

Survey of Critical Wetland Resources in Huerfano County, CO



March 2017

CNHP's mission is to preserve the natural diversity of life by contributing the essential scientific foundation that leads to lasting conservation of Colorado's biological wealth.

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EXECUTIVE SUMMARY

In April 2013, the Huerfano County Commissioners unanimously approved to support the Colorado Natural Heritage Program's (CNHP) project, ***Survey for Critical Wetland Resources in Huerfano County***. Funding was provided by the U.S. Environmental Protection Agency, Region 8 Wetland Program Development Grant, with matching funds from Colorado Parks and Wildlife, Colorado College, The Nature Conservancy, Citizens for Huerfano County, San Isabel Land Protection Trust, and Colorado State University. The purpose of the project was to provide a scientific data resource for land managers, county planners, and the citizens of Huerfano County for conducting proactive landscape planning to preserve the natural biodiversity of the county's wetland and riparian areas. This document is a tool for managing lands that support rare, imperiled and/or sensitive wetland-dependent plants, animals, and significant plant habitats. The goal of this project was to systematically identify the locations of wetland/riparian dependent rare and uncommon species and significant habitats. Additionally, the original paper topographic National Wetland Inventory maps were digitized in accordance with the U.S. Fish and Wildlife Wetland Inventory protocol.

The economic history of Huerfano County is based in agricultural production and coal extraction. Recently the county's economy has shifted from agriculture and mining activities towards tourism and recreation. Additionally, the county is becoming attractive for second home owners and as a popular destination for fishing, boating, hiking, and hunting. The Huerfano County Comprehensive Plan (2010) (HCCP) was created to address these shifts in land use and economic development and to protect the high quality of life and beauty of the natural environment. The HCCP emphasizes that the quality of life of the county's citizens be a priority. One of the HCCP's guiding principle is to "...maintain the high quality of life that its residents enjoy by making land use decisions that protect the beauty of the natural environment and the county's western heritage." The HCCP outlines several goals that address the need for accurate natural resource data especially for open space planning and scenic view protection. CNHP approached this survey with these goals in mind.

In May 2015, CNHP and its stakeholders identified potential survey areas for significant wetland dependent plants, animals, and habitats. Areas that were expected to contain significant elements were delineated as Targeted Inventory Areas (TIAs). These areas were prioritized for field survey based on the relative rarity of the elements expected to be found and the area's ability to maintain viable populations of those elements. Summer field surveys were conducted in 2015 and 2016 within the TIAs. The TIAs that were found to contain significant elements were delineated as sites or Potential Conservation Areas (PCAs). A PCA is designed to represent CNHP's best estimate of the primary area supporting the long-term survival of targeted species, subspecies and significant natural plant communities.

Results of the survey confirm that there are many wetland and riparian areas with high biological significance in Huerfano County. The importance of wetlands in Huerfano County cannot be overstated. They constitute less than 3% of the total landscape, yet are essential to wildlife and agriculture, and they support a number of rare plants and animals. CNHP documented two unique

wetland types: fens, which are peat-accumulating wetlands that are several thousand years old, and playas, ephemeral wetlands that support migratory birds, wildlife, and humans.

Altogether, four rare or imperiled species and 11 wetland plant communities of concern were documented in Huerfano County. Fourteen new county records were documented and deposited in the Colorado State University Herbarium (CSU). Despite two successful and productive field seasons, it is likely elements that are present in the county were not documented, due to either lack of access to private property, phenology (reproductive timing) of species, or time constraints.

CNHP has identified 21 PCAs in Huerfano County that represent both wetland and upland sites. Thirteen new wetland PCAs resulted from the 2015-2016 project and eight were existing PCAs, drawn for upland elements. Of those 21 presented in this report, three are of very high significance (B2), 10 are of high significance (B3), and eight are of moderate biodiversity (B4). These PCAs represent the best examples of observed wetland species, plant communities, and their ecological processes observed.

Huerfano County is truly unique with an amazing richness of wetland and riparian fauna and flora well worth preserving for future generations. The diversity of species and plant communities, ranging from alpine tundra to shortgrass prairie, substantiate the county's importance to the biodiversity of Colorado and the world; the concentration and quality of imperiled species and habitats attest to the fact that conservation efforts in Huerfano County will have both statewide and global significance. The final report and PCAs will be provided to the stakeholders, partners, local libraries, and available to the public on the CNHP website (www.cnhp.colostate.edu).

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INTRODUCTION

Project Overview

Huerfano County is located in southeastern Colorado. The county was named for a conical volcanic plug called *El Huerfano* or “the Orphan” by Spanish explorers in 1806 (Keating 2011). Walsenburg is the county seat and the largest city in the county. The Sangre de Cristo Range forms the western boundary, the Wet Mountains form the northern boundary and the Spanish Peaks outline the southern boundary. Elevations range from Blanca Peak at 14,345 feet to 6,000 feet at the eastern boundary. The county lies completely within the Huerfano River Watershed.



Figure 1. Huerfano Butte.

The county is a popular destination for fishing, hiking, hunting, boating, 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. Proactive and informed land planning decisions are necessary to preserve these unique wetland/riparian natural resources, as well as the rural, and agricultural characteristics of Huerfano County.

It is necessary to retain the intrinsic values of the landscape which provide 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 state. 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 the *Survey of Critical Wetland Resources in Huerfano County* were those employed worldwide throughout Natural Heritage Programs and Conservation Data Centers. CNHP's primary focus is to identify the locations of plant and animal populations and significant plant communities on CNHP's list of rare and

which a particular element or suite of elements depends for their continued existence. Best available knowledge of each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features, vegetative cover, and current and potential land uses to delineate PCA boundaries.

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

CNHP uses the Heritage Ranking Methodology (see Method Section for details) to prioritize conservation actions by identifying those areas that have the greatest chance of conservation success for the most imperiled elements. Sites are prioritized according to their biodiversity significance rank, or "B-rank," which ranges from B1 (outstanding significance) to B5 (general or statewide significance). Biodiversity ranks are based on the conservation (imperilment or rarity) ranks for each element and the element occurrence ranks (viability rank) for that particular location. Therefore, the highest quality occurrences (those with the greatest likelihood of long-term survival) of the most imperiled elements are the highest priority (receive the highest B-rank). The B1-B3 sites are the highest priorities for conservation actions (due to limited resources, only the B1-B3 PCAs are presented in the report). Based on current knowledge, the sites in this report represent areas that CNHP recommends for protection in order to preserve the natural heritage of wetland and riparian areas in Huerfano County.

WETLAND DEFINITIONS, PLANTS, TYPES, SOILS, ASSESSMENT, MAPPING, AND REGULATIONS

Wetland Definitions

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

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

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

Wetland Plants

Wetlands are typically defined or classified by the vegetation they support. A commonly used term for a wetland plant is hydrophyte; a plant that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. Hydrophytes have evolved a number of adaptations for life in wet environments, including additional pore spaces, dimorphic

(two distinct forms) leaves, and complex rooting systems. Phreatophytes are deep-rooted woody plants that obtain a significant portion of their water from groundwater (e.g., cottonwoods, alders, or willows). Phreatophytes are typically found along rivers and streams where the groundwater is near the surface. Wetland plants are at the base of the food chain and thus a major component of energy flow within a wetland. They provide habitat for major taxonomic groups, including vertebrates, invertebrates, phytoplankton, and zooplankton. Wetland plants influence water chemistry, acting as both a nutrient sink through uptake, and as a nutrient pump by moving compounds from sediment into the water column, thus improving water quality (Reddy et al. 1983, Reddy et al. 1987). Plants also influence the sediment and hydrologic regime by stabilizing shorelines and mitigating peak floodwaters.



Figure 3. Willows stabilize streambanks and mitigate floodwaters.

Wetland Types in Huerfano County

Playas

Playas are found throughout the eastern and southern portion of Huerfano County. They are ephemeral wetlands with variable hydroperiods. Typically they are clay-lined basins that periodically become inundated from rainfall and surface runoff, not from groundwater discharge. Playas provide many important landscape functions, such as mitigating flooding and storing surface water. They serve many important ecological functions such as capturing surface runoff, recharging aquifers, and providing habitat for wildlife, especially migratory birds (Haukos and Smith 1997). Wetland plants in playas are typically annuals that are linked to precipitation cycles. The most common and characteristic playa plants included: spreading yellowcress (*Rorippa sinuata*), needle spikerush (*Eleocharis acicularis*), common spikerush (*E. palustris*), and hairy waterclover (fern) (*Marsilea vestita*).

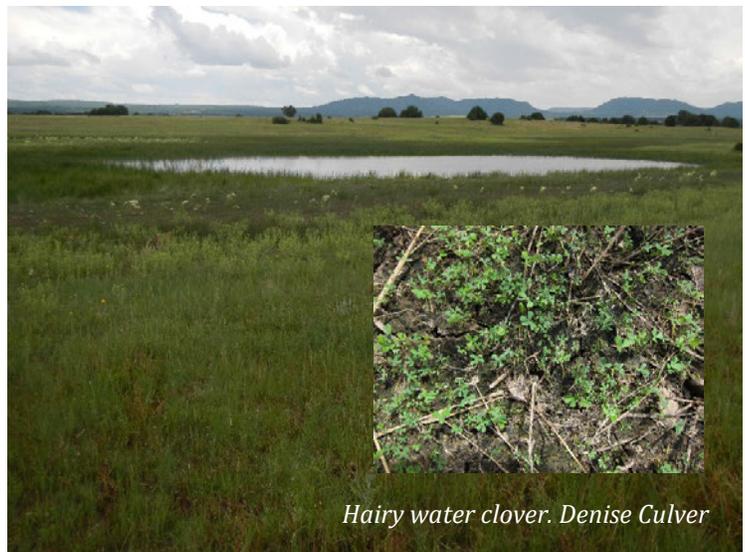


Figure 4. Playa located in southeastern Huerfano County.

Marshes

Marshes form in depressions created by landscape processes such as water, wind, and past glacial activity. In Huerfano County, the larger marsh wetlands have been enhanced for recreation, these include; Horseshoe and Martin lakes in Lathrop State Park, Maria Reservoir east of Walsenburg, and Wahatoya Lakes, south of La Veta. Marsh wetlands contain deep water in spring and early summer and are characterized by emergent herbaceous vegetation, e.g., cattails (*Typha* spp.), bulrushes (*Schoenoplectus* spp.), cottonwoods (*Populus* spp.), willows (*Salix* spp.), Russian olive (*Elaeagnus angustifolia*), and salt cedar (*Tamarix chinensis*).



Figure 5. Taylor pond by Horseshoe Lake.

Riparian

Riparian wetlands are the most common wetland type in Huerfano County. They are located along creeks and rivers that are intermittently flooded during snowmelt. They typically have a seasonally



Figure 6. Upper Huerfano River.

high water table due to their proximity to subsurface water. Riparian wetlands are commonly recognized by bottomland, floodplain, and streambank vegetation dominated by trees and shrubs. They are characterized by a combination of high animal diversity and high biomass productivity. Riparian wetlands are particularly productive ecosystems, receiving large inputs of water and nutrients from upstream sources during flood events. Woody plants are the dominant vegetation, and in Huerfano County they include: strapleaf willow (*Salix ligulifolia*, *S.*

monticola, *S. exigua*), thin-leaf alder (*Alnus incana*), river birch (*Betula occidentalis*), and cottonwoods (*Populus deltoides* ssp. *monilifera*, *P. acuminata*, *P. angustifolia*). Along the Cucharas River, the New Mexico locust (*Robinia neomexicana*) frequently appears in the shrub layer.

Wet Meadows

Wet meadows are dominated by graminoids (sedges, rushes, grasses) and have soils saturated near the surface in early summer, but rarely have standing water and are typically dry by the end of the



growing season. In Huerfano County, wet meadow wetlands are adjacent to or within irrigated pastures and are likely linked to irrigation practices. Wet meadows also occur in alpine and subalpine zones around mountain lakes that are fed by melting snowbanks throughout the summer. The most common wetland plants found in lower elevation wet meadows are: Nebraska sedge (*Carex nebrascensis*), beaked sedge (*C. utriculata*), field sedge (*C. praegracilis*), timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*), and Kentucky bluegrass (*Poa pratensis*).

Figure 7. Wet meadow along the Huerfano River.

Fens

Fens, a type of peat accumulating wetlands, were documented in the county during this project. Fens are an uncommon wetland type, usually found at 8,000 feet or above. Fens receive water from



Figure 8. Fen near Blue and Bear lakes.

groundwater discharge, not surface water or rainfall like bogs from northern and eastern North America. They accumulate peat at a very slow rate, 20 cm (8 inches) per 1,000 years (Chimner 200); essentially irreplaceable. Fens tend to be small in area (<5 acres) and typically support grasses and sedges, e.g., tall cottongrass (*Eriophorum angustifolia*), analougue sedge (*Carex simulata*), and water sedge (*C. aquatilis*). Forbs that were documented within the county's fens include: fringed gentian (*Gentianopsis thermalis*), falsegold groundsel (*Packera pseudoaurea*), shooting star

(*Dodecathon pulchellum*), and great blue lobelia (*Lobelia siphilitica* var. *ludoviciana*). Fens are considered a Resource Category 1 within the U.S. Fish and Wildlife Service Mitigation Policy (USFWS 1999), signifying that every reasonable effort should be made to avoid impacting this habitat. In 2002, the U.S. Forest Service Rocky Mountain Region issued a statement to avoid impacts to fens on National Forest Lands due to their irreplaceability (USFS 2002).



Figure 9. Tall cottongrass.

Wetland Soils

Wetland or hydric soils are very important in determining the frequency and duration of saturation or how long a soil is “underwater.” As a wetland is flooded, water replaces air in the soil pores, leading to anaerobic conditions that cause physical and chemical changes. Soil microbes deplete free oxygen and begin to utilize alternative metabolic pathways involving nitrogen, iron, manganese, and sulfur, producing chemical transformations in the soil. Evidence of these transformations can be seen in soil indicators, such as mottling (redoximorphic features), oxidized root channels, gleying, and a distinct, rotten egg smell (H₂S gas). If soils are permanently saturated with cold groundwater, the rate of organic matter decomposition can slow dramatically, creating thick organic soils known as peat. Hydric soil indicators reveal the general hydrologic signature, or hydroperiod, of a wetland, including how long and how frequently the soil has been saturated.

Wetland soils in Huerfano County are dominated by three major categories (USDA NRCS 2008):

- Noden series consists of deep, well-drained soils on foot slopes.
- Willowman series consists of deep, well drained soils on terraces and fans. These soils formed in cobbly and gravelly alluvium.
- Neville series consists of deep, well-drained soils on uplands, in drainage ways, and on foot slopes. These soils formed in mixed alluvium and colluvium derived from sandstone, siltstone, and shale.



Figure 10. Soil profile with peat in upper 12 inches.

Wetland Functions and Ecological Services

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

- Storage of water;
- Transformation (retention and supply) of nutrients;
- Growth of living matter; and
- Supporting diversity of wetland plants and animals.

Ecological services are the wetland functions that are valued by society (Millennium Ecosystem Assessment 2005). For example, biogeochemical (carbon, nitrogen, phosphorus, water, etc.) cycling (which includes retention and supply) is an ecological function whereas nutrient removal/retention is an ecological service to society. 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 in 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 Huerfano 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 wetland ecologists while incorporating 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 6) 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.

Wetland Mapping in Colorado

National Wetland Inventory Maps

In the late 1970s, the U.S. Fish and Wildlife Service began an inventory of the extent and types of the nation's wetlands. Basic mapping units for the U.S. National Wetlands Inventory (NWI) were provided by the Cowardin et al. (1979) classification system. Photo-interpretation and field reconnaissance were used to refine wetland boundaries according to the wetland classification system. In Colorado, maps east of the 106th parallel were created using 1970s black and white aerial photography. Maps west of the 106th parallel were created in the early 1980s using color aerial photography. The majority of maps produced for Colorado, however, were created as paper maps and were not available as digital polygon data appropriate for use in a GIS format. Converting existing NWI maps for Huerfano County from paper to digital data was conducted as part of this project and was completed prior to the summer field season. The NWI maps for Huerfano County and the rest of Colorado can be accessed via CNHP's Colorado Wetland Information Center <http://www.cnhp.colostate.edu/cwic/location.asp>.

The Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979) describes ecological taxa, arranges them in a system useful to resource managers, furnishes units for mapping, and provides uniformity of concepts and terms. Ecological systems form the highest level of the classification hierarchy; five are defined for the United States—Marine, Estuarine, Riverine, Lacustrine, and Palustrine (non-tidal). The next level of the classification indicates the life form of the dominant vegetation. Nine predominant system and life forms combinations are identified for Huerfano County (Figure 11.):

- (1) Lacustrine Limnetic (L1)—freshwater lakes, deeper water zone, supports non-rooted plants, plant and animal plankton;
- (2) Lacustrine Littoral (L2)—freshwater lakes, shallow water zone, supports rooted plants and bottom dwelling animals;
- (3) Riverine Upper Perennial (R3)—river and stream channels;
- (4) Palustrine Emergent Wetland (PEM)—vegetated wetlands



Figure 11. Example of NWI mapping of Lathrop State Park.

- dominated by emergent herbaceous flowering plants;
- (5) Palustrine Scrub-Shrub Wetland (PSS)—vegetated wetlands dominated by woody vegetation > 6 m tall;
 - (6) Palustrine Forested Wetland (PFO)—vegetated wetlands dominated by woody vegetation < 6m tall;
 - (7) Palustrine Unconsolidated Bottom (PUB)—shallow water wetlands with vegetative cover less than 30% (open ponds);
 - (8) Palustrine Aquatic Bed (PAB)—wetlands and deep water habitats dominated by plants that grow on or below the water surface; and
 - (9) Palustrine Unconsolidated Shore (PUS)—shoreline wetlands with vegetative cover less than 30%.

Wetland Regulation in Colorado

Wetlands in Colorado are currently regulated under the authority of the Clean Water Act (US EPA 1972). A permit issued by the Corps is required before placing fill in a wetland and before dredging, ditching, or channelizing a wetland. The Clean Water Act exempts certain filling activities, such as normal agricultural activities.

The 404(b) (1) guidelines, prepared by the Environmental Protection Agency in consultation with the Corps, are the federal environmental regulations for evaluating projects that will impact wetlands. Under these guidelines, the Corps is required to determine if alternatives exist for minimizing or eliminating impacts to wetlands. When unavoidable impacts occur, the Corps requires mitigation of the impacts. Mitigation may involve creation or restoration of similar wetlands in order to achieve an overall goal of no net loss of wetland area.

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

PROJECT BACKGROUND

Location of the Study Area

Huerfano County is located in south-central Colorado, on the east side of the Continental Divide (Figure 12). From Greenhorn Mountain the county line extends along the drainage divide of the Huerfano River to the crest of the Sangre de Cristo Range at Blanco Peak, along the crest of the Culebra Range to Trinchera Peak, and along the divide to East Spanish Peak. The county line extends along the dividing ridge of the Santa Clara and Apishapa Creek drainages into Pueblo County. Huerfano County encompasses approximately 1,590 sq. miles (1,018,992 acres).



Figure 12. Location of Huerfano County.

History of Huerfano County

Huerfano County was named for Huerfano Butte, an isolated, but prominent volcanic plug located about 10 miles north of Walsenburg along the Huerfano River. In 1861, the Territory of Colorado was established and set the original borders of the county (Figure 13). Huerfano County was one of the original 17 Colorado counties, encompassing over four million acres, stretching from the top of the Sangre de Cristo Range to the Kansas border. The county originally encompassed a large area that was later divided into Baca, Bent, Huerfano, Las Animas, Otero, and Prowers Counties in 1867 (Stanwyck 2003). The Ute, Comanche, and Arapahoe Indians inhabited the county when the first Spanish explorers passed through it. Jose Fabian Baca and Pedro Martinez were two of the first settlers in the area. They established ranches two miles east of Badito on the Huerfano River. In 1862, John Francisco and Henry Daigre established the town presently called La Veta (Keating 2011). In 1865, approximately 3,000 acres along the Huerfano and Cucharas Rivers were under cultivation. August Sporleder, Otto Unfug, and Fred Walsen were early settlers in the Plaza de Los Leones area, which later became Walsenburg (originally called Plaza de Los Leones)

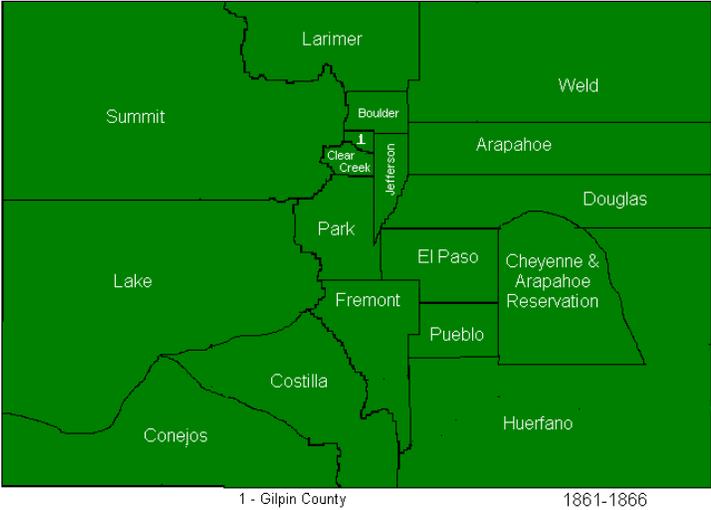


Figure 13. Original Colorado Counties established 1861 (D. Stanwyck 2003).

became the county seat due to its location along major transportation routes (Mitchell no date).

The extension of the Denver and Rio Grande Western Railroad in 1876, opened up trade. The Colorado Fuel and Iron Corporation opened the Walsen Coal Mine in 1876, which started an economic boom. Coal production peaked between 1915 and 1920, when Huerfano County ranked second in coal production statewide. Increased use of oil and gas for energy, however, led to the decline of coal production. In 1918, 37 mines were in production, but by 1970 only two remained active (Mitchell no date).

The first county seat was Autobeas Plaza at the confluence of the Huerfano and Arkansas Rivers (located in Pueblo County) in 1853. In 1867, the county seat was moved to Badito, at the confluence of Oak Creek and Huerfano Rivers. Walsenburg, presently the principal city in the county, was incorporated in 1873 and became the county seat in 1874. La Veta located along the Cucharas River, was initially a fort built by Colonel John M. Francisco and Henry Daigre, was incorporated in 1886. Cuchara was initially named Nunda, was founded in the late 1800s. In 1908, George Mays moved to the area and built several summer cabins and named it Cuchara named for the “spoon-shaped” valley (Mitchell no date).



Figure 14. Devils Stair Step Dike with West Spanish Peak.

Physiography and Ecoregions

Huerfano County straddles the eastern edge of the Southern Rocky Mountain ecoregion and the western edge of the Central Shortgrass Prairie as defined by The Nature Conservancy (TNC 1997, modified from Bailey 1995) (Figure 15). The Southern Rocky Mountain ecoregion includes the north-south trending mountain ranges with their intervening valleys and parks from southern Wyoming to northern New Mexico, while in Colorado, there are more westerly mountain ranges and high plateaus. The major ecological zones are alpine, subalpine, upper montane, lower montane and foothill (Neely et al. 2001). The eastern portion of the county lies within the Central Shortgrass Prairie ecoregion. Rolling plains and tablelands, dissected by streams, canyons, badlands, and buttes, are dominated by shortgrass prairie with large areas of mixed grass, with sandsage prairie and juniper woodlands on breaks. Surficial geology varies throughout the region, ranging from Quaternary eolian dune sand and loess, to tertiary sandstones and basalt flows, to Cretaceous shales and limestones (Neely et al. 2006).

