spruce (*Picea pungens*) and aspen (*Populus tremuloides*) are common in the overstory. Lodgepole pine (*Pinus contorta*) and wax flower (*Jamesia americana*) are the common dominant species in the upland areas of Maxwell Creek. Common forbs that grow along the stream banks include: bluebells (*Mertensia ciliata*), golden-glow (*Rudbeckia ampla*), cow parsnip (*Heracleum sphondylium*), green-flowered shinleaf (*Pyrola chlorantha*), smooth aster (*Aster laevis* var. *geyeri*), monkshood (*Aconitum columbianum*), sweet cicily (*Osmorhiza depauperata*), green bog orchid (*Limnorchis hyperborea*), wood rush (*Luzula parviflorum*) and other graminoids. The soils in the wetland areas and along the drainage in the northern section of the site consist largely of Kittredge-Earcree complex with 3-9 and 9-20 percent slopes. The uplands include both igneous and metamorphic outcrops that are 1,350-1,480 million years old (Tweto 1979). Soils are largely composed of the Rogert-Herbman-Rock outcrop complex with 30-70 percent slopes, and Grimstone-Hiwan-Rock outcrop complex with 30-60 percent slopes. In the southern part of the site the Legault-Hiwan-Rock outcrop complex with 30-50 percent slopes, Legault-Hiwan stony sandy loamy sands with 5-15 percent slopes and the Legault-Hiwan stony loamy sands with 15-30 percent slopes are common (USDA NRCS 2008).

Key Environmental Factors: The rugged topography and the intact hydrological features are significant factors that support the rare plant community and plants that occur in this drainage. It is also significant that this section of the drainage has not suffered from excessive anthropogenic disturbances. The dammed section outside the site does not appear to impact the area in the site.

Climate Description: The nearby weather station at Evergreen between 1961 and 2011 recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7°F (15.9°C) and the average annual minimum temperature is 27.2° F (-2.7° C, WRCC 2006).

Land Use History: Livestock grazing, roads and dams are common throughout this region.

Biodiversity Significance Rank Comments (B3): This site is drawn for a good (B-ranked) occurrence of a globally and state vulnerable (G3/S3) plant community, a thinleaf alder (*Alnus incana*) / mesic forbs shrubland, and an excellent (A-ranked) occurrence of a globally and state vulnerable (G3?/S3?) fern species, the Rocky Mountain polypody (*Polypodium saximontanum*).

Natural Heritage element occurrences at the Maxwell Creek at Brook 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	Alnus incana / Mesic Forbs Shrubland	Thinleaf Alder / Mesic Forb Riparian Shrubland	G3	S3				B	2011-08-07
Vascular Plants	Polypodium saximontanum		G3?	S3?				A	2011-08-07

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

Other Values: Within the site are five plants that ranked an 8 or above on the Colorado Floristic Quality Index (Rocchio 2007): Rocky mountain polypody, monkshood (*Aconitum columbianum*), shootingstar (*Dodecatheon pulchellum*), male fern (*Dryopteris felix-mas*) and spotted saxifrage (*Saxifraga odontoloma*). Six other species common in the area ranked a 7: spotted coralroot (*Corallorhiza maculata*), false lily of the valley (*Maianthemum amplexicaule*), sweet cicily (*Osmorhiza depauperata*), woodrush (*Luzula parviflora*), Macoun's buttercup (*Ranunculus macounii*), Hemlock parsley (*Conoselinum scopulorum*), and Rocky Mountain maple (*Acer glabrum*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: The boundary is drawn to include the known occurrence of a rare riparian plant community and a rare fern. The boundary is based on the immediate watershed which also encompasses intact upland communities where the rare fern was found. The hydrological features and other ecological processes including natural migration, pollination and dispersal are supported by the surrounding habitats and are important to the long-term persistence of the occurrences.

Protection Urgency Rank Comments (P3): The property is owned by the USDA Forest Service on the Arapaho National Forest. Special designation such as Wilderness or Research Natural Area would confer more secure protection of the important natural resources.

Management Urgency Rank Comments (M4): The quantity of non-native species in the more protected part of the drainage was very low. Monitoring the community and plants for changes in size or condition would help assure the long term integrity of the site. The US Forest Service is actively treating weeds in the area. Care should be taken since smooth brome (*Bromopsis inermis*) is present in the floodplain areas to avoid the use of herbicide sprays in the wetlands that select for dicots.

Land Use Comments: This area has a highly used hiking trail that runs along Maxwell Creek.

Natural Hazard Comments: Very steep and rugged terrain are potential hazards.

Exotic Species Comments: Alien plant species include; smooth brome (*Bromopsis inermis*), dandelion (*Taraxacum officinale*) and Canada thistle (*Breca arvensis*).

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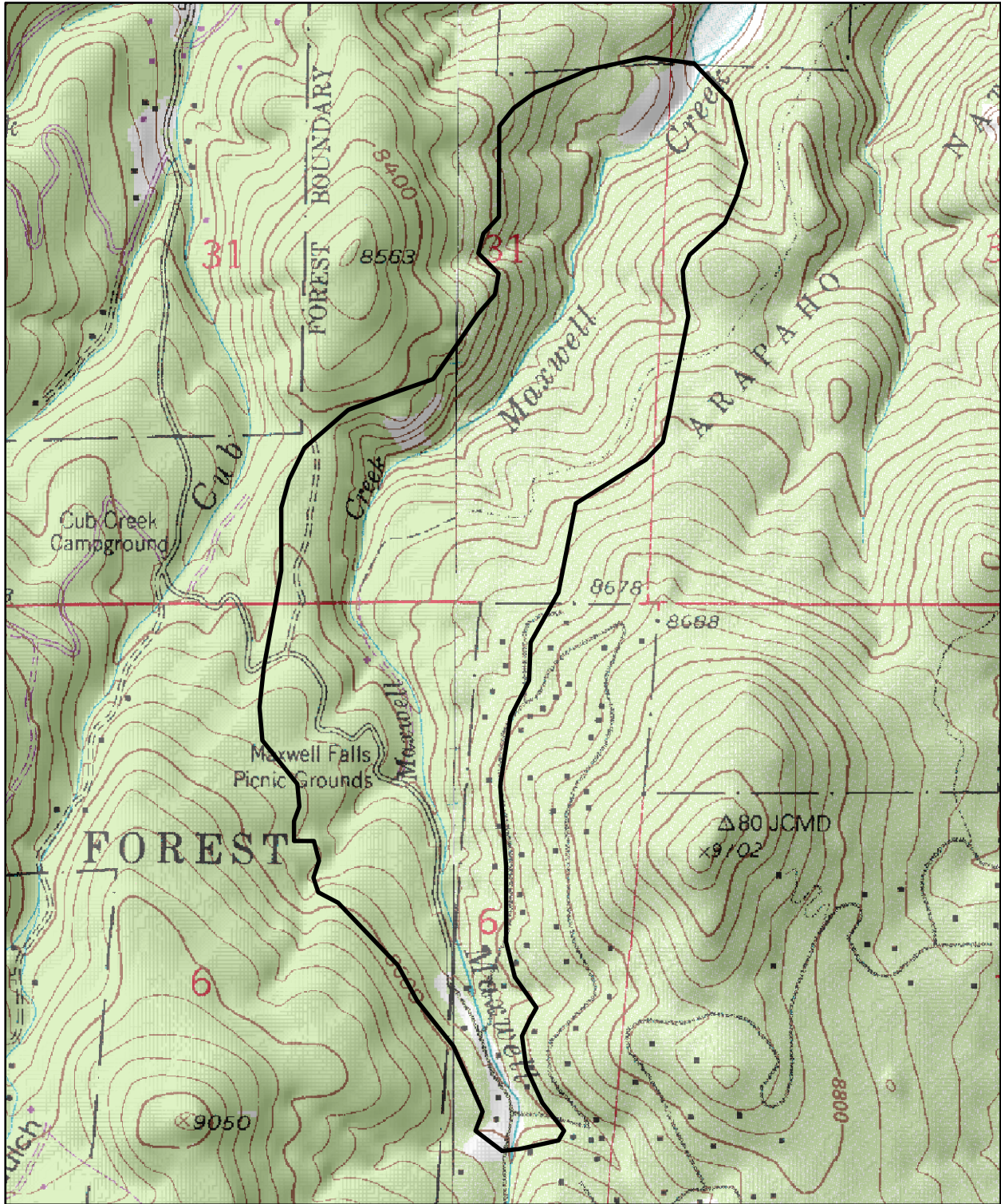
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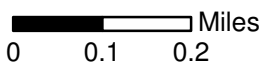
 PCA Boundary

Conifer, 39105-E3
 Meridian Hill, 39105-E4

Location in Jefferson County



Map Date: 01/10/2012



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

Map 30. Maxwell Creek at Brook Forest Potential Conservation Area, B3: High Biodiversity Significance

Mount Tom

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: Ralston Buttes

Size: 2,852 acres (1,154 ha)

Elevation: 7,700 - 9,735 ft. (2,347 - 2,967 m)

General Description: This site encompasses over 2,000 acres and includes Mount Tom (9,735 ft.), its surrounding slopes, and the headwaters of Sawmill Gulch and Van Bibber Creek. The view from Mount Tom and other high points at the site are both panoramic and spectacular. The large unfragmented landscape includes an amazing diversity of montane communities in excellent condition that are intermingled with highly functioning riparian systems. The peaks and ridges support stands of limber pine (*Pinus flexilis*) while the slopes support ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*) and Douglas-fir (*Pseudotsuga menziesii*) often with a thick understory of kinnikinnick (*Arctostaphylos uva-ursi*). Open meadows and shrublands are scattered throughout the woodlands with mountain mahogany (*Cercocarpus montanus*) and Rocky Mountain juniper (*Juniperus scopulorum*) common in these areas. Other microhabitats exist where either rock outcrops or moisture appears. The riparian areas form steep gulches and greatly add to the site's biodiversity with blue spruce (*Picea pungens*), quaking aspen (*Populus tremuloides*), and Douglas-fir as the primary overstory species. Pristine forests are found on the rugged peaks and steep slopes with some healthy stands found along the first order streams that flow into Van Bibber Creek, which include trees with girth measurements that exceed three feet in diameter. The dense and diverse shrub cover in the riparian areas consist of thinleaf alder (*Alnus incana*), Rocky Mountain maple (*Acer glabrum*), water birch (*Betula occidentalis*) and a variety of willows (*Salix* spp.). The understory is shaded and has a rich layer of native forbs and graminoids including blue clematis (*Atroгене occidentalis*), red baneberry (*Actaea rubra*), starry false Solomon's seal (*Maianthemum stellatum*), cow parsnip (*Heracleum sphondylium*), Fendler's meadowrue (*Thalictrum fendleri*), woodrush (*Luzula parviflora*), softleaf sedge (*Carex disperma*), wild sarsaparilla (*Aralia nudicaulis*), and waterleaf (*Hydrophyllum fendleri*). A diverse array of wildlife uses this area; bears, marmots and elk, were all observed during the survey and mountain lions have been observed by local land owners. The pine forests provide nesting and foraging area for Northern Goshawk (*Accipiter gentilis*), which have been recorded at the site. The geology is also quite diverse and includes massive rock outcrops of gneiss derived primarily from volcanic rocks on the north slopes of Mount Tom while granite is common on the south side of the mountain, and the lowlands to the east are largely

comprised of metamorphic rocks that are derived primarily from sedimentary rocks (Tweto 1979). The dominant soils found on the steep slopes (30-70 percent) include the Rogert-Herbman-Rock outcrop complex and the Legault-Tolvar-Rock outcrop complex. On the south side of the site where the landscape is less rugged and in the valleys, the soils include the Herbman-Sprucedale-Rock outcrop complex with 15-30 percent slopes and Kittredge-Earcree complex with 9-20 percent slopes in the lowlands (USDA NRCS 2008).

Key Environmental Factors: The size of the undeveloped landscape in addition to the physical topography including the steep outcrops and drainages with nearly pristine hydrology, and the steep rocky slopes, have likely protected many ecological processes that support the diversity of plants, plant communities and animals that currently exist. There is a low degree of anthropogenic disturbances including some areas that apparently have never been logged.

Climate Description: The nearby weather station at Ralston Reservoir between 1978 and 2011 recorded an average annual precipitation of 18.6 inches. Snowfall is greatest in November, December and March and spring/summer rains peak in April-June and August. The average annual maximum temperature is 63.0°F (17.2°C) and the average annual minimum temperature is 38.9°F (3.8°C, WRCC 2006)

Land Use History: Ranching, logging, homesteading, and construction of residences have occurred on this landscape. Logging was conducted in the early 1900's but some of the areas were not logged according to a third generation landowner. Many of the springs at the bases of the ridges have been tapped to water livestock over the years. There are some residences and abandoned cabins on the site, including a stainless steel house. Evidence for homesteading, grazing and light agriculture exists on the property. Spruce bud worm and pine beetle kills have been noted in the past forming a patchwork of meadows and raspberry stands.

Biodiversity Significance Rank Comments (B3): The site supports a good (B-ranked) occurrence of a globally vulnerable (G3/S3) blue spruce / thinleaf alder (*Picea pungens* / *Alnus incana*) riparian forest. There is also an excellent (A-ranked) and a good (B-ranked) occurrence of a globally secure and state vulnerable (G4/S3) ponderosa pine / kinnikinnick (*Pinus ponderosa* / *Arctostaphylos uva-ursi*) montane forest, and an excellent to good (AB-ranked) occurrence of the globally secure (G4/S2?) and state imperiled limber pine / kinnikinnick (*Pinus flexilis* / *Arctostaphylos uva-ursi*) montane woodland. Overall, the biodiversity of plant species is very high and the percentage of non-native species is low.

Natural Heritage element occurrences at the Mount Tom 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	<i>Picea pungens</i> / <i>Alnus incana</i> Woodland	Montane Riparian Forests	G3	S3				B	2011-06-13
Natural Communities	<i>Pinus flexilis</i> / <i>Arctostaphylos uva-ursi</i> Woodland	Lower Montane Woodlands	G4	S2?				AB	1992-07-22
Natural Communities	<i>Pinus ponderosa</i> / <i>Arctostaphylos uva-ursi</i> Woodland	Lower Montane Forests	G4	S3				B	1992-07-28
Natural Communities	<i>Pinus ponderosa</i> / <i>Arctostaphylos uva-ursi</i> Woodland	Lower Montane Forests	G4	S3				A	1992-07-22

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

Other Values: Within the riparian community were four plants that ranked an 8 or above on the Colorado Floristic Quality Index (Rocchio 2007): water birch (*Betula occidentalis*), softleaf sedge (*Carex disperma*), red baneberry (*Actaea rubra*) and wild sarsaparilla (*Aralia nudicaulis*). Six other species common in the area ranked a 7: spotted coralroot (*Corallorhiza maculata*), water leaf (*Hydrophyllum fendleri*), bluebells (*Mertensia ciliata*), hemlock parsley (*Conioselinum scopulorum*), false lily of the valley (*Maianthemum amplexicaule*), starry false Solomon's seal (*Maianthemum stellatum*) and Rocky Mountain maple (*Acer glabrum*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of this area.

Boundary Justification: The boundary is drawn to include the known occurrences of four significant plant communities; three upland plant communities and one riparian community. The rugged and large area deserves more inventory work to verify the exact boundaries of some of the rare upland communities. The boundary was digitized while referencing a digital color orthophoto quad and a 1:24,000 digital quad. This site is located entirely on private ranch lands and only lands with written permission were accessed.

Protection Urgency Rank Comments (P3): The property is privately owned and much of it appears to be managed for agriculture. Working with willing landowners on conservation easements or other conservation tools would help assure long-term integrity of this site.

Management Urgency Rank Comments (M4): Current conditions are satisfactory. Disturbing soil to plant more pasture grasses, increasing grazing pressures or changing the hydrology of the land (logging, new buildings, roads etc.) are currently the largest potential threats to the site. Future plans of the current landowner are not known. Management practices that maintain the hydrologic regime will best support the high quality natural resource values found in this site.

Land Use Comments: Evidence for homesteading, grazing and light agriculture exists on the property. Currently, grazing is the largest land use. Ranch roads traverse many of the sections. One nearby section of the property that is not included in the site is used to grow pasture grass (*Bromopsis inermis*) that has apparently invaded some of the nearby riparian areas within the site.

Natural Hazard Comments: Steep slopes and lightening.

Exotic Species Comments: In some of the riparian and upland communities smooth brome (*Bromopsis inermis*), a common pasture grass is invading. Common mullein (*Verbascum thapsus*) and two B listed noxious weeds (Colorado Weed Management Association 2009) musk thistle (*Carduus nutans*); and Canada thistle (*Breca arvensis*) were especially notable in areas that have been cleared of tree cover.

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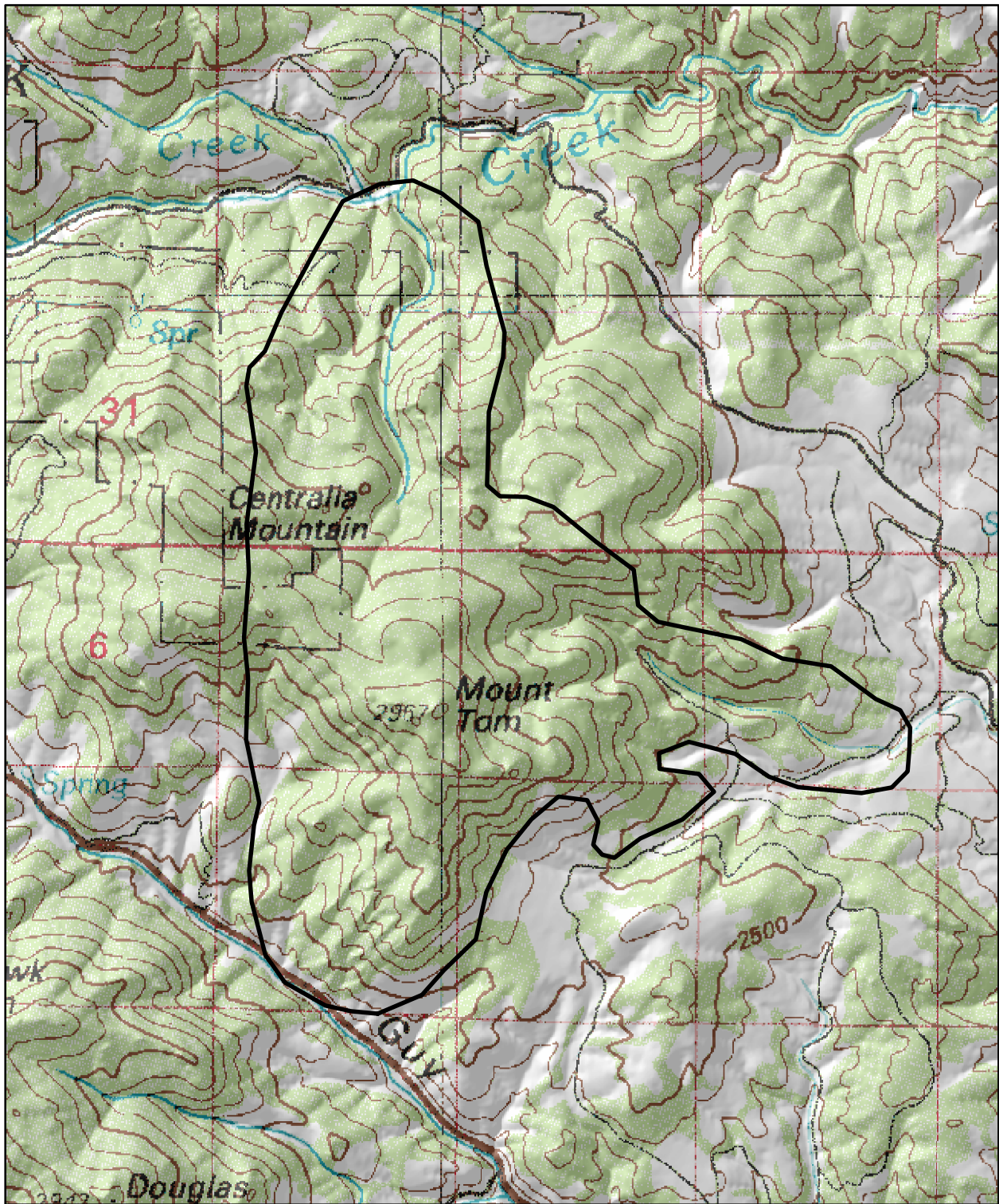
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Version Author: Smith, P. F.