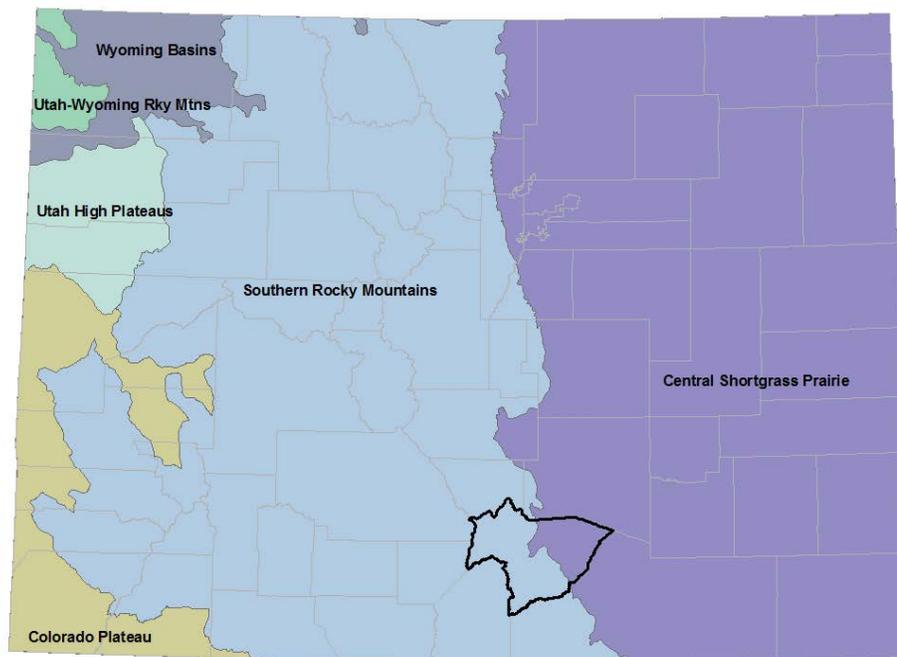


Figure 15. Huerfano County in relation to the Southern Rocky Mountain and Central Shortgrass Ecoregions.

The Sangre de Cristo Range forms the western border of the county with the Culebra Range forming the southwestern corner. The Sangre de Cristo Range is the longest range in Colorado and one of the longest ranges on the continent (Keating 2011) (Figure 16). Huerfano Park, an intermountain valley, is the physiographic area that lies between the Sangre de Cristo Range and Wet Mountains. This area has a badland topography of rolling hills that have an angular, jagged profile. Four igneous plugs are identified in Huerfano Park; Santana Butte, Gardner Butte, an unnamed small plug south of Gomez Canyon, and the smallest plug is located near the confluence of Reed Sand Arroyo Creek and Williams Creek, about 3.5 miles north of Gardner (Johnson 1959). Raton Basin,

the coal producing area, is located south of the Huerfano River and extends into Las Animas County. The eastern most part of the county is underlain by sandstone, limestone, and shale (Tweto 1979). In the eastern portion of the county, the fault line scarps, buttes, and canyons form distinct landmarks, e.g., Rattlesnake Buttes, Turkey Ridge, and Cucharas Canyon that cuts deep into the Dakota Sandstone to a depth of over 600 feet (Johnson 1959, Tweto 1979).

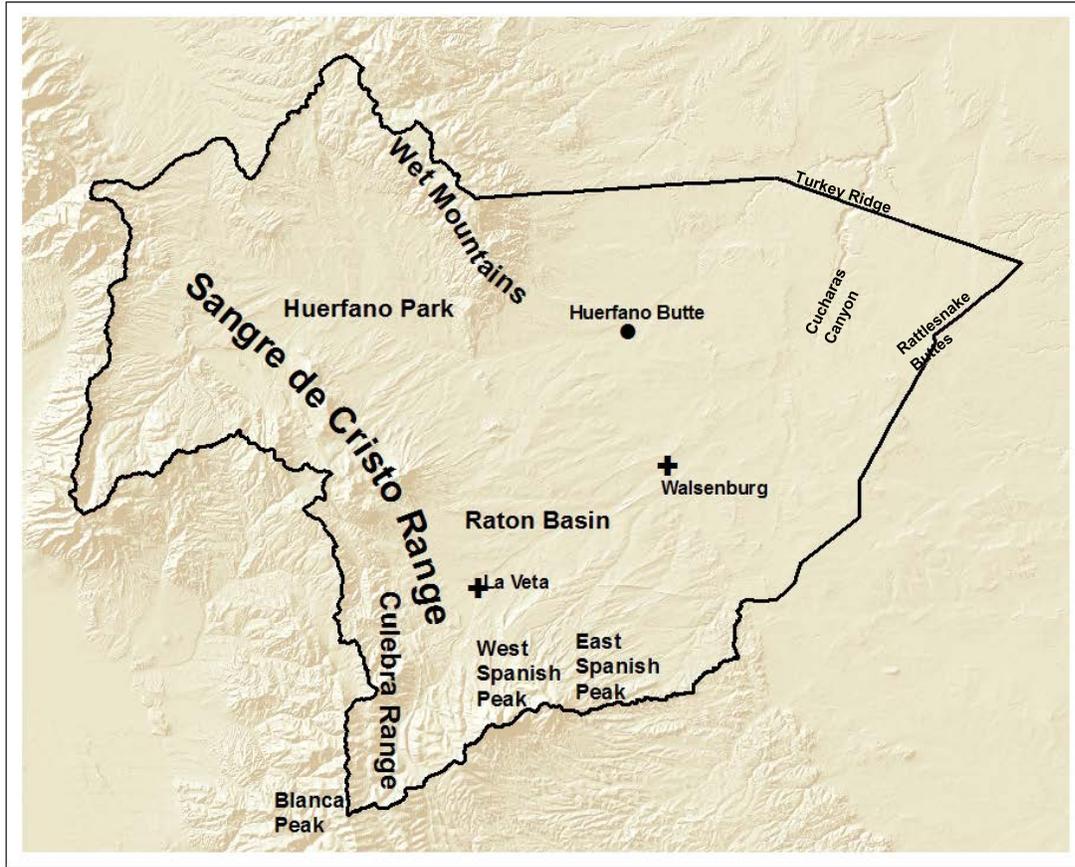


Figure 16. Physiography of Huerfano County.

Hydrology

Huerfano County lies entirely within the Huerfano River watershed (HUC 8—110200006). Two major rivers, the Huerfano and Cucharas, drain the county into the Arkansas River (Figure 17). A small area along the northern boundary of the county and east of the Wet Mountains is drained by Graneros Creek, a tributary of the St. Charles River. In the extreme eastern tip of the county, Mustang Creek empties into the Apishapa River.

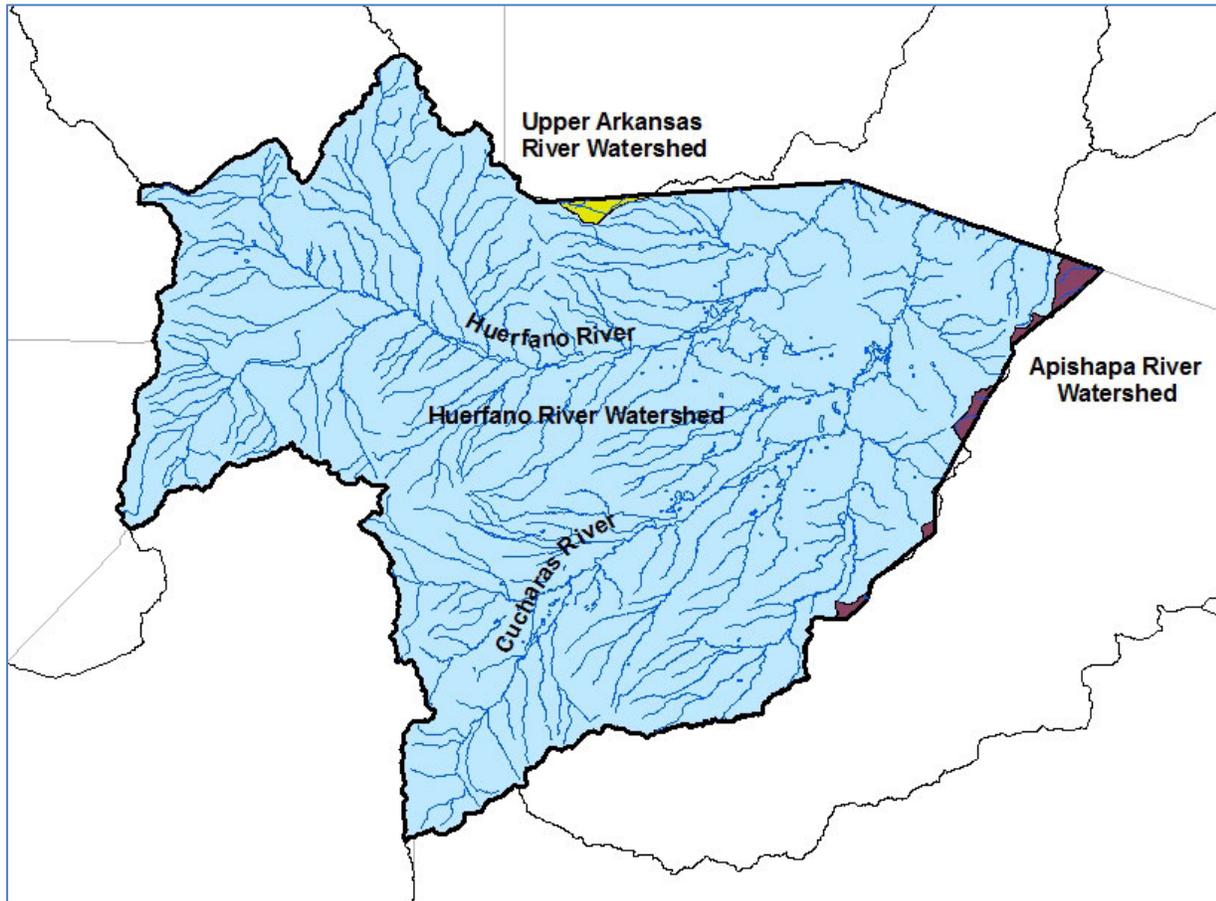


Figure 17. Major watersheds and rivers in Huerfano County.

The Cucharas River, the principal tributary of the Huerfano River, drains the southern part of the county. It flows from southwest to northeast to its confluence with the Huerfano River, just northeast of the county boundary with Pueblo. Its major tributaries include Santa Clara, Bear, and Wahatoya creeks. The important streams that supply the county with irrigation water include Apache, Bear, Muddy, Pass, Santa Clara, Turkey, Wahatoya, Williams, and Yellowstone creeks. Snowmelt from the Sangre de Cristo Range, the Wet Mountains, and the Culebra Range and water from springs and seeps contribute to the entirety of stream flows.

Reservoirs in Huerfano County are relatively small, with no federal water storage projects. The largest reservoir was the Cucharas Reservoir. In March 2013, the owner, Two Rivers Water and Farming Company, removed the storage restriction. The reservoir had been storing water since July

1988, but is presently dry with only water along the Cucharas River. Martin and Horseshoe Lakes supply some municipal and irrigation water and are important for recreation within the Lathrop State Park (Woodka 2015).

In 2016, the waters in the county were deemed impaired for aquatic life due to warm water in the main stem of Huerfano River from Muddy Creek near Gardner to the confluence with the Arkansas River and the Cucharas River, including all tributaries, wetlands, lakes and reservoirs, from the source to the point of diversion for the Walsenburg public water supply (U.S. EPA 2016).

Groundwater

Huerfano County has two types of groundwater aquifers: alluvial and bedrock (Topper et al. 2003). The alluvial aquifers are those in which water occurs in relatively thin surficial deposits in the valleys and beneath pediments (broad, sloping expanse of rock debris). They are recharged principally by the percolation of precipitation downward to the water table and by percolation through the stream beds. Water is discharged from the aquifers mainly through springs and seeps and by evapotranspiration. The bedrock aquifers comprise older consolidated rocks such as sandstone and limestone and are recharged principally both by infiltration of precipitation and the

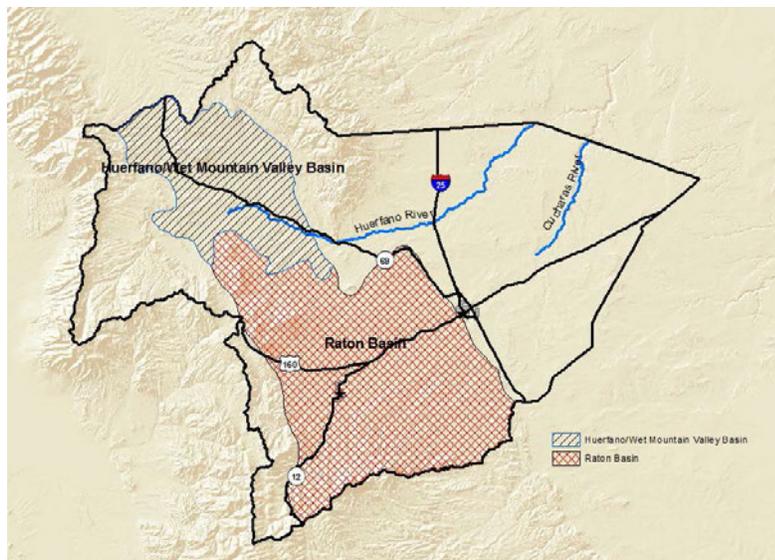


Figure 18. Illustration of aquifers in Huerfano County.

The Huerfano/Wet Mountain Valley Basin comprises about 240 sq. miles in the extreme northern part of the Raton Basin and 50 sq. miles between the eastern slope of the Sangre de Cristo Range and west slope of the Wet Mountains. It contains thick sedimentary rocks (Johnson 1959).

percolation through stream beds on the outcrop areas (Topper et al. 2003). Water is discharged from the bedrock aquifers through springs and seeps in the outcrop area and by movement into other formations (McLaughlin 1966).

The Raton Basin is a structural basin located in Las Animas and Huerfano counties and Colfax County in New Mexico (Figure 18). The basin has been a rich source of bituminous coal and currently of coal-bed methane. Raton Basin is one of the few areas where the Cretaceous-Paleogene (K-Pg [T]) boundary can be seen (Higley et al. 2005). The

Geology

The Sangre de Cristo Range, one of the youngest ranges in Colorado, extends in an unbroken rampart from Salida to Santa Fe, a distance of 235 miles (Chronic and Williams 2002). The western side is sharply faulted and very steep, with a main fault that is much younger and more active than most others in the region. The major peaks in Huerfano County include: Blanca Peak (14,351 ft.), Ellingwood Peak (14,042 ft.), and Little Bear Peak (14,037 ft.). Cretaceous and Tertiary substrates dominate the geology of Huerfano County (Figure 19) (Tweto 1979).

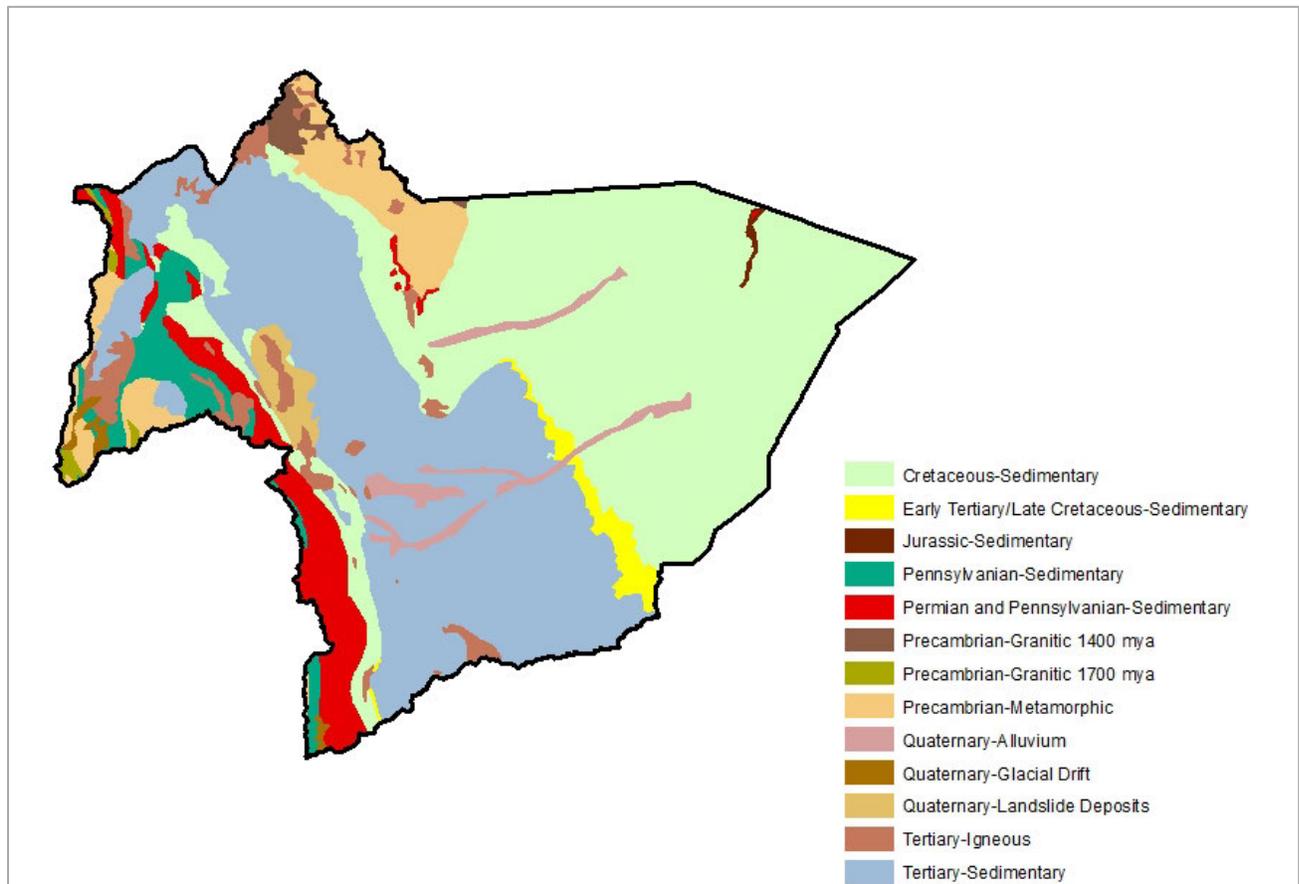


Figure 19. Geology of Huerfano County.

The county is distinctly divided between the sedimentary substrates of the eastern plains and Huerfano Park, underlined by sediments from the Tertiary. Huerfano Park displays both the compressional effects on sedimentary rocks created by intense eastward thrusting in the Sangre de Cristo Range on the west and the vertical uplifting of the Wet Mountains on the east during the Laramide Orogeny. A thick sequence of sedimentary rocks of Paleozoic, Mesozoic, and Cenozoic age is preserved in the area. These strata consist of unnamed marine rocks of Pennsylvanian age; the Sangre de Cristo formation of Pennsylvanian and Permian age; the Entrada sandstone and the Morrison formation of Jurassic age; the Purgatoire formation, the Dakota sandstone, the Graneros shale, the Greenhorn limestone, the Carlile shale, the Niobrara formation, and the Pierre Cuchara and Huerfano formations of Eocene age; the Farista conglomerate of probable Oligocene age; and

the Devils Hole formation of Miocene age (Johnson 1959). The ancestral Rocky Mountains and Wet Mountains were above sea level during a large part of the Paleozoic era and supplied sediments to neighboring basins during Pennsylvanian and Permian time. Jurassic and Cretaceous seas covered the Huerfano Park area several times. Many fossil mammals, including almost perfect skeletons of *Eohippus*, a tiny four-toed ancestor of the horse, have been found here (Chronic and Williams 2002).

Sills, dikes, plugs, and a laccolith (dome-shaped intrusion) were intruded into the sedimentary rocks during at least two periods of intrusive activity in Eocene time. Late tertiary and quaternary volcanic activity took place in the Wet Mountains east and northeast of the Huerfano Park area (Johnson 1959). The Spanish Peaks are geologically distinct from the faulted and uplifted mountains of the Sangre de Cristo range to the west. The Spanish Peaks are huge masses of igneous rock (stocks) whose magma pushed and melted its way upward into sedimentary rock during Tertiary time, possibly never reaching the surface. They are probably much reduced from their former height and are not extinct volcanoes. West Spanish Peak, at 13,623 feet, overtops the East Peak which is 12,708 feet. The Native American tribes held the Spanish Peaks in religious awe. They named the mountains Wahatoya, meaning “Breast of the Earth.”

Molten rock filling fissures and cracks that opened around the rising masses hardened into prominent radiating dikes from 1 to 100 feet wide. More resistant to erosion than surrounding sedimentary rocks, many of the dikes stand as vertical walls (Chronic and Williams 2002). The walls of rock are spectacular in height and length and are one of the most photographed tourist attractions in the area. The great dikes of the Spanish Peaks are unique for Colorado and the West. As the molten magma rose to form the Spanish Peaks, it moved into vertical cracks and joints. As erosion occurred, the dikes have become exposed.



Figure 20. Spanish Peaks.

Climate

Huerfano County has a continental climate characterized by dry air, sunny days, clear nights, variable precipitation, moderate evaporation, and large diurnal temperature changes. Temperature and precipitation patterns in Huerfano County generally follow elevational patterns, with highest precipitation and lowest temperatures occurring at higher elevations in the Sangre de Cristo Range. The average of daily temperatures and precipitation between the years 1981 and 2010 are illustrated in Figure 21. The lowest temperature on record, -36°F, occurred at Walsenburg Power Plant on January 12, 1963. The highest temperature, 100°F, was recorded on June 24, 1956 (WRCC 2015). The majority of precipitation occurs during April, July, and August (Figure 22). Annual average precipitation across the county is illustrated in Figure 23.

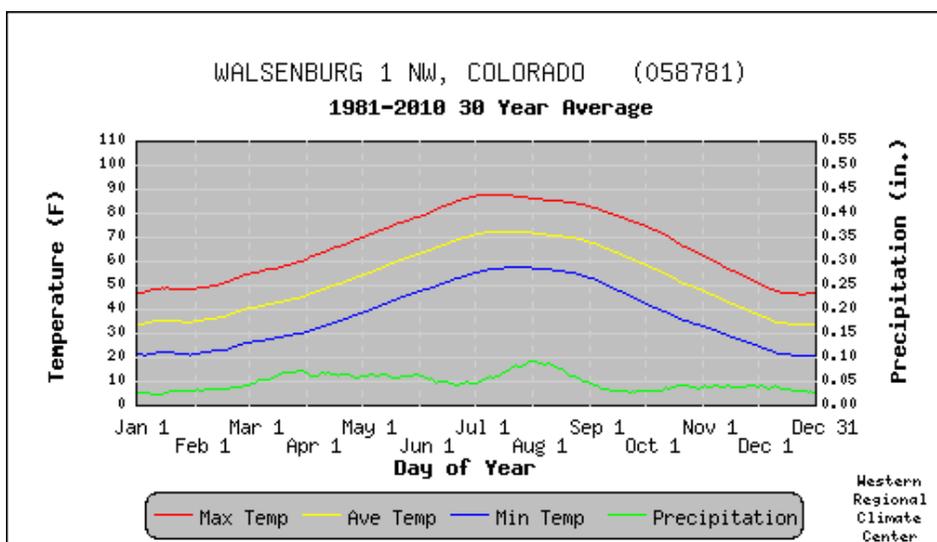


Figure 21. Thirty year average for temperature and precipitation for Walsenburg 1981-2010 (WRCC 2015).