Version Date: 02/22/2012



Colorado Natural Heritage Program
 Colorado State University
 1475 Campus Delivery
 Fort Collins, CO 80523-1475
<http://www.cnhp.colostate.edu>

Map Date: 01/23/2012

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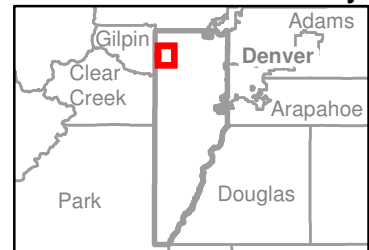


 PCA Boundary

Denver West, 39105-E1

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

Location in Jefferson County



Map 31. Mount Tom Potential Conservation Area, B3: High Biodiversity Significance

North Table Mountain

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: Golden

Size: 1,799 acres (728 ha)

Elevation: 5,800 - 6,512 ft. (1,768 - 1,985 m)

General Description: The North Table Mountain site lies to the northeast of the intersection of State Hwy 93 and U.S. Hwy 6 in Golden. North Table Mountain is a prominent landmark in the Denver-Golden area and has little development. The mountain forms a mesa that rises almost 1,000 feet from the landscape and is surrounded by the Great Plains and flanked by another mesa to the south (South Table Mountain). North Table Mountain consists of many diverse habitats including rolling hills, extensive grasslands, shrublands, volcanic rock outcrops, cliffs, springs, streams and small ponds. The top of the mountain is primarily grassland with several types of native grasses including needle-and-thread grass (*Hesperostipa comata*), sand dropseed (*Sporobolus cryptandrus*), blue grama (*Chondrosium gracile*), and big bluestem (*Andropogon gerardii*). Mountain mahogany (*Cercocarpus montanus*) is a common shrub with yucca (*Yucca glauca*), and wax currant (*Ribes cereum*). The herbaceous layer includes many native forbs such as hairy golden aster (*Heterotheca villosa*), scorpionweed (*Phacelia heterophylla*), prickly-pear cactus (*Opuntia polyacantha*), branched cinquefoil (*Potentilla effusa*), snakeweed (*Gutierrezia sarothrae*), bractless blazingstar (*Nuttallia nuda*), fringed sage (*Artemisia frigida*), dotted blazingstar (*Liatris punctata*), lupines (*Lupinus* spp.) and false boneset (*Brickellia rosmarinifolia* subsp. *chlorolepis*). There are wetlands that include three ponds, one of which is naturally formed. Springs on the top of the mesa feed the ponds which form headwaters for two drainages that cut across the property. The wetland vegetation includes cattails (*Typha latifolia*), softstem bulrush (*Schoenoplectus tabernaemontani*), pondweed (*Potamogeton natans*) and spikerushes (*Eleocharis* spp.). An area known as the "lichen garden" includes large outcrops of intruded volcanic basalts that provide habitat for some interesting plants including a variety of lichens, Rydberg's twinpod (*Physaria vitulifera*), a Colorado endemic that grows on metamorphic rock outcrops, and other vegetation that grows in the rock cracks such as sticky gilia (*Aliciella pinnatifida*), purple threeawn (*Aristida purpurea*), alpine golden buckwheat (*Eriogonum flavum*), James' nailwort (*Paronychia jamesii*), stemless Indian parsley (*Aletes acaulis*), sunbright (*Talinum parviflorum*), spike muhly (*Muhlenbergia wrightii*) and annual muhly (*Muhlenbergia minutissima*). Animal species that are known to occur include prairie dogs, mule deer and a variety of song birds and raptors. The steep cliffs provide habitat for Golden Eagles, Prairie Falcons, Red-tailed Hawks and other raptors that can nest or use the mountain during

migrations. In addition, colonies of White-Throated Swifts and Violet-Green Swallows have also been observed on the cliffs. The grasslands provide habitats for ground nesting birds and include prairie species such as Horned Larks and Lark Buntings. Nighthawks were also observed during the survey. The ponds and springs provide habitat for shore birds and ducks. Tiger salamanders have been observed in the ponds. The majority of the soils on the top of the mesa include the Baller variant-Lavina-Rock outcrop with 5-15 percent slopes and to a lesser extent Lavina loam, very rocky with 0-5 percent slopes, and Denver clay loam with 5-9 percent slopes. The soils of the steep slopes surrounding the mesa consist mainly of Leyden-Primen-Standley extremely stoney clay loams with 15-70 percent slopes (USDA NRCS 2008). The mountain is the result of three lava flows that originated from the Ralston Dike over 60 million years ago that originated about two miles northwest of North Table Mountain. The geology is characterized as a basaltic flow of the Denver Formation near Golden (Tweto 1979).

Key Environmental Factors: The topography of the mesa and the volcanic outcrops and associated soils support the wide variety of habitats that include the rare plant and the plant community. The springs and wetlands provide the functioning ecological systems and add to the biodiversity of plant and animal species. Ranching has been the predominant land use in the immediate area with some areas experiencing very low to no grazing in recent years perhaps allowing the land to recover.

Climate Description: The nearby weather station at Evergreen between 1961 and 2011 recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7°F (15.9°C) and the average annual minimum temperature is 27.2° F (-2.7° C, WRCC 2006).

Land Use History: Historically the area has been used for homesteading, grazing, and mining. Ranching was apparently the major land use for much of the land. Mineral extraction has affected a number of sites, including a noticeable area on the southwest corner of the mesa where the North Table Mine is located. Jefferson County Open Space acquired the property in 2004 and the area has since been used primarily for recreational activities. In July, 2005 a fire (~200 acres) burned on the north side of the mountain which was caused by humans.

Biodiversity Significance Rank Comments (B3): The site supports a fair (C-ranked) occurrence of a globally imperiled (G1G2/S1S2) *Hesperostipa comata* Great Plains mixed grass prairie and a good (B-ranked) occurrence of the globally vulnerable (G3/S3) Rydberg twinpod (*Physaria vitulifera*).

Natural Heritage element occurrences at the North Table 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	Hesperostipa comata Colorado Front Range Herbaceous Vegetation	Great Plains Mixed Grass Prairie	G1G2	S1S2				C	2011-09-07
Vascular Plants	Physaria vitulifera	Rydberg twinpod	G3	S3				B	2010-08-26

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

Other Values: The habitat that contains the Rydberg twinpod is an interesting area known as the "Lichen Garden. The fairly flat and open volcanic basalt outcrops support an interesting array of forbs and grasses that are widely spaced in cracks on the rock surface with a variety of lichens that occupy some of the rock surfaces. Also in areas to the east in the site there are wetlands including a natural pond, a palustrine emergent seasonally flooded wetland, that has been impacted by historical grazing activities. However, it still supports native wetland species and provides excellent habitat for wildlife. Other wetlands include springs and riparian areas that increase the biodiversity of the site and contribute to a rich flora and fauna. Within the site are four plants that ranked 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): big bluestem (*Andropogon gerardii*), spike muhly (*Muhlenbergia wrightii*), annual muhly (*Muhlenbergia minutissima*) and stemless Indian parsley (*Aletes acaulis*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats where these rare plants were found. The stemless Indian parsley is on the list to be considered for full-tracking status in the near future.

Boundary Justification: The boundary is drawn to include the known occurrences of one rare plant community and one rare plant. The entire mesa and a small amount of lands surrounding the feature were included in the boundary as an approximation to protect the integrity of the ecosystem. The boundary was drawn using 1:24,000 aerial photographs.

Protection Urgency Rank Comments (P3): The property is owned and managed by Jefferson County Open Space.

Management Urgency Rank Comments (M3): Since the property was purchased by the county, efforts were made to protect sensitive areas that were delineated in earlier studies. The county planned trail routes to avoid sensitive areas and by requiring recreationists to stay on trails further protection is offered. In addition, seasonal closures (March 15 to July 31 each year) were instituted to protect species of

cliff-nesting raptors that rely upon the mesa cliffs for habitat to raise young. There are impacts from past land uses, for example, the cattle have compacted the soil around all ponds and weeds are common on the property. In 1992, a study noted that no rare butterflies were observed and the species present were indicative of the effects of disturbance (Kilburn and White). However, tiger salamanders continue to breed in the natural ponds and there is a dominance of native wetland vegetation. Since the grazing and mining disturbances have been reduced for many years it is likely the natural systems are beginning to recover and more species could be found here in the future. Most of the noxious weed species that are present are likely related to times when there were more disturbances including off road vehicle use, heavy grazing and mining activities. Removal of the diffuse knapweed along the roadsides might be beneficial to protect the less disturbed areas. .

Land Use Comments: The public can access many trails on North Table Mountain which is owned by Jefferson County Open Space. Rock climbing, mountain biking, hiking and horseback riding are common uses along the trails. The majority of the surrounding private lands include residential areas, Hwy 93 on the west boundary, and ranches to the west of the highway.

Natural Hazard Comments: Very steep, rugged terrain, sheer cliffs, loose rocky slopes, lightening, and rattlesnakes are all potential threats.

Exotic Species Comments: One B-List noxious weed species (Colorado Weed Management Association 2009) was observed in the impacted upland areas near the old mining area and roads: diffuse knapweed (*Acosta diffusa*). Efforts to treat these easily accessible populations along the road is recommended. One C-List noxious weed species, common mullein (*Verbascum thapsus*), and cheatgrass (*Anisantha tectorum*) were commonly found in disturbed areas. Other non-native species observed include:, crested wheatgrass (*Agropyron desertorum*), intermediate wheatgrass (*Thinopyrum intermedium*), oak goosefoot (*Teloxys botrys*), and alyssum (*Alyssum parviflorum*). Most of these plants are annuals, biennials or planted grass species and there are no recommendations for treatment at this time.

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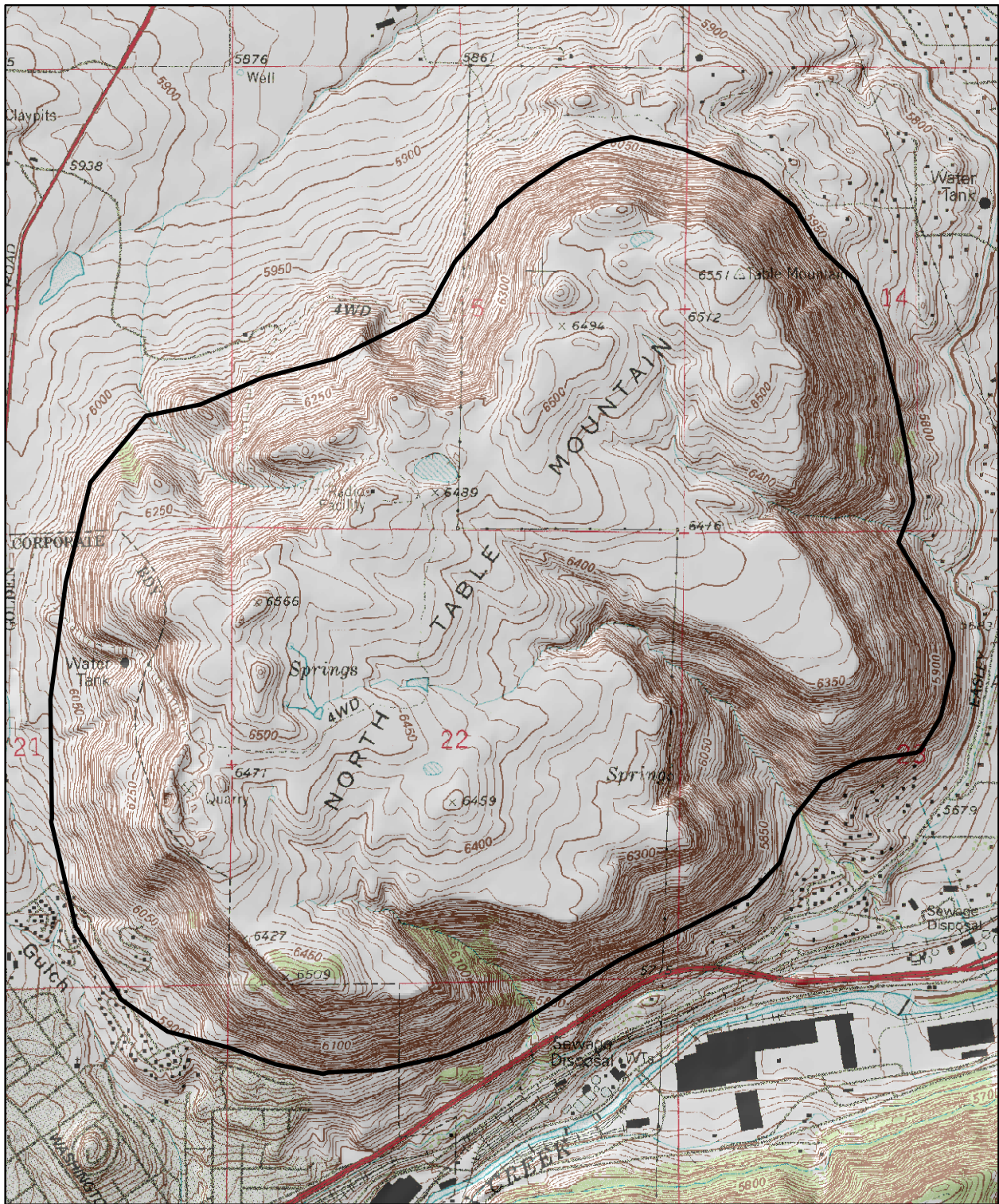
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Version Author: Smith, P.F.

Version Date: 03/22/2012



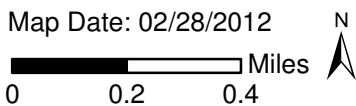
Colorado Natural Heritage Program
 Colorado State University
 1475 Campus Delivery
 Fort Collins, CO 80523-1475
<http://www.cnhp.colostate.edu>

 PCA Boundary

Golden, 39105-G2

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

Location in Jefferson County



Map 32. North Table Mountain Potential Conservation Area, B3: High Biodiversity Significance

Ralston Creek Uplands

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: Eldorado Springs, Ralston Buttes

Size: 4,950 acres (2,003 ha)

Elevation: 7,985 - 9,000 ft. (2,434 - 2,743 m)

General Description: The Ralston Creek Uplands site is located adjacent to and slightly overlapping Golden Gate Canyon State Park in the northwest section of Jefferson County, approximately 8 air miles southwest of Boulder. Blue Mountain is a prominent feature located in the northwest corner of the site with the peak reaching just over 9,000 feet. The rugged uplands are covered largely with forests and woodlands and include steep granite outcrops. The forest can be extremely dense in places (a sign of past logging), but has been thinned out in others due to spruce bud worm and pine beetle kills. The areas that are less densely forested have a more diverse understory and herbaceous layer. Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) are dominant tree species on the steep and rocky slopes. In some areas the ponderosa pines form savannahs that include spike fescue grass (*Leucopoa kingii*) forming a rare plant community in the southern section of the site. Common shrubs include mountain mahogany (*Cercocarpus montanus*), Rocky Mountain juniper (*Juniperus scopulorum*), common juniper (*Juniperus communis*), Boulder raspberry (*Oreobatus deliciosus*) and wax currant (*Ribes cereum*). The shrublands also contain rare plant communities dominated by mountain mahogany and needle-and-thread grass (*Hesperostipa comata*). Rocky Mountain juniper (*Juniperus scopulorum*) and mountain mahogany (*Cercocarpus montanus*) dominate large sections forming a matrix with ponderosa pine, Douglas-fir and very healthy and diverse native grassland communities. Common herbs include sunflowers (*Helianthus pumila*), sleepygrass (*Achnatherum robustum*), aspen fleabane (*Erigeron speciosus*), blue grama grass (*Chondrosom gracile*), big bluestem (*Andropogon gerardii*), hairy false golden aster (*Heterotheca foliosa*), sand dropseed grass (*Sporobolus cryptandrus*), porcupine grass (*Hesperostipa spartea*), and muhly grasses (*Muhlenbergia* spp.). Wetlands in the Ralston Creek drainage are described in the Middle Ralston Creek site, however, there are wetlands near springs and small drainages located in the upland sections that contain native plant communities that are in good to excellent shape. Many are dominated by willows (*Salix bebbiana*), aspen (*Populus tremuloides*), water birch (*Betula occidentalis*), sedges (*Carex nebrascensis*, *C. ebenea*, *C. vulpinoidea*) and rushes (*Juncus arcticus*). Some of the wetlands have been moderately to heavily impacted by grazing. Narrow rocky canyons, some with small streams are common. These wetland areas have a very rich diversity of both plants and butterflies. The aspen wetlands also have a very high diversity of birds. Eighteen

species of butterflies were observed (none were significant) "hilltopping" upslope from the foothill ponderosa pine savannas. The ponderosa pine forests in this area have supported Lewis's Woodpecker (*Melanerpes lewisii*) observed in 2005. The geology for the northwest section of the site is largely comprised of granite and includes large outcrops. The central part of the site is metamorphic rock including felsic and hornblende gneisses that are derived principally from volcanic rocks. To a lesser extent biotitic gneiss, schist and migmatites are found in the southern part and they are derived principally from sedimentary rocks. Quartzite, conglomerates and interlayered mica schists are also found in the southern section of the site (Tweto 1979). Blue Mountain soils include Rogert-Herbman outcrop complexes with 30 to 70 percent slopes, Legault-Tolvar-rock outcrop complex with 50-70 percent slopes, and Herbman-Sprucedale-Rock outcrop complex with 50-70 percent slopes. The sedge dominated wetlands contain Kittredge-Earcree complex with 9 to 20 percent slopes. The soils in the south section include the Ratake-Cathedral-Rock outcrop complex with 25 to 60 percent slopes, Ratake-Liniger stony sandy loams with 30 to 60 percent slopes, Grimstone-Hiwan-rock outcrop complex with 30-60 percent slopes, and the Troutdale-Kittredge sandy loams with 5-15 percent slopes. (USDA NRCS 2008).

Key Environmental Factors: The large unbroken extent of upland habitat with wetland areas are key factors for the rare plant community occurrences. The varied and rugged topography plays an important role supporting and protecting habitats for plant and animal species. Intact and only moderately impacted wetlands are also important in providing habitats that contribute to the biodiversity of the site.

Climate Description: The nearby weather station at Ralston Reservoir between 1978 and 2011 recorded an average annual precipitation of 18.6 inches. Snowfall is greatest in November, December and March and spring/summer rains peak in April-June and August. The average annual maximum temperature is 63.0°F (17.2°C) and the average annual minimum temperature is 38.9°F (3.8°C, WRCC 2006).

Land Use History: The past land use of the area has consisted primarily of homesteading, ranching and mining. Some of the residents include 3rd generation ranchers. Large scale developments above ground have not been a major factor on the landscape. Houses are few and the landscape is mostly undeveloped. Two track roads and a roadway runs through the center following the Ralston Creek drainage.

Biodiversity Significance Rank Comments (B3): This site supports a fair to poor (CD-ranked) occurrence of a globally imperiled (G1G2/S1S2) *Hesperostipa comata* Colorado Front Range herbaceous vegetation, a fair (C-ranked) occurrence of a globally imperiled (G2/S2) mountain mahogany / needle-and-thread grass (*Cercocarpus montanus* / *Hesperostipa comata*) mixed foothills shrubland and a good to fair (BC-ranked) occurrence of a globally vulnerable (G3/S3) ponderosa pine / spike fescue (*Pinus ponderosa* / *Leucopoa kingii*) savannah community.

Natural Heritage element occurrences at the Ralston Creek Uplands 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	Hesperostipa comata Colorado Front Range Herbaceous Vegetation	Great Plains Mixed Grass Prairie	G1G2	S1S2				CD	1992-07-07
Natural Communities	Cercocarpus montanus / Hesperostipa comata Shrubland	Mixed Foothill Shrublands	G2	S2				C	2011-07-26
Natural Communities	Pinus ponderosa / Leucopoa kingii Woodland	Foothills Ponderosa Pine Savannas	G3	S3				BC	1992-07-02

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

Other Values: There is a good occurrence of a Nebraska sedge (*Carex nebrascensis*) wetland that is a partially tracked community (G4S3) with a very nice aspen dominated woodland in the same vicinity. Both of these areas support a diversity of native wetland vegetation. Seven common plant species observed in these wetlands ranked an 7 or higher on the Colorado Floristic Quality Index (FQI) Coefficient of Conservation (Rocchio 2007) and include: shootingstar (*Dodecatheon pulchellum*), floating buttercup (*Ranunculus hyperboreus* ssp. *intertextus*), starry false lily of the valley (*Maianthemum stellatum*), sweet cicely (*Osmorhiza depauperata*), Rocky Mountain maple (*Acer glabrum*), red baneberry (*Actaea rubra*) and water birch (*Betula occidentalis*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of these wetlands. The observation of Lewis's woodpecker (*Melanerpes lewis*) from 2005 and the variety of birds observed during this survey is indicative of the health of the woodlands and forests. Although grazing is heavy in places and exotic species are common most of the land supports a diversity of native plants and animals. To have such a large area of land that is not heavily fragmented or developed and that is adjacent to a large State Park is a valuable asset to protect biodiversity and buffer impacts from environmental disturbances.

Boundary Justification: The boundary is drawn to include the known occurrences of three significant plant communities. The local mosaic of plant communities includes drainages, forested wetlands, floodplains, uplands, valley bottoms and seeps. These occurrences are included in the boundary based on field surveys and air photos. Across the large undeveloped landscape, ecological processes that are linked to the hydrology, natural migration of organisms, and potential pollinators and their habitats are allowed to function with minimal disruption. The size of the

site is important to the long-term persistence of the occurrences. Other potential landscapes were also included based on aerial photography (especially those areas on private lands). The boundary was digitized while referencing a one meter digital color orthophoto quad and a 1:24,000 digital quad. Although some of the land within the site is private, only public lands or lands with written permission were accessed.

Protection Urgency Rank Comments (P3): The land within this site, with the exception of a small area that overlaps Golden Gate State Canyon and State Land Board, is private property. Many of the plant communities like those found at this site have been heavily impacted by development along the Colorado Front Range. Acquiring any available adjacent lands may be beneficial to help assure the integrity of the area.

Management Urgency Rank Comments (M3): The privately owned lands appear to mainly be used for cattle ranches and residences that are widely spaced. Some of the areas are heavily impacted by grazing while some are in relatively good shape. The biggest threats include overgrazing and development, which includes road building or anything that would fragment the upland forests and plant communities or encourage weeds on the surrounding slopes. Climate change and pollution are threats that exist for many large landscape communities.

Land Use Comments: Cattle ranching on leases and leased private lands are the dominant use of the area. Widely spaced residences occur throughout. Some of the property owners also graze horses.

Natural Hazard Comments: Very steep rugged, loose terrain, bears and mountain lions are potential threats.