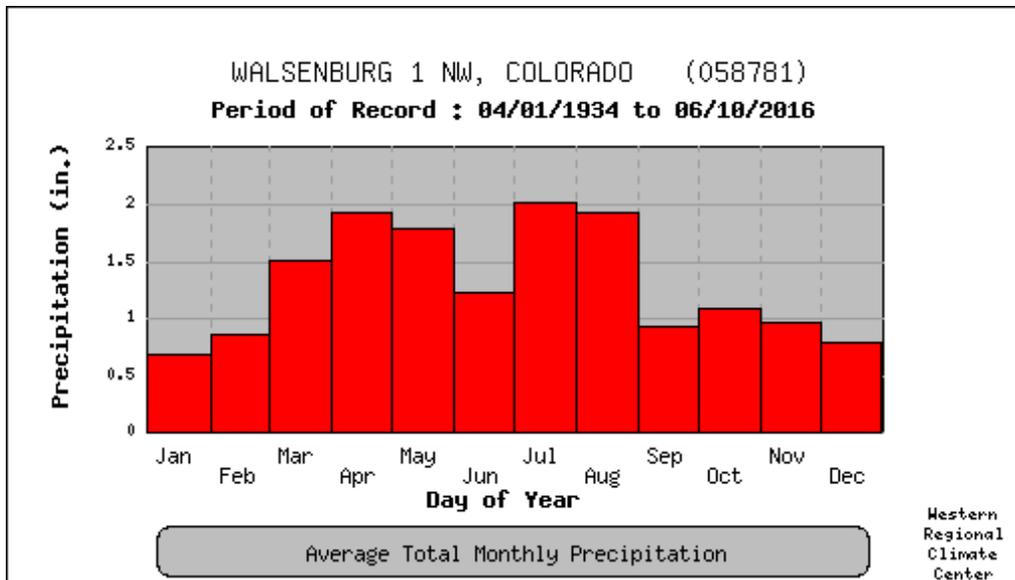


Figure 22. Total average precipitation by month during 1934-2016 (WRCC 2015).

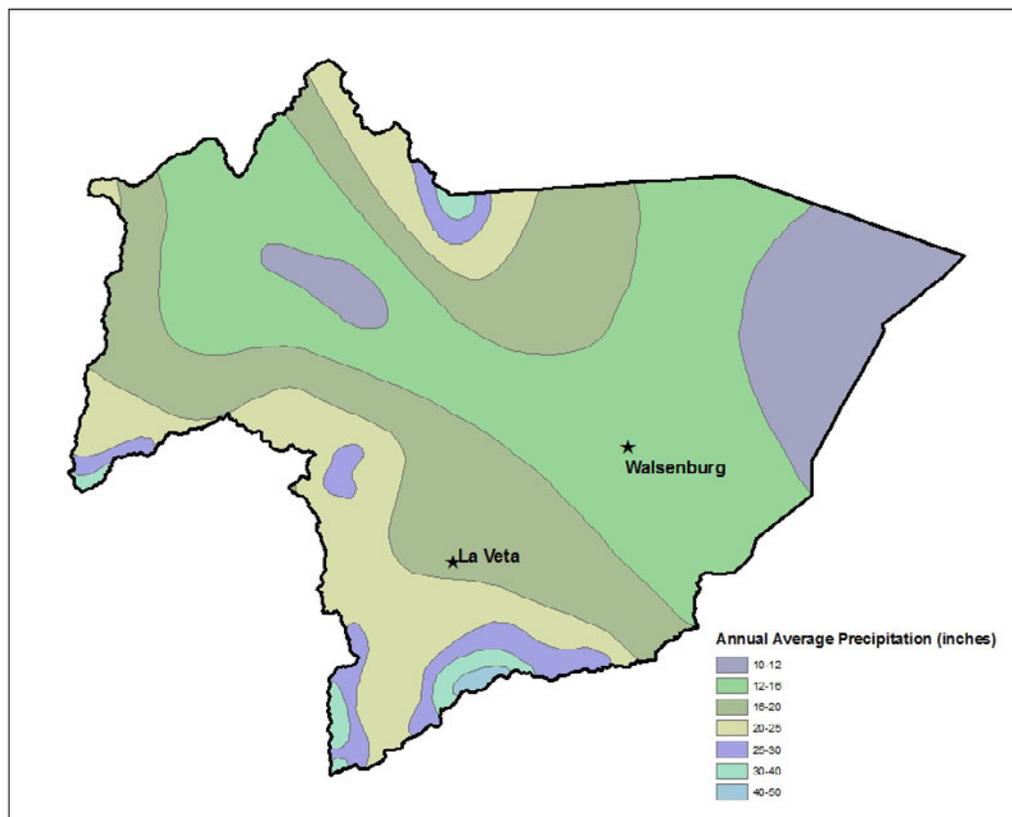


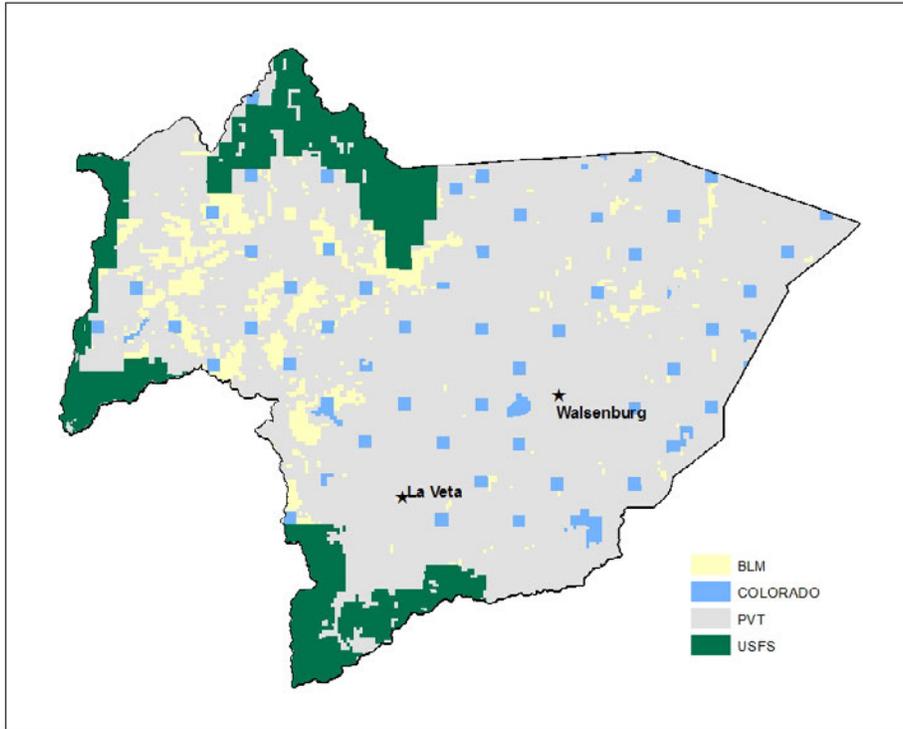
Figure 23. Annual average precipitation across the county.

Population

As of 2010, the population of Huerfano County was 6,711 (US Census 2015). Huerfano County is ranked approximately 45th of 64 counties. The population has been decreasing an average of 3.7% since 2000 (U.S. Census Bureau 2015). The county is significantly rural in character; less than half of the population of the county lives in the two towns of Walsenburg (2,898) and La Veta (759) which is approximately 4.2 persons per square mile. The largest racial/ethnic group is white (82.8%) followed by Hispanic (35.3%). In 2013, the median household income of residents was \$33,298, with 20.6% living in poverty. The median age of residents is 51.8 years old (U.S. Census Bureau 2015).

Land Ownership

Over 75% of Huerfano County is in private ownership (765,732 acres). The USFS Pike and San Isabel National Forest owns 14% (141,499 acres), Bureau of Land Management manages 6% (65,299 acres), 4% (45,852 acres) is owned by the State of Colorado (CPW and State Land Board), and less than 1% is owned by Local Governments and Land Trusts (CoMap 2015) (Figure 23). USFS lands include Greenhorn Mountain, Sangre de Cristo, and Spanish Peaks Wilderness Area. State Wildlife Areas include Apishapa, Huerfano, and Wahatoya. Huerfano County is the home for Colorado's first state park, Lathrop, which is the only state park with a golf course. The BLM Royal Gorge Field Office, manages the Cucharas Canyon Area of Critical Concern (ACEC). Cucharas Canyon was designated in 1966 to reflect the importance of the area to Native Americans, settlers, and ranchers.



Land Ownership in Huerfano County

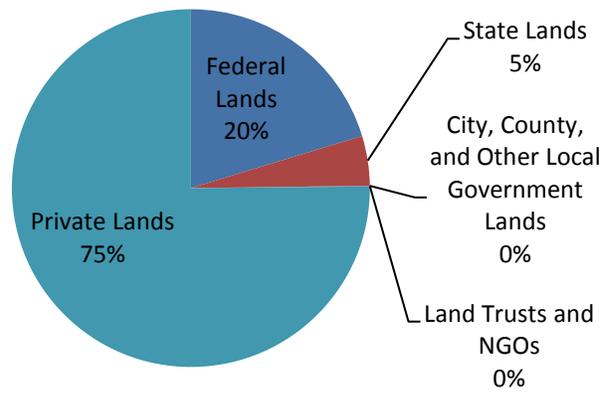


Figure 23. Land ownership in Huerfano County.

Land Use (adapted from Huerfano County Comprehensive Plan 2010)

Huerfano County is primarily a rural county with an average of 5 people per square mile. The economic history of the county is based in agricultural production and mineral extraction. Recently, the county's economy has shifted from agriculture and mining activities towards tourism and recreation. Additionally, the county is becoming very attractive for second home owners and as a weekend get-away for urban dwellers, as well as a popular destination for fishing, boating, hiking, and hunting. It is important to residents that rural land uses be maintained to protect the beauty of the natural environment and preserve the county's western heritage.

Agriculture, primarily beef production, is now the principal industry in the county. In 2010, the county's second biggest employer, the Huerfano County Correctional Center, was closed, laying off 188 employees. Currently, the largest employer is the Colorado State Veterans Home, with the adjacent Spanish Peaks Hospital. It is an 120 bed, long-term care facility for our nation's veterans, spouses, and widows.

Tourism is another major part of Huerfano County's economy. The county has abundant wildlife, outdoor recreational opportunities, and culture. The Huerfano County Trails Master Plan (2011) was developed to serve as a guide for future development and projects to enhance outdoor recreation opportunities.



Figure 24. Beaver pond off of Cucharas River.

Ecoregions

The county falls within two Omernik Level 3 ecoregions: the Southern Rockies and the Southwest Tablelands (Omernik 1987). Level 4 Ecoregions further divide the landscape into finer units based on vegetation, topography, and geology (Figure 25; Table 1).

Table 1. Descriptions of Level 4 Ecoregions within Huerfano County.

NAME	PERCENT IN COUNTY	DESCRIPTION
21a: Alpine Zone	1%	The Alpine Zone occurs on mountain tops above treeline, beginning at about 10,500 to 11,000 feet. It includes alpine meadows as well as steep, exposed rock and glaciated peaks. Annual precipitation ranges from about 35 to greater than 70 inches, falling mostly as snow. Vegetation includes low shrubs, cushion plants, wildflowers, and sedges in wet meadows. The forest-tundra interface is sparsely colonized by stunted, deformed Englemann spruce, subalpine fir, and limber pine (krummholz vegetation). Rocky Mountain bristlecone pines are also found here, some of the oldest recorded trees in North America. Land use, limited by difficult access, is mostly wildlife habitat and recreation. Ecoregion 21a is snow-free only 8 to 10 weeks annually. Snow cover is a major source of water for lower, more arid ecoregions.
21b: Crystalline Subalpine Forests	6%	The Crystalline Subalpine Forests ecoregion occupies a narrow elevational band on the steep, forested slopes of the mountains, becoming more extensive on the north-facing slopes. The elevation range of the region is 8,500 to 12,000 feet, just below the Alpine Zone (21a). The lower elevation limit is higher in the south, starting at 9000 to 9500 feet. The dense forests are dominated by Englemann spruce and subalpine fir; aspen and pockets of lodgepole pine locally dominate some areas. Subalpine meadows also occur. Forest blowdown, insect outbreaks, fire, and avalanches affect the vegetation mosaic. Soils are weathered from a variety of crystalline and metamorphic materials, such as gneiss, schist, and granite, as well as some areas of igneous intrusive rocks. Recreation, logging, mining, and wildlife habitat are the major land uses. Grazing is limited by climatic conditions, lack of forage, and lingering snowpack.
21c: Crystalline Mid-Elevation Forests	3%	The Crystalline Mid-Elevation Forests are found mostly in the 7,000 to 9,000 feet elevation range on crystalline and metamorphic substrates. Most of the region occurs in the eastern half of the Southern Rockies (21). Natural vegetation includes aspen, ponderosa pine, Douglas-fir, and areas of lodgepole pine and limber pine. A diverse understory of shrubs, grasses, and wildflowers occurs. The variety of food sources supports a diversity of bird and mammal species. Forest stands have become denser in many areas due to decades of fire suppression. Land use includes wildlife habitat, livestock grazing, logging, mineral extraction, and recreation, with increasing residential subdivisions.
21d: Foothills Shrublands	29%	The Foothill Shrublands ecoregion is a transition from the higher elevation forests to the drier and lower Great Plains (Ecoregions 25, 26) to the east and to the Colorado Plateaus (20) to the west. This semiarid region has rolling to irregular terrain of hills, ridges, and foot slopes, with elevations generally 6000 to 8500 feet. Sagebrush and mountain mahogany

NAME	PERCENT IN COUNTY	DESCRIPTION
		shrubland, pinyon-juniper woodland, and scattered oak shrublands occur. Other common low shrubs include serviceberry and skunkbush sumac. Interspersed are some grasslands of blue grama, Junegrass, and western wheatgrass. Land use is mainly livestock grazing and some irrigated hayland adjacent to perennial streams.
21e: Sedimentary Subalpine Forests	8%	The Sedimentary Subalpine Forests ecoregion occupies much of the western half of the Southern Rockies, on sandstone, siltstone, shale, and limestone substrates. The elevation limits of this region are similar to the crystalline (21b) and volcanic (21g) subalpine forests. Stream water quality, water availability, and aquatic biota are affected in places by carbonate substrates that are soluble and nutrient rich. Soils are generally finer-textured than those found on crystalline or metamorphic substrates of Ecoregion 21b, and are also more alkaline where derived from carbonate-rich substrates. Subalpine forests dominated by Englemann spruce and subalpine fir are typical, often interspersed with aspen groves or mountain meadows. Some Douglas-fir forests are at lower elevations.
21f: Sedimentary Mid-Elevation Forests	7%	The Sedimentary Mid-Elevation Forests ecoregion occurs in the western and southern portions of the Southern Rockies, at elevations generally below Ecoregion 21e. The elevation limits and vegetation of this region are similar to the crystalline (21c) and volcanic (21h) mid-elevation forests; however, a larger area of Gambel oak woodlands and forest is found in this region. Carbonate substrates in some areas affect water quality, hydrology, and biota. Soils are generally finer-textured than those found on crystalline and metamorphic substrates such as those in Ecoregion 21c.
21j: Grassland Parks	1%	The Grassland Parks ecoregion also consists of high intermontane valleys similar in elevation to the drier Sagebrush Parks (21i); however, water availability is greater in 21j and the region supports grasslands rather than the sagebrush shrubland and steppe found in 21i. Grasslands with bunchgrasses are dominant, and include Arizona fescue, Idaho fescue, mountain muhly, bluebunch wheatgrass, needle-and-thread, Junegrass, and slender wheatgrass. Springs and wetlands may occur. Some subalpine/montane fens are found where groundwater seepage has persistently reached the surface and supported peatland development. There are only a few trees or shrubs, and if present, they are widely scattered and mature.
26e: Piedmont Plains and Tablelands	31%	The Piedmont Plains and Tablelands ecoregion is a vast area of irregular and dissected plains underlain by shale and sandstone. Precipitation varies from 10 to 16 inches, with the lowest amounts found along the Arkansas River between Pueblo and Las Animas. The shortgrass prairie contains buffalograss, blue grama, western wheatgrass, galleta, alkali sacaton, sand dropseed, sideoats grama, and yucca. Land use is mostly rangeland. Irrigated agriculture occurs along the Arkansas River, and dryland farming is found primarily in the north half of the region.

NAME	PERCENT IN COUNTY	DESCRIPTION
26h: Pinyon-Juniper Woodlands and Savannas	14%	The Pinyon-Juniper Woodlands and Savannas ecoregion is characterized by scattered, dissected areas with pinyon and juniper on the uplands characterize. The region is a continuation or an outlier of the pinyon-juniper woodlands found in the Southern Rocky Mountains to the west. Soils tend to be thin and are formed in materials weathered from limestone, sandstone, and shale. Rock outcrops are common. Annual precipitation varies from 12 to 20 inches, with the highest amounts found in areas closest to the mountains. Land use is mainly wildlife habitat and rangeland.

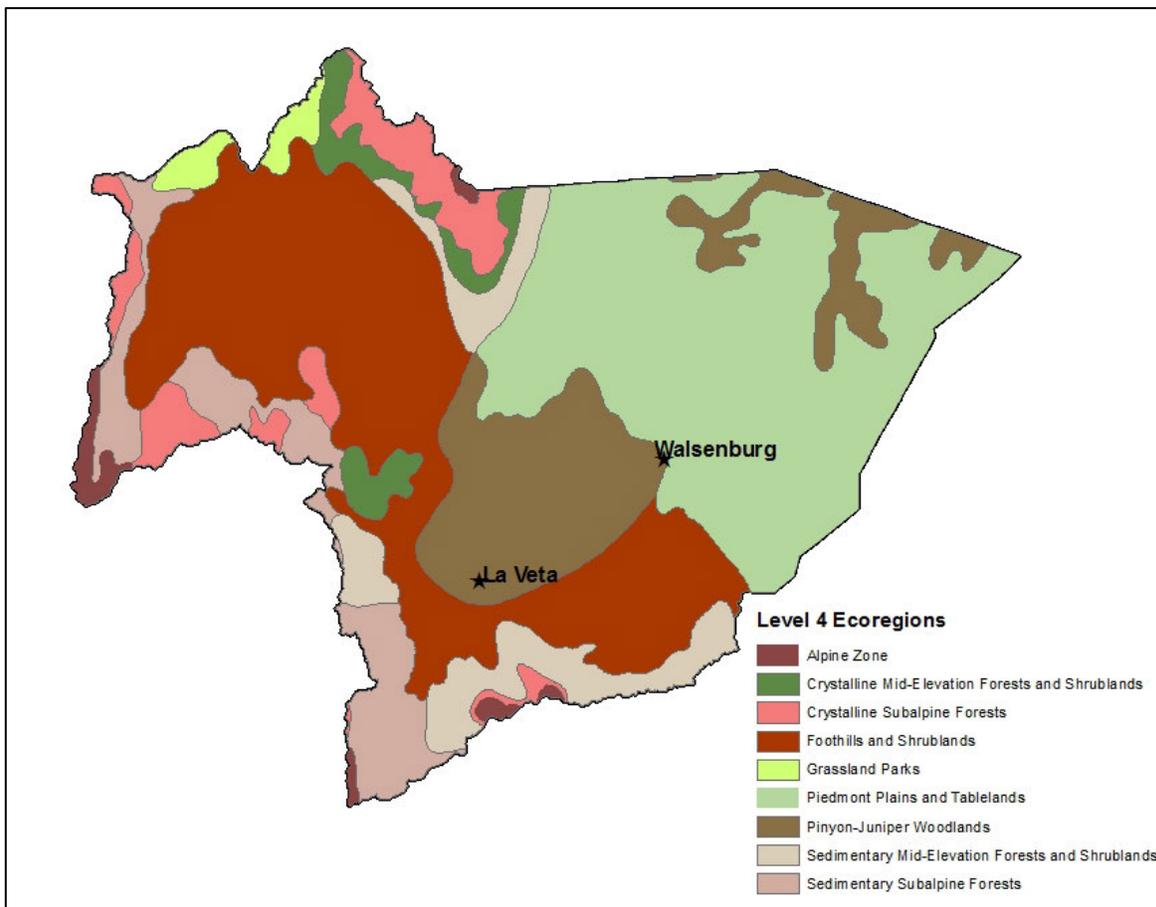


Figure 25. Omernik Ecoregions of Huerfano County.

Ecological Systems

Huerfano County is dominated by montane forests, shortgrass prairie, and pinon juniper shrublands—these ecological systems are characteristic of southern Colorado (Table 2) (Figure 26). Wetland and riparian systems consist of approximately 3.71% of total acreage in the state (Comer et al. 2003). This total percentage is 0.9% higher than the National Wetland Inventory maps indicate. This small difference is likely due to mapping or scale issues.

Table 2. Ecological Systems of Huerfano County (Wetland/Riparian Systems in Bold) (Comer et al. 2003).

Ecological Systems	Acre	Percent of County
Western Great Plains Shortgrass Prairie	260,763	25.60
Southern Rocky Mountain Pinon-Juniper Woodland	200,896	19.72
Rocky Mountain Foothill Grassland	116,595	11.44
Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland	100,259	9.83
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	70,287	6.90
Southern Rocky Mountain Montane Grassland	64,811	6.36
Rocky Mountain Ponderosa Pine Savanna and Woodland	48,755	4.79
Herbaceous Planted/Cultivated	43,465	4.27
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	32,230	3.16
Rocky Mountain Aspen Forest and Woodland	28,824	2.82
Rocky Mountain Subalpine Mesic-Spruce-Fir Forest and Woodland	20,434	2.01
Rocky Mountain Subalpine-Montane Riparian Woodland and Shrubland	14,573	1.43
Rocky Mountain Dry Tundra	8,709	0.86
Rocky Mountain Cliff and Canyon	2,283	0.22
Open Water	1,989	0.20
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	1,736	0.17
High Intensity Residential	1,041	0.10
Rocky Mountain Subalpine Mesic Meadow	650	0.06
Western Great Plains Riparian/Western Great Plains Floodplain	440	0.04
Rocky Mountain Alpine Bedrock and Scree	250	0.02
Totals	1,018,990	100.00

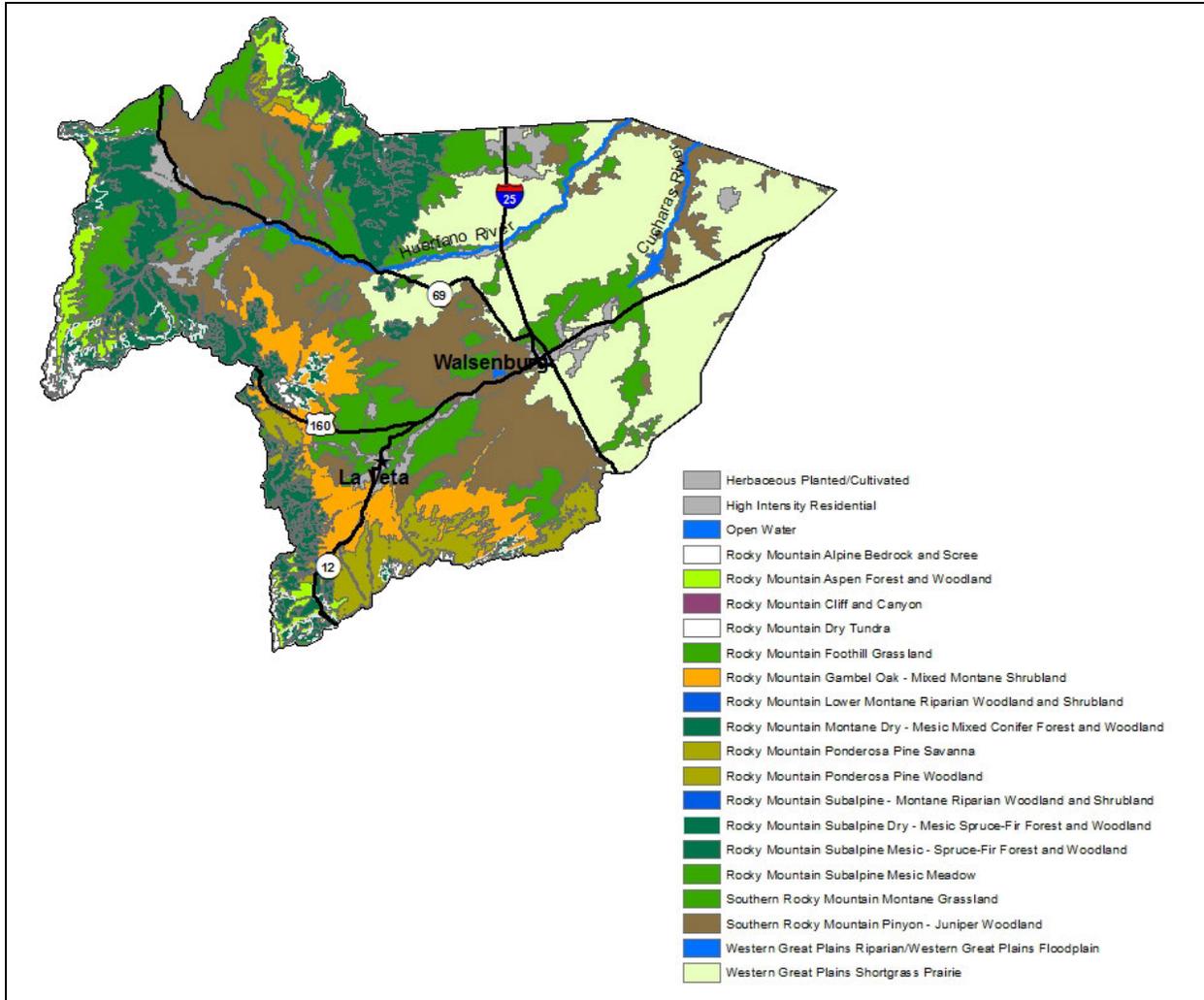


Figure 26. Major Ecological Systems in Huerfano County.