Exotic Species Comments: State B-listed noxious weeds (Colorado Weed Management Association 2009) that were observed at the site include diffuse knapweed (*Acosta diffusa*), musk thistle (*Carduus nutans*), Dalmatian toadflax (*Linaria genistifolia* subsp. *dalmatica*) and Canada thistle (*Breea arvensis*). Other non-native species that were common include smooth brome grass (*Bromopsis inermis*), Kentucky bluegrass (*Poa pratensis*), dandelion (*Taraxacum officinale*), common mullein (*Verbascum thapsus*), alyssum (*Alyssum parviflorum*), Japanese brome grass (*Bromopsis japonicas*), and cheatgrass (*Anisantha tectorum*).

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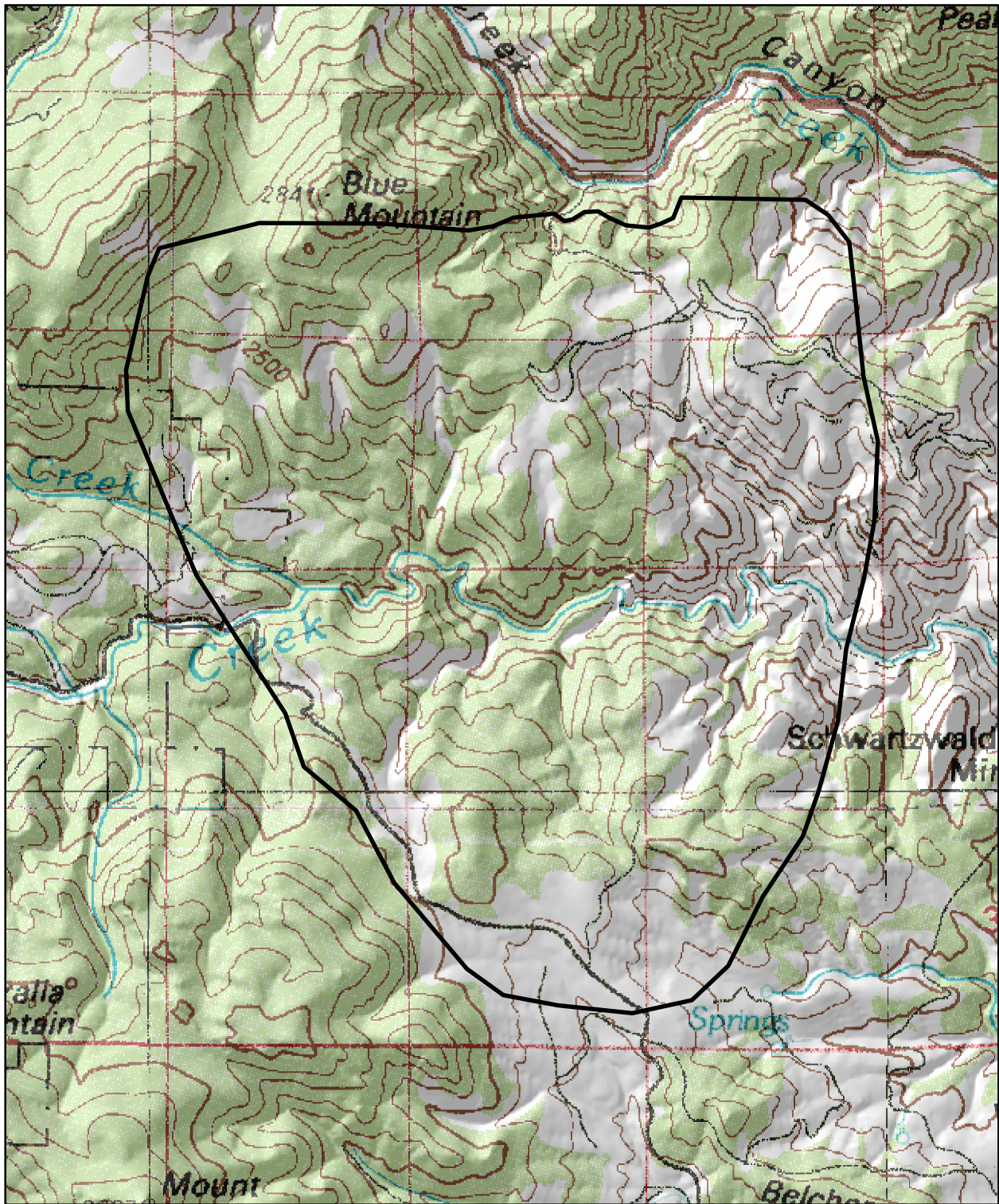
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Version Author: Smith, P.F.

Version Date: 03/27/2012



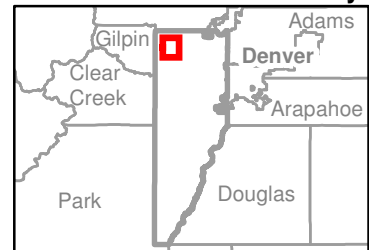
Colorado Natural Heritage Program
 Colorado State University
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 Fort Collins, CO 80523-1475
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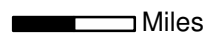
Denver West, 39105-E1

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

Location in Jefferson County



Map Date: 01/23/2012

 Miles
 0 0.2 0.4



Map 33. Ralston Creek Uplands Potential Conservation Area, B3: High Biodiversity Significance

Upper Coal Creek Canyon

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P2: Threat/Opportunity 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: Eldorado Springs, Ralston Buttes

Size: 1,079 acres (437 ha)

Elevation: 6,475 - 8,280 ft. (1,974 - 2,524 m)

General Description: The Upper Coal Creek Canyon site encompasses the riparian zone of Coal Creek, the steep, rugged, granitic slopes of the canyon and the surrounding mountain sides with 20 to 65 percent slopes. Coal Creek Canyon is a deep, steep walled drainage with dense, shady, riparian growth along its bottom. The upslope vegetation patterns are distinct due to the steep terrain and contrasting aspects. The slopes are primarily forested with ponderosa pine (*Pinus ponderosa*) at low elevations and on south-facing slopes and with mixed conifer forest codominated by Douglas-fir (*Pseudotsuga menziesii*) on north-facing slopes. The south slopes also support a mosaic of mountain mahogany (*Cercocarpus montanus*) shrubland distributed within the ponderosa pine. The ponderosa pine forest tends to have a more open understory with sparse shrubs including mountain mahogany and grasses. The site contains large open areas of grass and forb rangeland, species include wheatgrass (*Pascopyrum smithii*), blue grama (*Chondrosium gracile*), some cheatgrass (*Anisantha tectorum*), smooth brome (*Bromopsis inermis*) and dandelion (*Taraxacum officinale*). Rock outcrops and talus slopes with sparse vegetation occur sporadically within the site and include a Colorado endemic plant species, Rydberg twinpod (*Physaria vitulifera*). There are also small, sporadic patches of aspen (*Populus tremuloides*) in the riparian corridors. The riparian vegetation of the canyon includes willow (*Salix* spp.), aspen, Rocky Mountain maple (*Acer glabrum*), Douglas-fir, and blue spruce (*Picea pungens*). The moist microclimate and higher humidity of the drainage creates suitable conditions for riparian plants like field horsetail (*Equisetum arvense*), western white clematis (*Clematis ligusticifolia*), and common hop (*Humulus lupulus*). Common hop is the larval host plant for a rare butterfly, the hops azure (*Celastrina humulus*) and a colony of the butterfly populates the Upper Coal Creek Canyon site. Bedrock geology consists of Triassic, Permian and Pennsylvanian sedimentary rocks including red siltstone, sandstone and conglomerate of the Lykin, Lyons and Fountain Formations. Precambrian metamorphic rocks including felsic and hornblendic gneisses, quartzite, conglomerate and interlayered mica schist are also present. At high elevations, soils consist of exposed bedrock, boulders and talus slopes. Below this on the mountain slopes there are shallow to deep and well drained soils formed in stony, gravelly, and sandy to loamy colluvium derived from the sedimentary and metamorphic rocks of the underlying formations. In the creek bed there are deep and well to

excessively drained soils formed in sandy, loamy and gravelly alluvial materials.

Key Environmental Factors: Moist climate parameters that support common hop and the large unbroken extent of upland habitat are key factors. The varied and rugged topography plays an important role supporting and protecting habitats for plant and animal species.

Climate Description: The nearby weather station at Coal Creek Canyon, CO between 1994 and 2012 recorded an average annual precipitation of 26.1 inches. Snowfall is greatest in March and April, spring/summer rains peak in April and August. The average annual maximum temperature is 51.7 °F (10.9 °C) and the average annual minimum temperature is 28.7 °F (-1.8° C - WRCC 2006). The frost-free season is about 151 days.

Land Use History: Ranching, road construction and mining.

Biodiversity Significance Rank Comments (B3): This site supports a fair (C-ranked) occurrence of the globally imperiled (G2G3/S2) hops feeding azure (*Celastrina humulus*) and a good (B-ranked) occurrence of the globally vulnerable (G3/S3) state endemic plant, the Rydberg twinpod (*Physaria vitulifera*).

Natural Heritage element occurrences at the Upper Coal Creek 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
Insects	<i>Celastrina humulus</i>	Hops Feeding Azure	G2G3	S2				C	1997-07-05
Vascular Plants	<i>Physaria vitulifera</i>	Rydberg twinpod	G3	S3				B	2011-09-21

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

Other Values: In the riparian areas was a small population of a species of concern (CNHP watchlist), the carrion-flower (*Smilax lasioneura*). Although this species is not actively tracked, it has been in the past and will likely be re-evaluated soon as many of the past populations no longer exist because of development.

Boundary Justification: This boundary encompasses a small portion of the Coal Creek watershed and includes both north and south-facing slopes of the canyon and the valley bottom. The hops azure butterfly occurrence and their habitat and larval host plant are found nearer to the valley bottom in the riparian zone. Integrity of the riparian plant community upon which the butterfly is dependent is affected by influences occurring higher up in the watershed. Consequently, the site is drawn to protect water flow and to maintain the seasonal timing and level of flows from both spring runoff, surface flows following rain events and ground water recharge and subsequent discharge into Coal Creek. The boundary is also drawn to protect the

slopes above the creek from disturbances that could cause erosion leading to sedimentation and loss of riparian vegetation.

Protection Urgency Rank Comments (P2): It is estimated that stresses may reduce the viability of the element within 5 years. This site is comprised of approximately 75% private property. There is exurban development along Coal Creek at the exact location of one hops azure colony. Future development, although not a certainty, is likely and would have the potential to eliminate common hop, the butterfly's larval host plant, resulting in extirpation of the hops azure butterfly. Purchase of the private property and its protection as open space or the placement of conservation easements should be considered and/or encouraged.

Management Urgency Rank Comments (M4): Current activities seem compatible with the persistence of the butterfly, but management actions may be needed in the future to maintain the current quality of the occurrence. Current management actions beneficial to continued viability of the hops azure butterfly include the management of introduced nonnative plants. The spread of nonnative plants has the potential to eliminate or degrade the population of common hop which would lead to loss of the hops azure butterfly.

Land Use Comments: Ranching and exurban development.

Natural Hazard Comments: The area consists of very rough and steep terrain. Precautions should be taken when hiking in the site.

Exotic Species Comments: Exotics are common and include smooth brome (*Bromopsis inermis*), cheatgrass (*Anisantha tectorum*), Kentucky blue grass (*Poa pratensis*), orchardgrass (*Dactylis glomerata*), and knapweed (*Acosta* or *Centaurea* spp.).

Off-Site Considerations: Exurban development is occurring in the foothills within the vicinity of the site. The surrounding area has been extensively mined.

Information Needs: Long-term monitoring of hops azure colony would inform the population biology of this species and assist with managing the population.

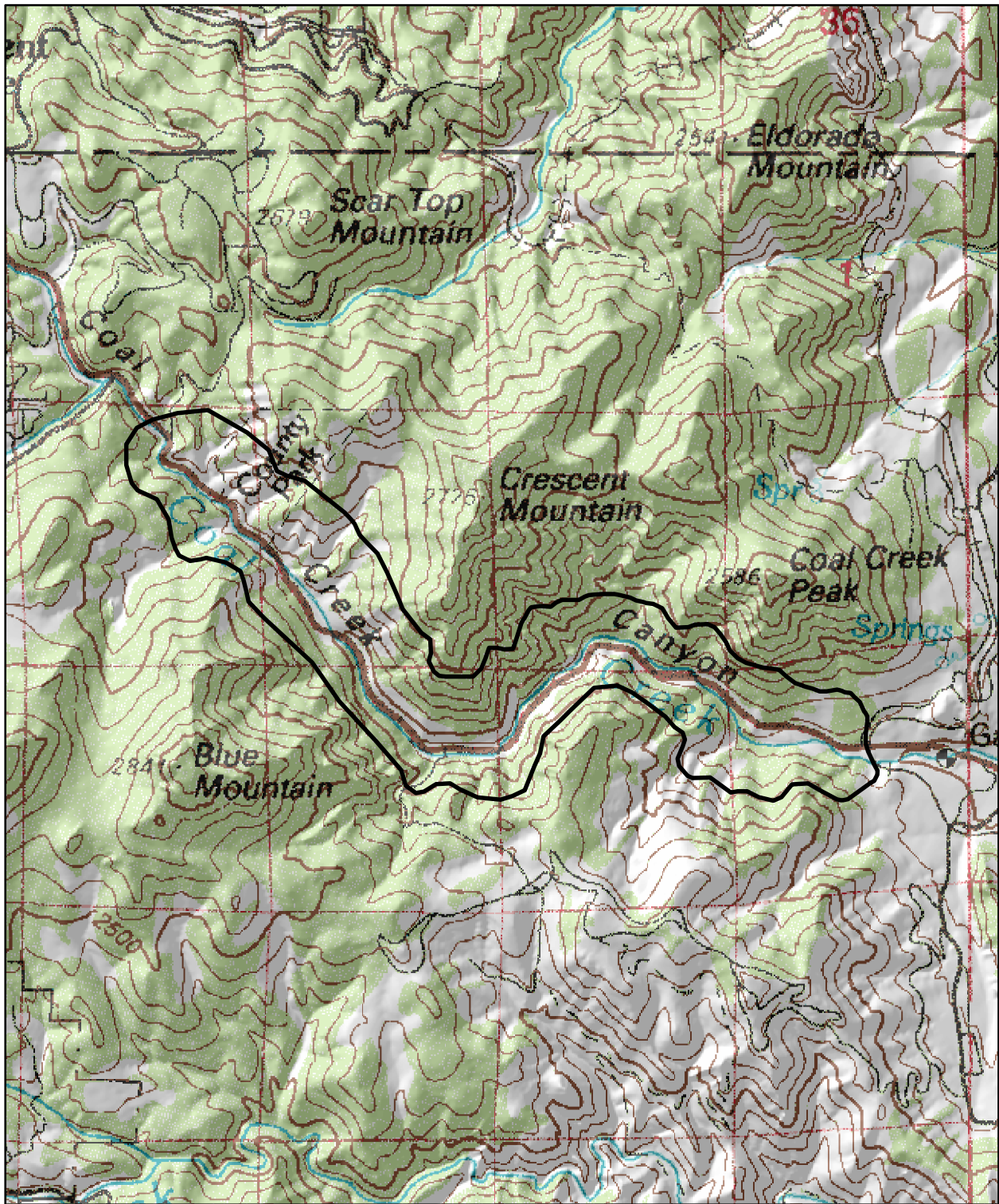
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Version Author: Sovell, J.R. and P.F. Smith

Version Date: 02/15/2012



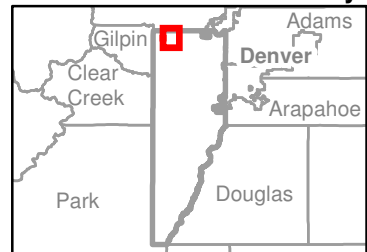
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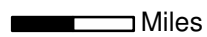
Location in Jefferson County

Denver, 39105-E1

30x60 Minute Digital Raster
 Graphic Produced by the
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Map Date: 01/10/2012

 Miles
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Map 34. Upper Coal Creek Canyon Potential Conservation Area, B3: High Biodiversity Significance

Deadman Gulch

Biodiversity Rank - B4: Moderate 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: Golden, Morrison, Evergreen

Size: 3,953 acres (1,600 ha)

Elevation: 5,800 - 7,220 ft. (1,768 - 2,201 m)

General Description: The Deadman Gulch site is a mountainous terrain of diverse topography and includes cliffs and steep slopes covered in conifers plus lower elevation areas on its east side of less incline that are dominated by foothills grassland. The geology is mostly of the Ratake-Cathedral-Rock outcrop complex containing slopes and ridges that face east, west or south, with 25 to 60 percent slopes. The soils in this complex are mostly formed in clayey and loamy material derived from sedimentary rocks. Soils are suitable for wildlife habitat, woodland, recreation areas, pasture, grazing, community development, and some crops. Soils are typically shallow and well drained. Soil blowing is minimal, and rock fragments make up about 35 to 80 percent of the soil volume. A mosaic of plant communities exists here. The higher areas are mostly ponderosa pine (*Pinus ponderosa*) communities with a graminoid understory, most of which is young growth, and no fire scars are apparent. Midslopes are dominated mostly by mountain mahogany (*Cercocarpus montanus*) shrubland communities and yucca (*Yucca glauca*) with big bluestem (*Andropogon gerardii*) grass in the understory. Bottoms of slopes are typically of shrubland / grassland communities, mostly plum (*Prunus americana*), chokecherry (*Padus virginiana* subsp. *melanocarpa*), skunkbush sumac (*Rhus aromatica* subsp. *trilobata*) and buckbrush (*Ceanothus fendleri*), with an abundant accumulation of exotic flora at this level. Hillsides are definitely much less weedy than upslope. Graminoids at all levels include one or more of the following: big blue stem, little blue stem (*Schizachyrium scoparium*), blue grama (*Chondrosum gracile*), western wheat (*Pascopyron smithii*), and buffalograss (*Buchloe dactyloides*). The higher elevation forests of the site are suitable for the Northern Goshawk (*Accipiter gentilis*) and one was observed in ponderosa pine forest. There are numerous historical records of rare grass skipper butterflies from the site. These species have not been observed since the 1980s, but good quality suitable habitat still exists. A population of the mottled dusky wing (*Erynnis martialis*) is present and was last observed in 1998.

Key Environmental Factors: Fire, erosion, low annual precipitation all contribute to ecological processes that support native plant and animal species. Unfragmented landscapes that provide corridors for wildlife and plants are also important to sustaining healthy systems.

Climate Description: Average annual precipitation is 17 to 20 inches (43 to 50 cm). Average annual air temperature is 43 to 47 degrees Fahrenheit (6.1 to 8.3 C). Average frost-free season is 76 to 125 days, depending on elevation.

Land Use History: At least within the last 100 years, this area was used for grazing of livestock.

Biodiversity Significance Rank Comments (B4): The site supports a fair (C-ranked) occurrence of a globally vulnerable (G3/S2S3) mottled dusky wing (*Erynnis martialis*).

Natural Heritage element occurrences at the Deadman 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
Insects	<i>Erynnis martialis</i>	Mottled Dusky Wing	G3	S2S3				C	1998-07-05

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

Other Values: The Northern Goshawk (*Accipiter gentilis*) which was observed in the ponderosa pine forest is a species of conservation concern and is partially tracked by CNHP. There are imprecise records of tiger moth (*Grammia* sp. 1), Arogos skipper (*Atrytone arogos*), hops feeding azure (*Celastrina humulus*) and *Doa ampla*. These occurrences were documented in the 1990s, with several last observation dates unknown. If populations are relocated in good condition, the biodiversity significance of the site may increase.

Boundary Justification: The boundaries are meant to enclose a small watershed associated with the Clear Creek drainage, and management should consider what upslope management has on the lower slopes. It is meant to allow for genetic exchange to occur between rare element occurrences. Areas adjacent or encompassing exurban residential development that include suitable habitat for the mottled dusky wing. However, high density residential areas east of the site are not included as the intensity of disturbance here has eliminated the natural plant communities the butterfly requires.

Protection Urgency Rank Comments (P3): Although the majority of land is protected by Open Space ownership and management, there is exurban development within the site in suitable habitat for the butterfly and the site is surrounded by residential and commercial development, which further fragments and isolates suitable habitat patches. Such isolation may be detrimental to the butterfly occurrence, as isolation decreases the chances of genetic exchange between populations and increases the risk of local extirpation.

Management Urgency Rank Comments (M2): This site is becoming increasingly

isolated by encroaching and surrounding development. Much of the invasive floral exotics that undermine the integrity of the natural plant communities are a direct result of ground level disturbances in developing areas. Focus should be on controlling invasive exotic flora, and perhaps developing a management plan for improving the quality of the natural plant communities. Also, higher upslope, the upper canopy is increasing, and ponderosa pine is increasing in density downslope, probably due to fire suppression. Increased tree density alters habitat structure and may result in loss of understory plants that are not shade tolerant and that the rare butterfly depend on. Plans for controlled burning or tree thinning should be integrated, to decrease the canopy density, so that reduction or loss of the graminoid - forb understory does not occur.

Land Use Comments: Historically, the area was probably used for grazing of livestock. More recently it has been found to be suitable for residential development.

Natural Hazard Comments: The area consists of very rough and steep terrain. Precautions should be taken when hiking in the site.

Exotic Species Comments: *Bromus tectorum*, *Bromus japonicus*, *Alyssum*, *Linaria dalmatica*, and very thick, impenetrable stands of *Carduus nutans*, especially at the bottom of the slopes.

Off-Site Considerations: Housing developments, roads, freeways, highways, trails, retail development, water diversions, City of Denver, City of Golden, quarries, agricultural development, livestock grazing.

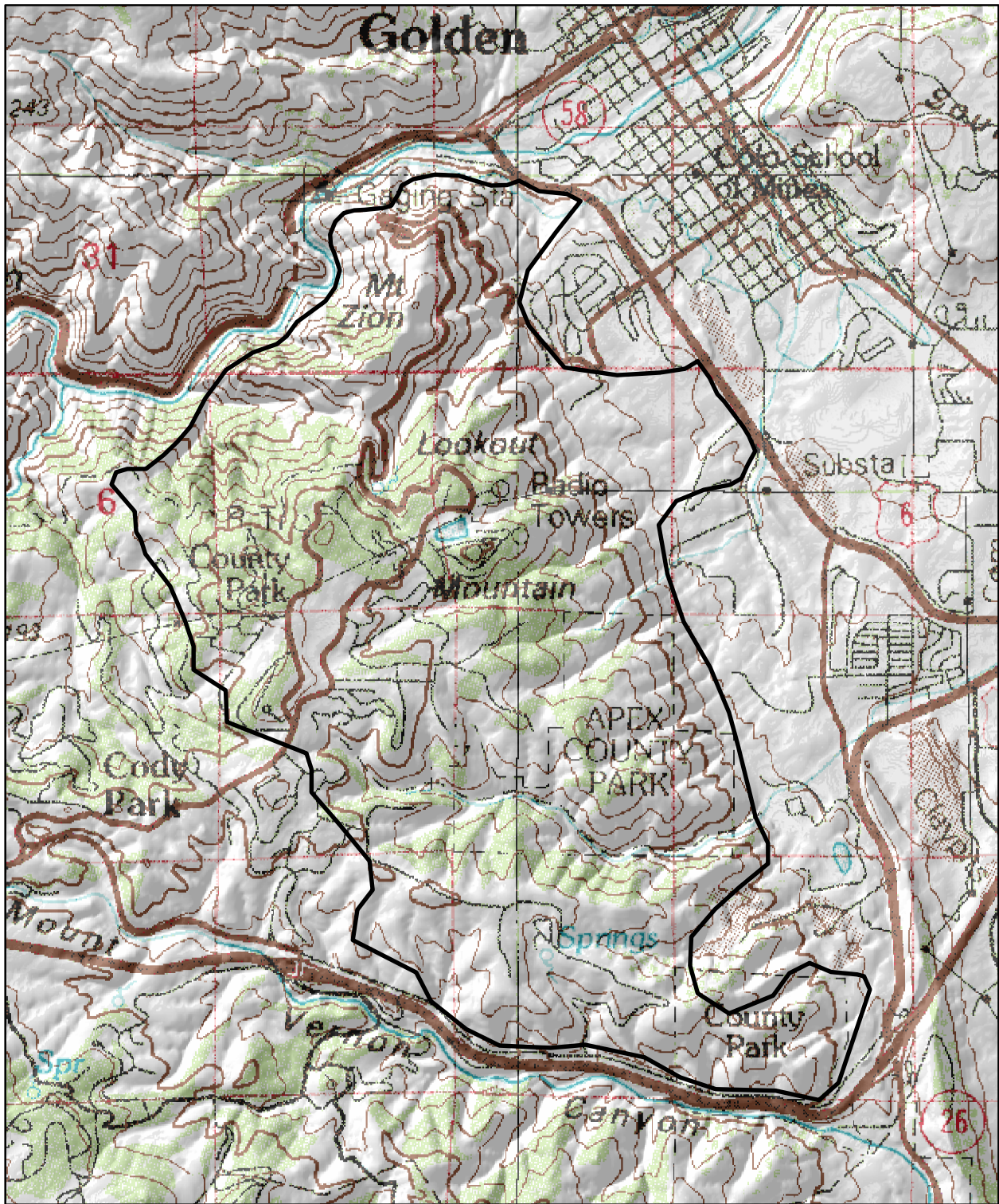
Information Needs: Further research is needed on the population size of the geographically isolated univoltine western mountain populations.

References

Sovell, J., P. Smith, D. Culver, S. Panjabi and J. Stevens. 2012. CNHP Final Report: Survey of Critical Biological Resources in Jefferson County, Colorado. Colorado Natural Heritage Program, Fort Collins, CO.

Version Author: Sovell, J.R.

Version Date: 02/28/2012



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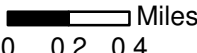
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Denver West, 39105-E1

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

Location in Jefferson County



Map Date: 02/29/2012 
 Miles
 0 0.2 0.4

Map 35. Deadman Gulch Potential Conservation Area, B4: Moderate Biodiversity Significance

North Turkey Creek

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: Conifer

Size: 212 acres (86 ha)

Elevation: 7,960 - 8,600 ft. (2,426 - 2,621 m)

General Description: The site includes a montane zone first order stream that originates from highlands to the west, where mature blue spruce (*Picea pungens*), quaking aspen (*Populus tremuloides*) and thinleaf alder (*Alnus incana*) dominate the streambank for about $\frac{3}{4}$ of a mile. This plant association typically occurs on narrow floodplains and is generally small in size (Carsey et al. 2003). The upper slopes are forested with a thick overstory of Douglas-fir (*Pseudotsuga menziesii*) and lodgepole pine (*Pinus contorta*). The immediate area that surrounds the drainage in the upland section of the site is well protected and used primarily for non-motorized recreational trails which cross the drainage in two places. Downstream, the drainage flows into open wet meadows, springs, drainages and open water. These wetlands include palustrine, emergent, seasonally flooded and irregularly exposed (PEMC) wetlands and palustrine wetlands with unconsolidated bottoms that are semipermanently flooded (PUBF, Cowardin et al 1979). A diverse array of native plants was found in the lowland wetlands with minor amounts of non-native species present. Dark (10YR3/2 and 10YR2/1) mucky organic soils with a sulfur odor were found in the wet meadow and spring areas. The soils near the forested stream were also dark (10YR2/2) but had sandy loams and loamy sands with evident clay and organic layers. The soils in the wetland areas and along the drainage consist largely of Earcree gravelly sandy loam with 9-15 percent slopes. The open wetland area soils were comprised of the Kettredge-Venable complex with 0-15 percent slopes, and the uplands were largely composed of the Legault-Hiwan stony loamy sands with 5-15 percent slopes (USDA NRCS 2008). The geology consists of igneous granitic rocks that are 1, 350-1,480 million years old (Tweto 1979).

Key Environmental Factors: The topography and hydrological features support the rare plant community that occurs in this drainage as well as the wetlands at the lower elevations with well-developed wetland soils. The fact that the north section of the site has not been as impacted from anthropogenic disturbances is important to the existence and integrity of this plant community.

Climate Description: The nearby weather station at Evergreen between 1961 and 2011 recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual

maximum temperature is 60.7°F (15.9°C) and the average annual minimum temperature is 27.2°F (-2.7°C, WRCC 2006).

Land Use History: Livestock grazing, ranching, impounded streams, tapped springs for residential water sources, logging and a historic landing strip for airplanes include some of the past land uses for the site. Residential developments surround the site.

Biodiversity Significance Rank Comments (B4): This site is drawn for a fair (C-ranked) occurrence of a globally and state vulnerable (G3/S3) plant community, a blue spruce / alder (*Picea pungens* / *Alnus incana*) woodland. This area is protected in a small valley and is over ¾ of a mile long. The majority of this forested drainage is in excellent shape with large trees and a very nice diversity of plants growing along the fairly undisturbed drainage. This association includes many seedling and saplings as well as mature trees which contribute to the integrity and quality of the community. The stream channels are steep and narrow with a very thick forb covering. The surrounding forested uplands also appear to be in good shape and contribute to the health and biodiversity of this area.

Natural Heritage element occurrences at the North Turkey 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	<i>Picea pungens</i> / <i>Alnus incana</i> Woodland	Montane Riparian Forests	G3	S3				C	2011-08-08

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

Other Values: Further indicators of quality include five plants found at the site that ranked a 7 or above on the Colorado Floristic Quality Index (Rocchio 2007): slimstem reedgrass (*Calamagrostis stricta*), false lily of the valley (*Maianthemum amplexicaule*); Fendler's waterleaf (*Hydrophyllum fendleri*), sun sedge (*Carex inops*), and pullup muhly (*Muhlenberiga filiformis*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of species with high FQI values (7-10) is indicative of the high quality of the habitats.

Boundary Justification: The boundary is drawn to include the known occurrence of a rare plant community and includes the potential extent of the community and adjacent habitats. The boundary is based on the immediate watershed which also encompasses intact upland communities.

Protection Urgency Rank Comments (P4): The property is owned and managed by Jefferson County Open Space and Denver Mountain Parks.

Management Urgency Rank Comments (M4): The disturbance to the lower wet

meadows occurred in the past and these lands are now managed as open spaces giving them a chance to recover.

Land Use Comments: Much of the area is used primarily for non-motorized recreational trails.

Natural Hazard Comments: Very steep and rugged terrain are potential hazards.

Exotic Species Comments: The quantity of non-native species in the more protected part of the drainage was very low. Alien plant species were more common in the areas with no tree cover and where the soils had been disturbed in the past. The most common alien plants species included: smooth brome (*Bromopsis inermis*), dandelion (*Taraxacum officinale*), and Canada thistle (*Breea arvensis*). Canada thistle is the only state listed noxious weed and was found in the open (non-forested) disturbed wetlands. Care should be taken not to use herbicides for dicots to treat Canada thistle in this area as smooth brome is present (a monocot) and would likely move into the area.

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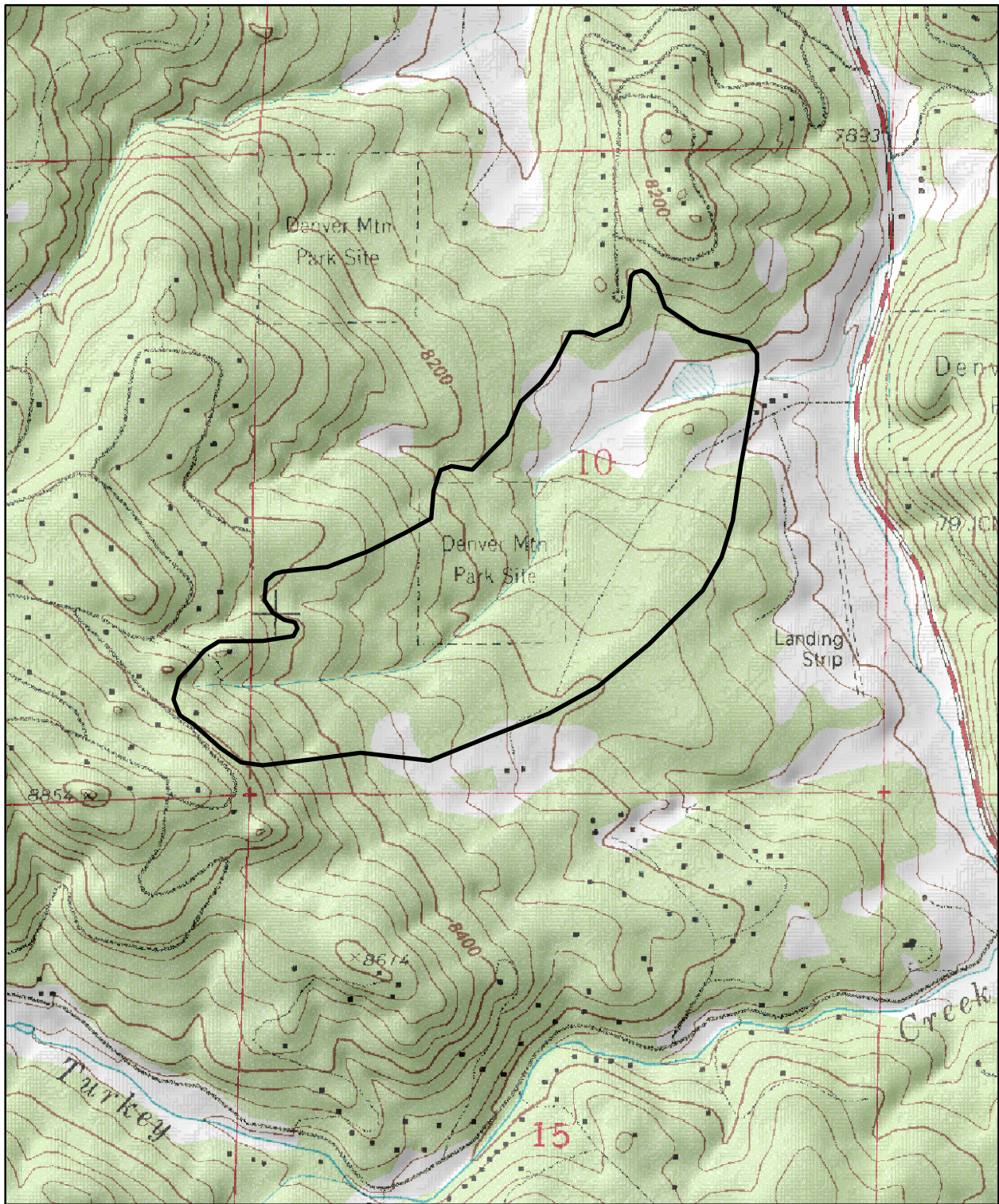
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Version Date: 02/21/2012



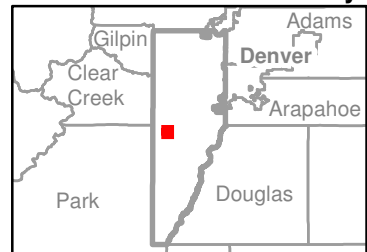
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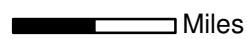
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7.5 Minute Digital Raster
 Graphic Produced by the
 U.S. Geological Survey

Location in Jefferson County



Map Date: 01/10/2012

 Miles
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Map 36. North Turkey Creek Potential Conservation Area, B4: Moderate Biodiversity Significance

South Platte River

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P?: Unknown

Management Urgency Rank - M?: Unknown

U.S.G.S. 7.5-minute quadrangles: Proctor, Johnstown, Sedgwick, Hackett Mountain, Fort Logan, Golden, Arvada, Spinney Mountain, North Sterling Reservoir, Crook, Galien, Barnesville, Sunken Lake, Platteville, Carter Lake Reservoir, Sulphur Mountain, Deckers, Cheesman Lake, Parker, Sterling North, Hygiene, Sterling South, Dearfield, Kassler, Wrights Reservoir, Marks Butte, Severance, Greeley, Masters, Weldona, Garo, Westcreek, Guffey NW, Iliff, Gowanda, Milton Reservoir, Milliken, Brush West, Merino SW, Tarryall, Morrison, Englewood, Louisville, Mile High Lakes, Horse Creek, Loveland, Windsor, Kersey, Merino, Omar, Atwood, Berthoud, Hardin, Orchard, Fort Morgan, Platte Canyon, Littleton, Fitzsimons, Brighton, Commerce City, Antero Reservoir, Timnath, Longmont, Brush East, Julesburg Reservoir, Julesburg, Eastlake, Erie, Keenesburg, Elevenmile Canyon, Tamarack Ranch, Messex, La Salle, Ovid, Green Mountain, Ralston Buttes, Fort Lupton, Lake George

Size: 248,267 acres (100,470 ha) **Elevation:** 3,511 - 8,940 ft. (1,070 - 2,725 m)

General Description: The site is open water and shorelines and includes the mainstem of the South Platte River and surrounding large lakes and reservoirs. The river has been altered by water diversion, development and agriculture. Mature cottonwood trees are present. In addition to Bald Eagles, the aquatic resources of the site support Snowy Egret, White Pelican, and Preble's meadow jumping mouse. At mid-elevations towards the west end of the site there are populations of the endangered Pawnee montane skipper butterfly. Within one reservoir there is a historical occurrence of the umbilicate sprite, an uncommon snail. Plains cottonwood riparian woodland (*Populus deltoides* ssp. *monilifera* / *Symphoricarpos occidentalis*), sandbar willow / bare ground (*Salix exigua* / bare ground), narrow-leaf cattail marsh (*Typha angustifolia* - *Typha latifolia*), Great Plains marsh (sandhills bullrush marsh), and montane riparian woodland (*Picea pungens* / *Betula occidentalis*) are some of the riparian and wetland communities present in the area. Wild black currant (*Ribes americanum*), ebony spleenwort (*Asplenium platyneuron*), and pale blue-eyed grass (*Sisyrinchium pallidum*) are state rare plants found within the site.

Biodiversity Significance Rank Comments (B4): This site supports multiple occurrences of the state rare (G5/S1B) Bald Eagle (*Haliaeetus leucocephalus*), including one in good condition (B-ranked).

Natural Heritage element occurrences at the South Platte River 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	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	H	1980- 03-24
Birds	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	H	9999- 99-99
Birds	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	D	1994- 06-10
Birds	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	E	1995- 99-99
Birds	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	E	1993- 99-99
Birds	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	E	2011- 99-99
Birds	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	H	1979- 12-99
Birds	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	B	2005- 01-23
Birds	Haliaeetus leucocephalus	Bald Eagle	G5	S1B,S 3N		ST	BLM/ USFS	H	1979- 99-99

** 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 primarily for Bald Eagles to include large reservoirs with trees in proximity to the South Platte River and its major drainages. The river was buffered 1/2 mile. In addition, all lakes and reservoirs 100 acres or larger, within 15 miles of the river, were included. This site does not include contiguous land between the river and the lakes and reservoirs.

Protection Urgency Rank Comments (P??): The site is approximately 73% private land, 16% State land, 11% USFS land with trace amounts of BLM land.

Management Urgency Rank Comments (M?): Maintain cottonwood trees and reduce disturbance from boating, fishing and ORV use on shorelines during nesting season. Should include adequate nesting, roosting and foraging sites which are all affected by disturbance (CSP Bird Working Group 2004).

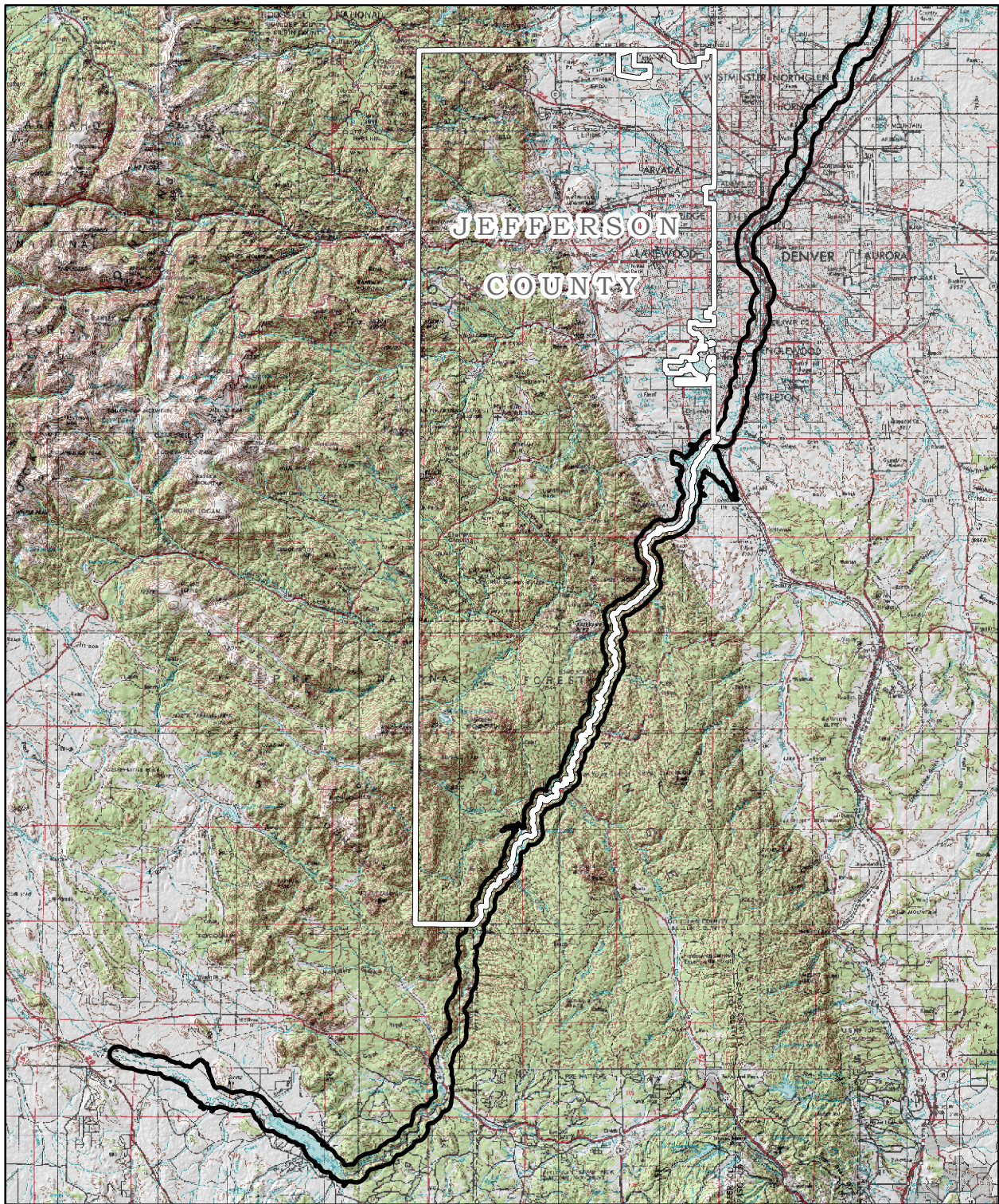
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Version Author: Sovell, J.R.