The following are brief descriptions of the major wetland/riparian ecological systems found in Huerfano County as described from the NatureServe Explorer (2015).

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

This ecological system constitutes approximately 2% of the total land cover in Huerfano County. It is a high-elevation system of the Rocky Mountains, dry eastern Cascades, and eastern Olympic Mountains dominated by Engelmann spruce (*Picea engelmannii*) and white fir (*Abies concolor*). It extends westward into the northeastern Olympic Mountains and the northeastern side of Mount Rainier in Washington, and as far east as mountain "islands" of north-central Montana. Occurrences

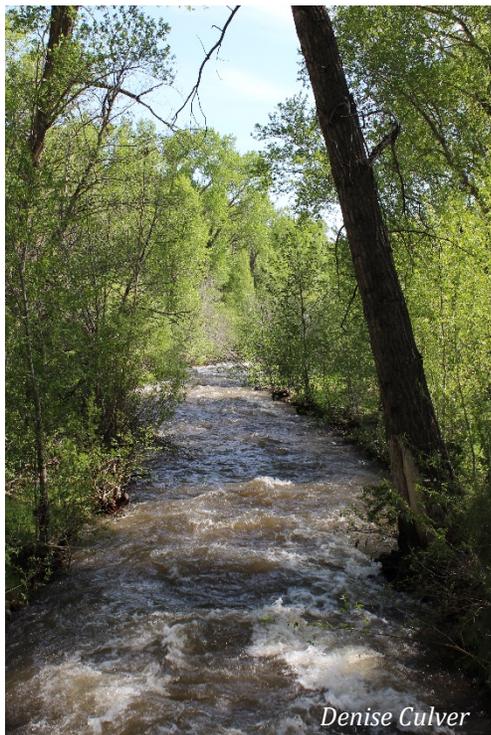


Figure 27. Wolf Lake.

are typically found in locations with cold-air drainage or ponding, or where snowpack lingers late into the summer, such as north-facing slopes and high-elevation ravines. These forests are found on gentle to very steep mountain slopes, high-elevation ridgetops and upper slopes, plateau-like surfaces, basins, alluvial terraces, well-drained benches, and inactive stream terraces.

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 West region and the Colorado Plateau. In Huerfano County it makes up only 1.43% of total land cover. This system contains the conifer and



aspen woodlands that line montane streams. These are communities tolerant of periodic flooding and high water tables. Snowmelt moisture in this system may create shallow water tables or seeps for a portion of the growing season. This ecosystem is confined to specific riparian environments occurring on floodplains or terraces of rivers and streams, in V-shaped, narrow valleys, and canyons (where there is cold-air drainage). Less frequently, occurrences are found in moderate-wide valley bottoms on large floodplains along broad, meandering rivers, and on pond or lake margins. Dominant tree species vary across the latitudinal range, although it usually includes Engelmann spruce (*Picea engelmannii*), Douglas fir (*Pseudotsuga menziesii*), blue spruce (*Picea pungens*), quaking aspen (*Populus tremuloides*), and Rocky Mountain juniper (*Juniperus scopulorum*). Other trees possibly present but not usually dominant include thin-leaf alder (*Alnus incana*), white fir (*Abies concolor*), lodgepole pine (*Pinus contorta*), and narrowleaf cottonwood (*Populus angustifolia*).

Figure 28. Upper Huerfano River.

The shrubland component includes montane to subalpine riparian areas occurring as narrow bands of shrubs lining streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains with sinuous stream channels. Occurrences can also be found around seeps, fens, and isolated springs on hillslopes away from valley bottoms. Many of the plant associations found within this system are associated with beaver activity. This system often occurs as a mosaic of multiple communities that are shrub- and herb-dominated and includes above-treeline, willow-dominated, snowmelt-fed basins that feed into streams. The dominant shrubs reflect the large elevational gradient and include thin-leaf alder (*Alnus incana*), river birch (*Betula occidentalis*), Drummond's willow (*Salix drummondiana*), strap-leaf willow (*Salix ligulifolia*), Geyer willow (*Salix geyeriana*), and Rocky Mountain willow (*Salix monticola*).

Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland

This ecological system makes up 0.17% of the land cover in Huerfano County. It is found throughout the Rocky Mountain and Colorado Plateau regions within a broad elevational range from approximately 3,000 ft. to 9,000 ft. This system often occurs as a mosaic of multiple communities that are tree-dominated with a diverse shrub component. It is dependent on a natural hydrologic regime that includes annual to episodic flooding. Occurrences are found within the flood zone of rivers, on islands, sand or cobble bars, and immediate streambanks. It can form large, wide occurrences on mid-channel islands in larger rivers or narrow bands on small, rocky canyon tributaries and well-drained benches. It is also typically found in backwater channels and other perennially wet but less scoured sites, such as floodplains swales and irrigation ditches. In some locations, occurrences extend into moderately high intermountain basins where the adjacent vegetation is sage steppe. Dominant trees include box elder (*Acer negundo*), narrowleaf cottonwood (*Populus angustifolia*), plains cottonwood (*Populus deltoides* ssp. *monilifera*), blue spruce (*Picea pungens*), peachleaf willow (*Salix amygdaloides*) and in Huerfano County white fir (*Abies concolor*) and New Mexico locust (*Robinia neomexicana*). Dominant shrubs include Rocky Mountain maple (*Acer glabrum*), thin-leaf alder (*Alnus incana*), river birch (*Betula occidentalis*), chokecherry (*Prunus virginiana*), Rocky Mountain willow (*Salix monticola*), strap-leaf willow (*S. ligulifolia*), Drummond's willow (*S. drummondiana*), sandbar willow (*S. exigua*), or snowberry (*Symphoricarpos* spp.). Exotic trees which can be dominant in areas include: Russian olive (*Elaeagnus angustifolia*), crack willow (*Salix fragilis*), and tamarisk (*Tamarix* spp.).



Figure 29. Cucharas River.

Rocky Mountain Subalpine Mesic Meadow



Figure 30. Mountain meadow.

This system is very widespread in the Rocky Mountain cordillera from New Mexico north into Canada. In Huerfano County, it constitutes only 0.06% of total vegetation. This Rocky Mountain ecological system is restricted to sites from lower montane to subalpine where finely textured soils, snow deposition, or windswept dry conditions limit tree establishment. Many occurrences are small patch in spatial character, and are often found in mosaics with woodlands, more dense shrublands, or just below alpine communities. These mesic meadow communities occur on gentle to moderate-gradient slopes and relatively moist habitats.

The soils are typically seasonally moist to saturate in the spring, but may dry out later in the growing season. Vegetation is typically forb-rich, with forbs often contributing more to overall herbaceous cover than graminoids.

Western Great Plains Riparian Woodland

This ecological system is found in the riparian areas of medium and large rivers throughout the western Great Plains. In Huerfano County it is found along the lower reaches of the Huerfano and Cucharas rivers, making up 0.04% of total land cover. It is most common in the shortgrass prairie and extends west as far as the Rio Grande in New Mexico, north into the Wyoming Basins and east into southwestern Nebraska, western Kansas. It includes primarily small, often narrow feeder streams that originate on the plains and reaches of major rivers, such as the Arkansas River. This



Figure 31. Lower Cucharas River.

system is found on alluvial soils in highly variable landscape settings, from deep cut ravines to wide, braided streambeds. The smaller streams hydrologically tend to be flashy and may dry down completely for some portion of the year. Main stem larger rivers have a less well-developed floodplain than their downstream counterparts (e.g., the Platte and Arkansas rivers), that are classified as floodplain systems. Water sources for this riparian system include snowmelt runoff, springs, and summer rains. Dominant vegetation shares much

with generally drier portions of larger floodplain systems downstream, but overall abundance of vegetation is generally lower. Communities within this system range from riparian forests and shrublands to herbaceous vegetation and gravel/sand bars. These areas are often subjected to heavy grazing and/or agriculture and can be heavily degraded. Tamarisk (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*), and less desirable grasses and forbs can invade degraded examples in central Colorado. Groundwater depletion and reduction in overbank flooding has changed the vegetation composition and structure to less desirable species.

Flora

There are 3,322 plant taxa known from Colorado, of which 84% are native (Ackerfield 2015). Of these, 627 have been documented in Huerfano County. Huerfano County has been over-looked and under collected by botanists, and many common species have not been collected. With the help of Peter and Elaine O'Brien, CNHP collected 14 species that had not previously been documented in the county.

Colorado endemics are those taxa known to occur only within the confines of the State. In Huerfano County there is one known Colorado endemic, the rock-loving aletes (*Aletes lithophilus*) (G3S3)

(Spackman et al. 1997). The rock-loving aletes is not a wetland dependent plant, it grows on volcanic substrates, such as the dikes radiating from Silver Mountain. Other notable wetland dependent species include:

- Strap-style gayfeather (*Liatrix ligulistylis*) state imperiled (G5?S2) located along the Huerfano River floodplain. Strap-style gayfeather is uncommon in Colorado. This occurrence was a county record for Huerfano County.
- Prairie violet (*Viola pedatifida*) state imperiled (G5 S2) located along the Wahatoya Creek floodplain.
- Lavender hyssop (*Agastache foeniculum*) state rare (G4G5S1) a globally secure plant that is at its most southern range extent.



Figure 32. Prairie violet.



Figure 34. Great blue lobelia.



Figure 33. Strap-style gayfeather.

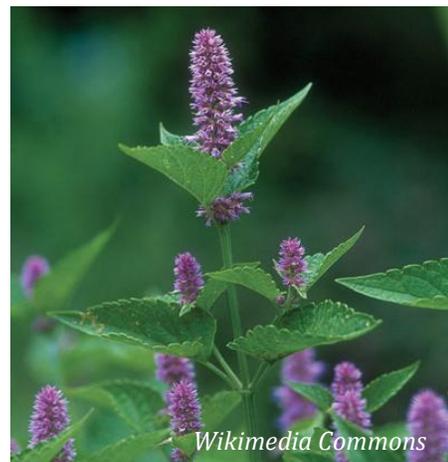


Figure 35. Lavender hyssop.

Non-native Plant Species

In Colorado there are 527 (16% of total flora) invasive plant species (Ackerfield 2015). The Colorado Department of Agriculture Noxious Weed Program lists species according to their degree of invasiveness (Table 3). List A species are designated by the State Commissioner for eradication. No List A species were documented during the project. List B weed species are species for which the State develops and implements state noxious weed management plans designed to stop the continued spread of these species. List C weed species are species for which the Commissioner will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands.

Table 3. List B and C noxious weeds documented in Huerfano County.

List B species	List C species :
Bull thistle (<i>Cirsium vulgare</i>)	Common burdock (<i>Arctium minus</i>)
Butter and eggs (<i>Linaria vulgaris</i>)	Cheatgrass (<i>Anisantha tectorum</i>)
Canada thistle (<i>Cirsium arvense</i>)	Common mullein (<i>Verbascum thaspus</i>)
Dalmatian toadflax (<i>Linaria dalmatica</i>)	Downy brome (<i>Bromus tectorum</i>)
Houndstongue (<i>Cynoglossum officinale</i>)	Field bindweed (<i>Convolvulus arvensis</i>)
Leafy spurge (<i>Euphorbia esula</i>)	Perennial sowthistle (<i>Sonchus arvensis</i>)
Musk Thistle (<i>Carduus nutans</i>)	Poison hemlock (<i>Conium maculatum</i>)
Ox-eye daisy (<i>Chrysanthemum leucanthemum</i>)	Puncturevine (<i>Tribulus terrestris</i>)
Salt cedar (<i>Tamarix ramosissima</i>)	Quackgrass (<i>Elytrigia repens</i>)
Scotch thistle (<i>Onopordum acanthium</i>)	Redstem filaree (<i>Erodium cicutarium</i>)
White top or hoary cress (<i>Cardaria draba</i>)	



Figure 36. Leafy spurge.



Figure 37. Scotch thistle.

Fauna

Wetland and riparian habitat are the life blood for many animals. Many mammals utilize wetlands for forage, resting, or breeding, and some species are wetland or riparian obligates. Elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*) are common animals that utilize wetlands. Numerous bat species, especially the little brown bat (*Myotis lucifugus*), use open water from lakes, rivers, and beaver ponds to forage for insects. Water shrews (*Sorex palustris*) have fringed hind feet that are ideal for swimming and foraging underwater. Other shrews known to occur in Huerfano County's wetlands include masked shrew (*S. cinereus*) and montane shrew (*S. monticolus*) (Fitzgerald et al. 1994). Other small mammals that can be found in riparian and wetlands include: long-tailed vole (*Microtus longicaudus*), meadow vole (*M. pennsylvanicus*), southern red-backed vole (*Clethrionomys gapperi*), and western jumping mouse (*Zapus princeps princeps*) (Fitzgerald et al. 1994).

One of the most important mammals and a keystone to the viability of riparian systems is the American beaver (*Castor canadensis*). Beavers were historically abundant throughout the west prior to 1870, but by the early 1900s were extirpated from much of their historic habitat due to unregulated trapping (Cary 1911). Removal of the beaver changed the character of riparian areas all across Colorado (Neff 1957, Naiman et al. 1988, McKinsty et al. 2001). Beaver and western riparian ecosystems have evolved together and are essential to each other's sustainability. Beavers have adapted to their watery niche with webbed hind feet, a waterproof coat, a paddle-like tail, nostril and ear valves that close when diving, and small eyes that are able to see underwater. Beavers build dams that create ponds, alter watersheds and enhance important ecosystem functions. These functions include slowing spring runoff, raising water tables, promoting water storage, and trapping sediments. Beavers cache willow branches that eventually root and grow into dense willow shrublands, which provide forage for ungulates and nesting habitat for birds.



Figure 38. Beavers.

The muskrat (*Ondatra zibethicus*) is often seen in beaver-created ponds. Muskrats are easily identified by their slender and hairless tail, small ears and partially webbed feet. They build small, dome-shaped lodges or burrows into streambanks and are an important indicator of a healthy wetland. Muskrats are perhaps North America's most valuable semi-aquatic furbearer (Huggins 2008). The mink (*Mustela vison*) is an uncommon occupant of the county's beaver ponds and slow-moving streams. It has a weasel-like appearance with a fully furred tail.

Bird species that occur in Huerfano County and that rely on riparian and wetland habitats include Osprey (*Pandion haliaetus*), Great Blue Heron (*Ardea herodias*), Common Snipe (*Gallinago gallinago*), Belted Kingfisher (*Ceryle alcyon*), Red-naped Sapsucker (*Sphyrapicus nuchalis*), American Dipper (*Cinclus mexicanus*), Veery (*Catharus fuscescens*), MacGillivray's Warbler

(*Oporonis tolmiei*), Lincoln's Sparrow (*Melospiza lincolni*), and Fox Sparrow (*Passerella iliaca*). Amphibians and reptiles affiliated with a variety of wetland habitats include western chorus frog (*Pseudacris triseriata*), plains spadefoot (*Spea bombifrons*), New Mexico spadefoot (*Spea multiplicata*), Red-spotted toad (*Anaxyrus punctatus*), Woodhouse's toad (*Anaxyrus woodhousii*), plains leopard frog (*Lithobates blairi*), and tiger salamander (*Ambystoma tigrinum*).



Figure 39. Plains Leopard Frog.



Figure 40. New Mexico spadefoot.



Figure 41. Chorus frog.



Figure 42. Woodhouse toad-(a very large one!).

LANDSCAPE CONSERVATION ASSESSMENT

Potential Impacts to Biological Diversity in Huerfano County

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

Climate Change

Data from the Intergovernmental Panel on Climate Change (IPCC) (Ray et al. 2008) and the Climate Change Vulnerability Assessment for Colorado (CNHP 2015) 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. The ephemeral wetlands, playas, are especially vulnerable to climate change due to the variable hydroperiods that will be exaggerated with global shifts in rainfall and temperature patterns (Dalu et al. 2016).

Recreation

Recreation, once very local and perhaps even unnoticeable, is increasing and becoming a threat to natural ecosystems in Huerfano County and throughout Colorado. 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 introduction of non-native plant species and a cause of soil erosion that smothers vegetation and results in excessive sedimentation in streams.

Non-motorized recreation, mainly hiking but also some horseback riding, mountain biking and rock climbing, presents a different set of issues (Knight and Cole 1991; Miller et al. 1998). Wildlife behavior can be significantly altered by repeat visits of hikers, horseback riders, or bicyclists. Trail placement should consider the range of potential impacts on the ecosystem. Considerations include

minimizing fragmentation by leaving large undisturbed areas of wildlife habitat where possible. Miller et al. (1998) found lower nest survival for ground-nesting birds adjacent to trails; they also found that ground-nesting birds were more likely to nest away from trails with a zone of influence approximating 250 feet (75 meters). Alpine areas, mountain lakes, and riparian zones are routes and destinations for many established trails. Thus, impacts to native vegetation (mainly trampling) in these areas can be high.

Livestock Grazing

Domestic livestock grazing has been a traditional livelihood in Huerfano County and a majority of the west 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 Huerfano County are included in rangeland and grazing allotments. Especially at lower elevations in the county, livestock tend to congregate near wetland and riparian areas for shade, lush browse, and access to water. Long-term, incompatible livestock use of wetland and riparian areas can potentially erode stream banks, cause streams to downcut or spread out of an established channel causing additional erosion, lower the water table, alter channel morphology, impair plant regeneration, establish non-native species, shift community structure and composition, degrade water quality, and diminish general riparian and wetland functions (Windell et al. 1986). Depending on grazing practices and local environmental conditions, impacts can be minimal and largely reversible (slight shifts in species composition) to severe and essentially irreversible (extensive gullying and introduction of non-native species).

Fragmentation and Edge Effects

Edges are simply the outer boundary of an ecosystem that abruptly grades into another type of habitat, such as the edge of a Gambel oak shrubland adjacent to grassland. Edges are often created by naturally occurring processes such as floods, fires, and wind. Edges can also be created by human activities such as roads, trails, timber harvesting, agricultural practices, and rangeland management. Human induced edges are often dominated by plant and animal species that are adapted to disturbance. As the landscape is increasingly fragmented by large-scale, rapid anthropogenic conversion, these edges become increasingly abundant in areas that may have had few "natural" edges. The overall reduction of large landscapes jeopardizes the existence of specialist species, may increase non-native species, and may limit the mobility of species that require large landscapes or a diversity of landscapes for their survival (e.g., large mammals or migratory waterbirds).

Non-native Species

Non-native species often move into areas that are disturbed by both natural and anthropogenic causes. Non-native plants or animals can have wide-ranging impacts. Non-native plants can increase dramatically under the right conditions and can dominate areas that used to be natural. This can generate secondary effects on animals that depend on native plant species for forage, host plants, cover, or propagation. For example, effects of non-native fishes include competition that can

lead to local extinctions of native fishes and hybridization that corrupts the genetic stock of the native fishes (James 1993; D’Antonio and Vitousek 1992).

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



Figure 43. Blanca Peak from Deer Creek with bristlecone pine in foreground.

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 Wetland Resources in Huerfano County* was conducted in several steps summarized below. Additionally, input from Huerfano County and its stakeholders was sought at all stages.

Survey Methods

Collect Available Information

CNHP databases were updated with information regarding the known locations of species and significant plant associations within Huerfano County. A variety of information sources were searched for this information including the Colorado State University, University of Colorado, Rocky Mountain Herbarium, and Colorado College museums and herbaria. 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 Huerfano County

The information collected in the previous step was used to refine a list of potential species and natural plant communities and to focus our search areas. Species and plant communities that have been recorded from Huerfano County or from adjacent counties are included in this list. Over 30 rare species and significant plant communities were targeted in this survey. A specific subset of species and communities were prioritized for our inventory efforts. Elements considered as priority included those with NatureServe global rankings of critically imperiled to vulnerable (G1—G3) and/or because they are known to occur in areas that are subject to various development pressures such as hydrological alterations and residential development.

Identify Targeted Inventory Areas

Survey sites were chosen based on their likelihood of harboring rare or imperiled species or significant plant communities (see Figure 16, page 52). Previously documented locations of species of concern were targeted, and additional potential areas were chosen using available information sources. Areas with potentially high natural values were selected using soil surveys, geology maps, vegetation surveys, aerial photos (color-infrared and natural color), personal recommendations from knowledgeable local residents, and numerous roadside surveys by our field scientists. Using

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

The above information was used to delineate Targeted Inventory Areas (TIAs) that were believed to have relatively high probability of harboring significant natural resources. Additional TIAs were identified by Huerfano County and its stakeholders.

Roadside surveys were useful in further resolving the natural condition of these areas. The condition of shrublands is especially difficult to discern from aerial photographs, and a quick survey from the road can reveal such aspects as weed cover or vegetation composition. Because there were limited resources to address an overwhelming number of potential sites, surveys for all elements were prioritized by the degree of imperilment. For example, the species with Natural Heritage Program ranks of G1-G3 were the primary target of our inventory efforts. Although species with lower Natural Heritage Program ranks were not the main focus of inventory efforts, many of these species occupy similar habitats as the targeted species, and were searched for and documented if encountered.

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 Huerfano County assessor's office or stakeholders. Landowners were then either contacted by phone or in person. If landowners could not be contacted, or if permission to access the property was denied, this was recorded and the site was not visited. **Under no circumstances were private properties surveyed without landowner permission.**

Conduct Field Site Surveys and Gather Data

Survey sites where access could be obtained were visited at the appropriate time as dictated by the seasonal occurrence (or phenology) of the individual elements. It was essential that surveys took place during a time when the targeted elements were detectable. For instance, plants are often not identifiable without flowers or fruit that are only present during certain times of the year or breeding birds cannot be surveyed outside of the breeding season because they are most visible in breeding plumage and are easier to spot when singing to attract mates. Amphibians are best surveyed in spring when adults are calling and mating, in mid-summer when tadpoles are out and adults are still active and in late summer when metamorphs are present. The methods used in the surveys vary according to the elements that were being targeted. In most cases, the appropriate habitats were visually searched in a systematic fashion that would attempt to cover the area as thoroughly as possible in the given time. Where necessary and permitted, voucher specimens were collected and deposited in 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. Animal surveys data collection

Surveys varied according to the animal that was being targeted. In most cases, the appropriate habitats were visually searched in a systematic fashion, attempting to cover the area as thoroughly as possible in the given time. Some types of organisms require special techniques to document their presence. These are summarized below followed by specific reference sources:

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

2. Plant and plant community data collection

- Lists of all plant associations in the survey area, including the percent cover by that community. In almost all cases, plant associations were immediately placed within both the International National Vegetation Classification (Anderson et al. 1998; Comer et al. 2003) and the Comprehensive Statewide Wetlands Classification (Carsey et al. 2003). Plant synonyms followed Kartesz (1999).
- Vegetation data using Ackerfield (2015) and Weber and Wittman (2001) for each major plant association in the wetland were collected using visual ocular estimates of species cover in a representative portion of the plant association.
- Soil description.
- Water chemistry.
- UTM coordinates and elevation from Garmin GPSmap 76CSx.
- Current and historic land use (e.g., grazing, logging, recreational use) when apparent.
- Notes on geology and geomorphology.
- Reference photos of the site.
- Notes on indicators of disturbance such as logging, grazing, flooding, etc.