Version Date: 01/06/2012



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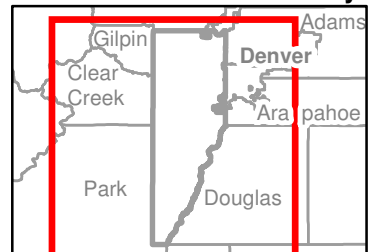
Map Date: 01/10/2012
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 PCA Boundary
 Pueblo, 38104-A1
 Denver, 39104-A1

1x2 Degree Digital Raster
 Graphics Produced by the
 U.S. Geological Survey

Location in Jefferson County



Map 37. South Platte River Potential Conservation Area, B4: Moderate Biodiversity Significance

Turkey Creek at Aspen Park

Biodiversity Rank - B4: Moderate 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: Conifer

Size: 1,631 acres (660 ha)

Elevation: 7,800 - 8,080 ft. (2,377 - 2,463 m)

General Description: The site is located about 2 air miles northeast of the Town of Conifer. It includes wetlands, forested uplands and small streams that drain the nearby peaks of Legault Mountain, which lies near the southeast boundary, and Berrian Mountain which lies to the northwest of the site. In addition, there is a significant Nebraska sedge (*Carex nebrascensis*) wet meadow community that occurs along U.S. Highway 285 on North Turkey Creek near the center of the site. The wet meadow area has been heavily impacted by highway construction over the years and the wetlands have been disturbed with fill, diversions, dykes and other anthropogenic changes. However, they are still functional and provide habitat for native plants and animals. A large number of uncommon native plants were observed in the wetlands near the highway. A high diversity of sedge species (*Carex brevior*, *C. microptera*, *C. foenea*, *C. buxbaumii*, *C. aquatilis*, *C. stipata*, *C. praeegracilis*, *C. pellita*, *C. vulpinoidea*, *C. utriculata*, *C. bebbii* and *C. conoidea*) were documented in the wet meadow, including the rare openfield sedge (*Carex conoidea*) and the cottonsedge (*Eriophorum angustifolium*). Other wet meadow species include: spikerushes (*Eleocharis* spp.), bulrushes (*Scirpus* spp.), cattails (*Typha* sp.) and rushes (*Juncus mertensianus*, *J. balticus*). Native wetland grass species include Canada bluejoint (*Calamagrostis canadensis*), salt and pepper grass (*Deschampsia caespitosa*), and sweetgrass (*Hierocloe hirta* subsp. *arctica*). Forbs include blue-eyed grass (*Sisyrinchium montanum*), bistort (*Bistorta bistortoides*), shooting star (*Dodecatheon pulchellum*), water spring beauty (*Crunocallis chamissoi*), Rocky Mountain iris (*Iris missouriensis*) and fringed loosestrife (*Lysimachia ciliata*), a native eastern prairie species. Willows are found on small parts of the stream and include Bebb willow (*Salix bebbiana*), coyote willow (*Salix exigua*), and Rocky Mountain willow (*Salix monticola*). Blue spruce (*Picea pungens*) and quaking aspen (*Populus tremuloides*) were dominant on the edges of the wet meadows while the upland forests were comprised of lodgepole pine (*Pinus contorta*), ponderosa pine (*Pinus ponderosa*), Engelmann spruce (*Picea engelmannii*) and Douglas-fir (*Pseudotsuga menziesii*). These forests include a shrub layer of buffaloberry (*Shepherdia canadensis*) and common juniper (*Juniperus communis*). Some understory species include Fendler's meadow-rue (*Thalictrum fendleri*), wild sarsaparilla (*Aralia nudicaulis*), pipsissewa (*Chimaphila umbellata*) and bilberry (*Vaccinium* sp.). The most common upland soils are the Grimstone-Hiwan-Rock outcrop complex with 30-60 percent slopes with

lesser amounts of Legault-Hiwan stony loamy sands with 15-30 percent slopes and Rogert-Herbman-rock outcrop complex with 30-70 percent slopes. Igneous and metamorphic rock outcrops occur on the north side of Turkey Creek. The soils in the wetland areas and along North Turkey Creek consist of Rosane-Venable fine sandy loams with 0-3 percent slopes, Kittridge-Earcree complex with 3-20 percent slopes, Torrfluvents, very gravelly, with 0-3 percent slopes, and Troutdale-Kittredge sandy loams with 5-15 percent slopes. The wet areas near Legault Mountain consist of Venable loam with 3-9 percent slopes (USDA NRCS 2008). The geology on the south side of Turkey Creek includes gneiss that is derived primarily from sedimentary rocks while the north side of the creek consists of metamorphic granite (Tweto 1979).

Key Environmental Factors: The topography, especially the north-facing aspect of some drainages, intact forested uplands, and the hydrological features that are not severely altered, allow the wetlands to continue to function and support native plants and animals.

Climate Description: Between 1961 and 2011, the nearby weather station at Evergreen recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7 degrees F (15.9 °C) and the average annual minimum temperature is 27.2 °F (-2.7° C - WRCC 2006).

Land Use History: Livestock grazing, haying, timber harvesting and residential developments are common throughout this region.

Biodiversity Significance Rank Comments (B4): The site supports a fair (C-ranked) occurrence of the state critically imperiled (G5/S1) openfield sedge (*Carex conoidea*). This is the only known occurrence in the State of Colorado (CNHP 2011). Openfield sedge is an eastern species not getting west of the Missouri River. However, this occurrence and another one documented in Arizona are the only known occurrences in the western United States. According to the Flora of North America "*Carex conoidea* is an uncommon plant throughout most of its wide range and is most frequent in New England. The species has been collected once in Arizona, where it is likely an introduction and does not appear to be persisting. *Carex conoidea* is unusual in *Carex* sect. Griseae in inhabiting open sites; it is the only species of the section regularly found in sunny habitats." The population at Meyer Ranch was first discovered in 2008 and was still doing well in 2011.

Natural Heritage element occurrences at the Turkey Creek at Aspen 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	<i>Carex conoidea</i>		G5	S1				C	2011-06-27

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

Other Values: A small population of a species on CNHP's watchlist, wood lily (*Lilium philadelphicum*), and various orchids have been reported in the area, but CNHP failed to find (F-ranked) an occurrence of blue-eyed grass (*Sisyrinchium demissum*) that was last observed in 1994. Also of interest is a significant wet meadow (*Carex nebrascensis*) community that supports a diverse array of unusual plant species including, as of 2011, the only known location in Jefferson County of cottonsedge (*Eriophorum angustifolium*). Additionally, there were seventeen plants that ranked a 7-10 on the Colorado Floristic Quality Index (Rocchio 2007): Buxbaum's sedge (*Carex buxbaumii*), Bebb's sedge (*Carex bebbii*), sweetgrass (*Hiercloe hirta* subsp. *arctica*), bistort (*Bistorta bistortoides*), shooting star (*Dodecatheon pulchellum*), water spring beauty (*Crunocallis chamissoi*), Fendler's meadow-rue (*Thalictrum fendleri*), buffaloberry (*Shepherdia canadensis*), wild sarsaparilla (*Aralia nudicaulis*), pipsissewa (*Chimaphila umbellata* subsp. *occidentalis*), giant lousewort (*Pedicularis procera*), Merten's rush (*Juncus mertensianis*), milkflower willowherb (*Epilobium lactiflorum*), heartleaf arnica (*Arnica cordifolia*), Colorado columbine (*Aquilegia coerulea*) and wood lily (*Lilium philadelphicum*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats.

Boundary Justification: The boundary was drawn to include the known occurrences of a rare plant and a significant wetland meadow community. The first order streams that drain from two local peaks and the intact upland forests contribute to the health of the communities. Ecological processes including hydrology, natural migration, pollination and dispersal are also important to the long term existence of the rare and uncommon plants and the plant and animal communities. The boundary was digitized while referencing digital color orthophoto quad and a 1:24,000 digital quad.

Protection Urgency Rank Comments (P3): The property is owned by Jefferson County Open Space. Mowing and herbicide treatments taking place in the meadow may need to be reconsidered.

Management Urgency Rank Comments (M2): The management goals for the wet meadow may need to be reviewed. This area is now known to contain a state rare plant species and a diversity of uncommon plants. Management to remove noxious weeds may need to include ways to be more protective of the native vegetation. Efforts to treat weeds should not disturb soils or organisms so that the end result is an increase in weed habitat. Smooth brome is a potential threat and is something that is hard to treat without damaging the ecology and perhaps exacerbating the spread. Although smooth brome is not on noxious weed lists it is known to degrade wetland systems probably more than many of the listed noxious weeds. Spraying for Canada thistle can often be a problem in wetlands where smooth brome is present. Recent monitoring studies (Rondeau et al. 2011) found that removing the Canada thistle using an herbicide that typically kill dicots selects for monocots to replace thistles. They found that when smooth brome is present (a monocot) it

replaces the treated thistle. Rondeau et al. also noted that in subsequent years the smooth brome not only replaced the Canada thistle but began to increase and they witnessed decreases in the local native flora. In wet areas one of the best treatments for smooth brome and Canada thistle is to make the area wetter. Clearly, that is not always feasible but seems to be one of the only ways to treat both species. Other alternatives to broadcast herbicides should be considered. Monitoring the Canada thistle populations and removing flowers might be a consideration.

Land Use Comments: This area is used for recreational activities that include hiking, biking and horseback riding.

Exotic Species Comments: Disturbed areas near roads, on open floodplains, near buildings and trails had a variety weeds. Exotics include: smooth brome (*Bromopsis inermis*), dandelion (*Taraxacum officinale*), musk thistle (*Carduus nutans*), field pennycress (*Thlaspi arvense*), field pepperweed (*Neolepia campestris*), Timothy grass (*Phleum pratense*), Kentucky bluegrass (*Poa pratensis*), mullein (*Verbascum thapsis*) and Canada thistle (*Breea arvensis*). Canada thistle and musk thistle are the only two Colorado B-listed noxious weeds (Colorado Weed Management Association 2010). Herbicide treatments were occurring in the wetland areas for Canada thistle control and should be reconsidered due to the high concentrations of smooth brome.

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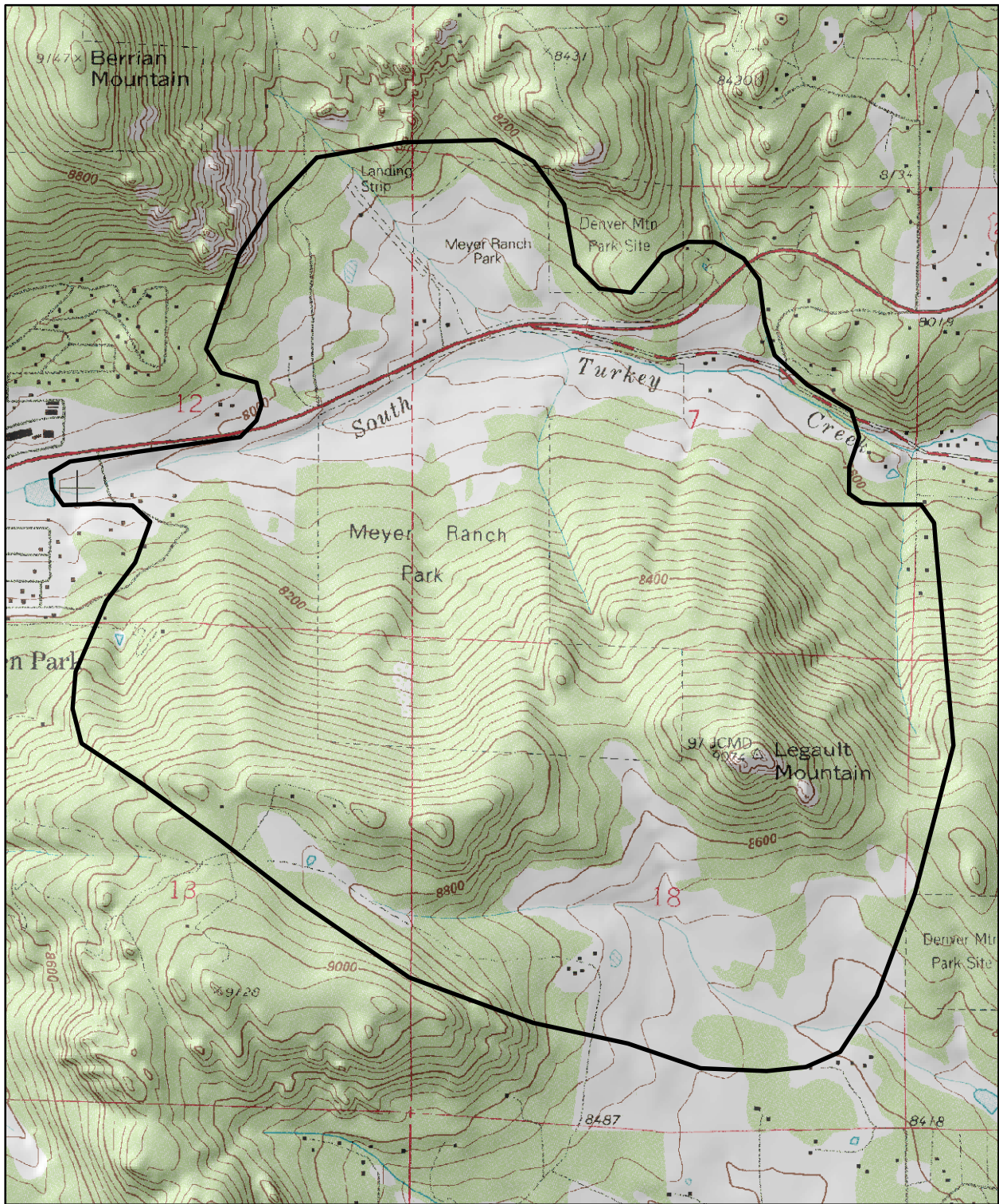
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Version Author: Smith, P.F.

Version Date: 03/21/2012



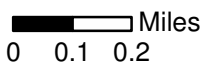
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<http://www.cnhp.colostate.edu>

 PCA Boundary

Conifer, 39105-E3

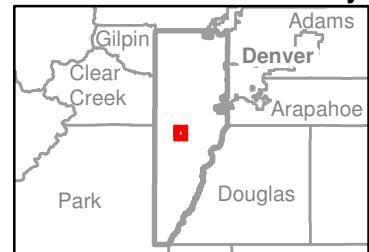
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 U.S. Geological Survey

Map Date: 02/28/2012

 Miles
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Location in Jefferson County



Map 38. Turkey Creek at Aspen Park Potential Conservation Area, B4: Moderate Biodiversity Significance

Wellington Lake

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: Windy Peak, Green Mountain

Size: 1,002 acres (405 ha)

Elevation: 8,000 - 8,900 ft. (2,438 - 2,713 m)

General Description: The site is located in southwest Jefferson County at Wellington Lake. Several small streams and intermittent drainages that originate from highlands to the southwest on Buffalo Peak and the southeast from Stoney Pass flow along steep to almost level grades to reach the Wellington Lake impoundment. Many of the small streams have very shady and densely forested banks. Blue spruce (*Picea pungens*), water birch (*Betula occidentalis*), thinleaf alder (*Alnus incana*) and quaking aspen (*Populus tremuloides*) are common overstory and shrub species in these areas. The herbaceous layer includes paniced bulrush (*Scirpus microcarpus*), meadowrue (*Thalictrum fendleri*), small floating manna grass (*Glyceria borealis*), beaked sedge (*Carex utriculata*), white violet (*Viola renifolia*), American speedwell (*Veronica americana*), cow parsnip (*Heracleum sphondylium* subsp. *montanum*) and floating buttercup (*Ranunculus hyperboreus*). The creeks are often gravelly with mossy and grassy floodplains. The slow moving streams have dark (10YR3/2) mucky organic soils with gravel bars in the streambed. The surrounding steep and rocky slopes are largely covered with coniferous forests of ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), and Douglas-fir (*Pseudotsuga menziesii*) interspersed with massive tors of Pikes Peak granite (Tweto 1979). The soils consist of sands and gravels interspersed between the massive granitic outcrops.

Key Environmental Factors: The physical topography including the steep, loose gravelly soils, forest cover and the large granite outcrops from which the drainages arise, all provide the intact hydrology that protects the habitat for the rare plant occurrence. The fact that logging, road building, road maintenance and use of nearby campground areas have not impacted the small area where the population of this rare species has existed for at least 30 years is important. Grazing by herbivores is detrimental to orchids and probably a factor contributing to the rarity of these orchids in Colorado. The lack of grazing in this area is also highly significant.

Climate Description: The nearby weather station at Bailey, CO recorded an average annual precipitation of 16.65 inches from 1901 to 2011. Snowfall is greatest in December through March and summer rains peak in March and April. The average annual maximum temperature is 58.2°F (14.6°C) and the average annual minimum temperature is 24.9°F (-3.9°C WRCC 2006).

Land Use History: Wellington Lake is a developed reservoir impoundment. Logging, road construction, campgrounds, fishing, developed trail systems and residential building have occurred in the area.

Biodiversity Significance Rank Comments (B4): This site supports a fair (C-ranked) occurrence of what has come to be known as the rarest orchid in Colorado, the white adder's-mouth orchid (*Malaxis monophyllos* subsp. *brachypoda* - Anderson 2006). The global rank for this rare orchid is apparently secure, although there is concern for its long-term viability (G4Q/S1). The Q indicates that there are questions regarding its taxonomic status. It is considered critically imperiled (S1) in Colorado. The white adder's-mouth orchid is endangered, threatened or vulnerable in at least eight U.S. states (USDA NRCS 2012). As of 2011, the population within this site represents the only population to have been seen in the last 20 years out of the four known Colorado locations, and is the only known location in Jefferson County. The other three Colorado populations are known from Boulder and El Paso counties. The Jefferson County population was originally discovered in 1971; it was re-visited in 1989 and contained seven individuals making it the largest known population in the state at that time. In 2011, almost twice that number of plants (13) were observed at the Jefferson County occurrence.

Natural Heritage element occurrences at the Wellington Lake 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	Malaxis monophyllos ssp. brachypoda	white adder's - mouth	G4Q	S1			USFS	C	2011-07-18

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

Other Values: The site includes 6 wetland and 1 upland plant species that ranked a 7 or higher, on the Colorado Floristic Quality Index (FQI) Coefficient of Conservation (Rocchio 2007): floating buttercup (*Ranunculus hyperboreus*), small floating manna grass (*Glyceria borealis*), white violet (*Viola renifolia*), water birch (*Betula occidentalis*), monkshood (*Aconitum columbianum*), Canadian anemone (*Anemone canadensis*), and kittentails (*Besseyia plantaginea*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. Therefore, the presence of species with high FQI values is indicative of the high quality of this area.

Boundary Justification: The boundary is drawn for the known occurrence of a plant species that is very rare in Colorado. Surrounding drainages, forested wetlands, floodplains, uplands, and valley bottoms that are part of the local watershed for the wetlands where these plants occur are included in the boundary. Important ecological processes including local hydrology, periodic flooding, natural migration,

pollination, and dispersal are all important to the long term persistence of the occurrence. Although some of the land included is private, only public lands or lands with written permission were accessed.

Protection Urgency Rank Comments (P2): This area is near private lands on road right of way. The adjacent lands are surrounded by the Lost Creek Wilderness in Pikes Peak National Forest. This area could benefit from protection efforts that support the local watersheds and prevent disturbances to the immediate and surrounding area.

Management Urgency Rank Comments (M2): This population has been in existence since 1971 but covers less than 50 linear feet of an intermittent stream that lies very close to dirt roads and private driveways. It was less than 100 feet from an area that was logged in 1989. Potential threats to this rare orchid include effects of small population size, hydrologic alterations (especially manipulations to lake levels or people accessing or putting developments in or around the small streams), residential and commercial development, collection, fire, recreation, timber harvest and fuels reduction, road construction and maintenance, livestock grazing and herbivory, exotic species invasion, climate change, and pollution (Anderson 2005). Considering protection for the surrounding land from human induced changes to the landscape, particularly hydrological impacts would be prudent to conserve these rare orchids.

Land Use Comments: The surrounding lands are largely used as private campgrounds, and for recreational users of the National Forest hiking trails and campgrounds; fishing is also popular in the area.

Natural Hazard Comments: Steep outcrops, loose gravels on steep terrain, and lightning.

Exotic Species Comments: Alien plant species included smooth brome (*Bromopsis inermis*), and Canada thistle (*Breca arvensis*). The Canada thistle populations are not problematic within the orchid population probably because of the densely shaded streambanks. Weed treatments in the vicinity of the riparian areas are more likely to be detrimental than helpful at this time. Orchids can be quite sensitive to herbicides.

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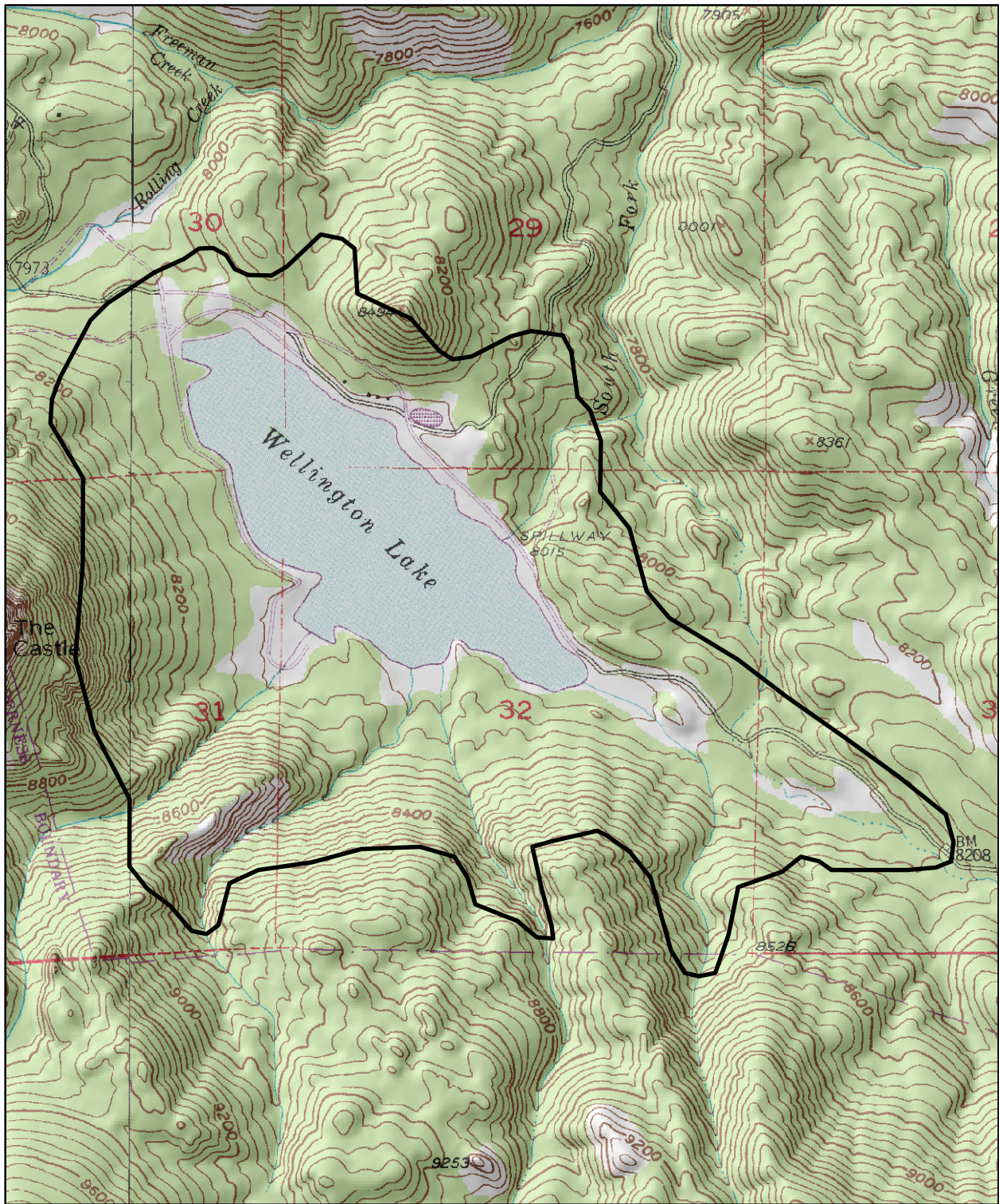
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Version Date: 02/21/2012

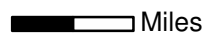


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 PCA Boundary

Green Mountain, 39105-C3
 Windy Peak, 39105-C4

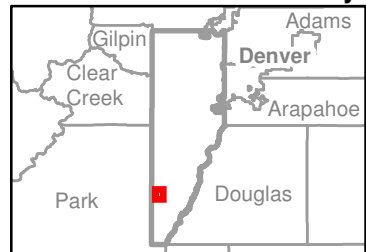
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 Miles
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7.5 Minute Digital Raster
 Graphics Produced by the
 U.S. Geological Survey

Location in Jefferson County



Map 39. Wellington Lake Potential Conservation Area, B4: Moderate Biodiversity Significance

Cathedral Spires

Biodiversity Rank - B5: General Biodiversity Interest

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: Pine, Platte Canyon

Size: 431 acres (174 ha)

Elevation: 6,600 - 8,580 ft. (2,012 - 2,615 m)

General Description: Cathedral Spires is a mountain peak containing dramatic cliff faces that rise to an 8,580 foot summit. The spire is located in the South Platte River Valley, one of Colorado's premier climbing areas containing a vast area of crags and domes composed of fine grained granite. Rock outcroppings dominate the site and the very gravelly sandy loam soils are well-drained. This combined with the xeric conditions of the site result in low soil moisture. The vegetation surrounding the cliffs consists of ponderosa pine (*Pinus ponderosa*) and mixed ponderosa pine and Douglas-fir (*Pseudotsuga menziesii*) forests. Within the forest on the south facing sides of the peak, there are pockets of mountain mahogany (*Cercocarpus montanus*) and Gambel's oak (*Quercus gambelii*) shrubland. Bedrock geology consists of igneous rock of the Pikes Peak Batholith known as Pikes Peak granite, dating to 1 billion years ago. Pikes Peak granite is a large formation found in the central part of Colorado's Front Range and was created by a large pool of magma formed under what is now central Colorado. Portions of the site are within Cathedral Spires Park, a Jefferson County Open Space or Denver Water Board property, and a small amount falls within private property. The granite spires and their associated cliffs offer suitable nesting habitat for raptors and nesting American Peregrine Falcon (*Falco peregrinus anatum*) and Prairie Falcon (*Falco mexicanus*) records date to the early 1990s, with the most recent observations of nesting occurring in 2010.

Key Environmental Factors: Pikes Peak Batholith

Climate Description: Annual mean precipitation is approximately 20 inches. Mean annual air temperature is 36-50 degrees F., and the frost-free season is about 152 days.

Land Use History: Recreational rock climbing and ranching.

Biodiversity Significance Rank Comments (B5): This site supports an extant occurrence of the state rare (G4T4/S2B) American Peregrine Falcon (*Falco peregrinus anatum*), a BLM and USFS sensitive species.

Natural Heritage element occurrences at the Cathedral Spires 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	Falco peregrinus anatum	American Peregrine Falcon	G4T4	S2B		SC	BLM/USFS	E	2010-99-99

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

Other Values: This area (the South Platte Valley) is one of Colorado's destination climbing areas comprised of numerous fine-grained, granite domes and crags spread out over a vast area. The feature formation is the scenically dramatic Cathedral Spires (Cynical Pinnacle), which is partially on private property and is a climbing resource of national significance. The Cathedral Spires area and the Dome are both managed with seasonal closures for protection of Peregrine Falcons (Jefferson County Open Space 2006).

Boundary Justification: The site includes Cathedral Spire and the rock outcrops within the immediate area. The boundary was drawn to accommodate only the nesting habitat for the targeted falcon with some buffer. These birds can range up to 20 miles in a day's forage for food. To draw a site that encompasses this much area is not practical for planning purposes, but projects within this radius should consider the potential effects on this species, particularly projects that occur in riparian and wetland areas, as these habitats are favorite foraging habitat.

Protection Urgency Rank Comments (P4): Approximately 80% of the site is either within a designated open space or owned by Denver Water, which rigorously restricts access to their properties. No protection actions are needed in the foreseeable future. There is potential for exurban development along Highway 287 to the north of the site to eventually encroach southward into the vicinity of the site. Protection of property north of the site as open space or in conservation easements before development occurs would benefit the raptors utilizing Cathedral Spires for nesting.

Management Urgency Rank Comments (M4): Current management seems to favor the persistence of the Falcon at the site, but management actions may be needed in the future to maintain the current quality of the element occurrence. The Cathedral Spires area is managed with seasonal closures for protection of the nesting Peregrine Falcons from human disturbance. However, if that were to change, disturbance from climbing activities has the potential to deleteriously affect the nesting Falcons because of their low tolerance for human disturbance. Current management actions beneficial to continued viability of the nesting Falcons includes closure of the Park to human activity from March 1, through July 31, annually.

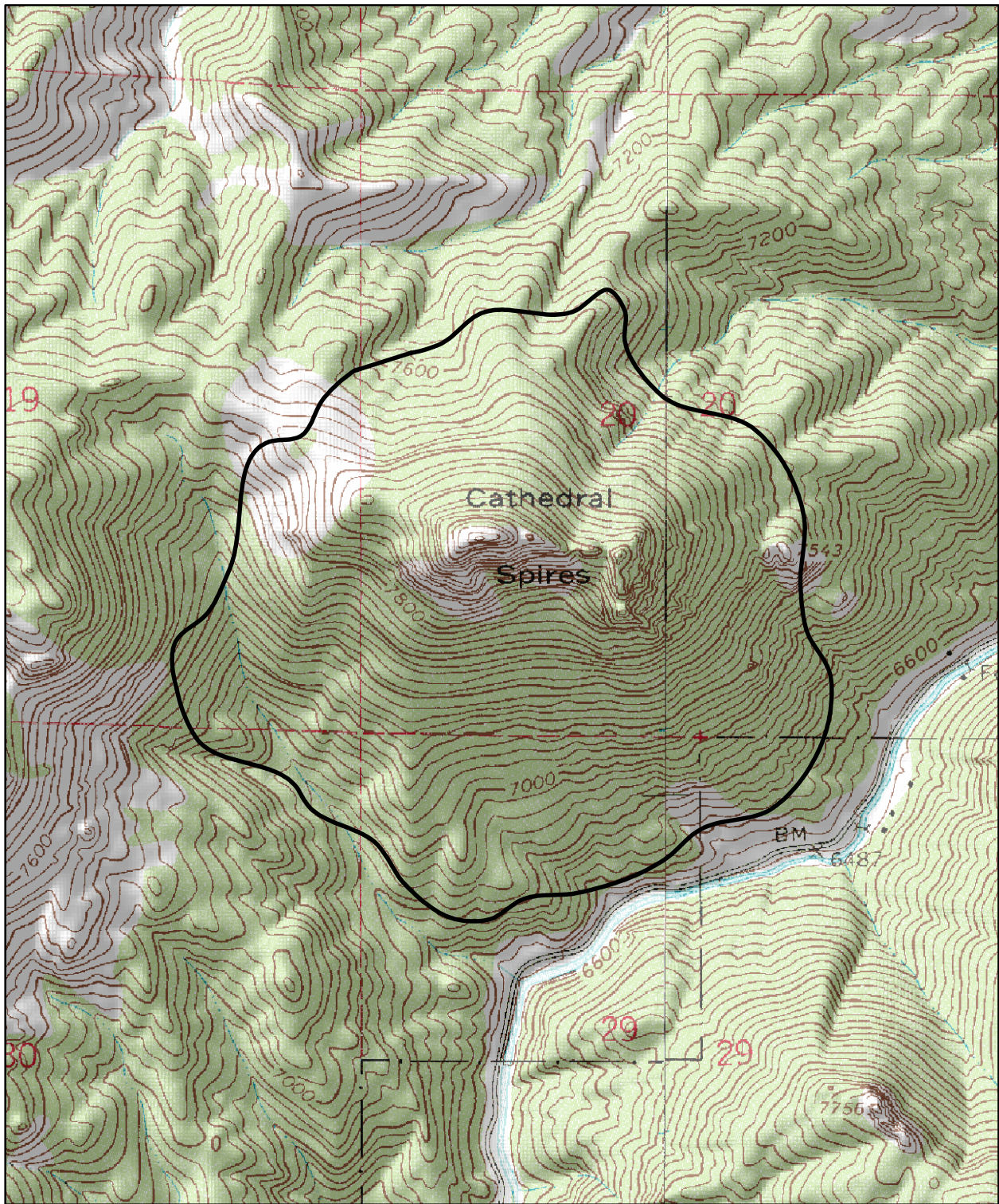
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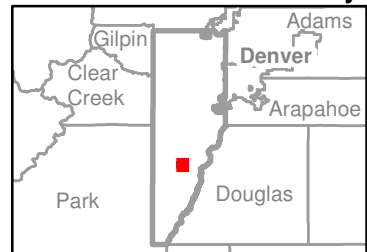


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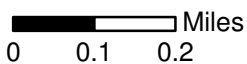
 PCA Boundary

Platte Canyon, 39105-D2
 Pine, 39105-D3

Location in Jefferson County



Map Date: 01/10/2012



7.5 Minute Digital Raster
 Graphics Produced by the
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Map 40. Cathedral Spires Potential Conservation Area, B5: General Biodiversity Interest

Hildebrand

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: Littleton

Size: 1,357 acres (549 ha)

Elevation: 5,500 - 5,775 ft. (1,676 - 1,760 m)

General Description: The Hildebrand site is part of an outwash plain lying below the hogback formation running from the southeast to the northwest through northeast Jefferson County. It consists of rolling mesas and swales bisected by an unnamed drainage flowing from the foothills lying to the west. The site is dominated by grasslands with a few small areas of grasses and forbs mixed with a sparse shrub overstory. The species composition is characterized by blue grama (*Chondrosum gracile*), prairie dropseed (*Sporobolus cryptandrus*), sideoats grama (*Bouteloua curtipendula*), needle-and-thread (*Hesperostipa comata*), western wheatgrass (*Pascopyrum smithii*), purple threeawn (*Aristida purpurea*), junegrass (*Koeleria macrantha*), thickspike wheatgrass (*Elymus lanceolatus*), green needlegrass (*Nassella viridula*), big bluestem (*Andropogon gerardii*), little blue stem (*Schizachyrium scoparium*) and Indian rice grass (*Achnatherum hymenoides*). Common shrub species include mountain mahogany (*Cercocarpus montanus*), wax currant (*Ribes cereum*), and yucca (*Yucca glauca*). The forbs of the site are very diverse and include, Utah sweetvetch (*Hedysarum boreale*) which is only known from this site in Jefferson County and Colorado gumweed (*Grindelia inornata*) - which is a state endemic and only reported from this site in Jefferson County. Other native forbs include princesplume (*Stanleya pinnata*), Drummond's milkvetch (*Astragalus drummondii*), slimleaf scurfpea (*Psoralidium tenuiflorum*), winterfat (*Krascheninnikovia lanata*), kittentales (*Besseyia plantaginea*), marbleseed (*Onosmodium molle* subsp. *occidentale*), silver sage (*Artemisia ludoviciana*), green milkweed (*Asclepias viridiflora*) and prairie coneflower (*Ratibida columnifera*). Within the grassland is a large complex of black-tailed prairie dogs (*Cynomys ludovicianus*). Prairie dogs are important prey resources for raptors and a Bald Eagle (*Haliaeetus leucocephalus*) was observed soaring over the prairie dog complex. The bedrock geology of the plain consists of Cretaceous sedimentary shales of the Niobrara Formation on the east and Sharon Springs Member on the west side of the site (Tweto 1979). The site is dominated by deep well drained soils that vary from clay and clay loams to gravelly sandy loams. Loam soils occur within the drainage that bisects the site. The clay layers include the Heldt clay with 3-15 percent slopes and the Razor-Heldt clay loams with 9-25 percent slopes in the south part of the site with Denver clay loam with 5-9 percent slopes and the Renohill-Midway complex with 9-15 percent slopes in the north section. Also in the south there are steep rock outcrops of the Ratake-Cathedral-Rock outcrop complex with 25-60 percent slopes (USDA NRCS

2008).

Key Environmental Factors: The clay and clay loam soil substrates are suitable for burrow construction by black-tailed prairie dogs and these soils support the very diverse mixed grass prairie that also support the prairie dogs.

Climate Description: Annual mean precipitation is approximately 18 inches. Mean annual air temperature is 41-55 degrees F., and the frost-free season is about 181 days.

Land Use History: Agriculture, ranching and cropland were probably the most significant uses of this land.

Biodiversity Significance Rank Comments (B5): This site supports an extant occurrence of the state rare (G4/S3) black-tailed prairie dog (*Cynomys ludovicianus*).

Natural Heritage element occurrences at the Hildebrand 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	<i>Cynomys ludovicianus</i>	Black - tailed Prairie Dog	G4	S3		SC	BLM/USFS	E	2010-07-14

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

Other Values: Prairie dogs regulate communities by changing plant and animal species composition, diversity, and production and can enhance the biodiversity of an area larger than the colony itself (Reading et al. 1989). Prairie dogs increase the diversity of other animals occupying their complexes. Of particular importance at this site is the increase in diversity of prairie songbirds resulting from the presence of prairie dogs. Birds commonly associated with colonies include the Burrowing Owl (*Athene cunicularia*), Mountain Plover (*Charadrius montanus*), Horned Lark (*Eremophila alpestris*), Lark Bunting (*Calamospiza melanocarys*), Western Meadowlark (*Sturnella neglecta*), Mourning Dove (*Zenaida macroura*), Killdeer (*Charadrius vociferus*), and Barn Swallow (*Hirundo rustica*) (Clark et al. 1982, Sharps and Uresk 1990). The grasslands despite being very weedy in places included a matrix of very healthy prairie species and a very rich diversity of grasses and forbs including a couple of plant species that are only known from this site in Jefferson County: Colorado gumweed: (*Grindelia inornata*) and Utah sweetvetch (*Hedysarum boreale*).

Boundary Justification: The boundary encompasses the numerous locations where black-tailed prairie dog colonies were observed and suitable habitat interspersed among the four separate colonies and adjacent to them. This vast expanse of clayey to clay loam soils is perfect for burrow construction and is therefore occupied by prairie dogs. The boundary is intended to represent the area needed to protect the prairie dog populations and includes additional areas suitable for population

expansion. To the east the boundary is defined by Wadsworth Boulevard and Chatfield Reservoir, to the north by Deer Creek Canyon Road, and to the west by the hogback, all of which act as sufficient barriers to the dispersal of black-tailed prairie dogs. The boundary was drawn using Landsat ETM+ satellite imagery and 25m Colorado Vegetation Classification data (CDOW).

Protection Urgency Rank Comments (P4): The north half of the site is protected as Hildebrand Ranch Park. The south half is within Lockheed Martin property and is protected from human disturbance and development until Lockheed Martin decides to build on or sell the property. Consequently, either the purchase for open space designation or protection in a conservation easement of the Lockheed Martin portion of the site should be considered and or encouraged. Only public properties or private properties with written permission were surveyed. The Lockheed Martin property was not surveyed because permission to do so was not granted.

Management Urgency Rank Comments (M3): Current management seems to favor the persistence of the prairie dogs at this site, but new management actions may be needed in the future to maintain the current quality of the occurrence. If the site is to be grazed, then timing grazing to occur in the fall and winter would improve the habitat for prairie dogs. Scotch thistle (*Onopordum tauricum*) is growing in large patches along the east-facing slopes on the east side of the site. Control efforts to minimize seed spread or spot spraying the plants could be beneficial to reduce spread of this B-Listed noxious weed.

Land Use Comments: Recreation and hay production occur in the area.

Exotic Species Comments: A number of weed species were observed including three B-List and 2 C-List species (CWMA 2012): B-List: Scotch thistle (*Onopordum tauricum*), milk thistle (*Carduus nutans*), and diffuse knapweed (*Acosta diffusa*). C-List: cheatgrass (*Anisantha tectorum*), and common mullein (*Verbascum thapsis*). Other exotics: smooth brome (*Bromopsis inermis*), salsify (*Tragopogon dubius*), alyssum (*Alyssum parviflorum*) and alfalfa (*Medicago sativa*).

Off-Site Considerations: Exurban development has occurred on the eastern edge of the site and agricultural cropland exists adjacent to the northeast corner of the site.

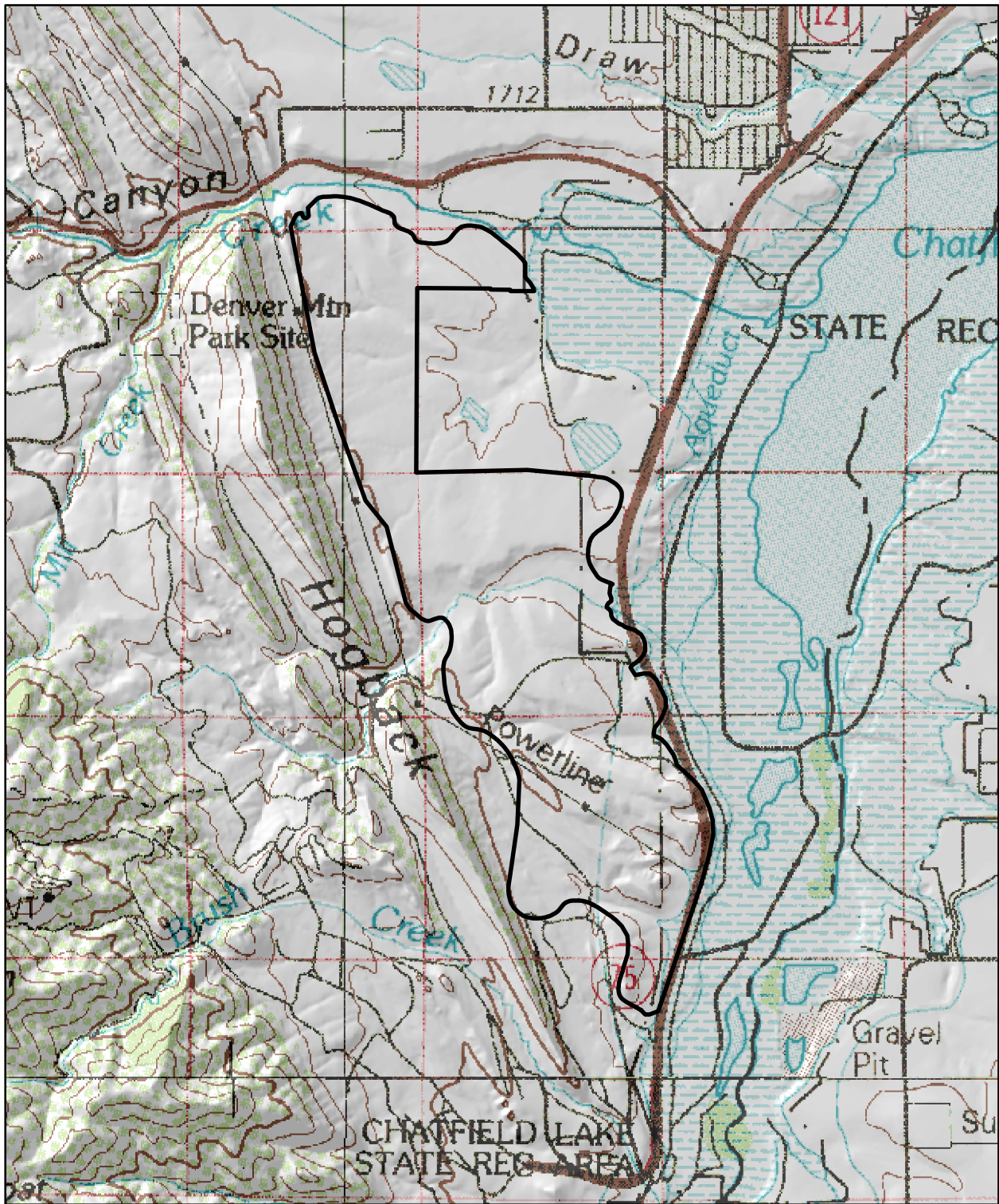
Information Needs: Of primary concern is the long-term viability of colonies in relation to size and distance to nearby colonies. Additional survey effort in the surrounding area including in Douglas County is needed to identify and protect other existing prairie dog complexes within the area. Additional complexes are needed to maintain genetic flow and to offer source populations for recolonization of colonies lost to disturbance such as sylvatic plague (*Yersinia pestis*).