Natural Heritage Methodology

To determine the status of species within Colorado, CNHP gathers information on plants, animals and plant communities. Each of these elements of natural diversity is assigned a rank that indicates its relative degree of imperilment on a five-point scale (for example, 1 = extremely rare/imperiled, 5 = abundant/secure). The primary criterion for ranking elements is the number of occurrences (in

other words, the number of known distinct localities or populations). This factor is weighted more heavily than other factors because an element found in one place is more imperiled than something found in twenty-one places. Also of importance are the size of the geographic range, the number of individuals, the trends in both population and distribution, identifiable threats, and the number of protected occurrences.

Element imperilment ranks are assigned both in terms of the element's degree of imperilment within Colorado (its State-rank or S-rank) and the element's imperilment over its entire range (its Global-rank or G-rank). Taken together, these two ranks indicate the degree of imperilment of an element. CNHP actively collects maps and electronically processes specific occurrence information for animal and plant species considered extremely imperiled to vulnerable in the state (S1 - S3). Several factors, such as rarity, evolutionary distinctiveness, and endemism (specificity of habitat requirements), contribute to the conservation priority of each species. Certain species are "watchlisted," meaning that specific occurrence data are collected and periodically analyzed to determine whether more active tracking is warranted. A complete description of each of the Natural Heritage ranks is provided in Table 4.

This single rank system works readily for all species except those that are migratory. 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 3, 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 4. Definition of Natural Heritage Imperilment Ranks.

G/S1	Critically imperiled -at very high risk of extinction due to extreme rarity (often 5 or fewer occurrences) in the world/statewide, very steep declines, or other factors.
G/S2	Imperiled - at high risk of extinction or elimination globally/statewide because of rarity (6 to 20 occurrences, or 1,000 to 3,000 individuals) due to very restricted range, very few populations, steep declines, or other factors.
G/S3	Vulnerable -at moderate risk of extinction or elimination 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/statewide, 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	Secure -common; widespread and abundant globally/statewide, though it may be quite rare in parts of its range, especially at the periphery.
G/SX	Presumed extinct (species)/ Eliminated (ecological communities) 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	Possibly Extinct (species)/ Eliminated (ecological communities) known from only historically occurrences but still hope of rediscovery.

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 5 defines the special status assigned by these agencies and provides a key to abbreviations used by CNHP.

Table 5. Federal and State Agency Special Designations for Rare Species.

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

Element Occurrences and their Ranking

Actual locations of elements, whether they are single organisms, populations, or plant communities, are referred to as element occurrences. The element occurrence is considered the most fundamental unit of conservation interest and is at the heart of the Natural Heritage Methodology.

To prioritize element occurrences for a given species, an element occurrence rank (EO-Rank) is assigned according to the ecological quality of the occurrences whenever sufficient information is available. This ranking system is designed to indicate which occurrences are the healthiest and the most viable ecologically, 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 factors such as a species having access to habitats and resources needed for life cycle completion, fragmentation of ecological communities and systems and the ability of the species to respond to environmental change through dispersal, migration, or re-colonization.

Each of these factors is rated on a scale of A through D, with A representing an excellent rank and D representing a poor rank. These ranks 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 6.

Table 6. 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). PCAs focus on capturing the ecological processes that are necessary to support the continued existence of a particular element occurrence. 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 CNHP's 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 7 for a summary of these B-ranks.

Table 7. Natural Heritage Program Biological Diversity Ranks and their Definitions.

B1	<p>Outstanding Significance (indispensable):</p> <ul style="list-style-type: none"> • only known occurrence of an element • A-ranked occurrence of a G1 element (or at least C-ranked if best available occurrence) • concentration of A- or B-ranked occurrences of G1 or G2 elements (four or more)
B2	<p>Very High Significance:</p> <ul style="list-style-type: none"> • B- or C-ranked occurrence of a G1 element • or B-ranked occurrence of a G2 element • One of the most outstanding (for example, among the five best) occurrences range wide (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	<p>High Significance:</p> <ul style="list-style-type: none"> • C-ranked occurrence of a G2 element • 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	<p>Moderate Significance:</p> <ul style="list-style-type: none"> • Other A- or B-ranked occurrences of a G4 or G5 community • C-ranked occurrence of a G3 element • 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
B5	<p>General or State-wide Biological Diversity Significance: good or marginal occurrence of common community types and globally secure S1 or S2 species.</p>

Protection Urgency Ranks

Protection urgency ranks (P-ranks) refer to the timeframe in which it is recommended that conservation protection occur. In most cases, this rank refers to the need for a major change of protective status (for example agency special area designations or ownership). The urgency for protection rating reflects the need to take legal, political, or other administrative measures to protect the area. Table 8 summarizes the P-ranks and their definitions.

Table 8. 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 PCA. Table 9 summarizes M-ranks and their definitions.

Table 9. Natural Heritage Program Management Urgency Ranks and their Definitions.

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

National Wetland Inventory Map Digitizing

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



Figure 44. Fen along the Upper Huerfano River.

RESULTS

CNHP initiated access procedures for a total of 85 properties; landowners provided access to 60 properties. A total of 38 private properties were surveyed and 22 properties were not included as they did not meet the requirements after roadside surveys (Figure 45).

A total of 15 wetland-dependent element occurrences were documented in Huerfano County during the field seasons of 2015 and 2016. CNHP biologists documented four rare or imperiled species and 11 plant communities of critical concern (Table 10). This is not a comprehensive list of all elements of biological significance known to occur in Huerfano County, but rather only includes those wetland-dependent elements associated with Potential Conservation Areas.

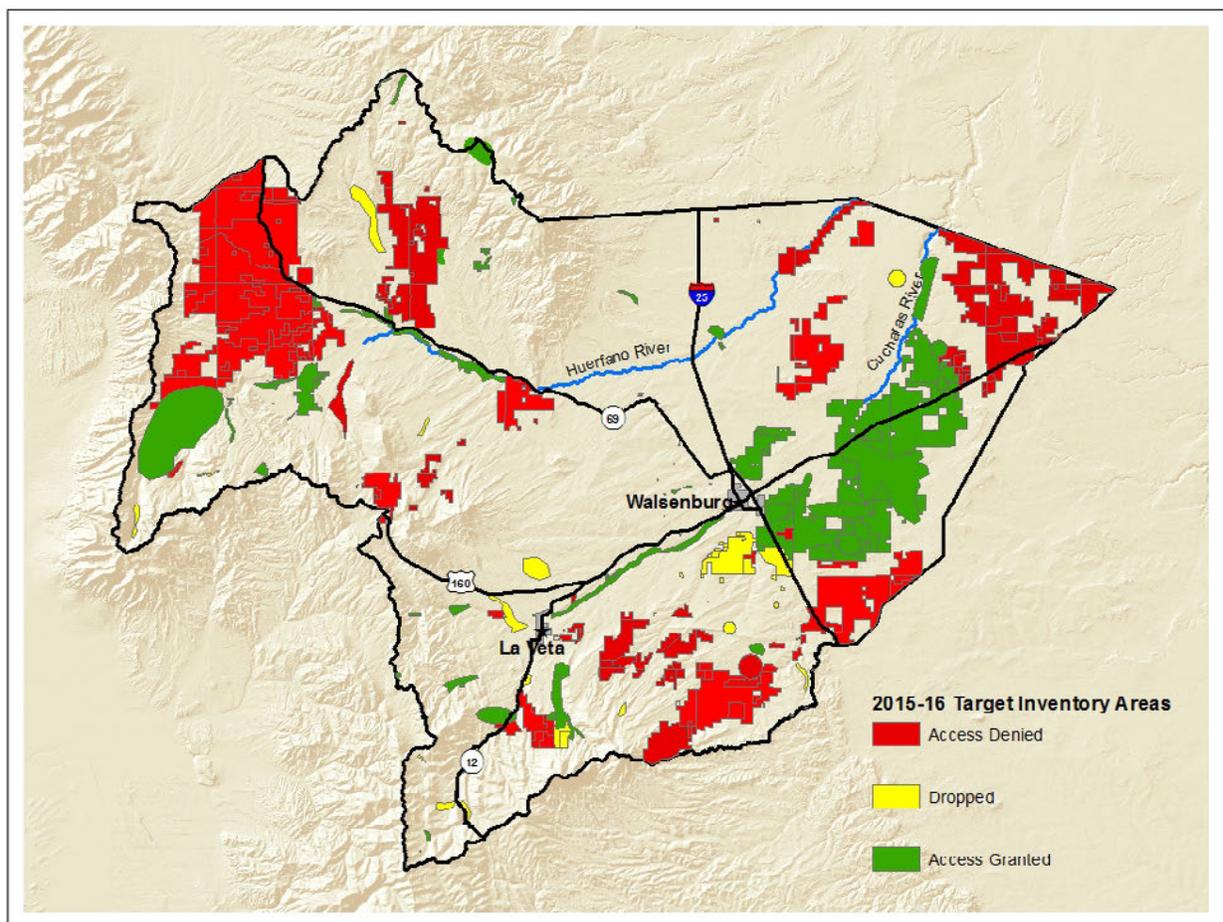


Figure 45. Huerfano County Target Inventory Areas.

Table 10. Significant Wetland-dependent Species and Plant Communities Documented from Huerfano County in 2010.

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive
Amphibians						
<i>Lithobates blairi</i>	Plains Leopard Frog	G5	S3		BLM/FS	SC
Plant Communities						
<i>Carex aquatilis</i> – <i>Carex utriculata</i> Herbaceous Vegetation	Water Sedge – Beaked Sedge Herbaceous Vegetation	G4	S4			
<i>Carex simulata</i> Herbaceous Vegetation	Analogue Sedge Herbaceous Vegetation	G4	S3			
<i>Carex atherodes</i> Herbaceous Vegetation	Wheat sedge Herbaceous Vegetation	G3G5	S1			
<i>Eleocharis palustris</i> Herbaceous Vegetation	Common spikerush Herbaceous Vegetation	G5	S5			
<i>Picea pungens</i> / <i>Alnus incana</i> Woodland	Blue spruce/Alder Woodland	G3	S3			
<i>Populus angustifolia</i> / <i>Alnus incana</i> Woodland	Narrowleaf Cottonwood / Thin-leaf Alder Woodland	G3	S2			
<i>Populus angustifolia</i> – <i>Salix</i> (<i>monticola</i> , <i>drummondiana</i> , <i>lucida</i>) Woodland	Narrowleaf Cottonwood- mixed willow Woodland	G3	S2			
<i>Populus angustifolia</i> / <i>Salix exigua</i> Woodland	Narrowleaf Cottonwood- Coyote Willow Woodland	G4	S4			

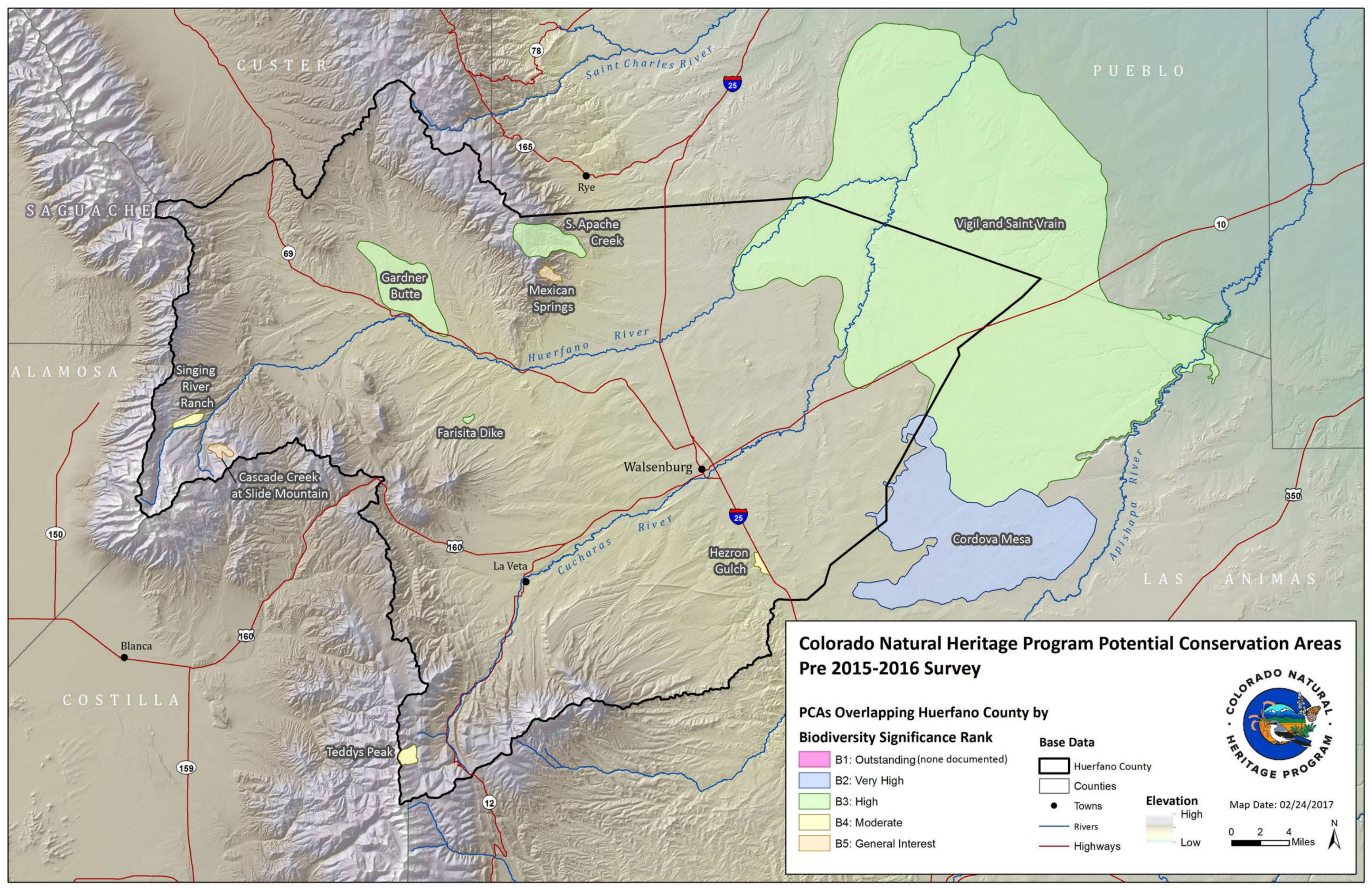
Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive
<i>Populus angustifolia</i> / <i>Betula occidentalis</i> Woodland	Narrowleaf Cottonwood/ River Birch Woodland	G2	S2			
<i>Populus deltoids</i> – (<i>Salix amygdaloides</i>) / <i>Salix (exigua, interior)</i> Woodland	Plains cottonwood – (Peach-leaf Willow) / Willow Woodland	G3G4	S3			
<i>Salix exigua</i> - <i>Salix ligulifolia</i> Shrubland	Strapleaf Willow Shrubland	G2G3	S2			
Vascular Plants						
<i>Agastache foeniculum</i>	Lavender hyssop	G4G5	S1			
<i>Liatris ligulistylis</i>	Gay-feather	G5?	S2			
<i>Viola pedatifida</i>	Prairie violet	G5	S2			

Before the 2015-16 project there were only eight PCAs identified in Huerfano County (Map 1). Twenty one PCAs are now documented for Huerfano County (Table 11; Map 2) that represents the immediate habitat needed for the viability of the critical biological elements.

Table 11. Potential Conservation Areas in Huerfano County in 2015-16. Bold indicates new PCAs

Site Name	Biodiversity Rank
Cordova Mesa	B2
Indian Creek at Sulphur Springs	B2
Wahatoya Creek	B2
Cucharas Fen	B3
Farista Dike	B3
Gardner Butte	B3
Huerfano River from Manzanaras Creek to Muddy Creek	B3
South Apache Creek	B3
South Middle Creek	B3
Stanley Creek	B3
Upper Cucharas River	B3
Upper Huerfano River	B3
Virgil and Saint Vrain	B3
Black Hawk Playas	B4
Greenhorn Mountain Wetland	B4
Hezron Gulch	B4
Huerfano River from Gardner to Farista	B4
Malachite Fen	B4
McCarty Park Wetland	B4
Mexican Springs	B4
Teddys Peak	B4

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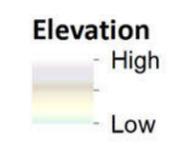


Colorado Natural Heritage Program Potential Conservation Areas Pre 2015-2016 Survey

PCAs Overlapping Huerfano County by Biodiversity Significance Rank

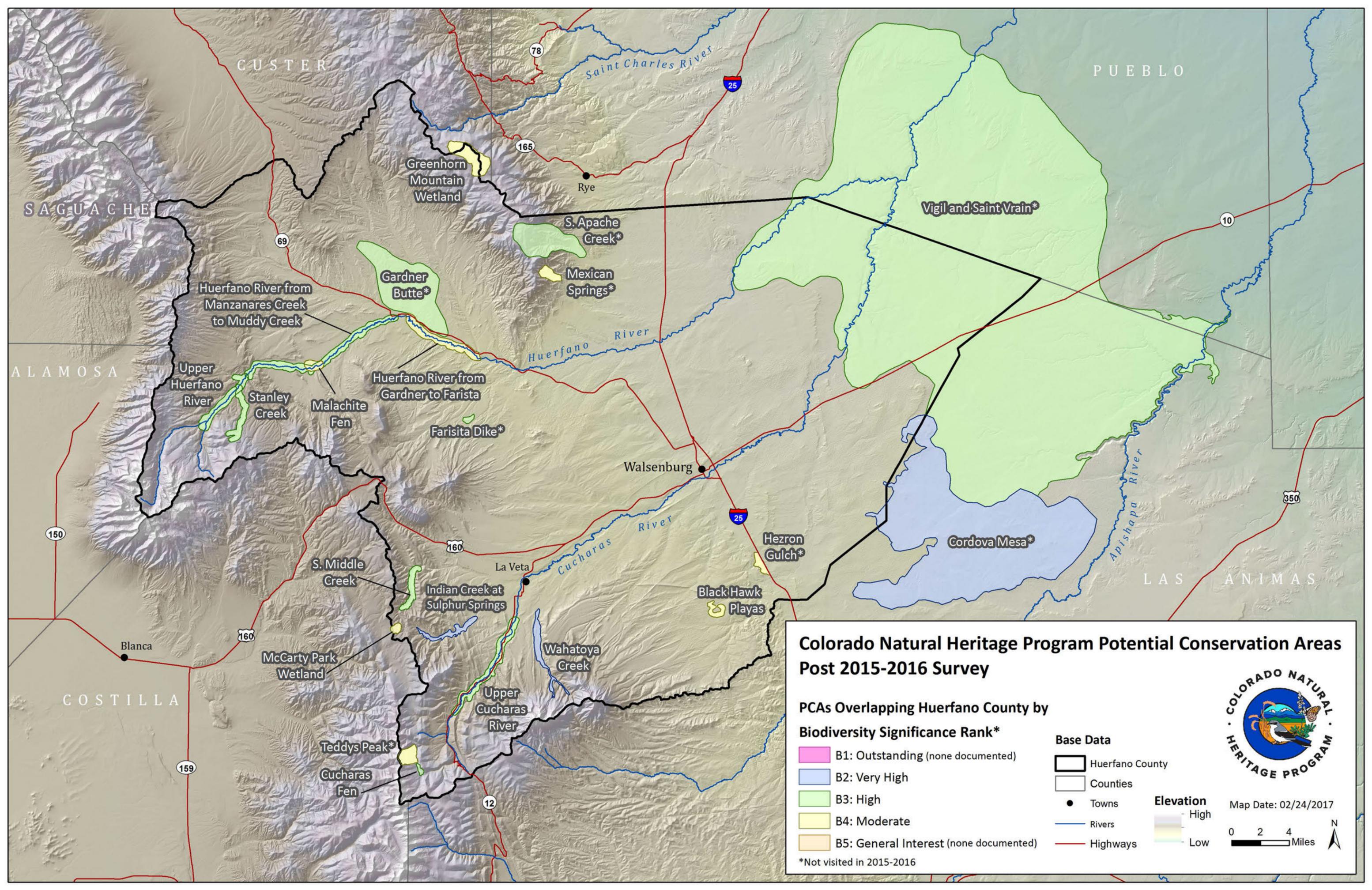
- B1: Outstanding (none documented)
- B2: Very High
- B3: High
- B4: Moderate
- B5: General Interest

- #### Base Data
- Huerfano County
 - Counties
 - Towns
 - Rivers
 - Highways



Map Date: 02/24/2017

0 2 4 Miles

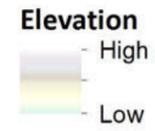


Colorado Natural Heritage Program Potential Conservation Areas Post 2015-2016 Survey

PCAs Overlapping Huerfano County by Biodiversity Significance Rank*

- B1: Outstanding (none documented)
- B2: Very High
- B3: High
- B4: Moderate
- B5: General Interest (none documented)

- Base Data**
- Huerfano County
 - Counties
 - Towns
 - Rivers
 - Highways



Map Date: 02/24/2017

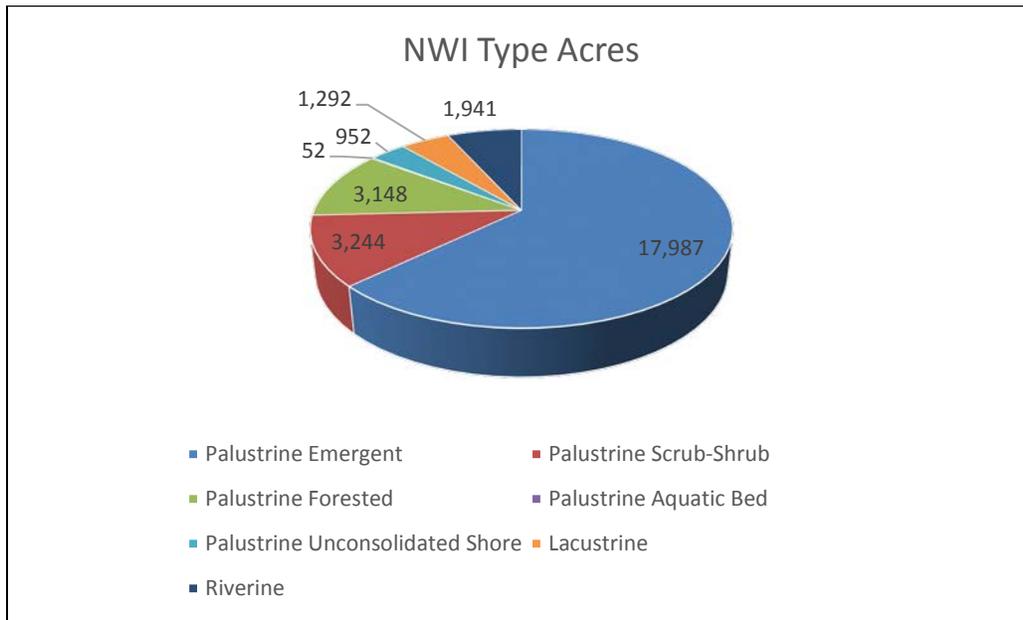
*Not visited in 2015-2016

NWI Mapping Results

Huerfano County has a total of 28,616 wetland acres or 2.81% of total land acres. The NWI System and Class for the county is as follows (Table 12, Figure 46).

Table 12. NWI Mapping Results.