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Map Date: 01/10/2012

0 0.2 0.4 Miles



 PCA Boundary

Denver West, 39105-E1

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

Location in Jefferson County



Map 41. Hildebrand Potential Conservation Area, B5: General Biodiversity Interest

Mount Lindo to Plymouth Mountain

Biodiversity Rank - B5: General Biodiversity Interest

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: Indian Hills

Size: 6,345 acres (2,568 ha)

Elevation: 5,980 - 7,814 ft. (1,823 - 2,382 m)

General Description: The site is part of the Front Range foothills complex, originating at roughly 6,000 feet at the interface of the piedmont valley and mountains, and rises to over 7,800 feet at Mount Lindo at the north edge of the site. The area consists of steep rugged montane terrain of complex topography. A number of major drainages originate in the mountains on the west side of the site, flowing east and effectively bisecting portions of the site including from north to south Weaver Gulch, Dutch Creek, Massey Draw and Deer Creek. The bedrock geology is surprising uniform consisting completely of metamorphic rocks of the Precambrian Age including gneisses, schist, migmatite and quartzite. Rock outcrop soils dominate the site. These soils can be shallow or deep, are well drained and consist of a wide range of textures from stony to cobbly, rocky, gravelly, loamy and sandy loam. The vegetation is dominated by forests and shrubland. A large portion of the site consists of a mosaic of Gambel's oak (*Quercus gambelii*) shrubland interspersed with pine forest including stands of pure ponderosa pine (*Pinus ponderosa*) or Douglas-fir (*Pseudotsuga menziesii*), mixed stands of Douglas-fir and ponderosa pine and patches of aspen (*Populus tremuloides*) woodland. Within this mosaic of shrubland and forest there are infrequent patches of grass dominated mountain meadows. This mosaic of forest and Gambel's oak shrubland is habitat for the Ovenbird (*Seiurus aurocapilla*).

Key Environmental Factors: The mosaic of ponderosa pine, Douglas-fir, aspen and Gambel's oak creates a vegetative structure that Ovenbirds key into.

Climate Description: Annual mean precipitation is approximately 22 inches. Mean annual air temperature is 37-52 degrees F., and the frost-free season is about 173 days.

Land Use History: Ranching has been a primary land use in this area.

Biodiversity Significance Rank Comments (B5): This site supports an extant occurrence of the state rare (G5/S2B) Ovenbird (*Seiurus aurocapilla*).

Natural Heritage element occurrences at the Mount Lindo to Plymouth 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
Birds	Seiurus aurocapilla	Ovenbird	G5	S2B				E	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 encompasses the Gambel's oak shrubland and mixed conifer - aspen forest that creates habitat suitable for the Ovenbirds.

Protection Urgency Rank Comments (P3): The site consists of two private open spaces, Willow Springs and Ken-Caryl Ranch; two Jefferson County Open Spaces, Mount Lindo and Deer Creek Park, and some private land within which exurban development is occurring. The private land requires attention and either conservation easements or purchase and protection as open space should be considered.

Management Urgency Rank Comments (M4): Current management seems to favor the persistence of the Ovenbirds, but new management actions may be needed in the future. Deforestation is the primary threat to Ovenbirds. Large forested tracts are required to maintain viable (self-sustaining) breeding populations.

Land Use Comments: Recreation including hiking, biking and equestrian use is currently the major land use in this area.

Off-Site Considerations: Exurban development.

Information Needs: Additional biological surveys to identify the size and extent of the breeding Ovenbird population would assist with managing the population.

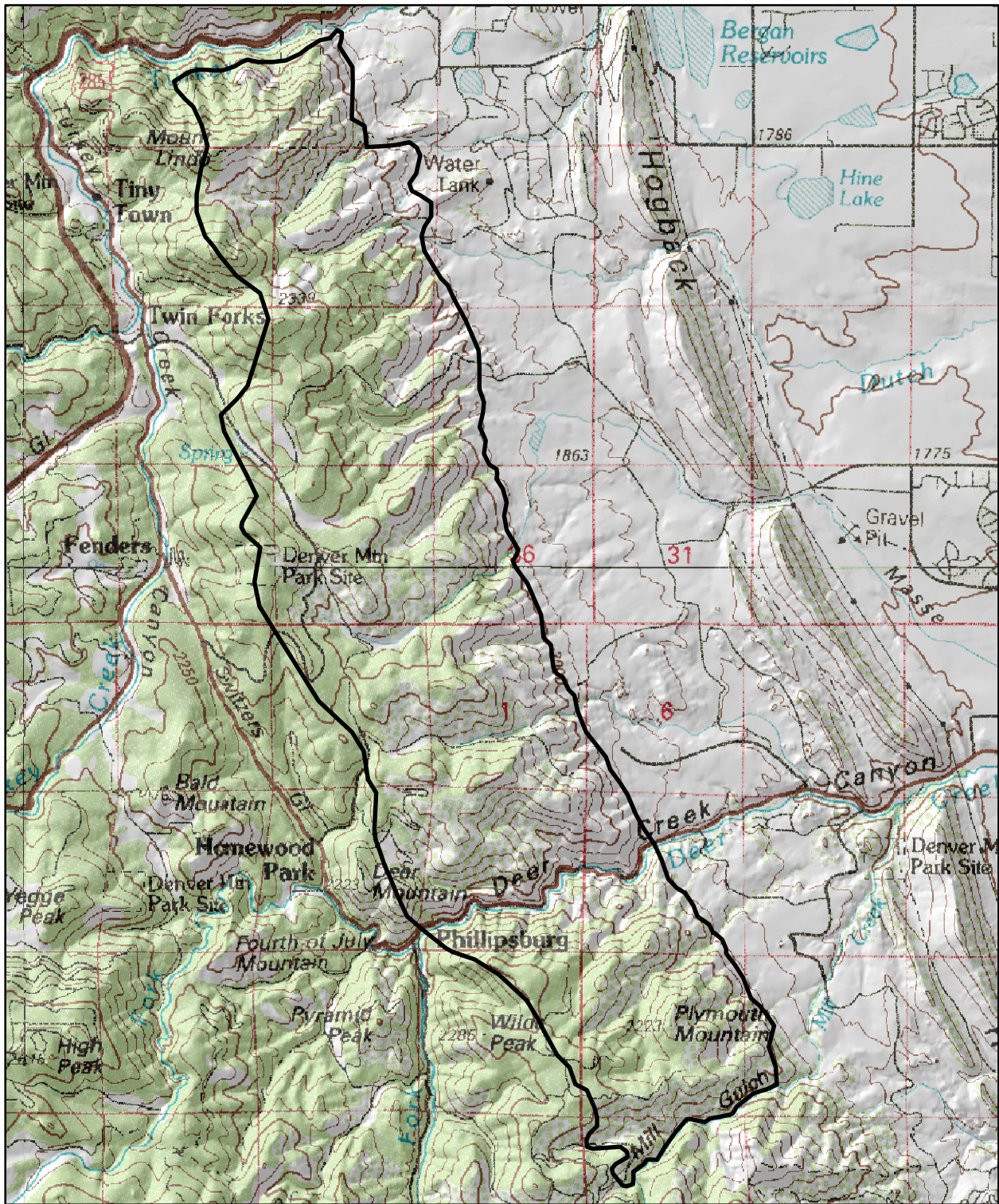
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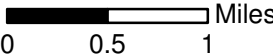
 PCA Boundary

Denver West, 39105-E1

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

Location in Jefferson County



Map Date: 01/10/2012
 Miles



Map 42. Mount Lindo to Plymouth Mountain Potential Conservation Area, B5: General Biodiversity Interest

Wilmot Creek

Biodiversity Rank - B5: General Biodiversity Interest

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: Conifer, Evergreen

Size: 1,323 acres (535 ha)

Elevation: 7,500 - 8,350 ft. (2,286 - 2,545 m)

General Description: The site lies along a forested, first order stream that originates within the site. The stream is steeply sloped at the top and then flattens out in the last half mile and flows in an easterly direction. The average slope is 6% and the stream has very low sinuosity. Ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and quaking aspen (*Populus tremuloides*) dominate the overstory with Rocky Mountain maple (*Acer glabrum*), dense forbs including heart-leaved arnica (*Arnica cordifolia*), Colorado columbine (*Aquilegia coerulea*), meadowrue (*Thalictrum fendleri*) and graminoids dominating the understory. The American yellow lady's slipper orchid (*Cypripedium calceolus* ssp. *parviflorum*) and wood lily (*Lilium philadelphicum*) are present in the understory. Rotting logs are plentiful and the lady's slipper orchids were often found growing alongside these decaying logs. The soils in the wetland areas and along the drainage consist of Herberman-Sprucedale-Rock outcrop complex with 15-30 percent slopes and Kittredge-Earcree complex with 9-20 percent slopes. The uplands are largely composed of the Rogert-Herberman-Rock outcrop complex with 30-70 percent slopes and the Legault-Hiwan-Rock outcrop complex with 30-50 percent slopes (USDA NRCS 2008). The geology consists of metamorphic rock including biotitic gneiss, schist and migmatite derived principally from sedimentary rocks with the exception of a small portion of the site where it consists of granite (Tweto 1979).

Key Environmental Factors: Physical topography including the drainages with nearly pristine hydrology, steep rocky slopes, rocky outcrops, and ecological processes especially flooding and the presence of dead and downed wood are key environmental factors that support the habitat for the rare plants.

Climate Description: Between 1961 and 2011, the nearby weather station at Evergreen, recorded an average annual precipitation of 18.7 inches. Snowfall is greatest in March and April, spring/summer rains peak in April-August. The average annual maximum temperature is 60.7° F (15.9°C) and the average annual minimum temperature is 27.2°F (-2.7°C, WRCC 2006).

Land Use History: The surrounding landscape just to the east and outside of the site

includes areas now developed with residences that historically contained populations of the rare lady's slipper orchids. Much of the area was homesteaded beginning in the early 1870's. The major land use has been land pasture for cattle and horses. There was a working sawmill on the site but the area has never been commercially logged. For a brief period of time there was a fox breeding facility on the property. There are areas where hay was harvested regularly over the years. In addition, in the vicinity of the rare plant occurrences there was forestry management taking place in 2008-2009 that opened up the canopy for fire suppression efforts (Jefferson County Open Space website: accessed 12-2011).

Biodiversity Significance Rank Comments (B5): This site supports a good (B-ranked) occurrence of the state rare (G5/S2) plant, American yellow lady's-slipper (*Cypripedium calceolus* ssp. *parviflorum*). CNHP records indicate this is the only known occurrence of a population of the American yellow lady's slipper orchids in Jefferson County. As of 2011, there are 27 reported occurrences in Colorado with 18 of these historical (H-ranked), not found, or in very poor condition (D-ranked). There are only three good (B-ranked) occurrences (including this one) and two A-ranked occurrences in the entire state.

Natural Heritage element occurrences at the Wilmot 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	<i>Cypripedium calceolus</i> ssp. <i>parviflorum</i>	American yellow lady's - slipper	G5	S2			USFS	B	2011-06-30

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

Other Values: In addition to the orchids, there is also a good population of a species of conservation concern (CNHP watchlist) the wood lily (*Lilium philadelphicum*). Watchlist species are not fully tracked by CNHP but are being monitored as there is concern these plants may need to be tracked in the future. Within the site were six plants that ranked an 8 or above on the Colorado Floristic Quality Index (Rocchio 2007): American lady's slipper orchid, wood lily, water birch (*Betula occidentalis*); red baneberry (*Actaea rubra*), wild sarsaparilla (*Aralia nudicaulis*) and Colorado columbine (*Aquilegia coerulea*). Six other species common in the area ranked a 7 and include: spotted coralroot (*Corallorhiza maculata*); Fendler's waterleaf (*Hydrophyllum fendleri*), false lily of the valley (*Maianthemum amplexicaule*); starry false lily of the valley (*Maianthemum stellatum*), littleseed ricegrass (*Piptatherum micranthum*), heart-leaved arnica (*Arnica cordifolia*), sweet cicily (*Osmorhiza depauperata*) and Rocky Mountain maple (*Acer glabrum*). Coefficient of Conservation values range from 0-10 with 10 ranks representing species that are always found in unaltered high quality habitats. The presence of 12 species with high FQI values (7-10) is exceptional and indicative of the high quality of the habitats where these rare plants were found.

Boundary Justification: The boundary is drawn to include the known occurrence of two rare plants. Smaller drainages, forested wetlands, floodplains, uplands, valley bottoms and seeps are included in the boundary based on the immediate watershed which also encompasses intact upland communities. The land contained within the local watershed is important to promote ecological processes including hydrology, natural migration, pollination and dispersal which are important to the long term persistence and integrity of the site.

Protection Urgency Rank Comments (P3): The property is owned and managed by Jefferson County Open Space.

Management Urgency Rank Comments (M4): Two other locations of American lady's slipper orchids have been documented historically within the site. These locations were surveyed in 2010 and 2011 and no plants were found. A third location outside the site is located on nearby developed residential properties adjacent to the boundary; the area was not surveyed because it was on private property although it is likely these plants have been impacted or destroyed by the residential development of the area. The existing population of the rare orchids were documented originally in 1994 and a local group of volunteers has been monitoring them since 2004 (CNHP 2011). Recent efforts to conduct fire treatments in the area may have impacted the population of orchids because the overstory has been opened by tree removal operations. This has likely increased light penetration into both the nearby orchid and lily populations. Changes in light regime and soil moisture are to be expected which potentially could impact the rare plants. A buffer distance at least equal to the height of the tallest mature trees (or more) should be considered in the future to avoid changes to the light regime and hydrology of the area containing the rare plants. The county's recent addition of trails to the area with the orchids has helped reduce potential threats by channeling the impacts from local residents that walk their dogs and use the area to access the main part of the park.

Land Use Comments: The area is used by mainly by local residents as a recreational trail and as a route to access the County Park.

Exotic Species Comments: Alien plant species included three B List noxious weeds (Colorado Weed Management Association 2010): musk thistle (*Carduus nutans*), diffuse knapweed (*Acosta diffusa*) and Canada thistle (*Breea arvensis*). These species were found in the upland area close to the residential roads and near trails. Smooth brome (*Bromopsis inermis*) and common mullein (*Verbascum thapsus*) were also present in the site. Herbicide use near the streams for the B-list plants is not a good alternative. It could increase the density of smooth brome and potentially impact the orchids. Monitoring is probably prudent and perhaps clipping the flowerheads before they go to seed would be helpful.

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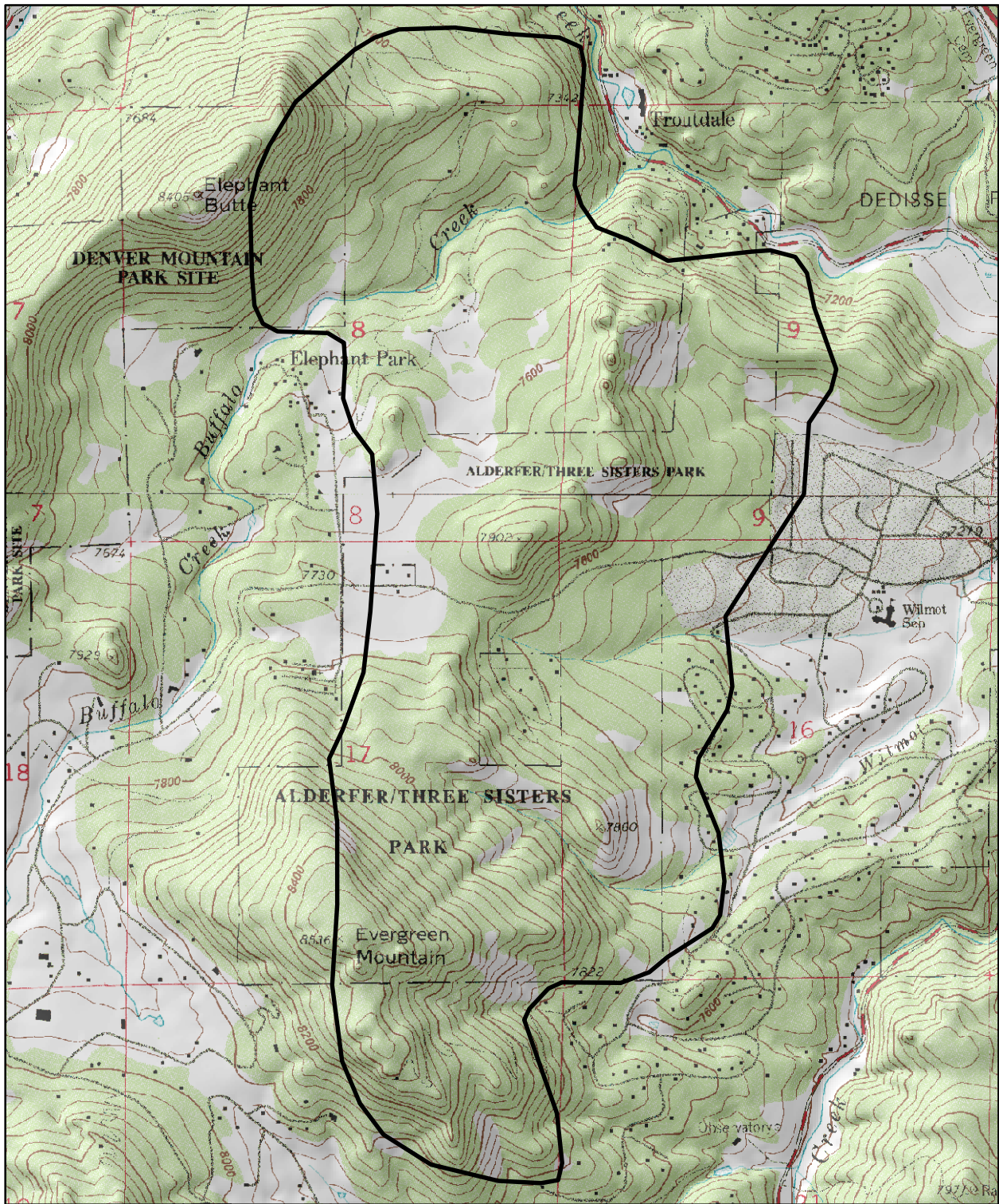
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Version Date: 02/17/2012



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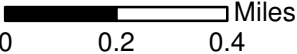
 PCA Boundary

Conifer, 39105-E3
 Evergreen, 39105-F3

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

Location in Jefferson County



Map Date: 01/10/2012
 Miles



Map 43. Wilmot Creek Potential Conservation Area, B5: General Biodiversity Interest

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APPENDIX A. Plant target list for the Jefferson County survey 2010-2011

Plant	Common Name	Optimal Survey Dates	Habitat	Elev	Rank
<i>Acorus calamus</i>	sweet flag	April-June	wetlands-piedmont valleys	low	G4?S H
<i>Agastache foeniculum</i>	lavender hyssop	July-sept	canyons		G5S1
<i>Aletes humilis</i>	Larimer aletes	April-May	N&Wfacing cliffs/silver plume granite,PIPO duff	6500- 8700	G2S3
<i>Amorpha nana</i>	dwarf wild indigo	late June	prairie	5500- 7000	G5S2 S3
<i>Apios americana</i>	American groundnut	summer	mesic woods, ditch banks, streambanks, ponds	foothills & lower?	G5S1
<i>Aquilegia chrysantha v. rydbergii</i>	golden columbine	June	streamsides, rocky ravines	5500- 6000	G4T1 Q

Plant	Common Name	Optimal Survey Dates	Habitat	Elev	Rank
<i>Aquilegia saximontana</i>	Rocky Mountain columbine	July-Aug	cliffs and rocky slopes	9000-12300	G3S3
<i>Argyrochosoma fendleri</i>	Fendler cloak-fern	April-Sept	granite/basalt cliffs	5597-9154	G3S3
<i>Aristida basiramea</i>	forktip three-awn	Aug-Sept fruit	barren/sandy soil, sandstone outcrops & hogbacks	5200-6200	G5S1
<i>Asclepias stenophylla</i>	narrow-leaved milkweed	June-July	dry prairies, bluffs, outwash mesas		G4G5 S2
<i>Asclepias uncialis</i>	wheel milkweed	April-May	shortgrass prairie, sandstone soils, gravelly, rocky	4000-6500	G3G4 T2T3 S2
<i>Asplenium adiantum nigrum</i>	black spleenwort	July-Dec	sandstone, shaded cracks, crevices, ledges dry S & E face cliffs	5200	G5S1
<i>Astragalus plattensis</i>	Platte River milkvetch	spring	woods, prairies, rocky slopes, gullies, bluffs		G5S1
<i>Astragalus sparsiflorus</i>	Front Range milkvetch	May-July	rocky slopes, wet meadows, river floodplains, granite, PIPO duff	5300-7880	G3?S 3?
<i>Betula papyrifera</i>	paper birch	NA	canyon in Boulder County	foothills	G5S1
<i>Botrychium echo</i>	reflected moonwort	July - spores	mountains, grassy slopes	mountains	G3S3
<i>Botrychium hesperium</i>	western moonwort	mid-spring to fall	grassy mountain slopes	mountains	G4S2
<i>Botrychium lineare</i>	narrowleaf grapefern	June - spores	mountains	mountains	G2?S 1
<i>Botrychium pallidum</i>	pale moonwort	July - spores	mountains	mountains	G3S2 ?
<i>Botrychium simplex</i>	least moonwort	spring summer	dry fields, marshes bogs and swamps	mountains	G5S1
<i>Botrypus virginianum</i>	rattlesnake fern	Jun-Jul spores	springs and moist areas in cool ravines	6000-9500	G5S1
<i>Callitriche heterophylla</i>	large water-starwort	June-Sept	aquatic, water with little movement, drying mud		G5S1
<i>Campanula aparinoides</i>	marsh bellflower	Apr-Aug	wet meadows, streambanks	5000-	G5SH
<i>Carex conoidea</i>	openfield sedge	June fruit	wet meadows, prairies	7885	watc hlist
<i>Carex crawei</i>	Crawe sedge	July fruit	wet gravel, sand, streams, pond margins, flow dist.		G5S1
<i>Carex diandra</i>	lesser paniced sedge	late May-Aug	wet meadows, fens, floating mats	to 9000	G5S1
<i>Carex lasiocarpa</i>	slender sedge	June-Aug fruit	fens, bogs, lakeshores	less than 5000	G5S1