NWI System and Class	NWI Symbol (s)	Acres
Palustrine Emergent	PEM	17,987
Palustrine Scrub-Shrub	PSS	3,244
Palustrine Forested	PFO	3,148
Riverine Upper Perennial	R3	1,941
Lacustrine Limnetic/Littoral	L1/L2	1,292
Palustrine Unconsolidated Shore/Bottom	PUS/PUB	952
Palustrine Aquatic Bed	PAB	52
Total		28,616



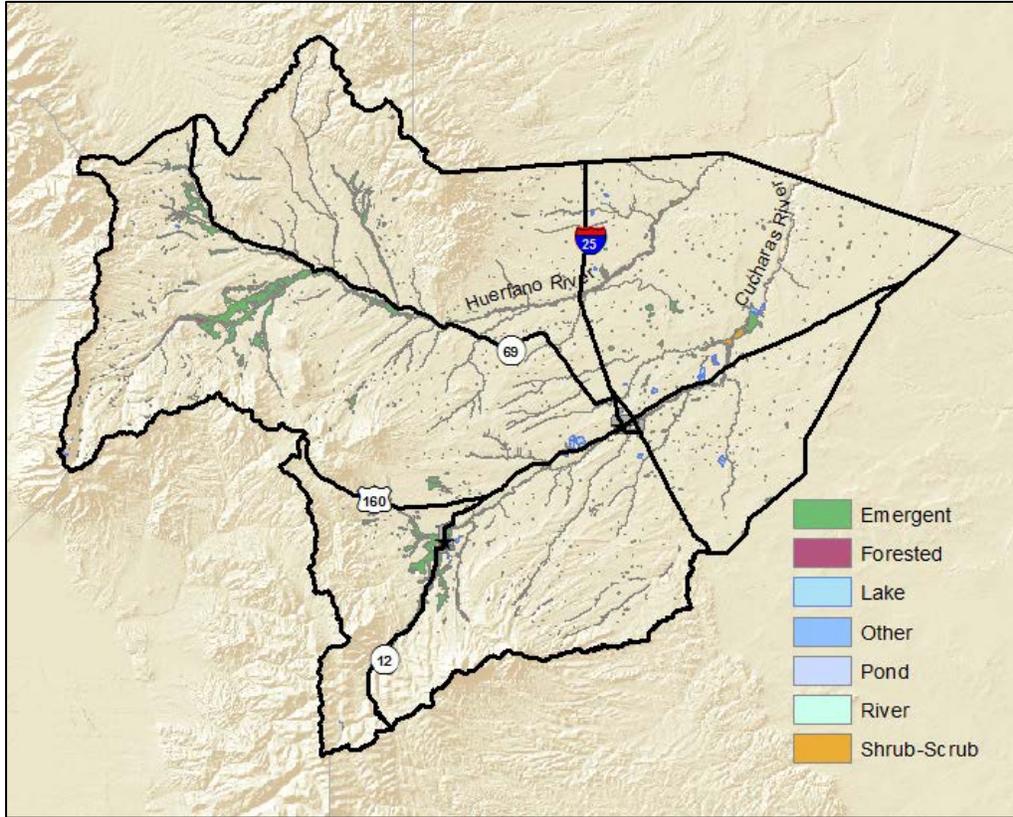


Figure 46. Map of NWI Wetland Types in Huerfano County.

DISCUSSION

The biodiversity of Huerfano County exemplifies Colorado's world-renowned plains-to-peaks landscape. Eastern Huerfano County encompasses shortgrass prairie all the way to the southern horizon of the Spanish Peaks. The county's biodiversity is why it is a destination for so many due to the high quality of life and ready access to open space and recreation. CNHP encourages the county's decision makers and planners to be mindful of informed land planning to keep Huerfano County's biodiversity intact, and to direct future growth to the most appropriate places while avoiding sensitive ecological habitats such as wetlands, stream corridors, flood prone areas, and alpine tundra.

The one question that arose consistently is, "Are there wetlands in Huerfano County?" Yes, there are! The county's wetlands provide many functions that are valued by society, (e.g., groundwater recharge, flood attenuation, removal of sediment, and channel stabilization). One of the most important functions is the role of wetlands in providing clean water. Wetland vegetation acts as a filter or sponge for water and sediment that may contain heavy metals, pesticides, or fertilizers. Wetland vegetation also provides a buffer for flood zones, especially along larger rivers, e.g., Huerfano and Cucharas Rivers that flow through the county's towns. In addition, wetlands are key in providing quality wildlife and fish habitat. In many areas of the Intermountain West, more than 90% of wildlife species depend on wetland and riparian areas at some point in their lives (Redelfs 1980 as cited in USGS 1996, McKinstry et al. 2004).

Recommendations

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

Integrate the results and specifically the PCAs profiled in this report in the Huerfano County Comprehensive Plan (2010).

- Implement an action plan for the county's comprehensive plan that utilizes PCAs as priority areas to protect.
- 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 San Isabel Land Protection Trust, in purchasing or acquiring conservation easements for protection of biological diversity or open space.
- Explore opportunities to form partnerships to access state and federal funding for conservation projects, such as those offered through the Colorado Parks and Wildlife or the Farm Bill.

Increase efforts to protect biodiversity by promoting cooperation and incentives among landowners, pertinent government agencies, and non-profit conservation organizations.

- Involve all stakeholders in land-use planning. The long-term protection of natural diversity in Huerfano County will be facilitated by the cooperation of private landowners, businesses, government agencies and non-government organizations.
- 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.
- Develop incentives that encourage biodiversity considerations in land-use planning, the likelihood of conserving biodiversity should increase. Such incentives will make planning for conservation a higher priority for private and public entities.

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

- Review PCAs when making land-use decisions.
- Avoid cumulative impacts on wetland and riparian areas that are particularly susceptible to off-site activities that affect water quality or hydrologic regimes.
- Use the GIS layer deliverable to consider land use plans.
- Contact persons, organizations, or agencies with the appropriate biological expertise for input in the planning process. CNHP is continually updating biodiversity data throughout the state and can provide up-to-date information in the area of concern. To contact CNHP's Environmental Review Coordinator call (970) 491-7331.

Recognize the importance of larger, contiguous natural habitats.

- Protect large contiguous riparian corridors to ensure protection of known and unknown.
- Protect large blocks of land within the watershed
- Avoid fragmenting large natural areas unnecessarily with roads, trails, etc. to protect migrating animals like deer and elk

Encourage public education outreach, functions, and publications.

- Provide educational opportunities for local citizens and other stakeholders on the value that such areas offer the public.
- Convey the value and function of these habitats and species can generate greater interest in conserving lands.
- Conduct forums or presentations that highlight the biodiversity of Huerfano County should increase awareness of the uniqueness of the habitats within the county.

Promote wise management of the biodiversity resources that exist within Potential Conservation Areas. Development of a site-specific conservation plan is a necessary component of the long-term protection of a PCA.

- Consult organizations and agencies in the development of conservation plans, including CNHP, CDOW, Natural Resources Conservation Service, Colorado State University Extension,

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., San Isabel Land Protection Trust, schools, 4-H clubs, Colorado Native Plant Society, Audubon) in assisting with management and monitoring projects on public lands. Make a concerted effort to involve individual landowners in conservation dialogue, as applicable.

Continue species surveys and monitoring where necessary, including inventories for species that cannot be surveyed adequately in one field season and continue inventories on lands that CNHP could not access in 2015 and 2016.

- Monitor rare species for presence/absence as well as trends.

Continue to take a proactive approach to weed and exotic species control. Recognize that weeds affect both agriculture and native plant communities.

- Discourage the introduction and/or sale of non-native species that are known to significantly impact natural areas. These include, but are not limited to; tamarisk, Russian olive, yellow toadflax, and purple loosestrife.
- Remove established populations of non-native species.
- Enforce the use of weed-free forage on horse trails, campgrounds, and trailheads.
- Encourage the use of native species for revegetation and landscaping efforts. Ideally, seed should be locally harvested.
- Refer to the Huerfano County Weeds Department for assistance on identifying and eradicating weeds [http://www.huerfano.us/CSU Cooperative Extension.php](http://www.huerfano.us/CSU_Cooperative_Extension.php) and the Colorado Natural Areas Program's Native Plant Revegetation Guide for Colorado <http://cpw.state.co.us/aboutus/Pages/RS-Revegetation.aspx>

Develop and implement a comprehensive program to address loss of wetlands.

- Use the digitized National Wetland Inventory Maps for management. See U.S. Fish and Wildlife Service Wetlands Mapper <http://www.fws.gov/wetlands/Data/Mapper.html> and CNHP's Colorado Wetland Information Center <http://www.cnhp.colostate.edu/cwic/>.
- Encourage and support statewide wetland protection efforts such as the Colorado Parks and Wildlife Wetland Wildlife Conservation Program <http://cpw.state.co.us/aboutus/Pages/Wetlands.aspx>.
- Support research efforts on wetlands to aid in their conservation. Countywide education on the importance of wetlands could be implemented through the Colorado State University Extension or other local agencies. Encourage communication and cooperation with landowners regarding protection of wetlands in Huerfano County.

SITES OF BIODIVERSITY SIGNIFICANCE

The 21 most important wetland and riparian sites in Huerfano County are profiled in this section as Potential Conservation Areas (PCAs) with biodiversity ranks (Table 9, Map 2).

Each 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 PCA descriptions.



Figure 47. Cucharas Canyon.

Cordova Mesa

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: South Rattlesnake Butte, Vega Corral, Little Dome, The Hogback, Hidden Valley Ranch, Pryor SE, Cucharas Reservoir

Size: 65,509 acres (26,510 ha)

Elevation: 5,430 - 6,530 ft. (1,655 - 1,990 m)

General Description: This site is characterized by shale hills, escarpments, mesas, and outwash prairies embedded in the shortgrass prairie. The original sediments of the hills were created when a shallow ocean covered the area some 87-92 million years ago, also known as the Upper Cretaceous period (Kauffman 1977). Most of the Upper Cretaceous period in eastern Colorado has eroded away, with the exception being the shale hills, of which Cordova Mesa is one example. The Cretaceous period was a relatively warm climate with changing sea levels, mostly increasing. The oceans and seas were populated with now extinct marine reptiles, ammonites, and bivalves. The abundant ocean life can still be viewed today in the form of fossils. This fossil rich area contains specimens of ammonites, sharks teeth, clam shells, and many other sea creatures. In addition to fossils the area is rich in geologic oddities, e.g., geodes (aka turtle rocks), concretions, and cones in cones. The sedimentary units that comprise the hills are Carlile shale, Greenhorn limestone and Graneros shale, dark-gray shale, gray limestone, and gray shale (Johnson 1969 geologic map). The vegetation of the hills is tightly associated with the geology and is noticeably different than the surrounding prairie in that it is dominated by junipers and occasional pinons and generally has very little soil build up thus giving a white hue to the hills. The whiteness of the hills is due to the white-gray shale and limestone substrate. The understory varies from sparse to dense vegetation depending on slope, aspect, and grazing regime. The outwash areas are the bajadas of the hills and are comprised of colluvial soils derived from the eroding shale hills. These outwash areas are generally dominated by grasses and occasional shrubs, especially cholla (*Cylindropuntia imbricata*) and four-winged saltbush (*Atriplex canescens*). Typical grasses throughout the site are blue grama (*Bouteloua gracilis*), New Mexico feather grass (*Hesperostipa neomexicana*), galleta grass (*Pleuraphis jamesii*), and threeawn grass (*Aristida purpurea*). Many of the sparsely vegetated slopes (barrens) are dominated by *Frankenia jamesii*, a species that is the only representative of its family (the Frankenia Family, or *Frankeniaceae*) in Colorado and relatively uncommon in Colorado. The shale breaks and associated colluvial outwash areas are particularly important because they support significant plants and plant communities. Several Colorado endemic plants that are globally rare are only associated with this habitat, specifically, Arkansas Valley evening primrose (*Oenothera harringtonii*), and rayless goldenweed (*Oonopsis foliosa* var. *monocephala*), both tightly associated with the colluvial outwash while Rocky Mountain bladder pod (*Lesquerella calcicola*) is more commonly found on the shale slopes and mesa tops. The juniper / New Mexico feathergrass (*Juniperus monosperma* / *Hesperostipa neomexicana*) community occurs on the mesa tops and is a rare community of interest that is tightly associated with grazing regimes. Additional dominant plant species include

Gutierrezia sarothrae, *Echinocereus reichenbachii*, *Melampodium leucanthum*, *Piptatherum micranthum*, *Achnatherum scribneri*, *Acnatherum hymenoides*, and *Bouteloua curtipendula*. Several animal species of concern also utilize this habitat, especially the triploid checkered whiptail, Texas horned lizard, and Colorado blue butterfly.

Key Environmental Factors: Geology, soil depth, drought, grazing, fires, and slope play a critical role in determining the vegetation species composition. Fires kill junipers yet much of the area has relatively low biomass thus preventing large scale fires. Old-growth junipers and pinons are common throughout, denoting that fires are infrequent. Adequate soil depth coupled with low intensity grazing favors New Mexico feathergrass while high intensity grazing favors blue grama. Slopes are generally less vegetated than the mesa tops or the outwash.

Climate Description: The climate is semiarid and is typical of the high plains of southeastern Colorado where approximately 13 inches of precipitation is received annually. Most precipitation occurs between April and September, with May typically being the wettest month. Annually, climate of the area is characterized by cold winters and hot summers with winter temperatures as low as zero on at least several days and temperatures of over 100 °F occurring on many days in July and August (HPRCC 2008).

Land Use History: Livestock grazing and seasonal hunting are the primary land uses.

Cultural Features: Numerous Native American and homesteader artifacts occur throughout the area.

Biodiversity Significance Rank Comments (B2): The site supports excellent (A-ranked) and good (B-ranked) occurrences of the globally imperiled (G2/S2) *Frankenia jamesii* / *Achnatherum hymenoides* foothills shrubland. Significant plants in the site include a good (B-ranked) occurrence of the globally imperiled (G3G4T2/S2) rayless goldenweed (*Oenopsis foliosa* var. *monocephala*), excellent (A-ranked) and good (B-ranked) occurrences of the globally vulnerable (G3/S3) Rocky Mountain bladderpod (*Lesquerella calcicola*), an excellent (A-ranked) occurrence of the globally vulnerable (G3/S3) Fendler cloak-fern (*Argyroschisma fendleri*), and good (B-ranked) and fair (C-ranked) occurrences of the globally vulnerable (G3/S3) Arkansas Valley evening primrose (*Oenothera harringtonii*). There are also several state-rare plant species and significant plant communities.

Natural Heritage element occurrences at the Cordova Mesa 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	Frankenia jamesii / Achnatherum hymenoides Shrubland	Foothills Shrubland	G2	S2				A	2009-06-09
Natural Communities	Frankenia jamesii / Achnatherum hymenoides Shrubland	Foothills Shrubland	G2	S2				C	2009-08-26
Natural Communities	Frankenia jamesii / Achnatherum hymenoides Shrubland	Foothills Shrubland	G2	S2				B	2009-06-09
Natural Communities	Juniperus monosperma / Hesperostipa neomexicana Woodland	Foothills Pinyon - Juniper Woodlands	G4	S2				C	2009-08-26
Natural Communities	Juniperus monosperma / Hesperostipa neomexicana Woodland	Foothills Pinyon - Juniper Woodlands	G4	S2				A	2009-05-28
Natural Communities	Juniperus monosperma / Hesperostipa neomexicana Woodland	Foothills Pinyon - Juniper Woodlands	G4	S2				B	2009-06-09
Natural Communities	Bouteloua gracilis - Bouteloua curtipendula Herbaceous Vegetation	Shortgrass Prairie	G5	S1				C	2009-05-21
Natural Communities	Juniperus monosperma / Quercus x pauciloba Woodland		G5	S1				B	2009-06-09
Natural Communities	Pinus edulis - Juniperus (monosperma, depeana) / Cercocarpus montanus - Mixed Shrubs Woodland	Two - needle Pinyon - (One - seed Juniper, Alligator Juniper) / Alderleaf Mountain - mahogany - Mixed Shrubs Woodland	G5	S5				A	2009-05-19
Vascular Plants	Argyrochosma fendleri	Fendler cloak - fern	G3	S3				A	2009-09-02

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	Oenothera harringtonii	Arkansas Valley evening primrose	G3	S3				C	2009-05-28
Vascular Plants	Oenothera harringtonii	Arkansas Valley evening primrose	G3	S3				B	2007-08-07
Vascular Plants	Oenothera harringtonii	Arkansas Valley evening primrose	G3	S3				CD	2007-08-08
Vascular Plants	Physaria calcicola	Rocky Mountain bladderpod	G3	S3				B	2009-06-09
Vascular Plants	Physaria calcicola	Rocky Mountain bladderpod	G3	S3				A	2009-09-01
Vascular Plants	Oenopsis foliosa var. monocephala	rayless goldenweed	G3G4T2	S2				B	2007-08-07
Vascular Plants	Asclepias macrotis	long - hood milkweed	G4	S2				A	2009-05-28
Vascular Plants	Forsellesia planitierum	Texas greasebush	G4	S2				C	2009-08-26
Vascular Plants	Penstemon jamesii	James' beard - tongue	G4	S1				A	2009-06-09
Vascular Plants	Bothriochloa springfieldii	Springfield bluestem	G5	S1				C	2009-09-02

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

Boundary Justification: The boundary is drawn to include the known occurrences, additional potential habitat, and the local mosaic of plant communities. The boundary was digitized while referencing a one meter digital color orthophoto quad, a 1:24,000 digital quad, and a GIS model developed by CNHP that shows the probability of the presence of shale loving plants.

Protection Urgency Rank Comments (P4): The site includes a mix of private and state-managed lands. The current livestock grazing regimes appear compatible with the continued viability of the rare plants and significant plant communities. Protection of the elements could be improved by taking measures to increase the intent and tenure of legal protection (e.g. easements, etc.).

Management Urgency Rank Comments (M4): The current dominant land use of livestock grazing appears compatible with continued viability of the biological resources. Wind energy companies have leased many of these hills and wind monitoring towers along the escarpments but as of 2009 no wind energy development was present. Future wind development should attempt to avoid areas with high quality occurrences of tracked elements, utilize best management practices, and mitigate for any loss of habitat.

Land Use Comments: The existing land use of livestock grazing appears compatible with the continued viability of the elements. Appropriate timing, intensity of grazing and periodic prescribed burning can be valuable and necessary management tools. In 2009, many of the escarpments contained wind monitoring towers that indicate the potential for wind development but there were no wind farms in the area.

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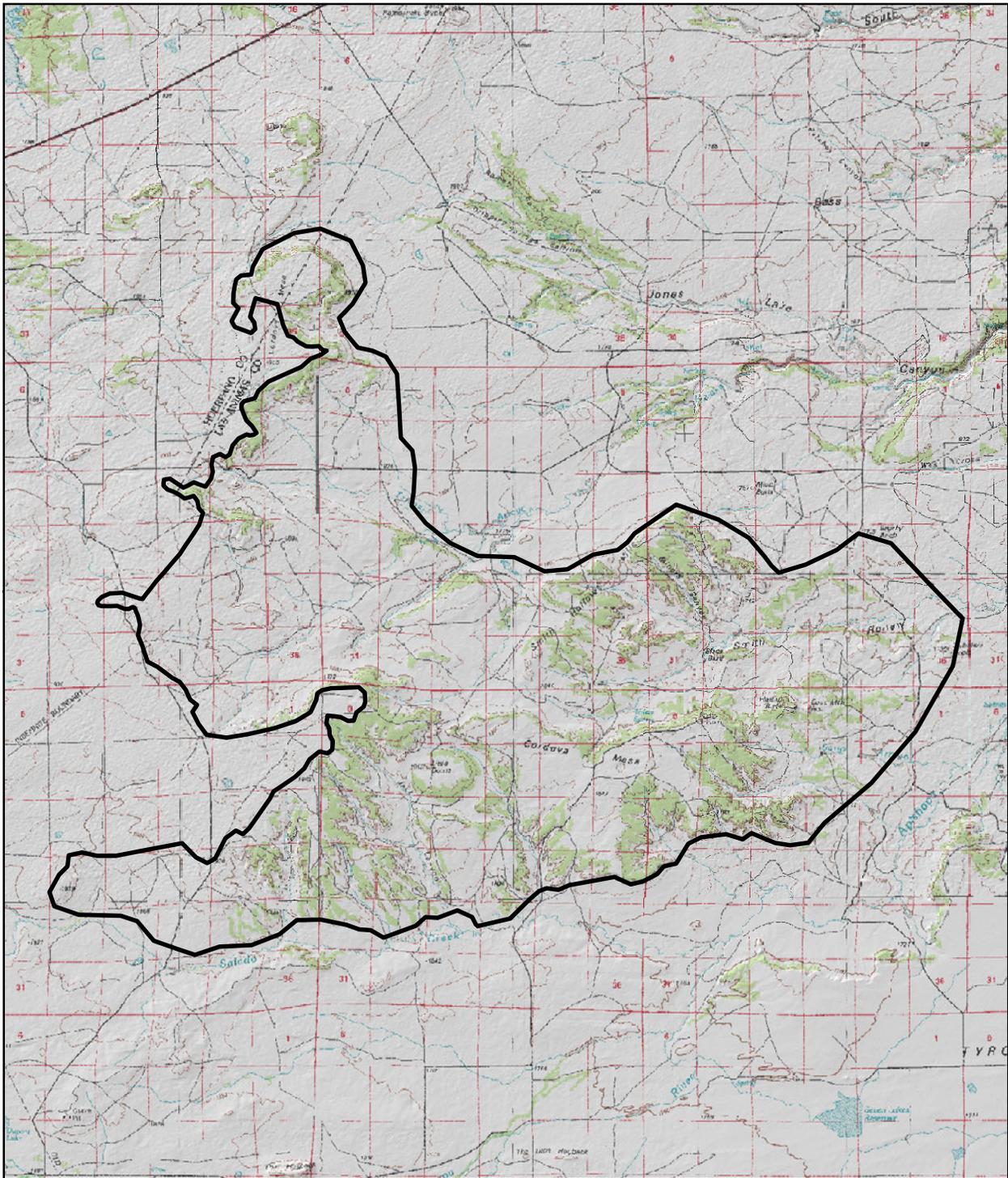
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Version Author: Panjabi, S.S. and R.J. Rondeau

Version Date: 02/01/2010



 PCA Boundary

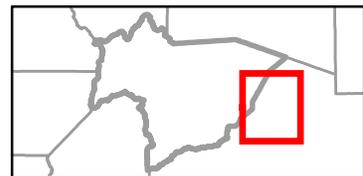
 Miles
0 1 2

Map Date: 02/19/2017



30x60 Minute Digital Raster Graphics
by the U.S. Geological Survey
Walsenburg, 37104-E1
Trinidad, 37104-A1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Cordova Mesa Potential Conservation Area, B2: Very High Biodiversity Significance

Indian Creek at Sulphur Springs

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

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

U.S.G.S. 7.5-minute quadrangles: Cuchara, McCarty Park

Size: 946 acres (383 ha)

Elevation: 7,500 - 8,600 ft. (2,286 - 2,621 m)

General Description: The Indian Creek at Sulphur Springs site is located along Indian Creek, a tributary of the Cucharas River. It is a first order, perennial stream, although the flow is a trickle by late summer. Several gullies and canyon draws feed Indian Creek, mainly Tracy and Price Canyons. The evergreen forest plant association that dominates this narrow riparian corridor is a rich, mixed conifer - deciduous forest occurring on active floodplains and streambanks and is indicative of the southernmost mountains in Colorado. The presence of white fir (*Abies concolor*) distinguishes this community from the more common narrow leaf cottonwood - blue spruce / alder woodland (*Populus angustifolia* - *Picea pungens* / *Alnus incana*) woodland. This riparian forest association is dominated primarily by the evergreen needle-leaved trees white fir and blue spruce, with the broad-leaved deciduous tree narrowleaf cottonwood always present as a codominant, and aspen (*Populus tremuloides*) in scattered patches. The conifers average 40-45% cover, and cottonwood 15%. The understory has a well-developed tall-shrub layer, dominated by broad-leaved deciduous species. Rocky Mountain maple (*Acer glabrum*) is the most abundant, with 8% average cover. Other common shrubs include alder (*Alnus incana*), waxflower (*Jamesii americana*), prickly currant (*Ribes lacustre*), twinberry (*Lonicera involucrata*), and wild rose (*Rosa woodsia*). The herbaceous layer is diverse and has many species with abundant cover, indicating relatively mesic conditions under the tree and shrub canopies. Most species are perennials. The graminoids include both grasses and sedges. The uplands are dominated by Gambel's oak (*Quercus gambelii*).

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Cultural Features: There is a hot spring discharge that once supported a bath house. The spring is still active, but not enough to provide water for recreation.

Biodiversity Significance Rank Comments (B2): The site supports a good (B-ranked) occurrence of a globally rare riparian forest, white fir - blue spruce - narrowleaf cottonwood / Rocky Mountain maple (*Abies concolor* - *Picea pungens* - *Populus angustifolia* / *Acer glabrum*). This association has few high-quality stands and a very restricted range, clustered in the southern San Juan and Sangre de Cristo mountain ranges in southern Colorado. The association demonstrates the most structurally complex riparian forests in the southern Rocky Mountains with late-seral and early-seral elements represented. The combination of northern (*Populus angustifolia*, *Acer glabrum*, *Picea pungens*) and southwestern (*Abies*

concolor) floristic elements is unique for riparian communities in the southern Rockies. In addition, most rivers and streams in the southern Rockies have been altered by dams or water diversions, gravel extractions, gold mining, and livestock grazing. Few high quality examples remain of riparian plant associations, such as this one, in the montane zone. Many have altered species compositions, or have been impacted by altered streamflow regimes.

Natural Heritage element occurrences at the Indian Creek at Sulphur Springs PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Abies concolor - Picea pungens - Populus angustifolia / Acer glabrum Forest	Montane Riparian Forests	G2	S2				B	2016-08-10

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

Boundary Justification: The boundary is drawn to encompass the headwaters, and the lower parts of the gullies and canyons that feed into Indian Creek downstream to where the creek enters the wide valley into La Veta.

Protection Urgency Rank Comments (P4): The western portion of the site lies within the San Isabel National Forest. One private property was field visited in 2016, those owners are conservation minded. The remainder of the site is on private lands, but was not ground surveyed.

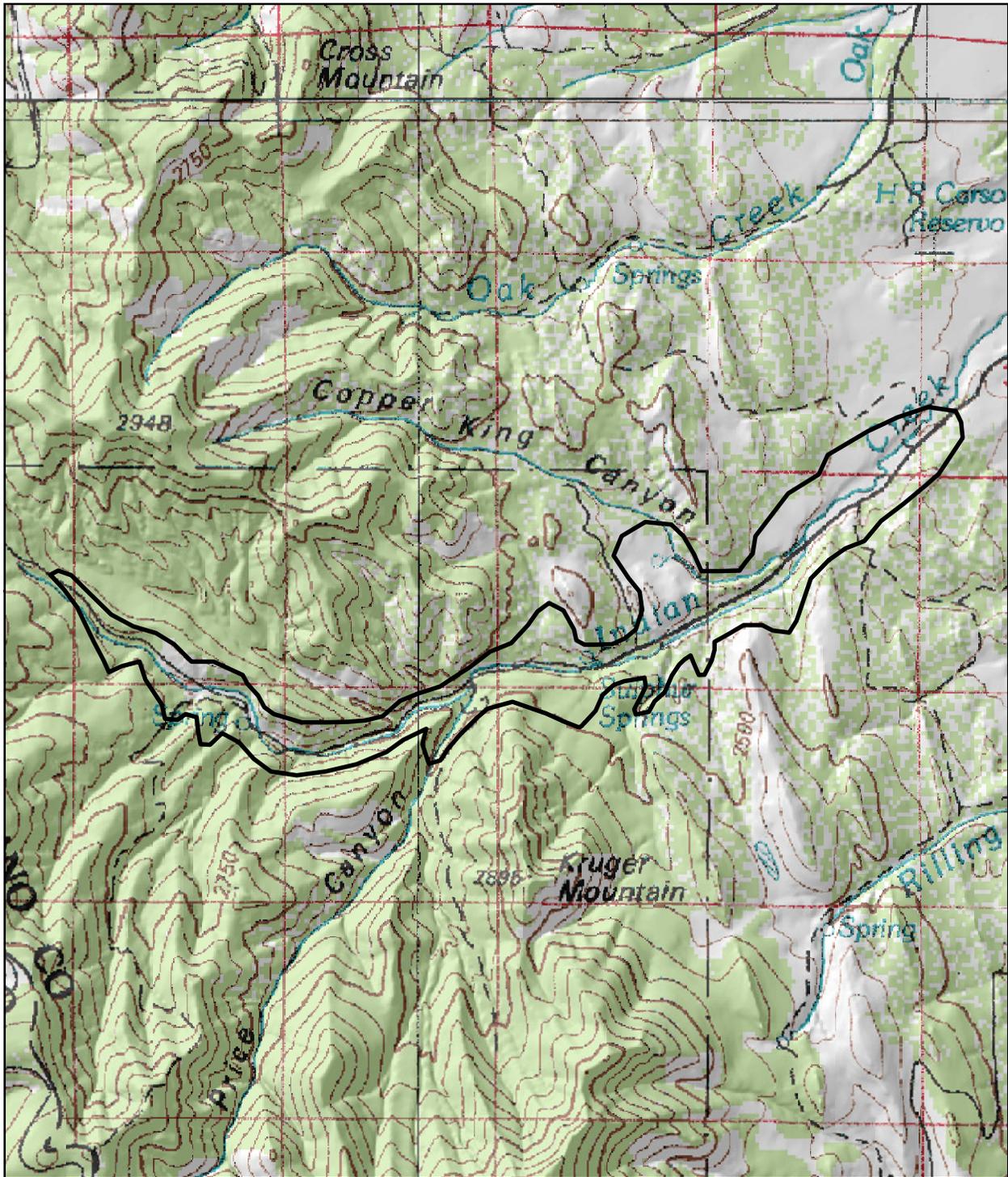
Management Urgency Rank Comments (M2): A majority of the white firs are infested with broom rust caused by the fungus *Melampsorella caryo-phyllacearum*. Alternate hosts are chickweeds (*Cerastium* and *Stellaria* spp.). Broom rust will cause stem cankers and deformations, growth loss, top-kill and tree mortality.

References

Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

Version Author: Culver, D.R.

Version Date: 10/31/2016



 PCA Boundary

 Miles

0 0.25 0.5

Map Date: 02/19/2017



30x60 Minute Digital Raster Graphics
by the U.S. Geological Survey
Alamosa, 37105-A1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Indian Creek at Sulphur Springs Potential Conservation Area, B2: Very High Biodiversity Significance

Wahatoya 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: Spanish Peaks

Size: 1,303 acres (527 ha)

Elevation: 7,200 - 9,200 ft. (2,195 - 2,804 m)

General Description: The Wahatoya Creek site is a second order stream with headwaters on northeast flank of West Spanish Peak. Wahatoya Creek flows from the snowmelt meadows atop West Spanish Peak, dropping into Wahatoya Camp, along the Big Wall Dike, north to its confluence with the Cucharas River east of La Veta. Soils are sandy loam from the sandstone of the Cucharas Formation (USDA NRCS 2008). This riparian forest association is dominated primarily by the evergreen needle-leaved trees white fir (*Abies concolor*) with blue spruce (*Picea pungens*), with the broad-leaved deciduous tree narrowleaf cottonwood (*Populus angustifolia*) always present as a codominant, and aspen (*Populus tremuloides*) in scattered patches. The conifers average 40-45% cover, and cottonwood 15%. The understory has a well-developed tall-shrub layer, dominated by broad-leaved deciduous species. Rocky Mountain maple (*Acer glabrum*) is the most abundant, with 8% average cover. Other common shrubs include alder (*Alnus incana*), waxflower (*Jamesii americana*), prickly currant (*Ribes lacustre*), twinberry (*Lonicera involucrata*), and wild rose (*Rosa woodsia*). The herbaceous layer is diverse and has many species with abundant cover, indicating relatively mesic conditions under the tree and shrub canopies. Most species are perennials. The graminoids include both grasses and sedges. The riparian vegetation changes once the creek enters the Wahatoya Valley to narrowleaf cottonwood / alder (*Populus angustifolia* / *Alnus incana*). This plant association is found in narrow bands on the floodplains and benches of montane streams in Colorado and New Mexico, primarily in the southern Rocky Mountains. Stands occur on banks and benches along narrow streams with active floodplains in broad valleys and narrow canyons. These narrow streams may be higher gradient, fast-moving or low gradient, highly sinuous stream reaches. Substrates are typically deep sand or shale sandy loam but may be stratified with finer-textured alluvial layers. The vegetation is characterized by an open to nearly closed deciduous tree canopy of narrowleaf cottonwood with a dense layer of alder lining the streambank. The narrowleaf cottonwood is always present, although sometimes only as a sapling. A variety of riparian and upland tree species may also be present. Alder is the most abundant shrub within the stand with a minimum of 10% cover. Other shrubs include: bluestem willow (*Salix irrorata*), Rocky Mountain willow (*S. monticola*), Drummond's willow (*S. drummondiana*) strap-leaf willow (*S. ligulifolia*), coyote willow (*S. exigua*), wood rose, Rocky Mountain maple and river birch (*Betula occidentalis*). Herbaceous growth is generally a sparse mixture of mesic and wetland graminoids and forbs.

Key Environmental Factors: Key environmental factors include unimpeded flows from water storage projects from the headwaters to the confluence with the Cucharas River.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Land Use History: The Spanish Peaks have been used by Native Americans and later by Spanish and European emigrants as a landmark (Keating 2011).

Cultural Features: The Spanish Peaks were known to the Comanche as "Wahatoya", which means Double Mountain. The Ute Indians also named them Huajatolla (pronounced Wa-ha-toy-a) meaning "Breasts of the World" (Keating 2011). The West Spanish Peak is the easternmost mountain over 13,000 ft (4,000 m) tall in the U.S.

Biodiversity Significance Rank Comments (B2): The site supports a good (B-ranked) example of a globally rare (G2/S2) white fir - blue spruce - narrowleaf cottonwood / Rocky Mountain maple (*Abies concolor* - *Picea pungens* - *Populus angustifolia* / *Acer glabrum*). This association has a very restricted range and few high-quality stands. Element occurrences are clustered in the southern San Juan and Sangre de Cristo mountain ranges in southern Colorado. The association demonstrates the most structurally complex riparian forests in the Southern Rocky Mountains with late-seral and early-seral elements represented. The combination of northern (*Populus angustifolia*, *Acer glabrum*, *Picea pungens*) and southwestern (*Abies concolor*) floristic elements is unique for riparian communities in the southern Rockies. Additionally, there is a good (B-ranked) example of a globally vulnerable (G3/S3) riparian woodland, narrowleaf cottonwood / alder (*Populus angustifolia* / *Alnus incana*).

Natural Heritage element occurrences at the Wahatoya 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>Abies concolor</i> - <i>Picea pungens</i> - <i>Populus angustifolia</i> / <i>Acer glabrum</i> Forest	Montane Riparian Forests	G2	S2				B	2016-08-20
Natural Communities	<i>Populus angustifolia</i> / <i>Alnus incana</i> Woodland	Montane Riparian Forest	G3	S3				B	2016-08-30

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

Other Values: Highly scenic riparian valley with the Spanish Peaks and radiating dikes. The state rare prairie violet (*Viola pedatifida*) has been historically documented in the vicinity of the site.

Boundary Justification: The boundary is drawn to encompass the Wahatoya Creek from its headwaters to just south of its confluence with the Cucharas River. The boundary was drawn to include the immediate ecological processes, e.g., snowmelt, in mind. Only private property with written permission was accessed during the field seasons of 2015 and 2016.

Protection Urgency Rank Comments (P4): The majority of the site is located on private lands, however many of the properties are held within a conservation easement. The upper portion of the site is located in the Spanish Peaks Wilderness Area.

Management Urgency Rank Comments (M4): There are no immediate threats to the riparian forests, but non-native plant invasion should be monitored.

References

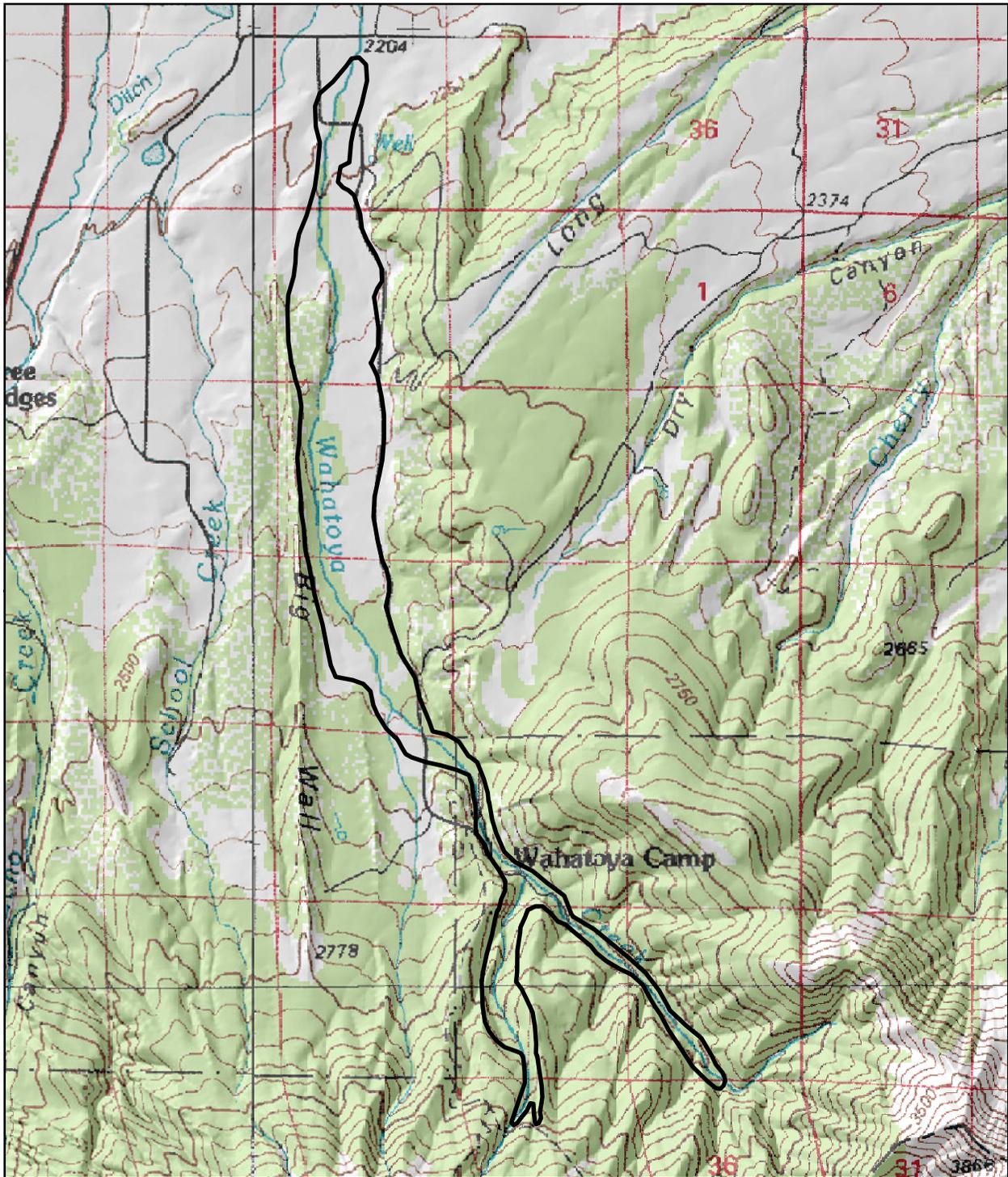
Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

Keating, R. C. 2011. Colorado's Spanish Peaks Region: An Exploration Guide to History, Natural History, Trails, and Drives. Missouri Botanical Garden, St. Louis, MO.

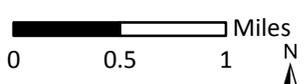
USDA Natural Resource Conservation Service. 2008. Soil Survey Geographic (SSURGO) Database for Huerfano County, Colorado. Fort Worth, TX: U.S. Environmental Protection Agency. 2010. Watershed Assessment, Tracking & Environmental Results database.

Version Author: Culver, D.R.

Version Date: 10/13/2016



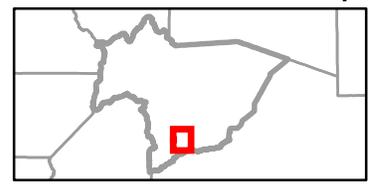
 PCA Boundary



Map Date: 02/19/2017

30x60 Minute Digital Raster Graphics
by the U.S. Geological Survey
Trinidad, 37104-A1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Wahatoya Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Cucharas Fen

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: Trinchera Peak

Size: 136 acres (55 ha)

Elevation: 10,000 - 10,800 ft. (3,048 - 3,292 m)

General Description: The Cucharas Fen site is located within the white fir (*Abies concolor*) / Engelmann spruce (*Picea engelmannii*) forest along the eastern slope of the Culebra Range, a part of the Sangre de Cristo Mountains. The site includes a geological complex of end and lateral moraines that include Bear and Blue lakes, extending upward towards Trinchera Peak. The moraine complex at Blue and Bear lakes was deposited during a late stage Pinedale Glaciation, approximately 12,000 to 18,000 years ago (Richmond 1986, Wallace and Lindsey 1996, Armour et al. 2002). Three valley glaciers contributed sediment to the construction of the moraine, which built up during a temporary still-stand, as the glaciers retreated up valley. Buried blocks of stagnant ice later melted away leaving numerous closed depressions, known as kettleholes, which created the fens observed during the 2015-16 field survey. A fen is a type of peatland that accumulates at least 40 cm (16 inches) of organic material in the upper 80 cm (32 inches) of the soil profile. Peat forms slowly over time where the production of organic matter is greater than the rate of decomposition due to saturation (Culver and Lemly 2013). Vegetation is dominated by sedges such as water sedge (*Carex aquatilis*), beaked sedge (*C. utriculata*), boreal bog sedge (*C. magellanica* ssp. *irrigua*), star sedge (*C. echinata*), and tall cottongrass (*Eriophorum angustifolium*). Dominant grasses include tufted hairgrass (*Deschampsia cespitosa*), northern sweetgrass (*Hierchloe hirta*), and bluejoint reedgrass (*Calamagrostis canadensis*). Forbs that occur within the fen include marsh marigold (*Caltha leptosepala*), elephanthead lousewort (*Pedicularis groenlandica*), and Rocky Mountain hemlockparsley (*Conioselinum scopulorum*). Shrubs are scattered throughout the fen, but are not dominant. They include planeleaf willow (*Salix planifolia*) and shrubby cinquefoil (*Dasiphora fruticosa*). Uplands are dominated by Engelmann spruce (*Picea engelmannii*) and bristlecone pine (*Pinus aristata*) forests.

Key Environmental Factors: The key environmental factor is undisturbed groundwater discharge from snowmelt from the Culebra Range.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Land Use History: Recreational activities e.g., camping, fishing, and hiking.

Biodiversity Significance Rank Comments (B3): The site supports an excellent (A-ranked) occurrence of a large common wetland plant community, water sedge - beaked sedge (*Carex aquatilis* - *C. utriculata*). The Cucharas fen is the best example of a peatland

documented during the 2015-16 field surveys. Fens are an uncommon, irreplaceable wetland in the Intermountain West. The peat accumulates at an extremely slow rate, 20 cm (8 inches) per 1,000 years. Fens are considered a Resource Category 1 within the U.S. Fish and Wildlife Service and an irreplaceable resource within the National Forest (Culver and Lemly 2013).

Natural Heritage element occurrences at the Cucharas Fen PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Carex aquatilis - Carex utriculata Herbaceous Vegetation	Montane Wet Meadows	G4	S4				A	2015-07-15

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

Other Values: There are globally common wetland plants such as tall cottongrass and a diversity of sedges that are uncommon in the county. The uplands along the eastern flank of Teddys Peak are dominated by bristlecone pine forests (*Pinus aristata* / *Festuca thurberi* and *Pinus aristata* / *Vaccinium myrtillus*)

Boundary Justification: Boundary is drawn to capture the immediate hydrological processes that support the fens and peat accumulation. This includes adjacent slopes of Teddys Peak and Steep Mountain.

Protection Urgency Rank Comments (P4): The site is located entirely within the Pike-San Isabel National Forest. This area is a very popular camping, fishing, and day hiking destination in the summer.

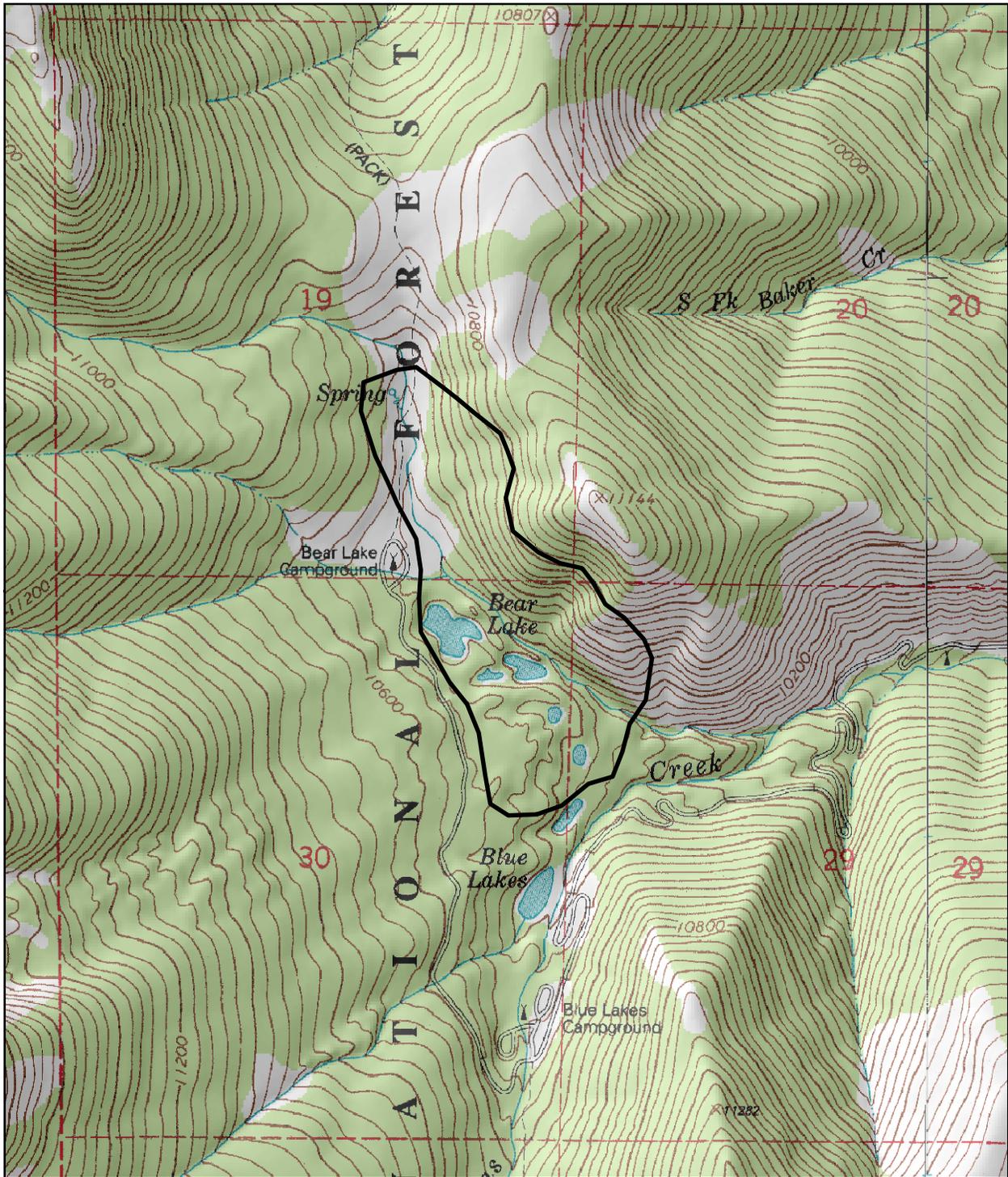
Management Urgency Rank Comments (M4): No immediate threats are evident. Suggestions for future management actions would include no hydrologic changes, e.g., ditching that would interfere with the groundwater discharge level, and to monitor the hiking trails to observe adverse effects from overuse of trails in immediate vicinity of the fens.