Plant	Common Name	Optimal Survey Dates	Habitat	Elev	Rank
<i>Carex oreocharis</i>	sedge	fruit July and later	dry slopes, granitic soils	5950-8550	G3S1
<i>Carex peckii</i>	Peck sedge	Jun-Aug fruit	cool shaded gulches, riparian alluvium soils, foothills	6500-7500	G4G5 S1
<i>Carex saximontana</i>	Rocky Mountain sedge	May-July	pine forests, thickets of outer foothills	5998-7600	G5S1
<i>Carex sprengeii</i>	Sprengel's sedge	early to mid-summer fruits	dry to mesic deciduous forests, floodplain forests with calcium		G5?S 2S3
<i>Carex sychnocephala</i>	many-headed sedge	summer-fall fruiting	Wet areas, at least seasonally, open, sandy, silty or peaty shores, banks, on limestone	5000	G4S1
<i>Carex torreyi</i>	Torrey sedge	summer fruiting	dry & moist woodlands, meadows, gulches, outer foothills	foothills	G4S1
<i>Cheilanthes eatonii</i>	Eaton's lip fern	summer-fall	slopes and ledges, limestone and granite	to 10000	G5?S 1S2
<i>Claytonia rubra</i>	miners lettuce	June-Aug	gambell oak, cut banks near streams, sand, tree fall	5000-7000	not tracked
<i>Cleome multicaulis</i>	slender spiderflower	June-Aug	grows in bands above rushes (central WY & CO)	5900-8000	G2G3 S2S3
<i>Crassula aquatica</i>	water pygmyweed	Aug-Sept	muddy pondshores, annual w/fleshy leaves fls wht/grn	to 9210	G5SH
<i>Crataegus chrysocarpa</i>	yellow hawthorne	April-June	north slopes, riparian	5000-6000	G5S1
<i>Crocanthemum bicknellii</i>	frostweed	summer	grassy forest opening	6500	G5S2
<i>Cypripedium fasciculatum</i>	clustered lady's-slipper	Apr-Aug	moist to dry coniferous forests, thickets	to 10,000	G4S3
<i>Cypripedium parviflorum</i>	yellow lady's-slipper	Jun-Jul	aspen, PIPO/PSME	7400-8500	G5S2
<i>Draba exunguiculata</i>	clawless draba	late Jun-early Aug	rocky, gravelly, tallus slopes, fellfields, granitic bedrock	12000-14000	G2S2
<i>Draba rectifruca</i>	mountain whitlow grass	Apr-Aug	montane meadows forests clearings (annual)	5900-10500	G3S2 ?
<i>Drymaria effusa var. depressa</i>	spreading drymaria	late summer early fall	annual, pine, aspen woodlands	7000-11000	G4T4 SNR
<i>Eriophorum gracile</i>	slender cottongrass	June-Aug	fens, subalpine wetlands	7000-10000	G5S2
<i>Eustoma exaltatum ssp. russellianum</i>	Texas bluebells	July Aug	alkaline depressions seasonal floods, riparian	3400-5400	G5S2
<i>Geranium bicknellii</i>	Bicknell's geranium	June-Aug	cut banks near riparian corridors, sand	foothills - montan	not tracked

Plant	Common Name	Optimal Survey Dates	Habitat	Elev	Rank
				e	
<i>Helianthemum bicknellii</i>	hoary frostweed	June-July	PIPO dry rocky sandy, dry grasslands below conglomerate outcrops	4800-7100	G5S2
<i>Heuchera richardsonii</i>	Richardson alumroot	May-July	woods, slopes central, CO	7000-8000	G5S1
<i>Hippochaete variegata</i>	variegated scouring rush		(south platte village) sand bar, riparian, under willows		G5S1
<i>Hypoxis hirsuta</i>	yellow stargrass	mid spring early summer	meadows, open woos, plains foothills	5000-7800	G5SH
<i>Juncus vaseyi</i>	Vasey bulrush	summer early fall	raised sites in wetlands, wet meadows, sandy lakeshores	4500	G5?S 1
<i>Liatris ligulistylis</i>	gay-feather	July-Sept	wet meadows	plains	G5?S1 S2
<i>Lilium philadelphicum</i>	wood lily	June	slopes, hills and open woods	6000-10000	watchlist
<i>Listera convallarioides</i>	broad-leaved twayblade	June-Sept	rich humus woods	to 8500	G5S2
<i>Malaxis brachypoda</i>	white adder's-mouth	July	moist ground	7000-8000	G4QS1
<i>Naumburgia thyrsoflora</i>	tufted loostrife	May-July	willows, Rocky Mts to Fort Collins area, dense cottonwoods standing water		G5SH
<i>Nuttallia sinuata</i>	wavy- leaf stickleaf	summer	dry sandy slopes	5000-9000	G3S2
<i>Nuttallia speciosa</i>	stickleaf	summer	dry sandy slopes	5000-9000	G3?S3 ?
<i>Mimulus gemmiparus</i>	budding monkey-flower	July (rarely flowers)	wet seepy on cliff edges, under overhangs	8400-11120	G1S1
<i>Oenothera neomexicana subsp. colo</i>	Colorado butterfly plant	June-Sept	wet meadows, wet prairie	5800-6200	G3T2 S1
<i>Oligoneuron album</i>	prairie goldenrod	July-Oct	prairie, limeston bluffs, roadsides, sand		G5S2 S3
<i>Oreoxis humilis</i>	Pike's peak spring parsley	May-June	Pike's Peak	12000-13000	G1S1
<i>Oxytropis parryi</i>	Parry's crazy-weed	May-June	rocky openings (mostly alpine felfields)	montane-alpine	G5S1
<i>Phacelia denticulata</i>	Rocky Mountain phacelia	Jun-Aug	outer foothills, prairie draws, streambanks, granitic soils, disturbance	5500-9500	G3?S 3?
<i>Physaria bellii</i>	Bell's twinpod	Mar-May	probably not in Jeffco - on shale	foothills	G2G3
<i>Physaria bellii x vitulifera</i>	Bell's twinpod hybrid	summer (fruit in June)	on shale	foothills	G2Q
<i>Physaria vitulifera</i>	round-tipped twinpod	summer (fruit in June)	foothill canyons decaying granite, sedimentary rocks	foothills	G3

Plant	Common Name	Optimal Survey Dates	Habitat	Elev	Rank
<i>Polypodium saximontanum</i>	polypody fern	summer-fall	rock outcrops granite or gneiss, N face or shade	7600-8700	G3?S3?
<i>Potamogeton diversifolius</i>	waterthread pondweed		shallow lakes, ponds, slow moving water		
<i>Potentilla ambigens</i>	southern Rocky Mt. cinquefoil	July-Aug	grassy openings,	6800-8600	G3S1S2
<i>Potentilla rupicola</i>	Rocky Mt. cinquefoil	mid-June-Aug	granite rock cracks N & W exposures	6900-10500	G2S2
<i>Ptilogrostis porteri</i>	Porter feathergrass	July-Aug fruits	peat, willow carrs	9600-11100	G2S2
<i>Ribes americanum</i>	American current	Apr-May	base of hills on upland bench riparian, canyons, under cottonwoods	3500-8000	G5S2
<i>Selaginella weatherbiana</i>	Weatherby's spike-moss		erect stems - known from Boulder, CO endemic	5640-11300	G3G4S3S4
<i>Sisyrinchium demissum</i>	blue-eyed grass	spring-fall	moist meadows	7600-7700	G5S2
<i>Sisyrinchium pallidum</i>	pale blue-eyed grass	late June-July	stream margins, wet meadows	7100-9500	G2G3S2
<i>Smilax lasioneura</i>	carrion-flower	May-Jul	canyons, gulches, outwash mesas	5600-7400	G5S3S4
<i>Spiranthes diluvialis</i>	Ute lady's-tresses	July-Sept	sub-irrigated alluvial soils along streams, wet meadows, floodplains	5330-6420	G2S2
<i>Telesonix jamesii</i>	James' telesonix	July-Aug	granite tors, front range	montane-alpine	G2S2
<i>Triodanus leptocarpa</i>	slim-pod Venus' looking-glass	May-June	rocky sandy S/E face	5500	G5S1
<i>Utricularia minor</i>	lesser bladderwort	no info	shallow water, subalpine ponds	5500-9000	G5S2
<i>Virgulus novae-angliae</i>	New England aster	Aug-Oct	meadows, moist areas in prairies, sandy, loamy soils	not listed	G5S1

**APPENDIX B. Plant community target list for the Jefferson County survey
2010-2011**

COMMUNITY	RANK
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Mertensia ciliata</i> Forest	G5S5
<i>Alnus incana</i> - <i>Salix drummondiana</i> Shrubland	G3S3
<i>Alnus incana</i> / <i>Equisetum arvense</i> Shrubland	G3S3
<i>Alnus incana</i> /Mesic Forbs Shrubland	G3S3
<i>Alnus incana</i> /Mesic Graminoids Shrubland	G3S3
<i>Andropogon gerardii</i> - <i>Schizachyrium scoparium</i> Western Great Plains Herbaceous Vegetation	G2?S2
<i>Andropogon gerardii</i> - <i>Sorghastrum nutans</i> Western Great Plains Herbaceous Vegetation	G2S1S2
<i>Andropogon gerardii</i> - <i>Sporobolus heterolepis</i> Western Great Plains Herbaceous	G2S1S2

COMMUNITY	RANK
Vegetation	
<i>Betula occidentalis/Cornus sericea</i> Shrubland	G3S1S2
<i>Betula occidentalis/Maianthemum stellatum</i> Shrubland	G4?S2
<i>Betula occidentalis/Mesic Graminoids</i> Shrubland	G3S2
<i>Carex diandra</i> Wet Meadow Herbaceous Vegetation	GNRSU
<i>Carex lasiocarpa</i> Herbaceous Vegetation	G4?S1
<i>Carex nebrascensis</i> Herbaceous Vegetation	G4S3
<i>Carex utriculata</i> Herbaceous Vegetation	G5S4
<i>Celtis laevigata</i> var. <i>reticulata</i> / <i>Pseudoroegneria spicata</i> Woodland	G2G3
<i>Cercocarpus montanus/Achnatherum scribneri</i> Shrubland	G3S3
<i>Cercocarpus montanus/Hesperostipa comata</i> Shrubland	G2S2
<i>Cercocarpus montanus/Hesperostipa neomexicana</i> Shrubland	G2G3S2S3
<i>Cercocarpus montanus-Rhus trilobata/Andropogon gerardii</i> Shrubland	G2G3S2S3
<i>Danthonia parryi</i> Herbaceous Vegetation	G3S3
<i>Distichlis spicata</i> Herbaceous Vegetation	G5S3
<i>Elocharis rostellata</i> Herbaceous Vegetation	G3S2
<i>Festuca arizonica-Muhlenbergia filiculmis</i> Herbaceous Vegetation	GUS3
<i>Festuca arizonica-Muhlenbergia montana</i> Herbaceous Vegetation	G3S2
<i>Glyceria borealis</i> Herbaceous Vegetation	G4S3
<i>Hesperostipa comata</i> Colorado Front Range Herbaceous Vegetation	G1G2S1S2
<i>Hesperostipa comata-Bouteloua gracilis-Carex</i> Herbaceous Vegetation	G5S2S3
<i>Hesperostipa neomexicana</i> Herbaceous Vegetation	G3S3
<i>Juniperus scopulorum/Cercocarpus montanus</i> Woodland	G2S2
<i>Muhlenbergia montana-Hesperostipa comata</i> Herbaceous Vegetation	G1G2S1S2
<i>Picea pungens/Alnus incana</i> Woodland	G3S3
<i>Picea pungens/Alnus incana-Corylus cornuta</i> Woodland	GUSU
<i>Picea pungens/Betula occidentalis</i> Woodland	G2S2
<i>Pinus aristata/Festuca arizonica</i> Woodland	G4S3
<i>Pinus aristata/Ribes montigenum</i> Woodland	G3S1
<i>Pinus flexilis/Arctostaphylos uva-ursi</i> Woodland	G4S2?
<i>Pinus ponderosa/Alnus incana</i> Woodland	G2S2
<i>Pinus ponderosa/Arctostaphylos uva-ursi</i> Woodland	G4S3
<i>Pinus ponderosa/Carex rossii</i> Forest	G4G5S3S4
<i>Pinus ponderosa/Cercocarpus montanus</i> Woodland	G4S4
<i>Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii</i> Woodland	G2S2?
<i>Pinus ponderosa/Festuca arizonica</i> Woodland	G4S4
<i>Pinus ponderosa/Leucopoa kingii</i> Woodland	G3S3
<i>Pinus ponderosa/Muhlenbergia montana</i> Woodland	G4G5S2S3
<i>Pinus ponderosa/Purshia tridentata</i> Woodland	G3G5S3?
<i>Pinus ponderosa/Quercus gambellii</i> Woodland	G5S4
<i>Populus angustifolia/Alnus incana</i> Woodland	01G3S3

COMMUNITY	RANK
<i>Populus angustifolia/Betula occidentalis</i> Woodland	G3S3
<i>Populus angustifolia/Prunus virginiana</i> Woodland	G2QS1
<i>Populus angustifolia/Salix exigua</i> Woodland	G4S4
<i>Populus angustifolia/Salix irrorata</i> Woodland	G2S2
<i>Populus deltoides ssp. monilifera/Prunus virginiana</i> Woodland	GUSU
<i>Populus deltoides/Symphoricarpos occidentalis</i> Woodland	G2G3S2
<i>Populus tremuloides/Betula occidentalis</i> Forest	G3S2
<i>Populus tremuloides/Corylus cornuta</i> Forest	G3S1
<i>Potamogeton natans</i> Herbaceous Vegetation	G5?S1
<i>Pseudotsuga menziesii/Betula occidentalis</i> Woodland	G3?S3
<i>Pseudotsuga menziesii/Carex geyeri</i> Forest	G4?S3
<i>Pseudotsuga menziesii/Jamesia americana</i> Forest	G3G4
<i>Purshia tridentata/Muhlenbergia montana</i> Shrubland	G2S2
<i>Quercus gambellii-Cercocarpus montanus/Carex geyeri</i> Shrubland	G3S3
<i>Quercus gambellii-Cercocarpus montanus/Muhlenberia montana</i> Shrubland	GUSU
<i>Ribes cereum/Leymus ambiguus</i> Shrubland	G2S2?
<i>Salix bebbiana</i> Shrubland	G3?S2
<i>Salix drummondiana/Mesic Forbs</i> Shrubland	G4S4
<i>Salix geyeriana-Salix monitcola/Mesic Forbes</i>	G3S3
<i>Salix ligulifolia</i> Shrubland	G2G3S2S3
<i>Salix monticola/Calamagrostis canadensis</i> Shrubland	G3S3
<i>Salix monticola/Mesic Forbs</i> Shrubland	G4S3
<i>Salix monticola/Mesic Graminoids</i> Shrubland	G3S3
<i>Salix planifolia/Carex aquatilis</i> Shrubland	G5S4
<i>Sparganium angustifolium</i> Herbaceous Vegetation	G4SU
<i>Spartina pectinata</i> Western Herbaceous Vegetation	G3?S3
<i>Suaeda calceoliformis</i> Herbaceous Vegetation	GUS2
<i>Typha (latifolia, angustifolia)</i> Western Herbaceous Vegetation	G5S4
<i>Utricularia vulgaris</i> Herbaceous Vegetation	G3?S1

APPENDIX C. Animal target list for the Jefferson County survey 2010-2011

ANIMAL	COMMON NAME	TRACK ¹	RANK
AMPHIBIANS			
<i>Lithobates pipiens</i>	northern leopard frog	F	G5S3
<i>Anaxyrus boreas</i>	boreal toad (pop 1)	F	G4T1QS1
BIRDS			
<i>Accipiter gentilis</i>	Northern Goshawk	W	G5S3B
<i>Catharus fuscescens</i>	Veery	W	G5S3B, SZN
<i>Cypseloides niger</i>	Black Swift	F	G4S3B

ANIMAL	COMMON NAME	TRACK¹	RANK
<i>Empidonax traillii</i>	Willow Flycatcher	W	G5S4B, S4N
<i>Falco mexicanus</i>	Prairie Falcon	W	G5S4B, S4N
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	F	G4T4S2B
<i>Haliaeetus leucocephalus</i>	Bald Eagle	F	G5S1B,S3N
<i>Loxia leucoptera</i>	White-winged Crossbill	W	G5S1B,SZN
<i>Numenius americanus</i>	Long-billed Curlew	F	G5S2B
<i>Seiurus aurocapillus</i>	Ovenbird	F	G5S2B
<i>Tympanuchus phasianellus jamesi</i>	Plains Sharp-tailed Grouse	F	G4T4S1
<i>Melanerpes lewis</i>	Lewis's Woodpecker	F	G4S3
FISH			
<i>Gila robusta</i>	roundtail chub	F	G3S2
<i>Oncorhynchus clarki stomias</i>	greenback cutthroat trout	F	G4T2T3S2
LEPODOPTERA			
<i>Agapema homogena</i>	Rocky Mountain agapema	F	G4S2
<i>Atrytone arogos</i>	Arogos Skipper	F	G3S2
<i>Callophrys mossii schryveri</i>	Moss's Elfin	F	G4T3S2S3
<i>Celastrina humulus</i>	Hops Feeding Azure	F	G2G3S2
<i>Cicindela nebraskana</i>	A Tiger Beetle	F	G4S1?
<i>Coloradia luskii</i>	Lusk's pinemoth	F	G4S1?
<i>Doa ampla</i>	A Moth	F	GNRS1
<i>Erynnis martialis</i>	Mottled Dusky Wing	F	G3S2S3
<i>Hesperia leonardus montana</i>	Pawnee Montane Skipper	F	G4T1S1
<i>Hesperia ottoe</i>	Ottoe Skipper	F	G3G4S2
<i>Pachysphinx modesta</i>	modest sphinx	F	G4G5S3?
<i>Paratrytone snowi</i>	Snow's skipper	W	G4S3
<i>Polites origenes</i>	Cross-line Skipper	F	G5S3
<i>Polites rhesus</i>	rhesus skipper	F	G4S2S3
<i>Proserpinus juanita</i>	Juanita sphinx	W	G4G5S3S4
<i>Pyrgus ruralis</i>	two-banded checkered-skipper	W	G5S3
<i>Pyrgus xanthus</i>	mountain checkered-skipperq	F	G3G4S3
<i>Speyeria idalia</i>	Regal Fritillary	F	G3S1
<i>Sphinx drupiferarum</i>	wild cherry sphinx moth	F	G4S3
<i>Sphinx perelegans</i>	elegant sphinx moth	F	G4G5S1?
<i>Stinga morrisoni</i>	Morrison's skipper	F	G4G5S3S4
<i>Grammia sp. 1</i>	A Tiger Moth	F	G2G3SNR
MAMMALS			

ANIMAL	COMMON NAME	TRACK¹	RANK
<i>Corynorhinus townsendii pallescens</i>	Townsend's big-eared bat	F	G4T4S2
<i>Cynomys gunnisoni</i>	Gunnison's prairie dog	F	G5S5
<i>Cynomys ludovicianus</i>	black-tailed prairie dog	F	G4S3
<i>Myotis thysanodes</i>	fringed myotis	P	G4G5S3
<i>Sorex nanus</i>	dwarf shrew		G4S2
<i>Sorex preblei</i>	Preble's shrew		G4S1
<i>Vulpes velox</i>	swift fox	F	G3S3
<i>Zapus hudsonius preblei</i>	meadow Jumping Mouse Subsp	F	G5T2S1
MOLLUSCS			
<i>Acroloxus coloradensis</i>	Rocky Mountian capshell	F	G3S1
<i>Pygnodon grandis</i>	giant floater	F	G5S2
<i>Ferrissia fragilis</i>	fragile ancyloid	F	G5S1
<i>Promenetus umbilicatellus</i>	umbilicate sprite	F	G4
ODONATA			
<i>Hesperagrion heterodoxum</i>	Painted damsel	F	G5S1
<i>Plathemis subornata</i>	desert whitetail	F	G4S4
<i>Somatochlora ensigera</i>	plains emerald	F	G4S1
<i>Stylurus intricatus</i>	brimstone clubtail	F	G4S2
<i>Sympetrum costiferum</i>	safron-winged meadowhawk	F	G5S1?
REPTILES			
<i>Eumeces multivirgatus multivirgatus</i>	many-lined skink	F	G5T5S4
<i>Phrynosoma hernandesi</i>	short-horned lizard	W	G5S5
<i>Tropidoclonion lineatum</i>	lined snake	W	G5S3

¹ F = Full Tracking; W = Watchlisted.