References

- Armour, J., P.J. Fawcett, and J.W. Geissman. 2002. 15 k.y. paleoclimatic and glacial record from northern New Mexico. *Geology* 30:8: 723-726.
- Culver, D.R. and J.M. Lemly. 2013. *Field Guide to Colorado's Wetland Plants; Identification, Ecology and Conservation*. Colorado Natural Heritage Program, Colorado State University, Fort Collins, 694 pp.
- Culver, D.R. and P. Smith. 2017. *CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO*. Colorado Natural Heritage Program, Fort Collins, CO.
- Richmond, G.M. 1986. Stratigraphy and correlation of glacial deposits of the Rocky Mountains, the Colorado Plateau, and the ranges of the Great Basin. *In*: V. Sibrava, D. Q. Bowen, and G. M. Richmond (eds.) *Quaternary glaciations in the northern hemisphere*, p. 99—127. Pergamon Press, Oxford & New York.
- Wallace, A.R. and D.A. Lindsey. 1996. *Geologic map of the Trinchera Peak Quadrangle, Costilla, Huerfano, and Las Animas counties, CO*. U.S. Geological Survey, Misc. Field Studies, Map MF-2312-A.

Version Author: Culver, D.R.

Version Date: 10/13/2016



 PCA Boundary

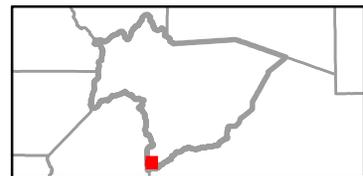
 Miles
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Map Date: 02/19/2017



7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
Trinchera Peak, 37105-C2

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Cucharas Fen Potential Conservation Area, B3: High Biodiversity Significance

Farisita Dike

Biodiversity Rank - B3: High Biodiversity Significance

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

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

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

Size: 190 acres (77 ha)

Elevation: 7,090 - 7,460 ft. (2,161 - 2,274 m)

General Description: The site encompasses an igneous dyke and surrounding pinon pine woodlands.

Biodiversity Significance Rank Comments (B3): This site contains a good (B-ranked) occurrence of a globally vulnerable (G3/S3) plant, rock-loving neoparrya (*Aletes lithophilus*). There is also a good (B-ranked) occurrence of a plant community, *Pinus edulis* / *Leymus ambiguus*, whose global rank is unknown at this time (GU/SU).

Natural Heritage element occurrences at the Farisita Dike 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 edulis</i> / <i>Leymus ambiguus</i> Woodland		GU	S1				B	1981-07-09
Vascular Plants	<i>Aletes lithophilus</i>	Rock - loving neoparrya	G3	S3			BLM/US FS	B	2012-05-05

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

Boundary Justification: The north boundary is the EW road, the west boundary is an unpaved road, and the eastern boundary is where the stream crosses road. The entire dyke plus neighboring stream are included as a buffer to elements.

Protection Urgency Rank Comments (P2): TNC had a management lease. It expired in 1994.

Management Urgency Rank Comments (M3): Continue monitoring the site and maintain fence.

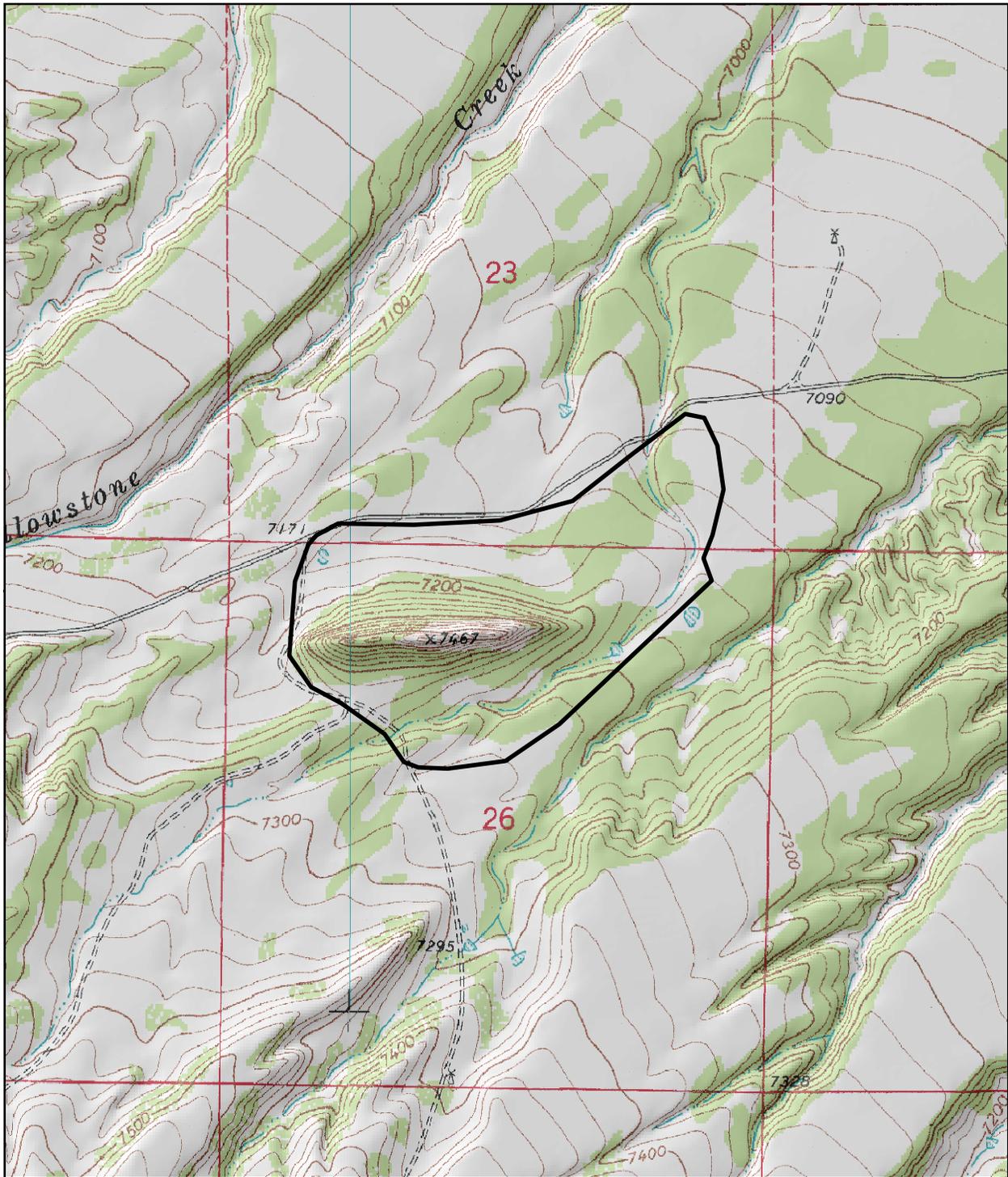
Information Needs: A recent field visit is needed to assess the quality of the rare plant populations and surrounding pinon pine woodlands.

References

Carpenter, Alan. 1993. Monitoring *Neoparrya lithophila* at Farisita Dike for the Nature Conservancy.

Version Author: Reid, M. and G.M. Kittel

Version Date: 05/02/1997



 PCA Boundary

 Miles

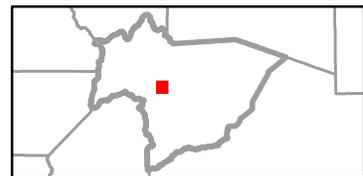
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Map Date: 02/19/2017



7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
Farisita, 37105-F1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Farisita Dike Potential Conservation Area, B3: High Biodiversity Significance

Gardner Butte

Biodiversity Rank - B3: High Biodiversity Significance
 Protection Urgency Rank - P2: Threat/Opportunity within 5 Years
 Management Urgency Rank - M?: Unknown

U.S.G.S. 7.5-minute quadrangles: Gardner, Badito Cone

Size: 11,928 acres (4,827 ha) **Elevation:** 6,824 - 7,811 ft. (2,080 - 2,381 m)

General Description: This site is characterized by grasslands with ponderosa pine (*Pinus ponderosa*) and pinon pine (*Pinus edulis*) - juniper woodlands. Associated plant species include blue grama (*Bouteloua gracilis*), lacy tansyaster (*Machaeranthera pinnatifida*), and yucca (*Yucca glauca*).

Biodiversity Significance Rank Comments (B3): The site supports an excellent (A-ranked) and an extant occurrence of dwarf milkweed (*Asclepias uncialis* ssp. *uncialis*), a globally imperiled plant (G3G4T2T3/S2). There is also an unranked occurrence of the globally rare (G3G4/S1S2) Brandegee milkvetch (*Astragalus brandegeei*).

Natural Heritage element occurrences at the Gardner Butte 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 brandegeei</i>	Brandegee milkvetch	G3G4	S1S2				E	1998-06-03
Vascular Plants	<i>Asclepias uncialis</i> ssp. <i>uncialis</i>	Dwarf milkweed	G3G4T2T3	S2			BLM/US FS	A	2004-05-19
Vascular Plants	<i>Asclepias uncialis</i> ssp. <i>uncialis</i>	Dwarf milkweed	G3G4T2T3	S2			BLM/US FS	E	1998-06-03

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

Boundary Justification: The boundary is drawn to include the known rare plant occurrences, additional potential habitat to support expansion over time, and the local mosaic of plant communities. The boundary was digitized while referencing a one meter digital color orthophoto quad.

Protection Urgency Rank Comments (P2): The site is primarily privately owned, with some public lands managed by the BLM. Plans of the private land owner are not known.

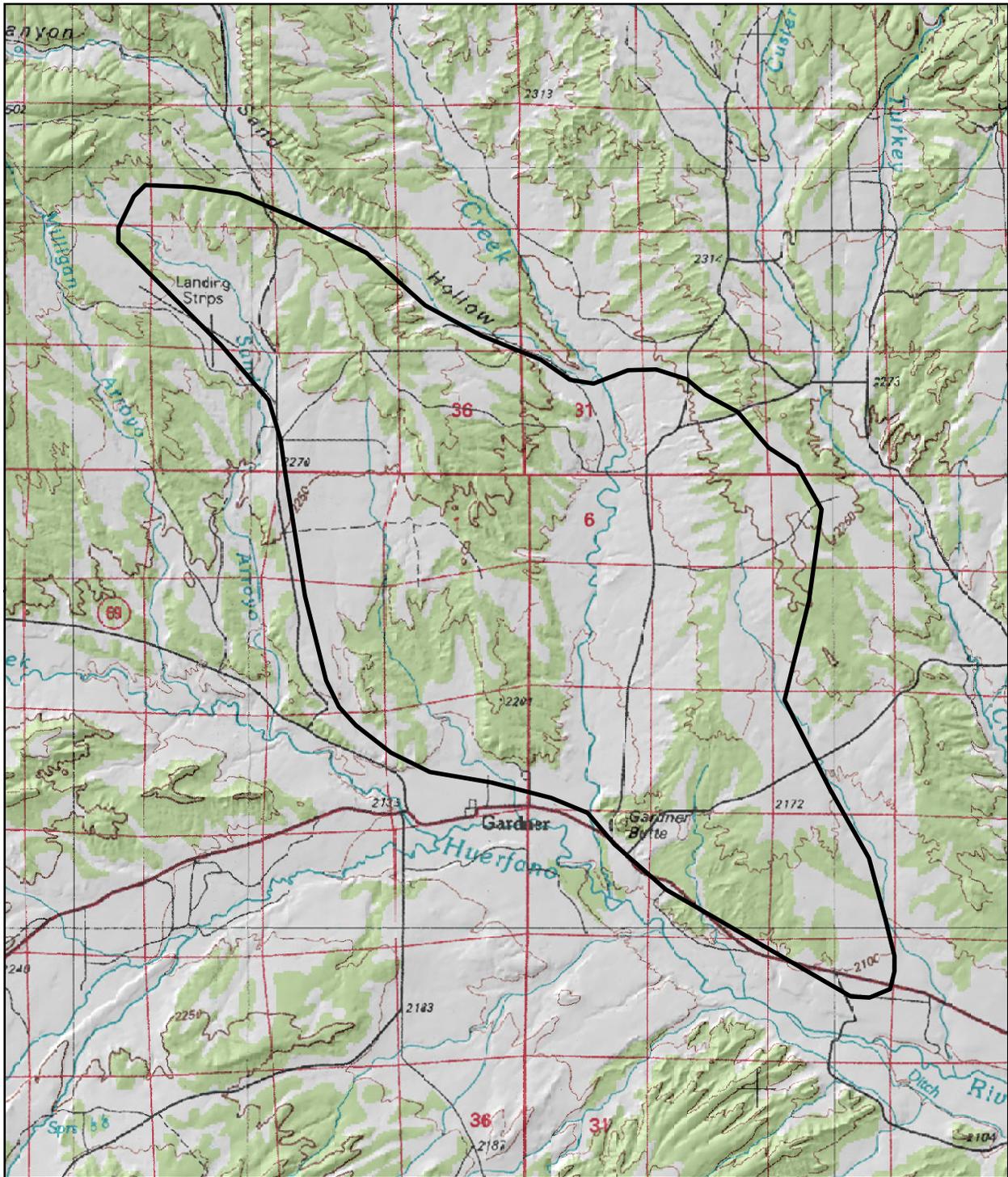
Management Urgency Rank Comments (M?): Management issue have not been identified at this time.

References

Elliott, B. 2004. USFS field surveys.

Version Author: Panjabi, S.S.

Version Date: 08/10/2009



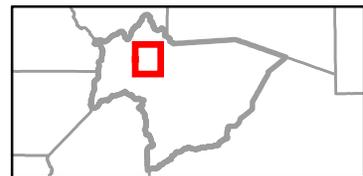
 PCA Boundary

 Miles
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Map Date: 02/19/2017 

30x60 Minute Digital Raster Graphics
by the U.S. Geological Survey
Blanca Peak, 37105-E1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Gardner Butte Potential Conservation Area, B3: High Biodiversity Significance

Huerfano River from Manzanares Creek to Muddy Creek

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

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

U.S.G.S. 7.5-minute quadrangles: Gardner, Little Sheep Mountain, Red Wing

Size: 1,834 acres (742 ha)

Elevation: 6,900 - 8,600 ft. (2,103 - 2,621 m)

General Description: The site begins at the confluence of Manzanares Creek with the Huerfano River. It encompasses the Huerfano River with its main tributaries of Martin and Pass creeks that drain the eastern flank of the Sangre de Cristo Mountains, and Sheep and Little Sheep Mountains. The geology is a complex of sedimentary rock formations that include the Nacimiento and Sangre de Cristo Formations with pockets of Pierre shale that were deposited in fluvial and lacustrine settings 64 to 61 million years ago, during the early Paleocene (Tweto 1979). The Huerfano River has a well-developed floodplain. The river is sinuous with a channel slope of 2% or less as it flows to its confluence with Muddy Creek. The coyote-strapleaf willow (*Salix exigua* - *Salix ligulifolia*) riparian shrubland dominates this portion of the Huerfano River with pockets of plains cottonwood (*Populus deltoides* ssp. *monilifera*) and lance-leaf cottonwood (*Populus x acuminata*). This medium to tall willow shrub association occurs on saturated point bars and active stream channels along broad, sandy-bottom or braided streams in the foothills of Huerfano County. The association is dominated by strap-leaf willow (*Salix ligulifolia*) mixed with coyote or sandbar willow (*Salix exigua*). Other shrubs include whiplash willow (*Salix lucida* ssp. *caudata*), alder (*Alnus incana*), snowberry (*Symphoricarpos occidentalis*), river birch (*Betula occidentalis*), and Gambel's oak (*Quercus gambelii*). The floodplain is lined with willows with an occasional even-aged stand of plains cottonwood (*Populus deltoides* ssp. *monilifera*). The herbaceous layer is quite diverse. Common species include woolly sedge (*Carex pellita*), Nebraska sedge (*Carex nebrascensis*), Arctic sedge (*Juncus arcticus* ssp. *littoralis*), scratchgrass (*Muhlenbergia asperifolia*), cutleaf coneflower (*Rudbeckia laciniata*), common spikerush (*Eleocharis palustris*), and a variety of non-native plants. The soils are sandy clay loams with pockets of mucky peat. Back channels and ponds are located throughout the floodplain with standing water, cattails, and bulrushes. The riparian area supports numerous song birds, raptors, muskrats, beavers, deer, and elk with an occasional black bear.

Key Environmental Factors: Environmental factors include unimpeded stream flows, currently there are no major dams or diversions upstream. Other factors include climate change and effects of long-term drought.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Cultural Features: In 1910, the Town of Malachite had a population of 150 and two stores, a school, grist mill, and blacksmith due to copper mining. Redwing had a post office and

school by 1914. Both Redwing and Malachite schools remained open until the late 1950s (Keating 2011, Mitchell No Date).

Biodiversity Significance Rank Comments (B3): The site supports a large, fair (C-ranked) occurrence of a globally imperiled (G2G3/S2) riparian shrub plant community, coyote willow-strapleaf willow (*Salix exigua* - *S. ligulifolia*). This plant association is known only from Colorado and Wyoming, but is expected to occur in New Mexico. The strap-style gayfeather (*Liatris ligulistylis*), a globally common but state rare (G5?/S2) plant, was documented within the site in good (B-ranked) condition.

Natural Heritage element occurrences at the Huerfano River from Manzanares Creek to Mu

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 exigua</i> - <i>Salix ligulifolia</i> Shrubland	Strapleaf Willow - Coyote Willow	G2G3	S2				C	2015-07-05
Vascular Plants	<i>Liatris ligulistylis</i>	gay - feather	G5?	S2				B	2015-08-15

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

Boundary Justification: The boundary is drawn to encompass the ecological processes that support the Huerfano River and its side tributaries. Only private properties with written permission were field surveyed.

Protection Urgency Rank Comments (P4): The entire site is owned by private land owners. The majority of private landowners have conservation easements in place.

Management Urgency Rank Comments (M3): Weed management considerations include eradication of Russian olive and non-native forbs e.g., leafy spurge, Canada thistle, and common mullein.

References

Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

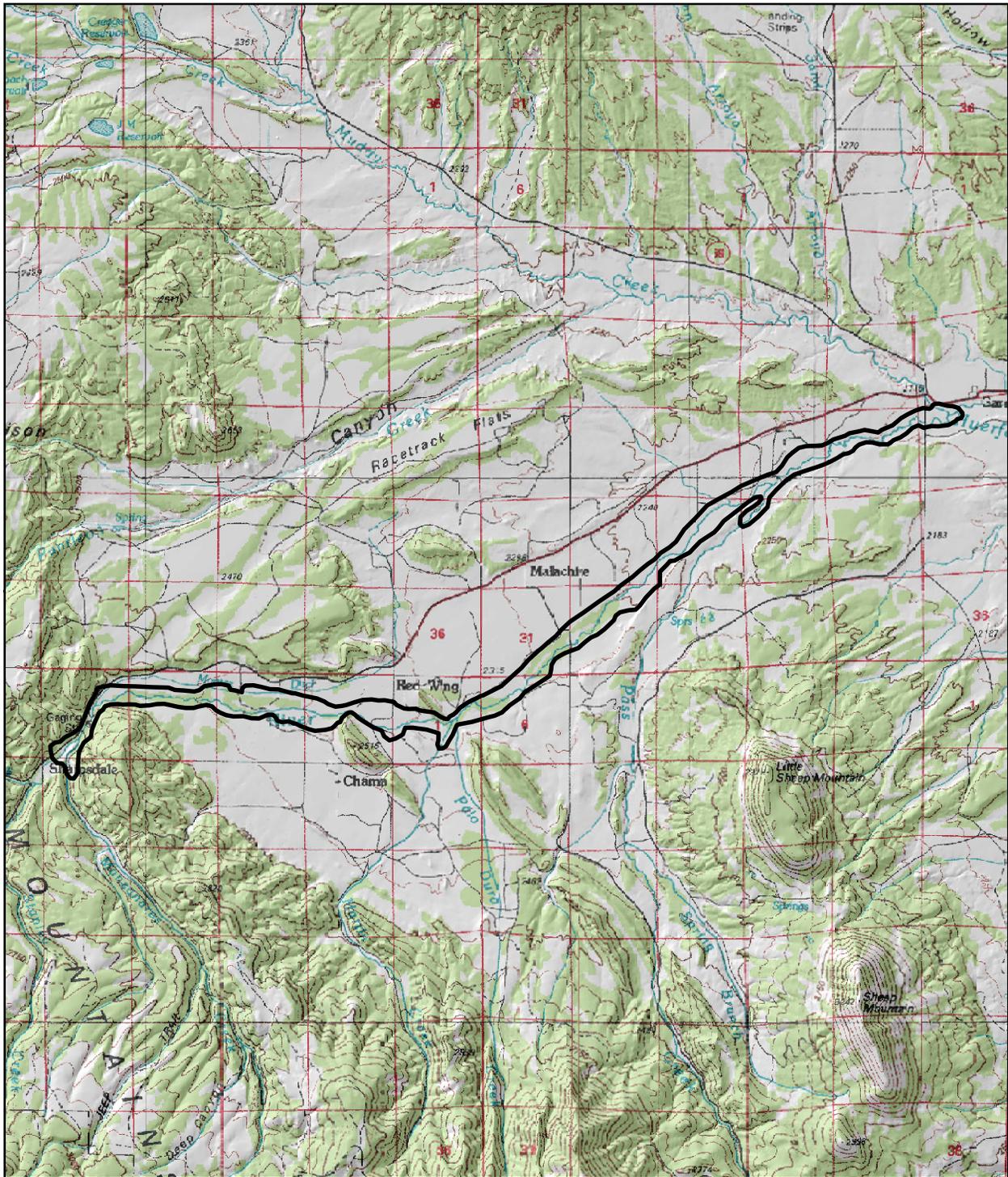
Keating, R. C. 2011. Colorado's Spanish Peaks Region: An Exploration Guide to History, Natural History, Trails, and Drives. Missouri Botanical Garden, St. Louis, MO.

Mitchell, K. No date. Huerfano County, Colorado, History. Online. Available: <http://www.kmitch.com/Huerfano/century.html>. Accessed in 2016.

Tweto, O. 1979. Geologic Map of Colorado, 1:500,000. United States Geological Survey, Department of Interior, and Geologic Survey of Colorado, Denver, CO.

Version Author: Culver, D.R.

Version Date: 10/13/2016



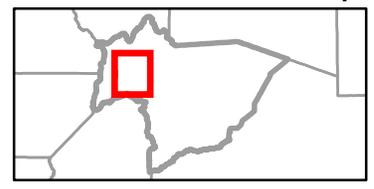
 PCA Boundary

 Miles
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Map Date: 02/19/2017 

30x60 Minute Digital Raster Graphics
by the U.S. Geological Survey
Blanca Peak, 37105-E1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Huerfano River from Manzanares Creek to Muddy Creek Potential Conservation Area, B3: High Biodiversity Significance

South Apache Creek

Biodiversity Rank - B3: High Biodiversity Significance

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

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

U.S.G.S. 7.5-minute quadrangles: Badito Cone, San Isabel, Hayden Butte

Size: 5,278 acres (2,136 ha)

Elevation: 6,830 - 11,660 ft. (2,082 - 3,554 m)

General Description: This site encompasses a deep canyon with rock outcrops and perennial streams composed of Douglas-fir, white fir, ponderosa pine, quaking aspen and Engelmann spruce.

Biodiversity Significance Rank Comments (B3): Genetically pure populations of the globally imperiled (G4T2T3/S2) greenback cutthroat trout (*Oncorhynchus clarkii stomias*) are historically known from the site. There is also an historical occurrence of the globally vulnerable (G3T3/S1B) Mexican spotted owl (*Strix occidentalis lucida*).

Natural Heritage element occurrences at the South Apache 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
Birds	<i>Strix occidentalis lucida</i>	Mexican Spotted Owl	G3G4T3T4	S1B,SU N	LT	ST		H	1990-06-99
Fish	<i>Oncorhynchus clarkii stomias</i>	Greenback Cutthroat Trout	G4T2T3	S2	LT	ST		H	1996-99-99

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

Boundary Justification: The boundary encompasses both elements and provides a buffer intended to limit direct disturbances to the immediate habitat. Note that foraging area of these birds possibly extends far outside of the site boundary, warranting landscape management that is compatible with the long-term viability of the site.

Protection Urgency Rank Comments (P5): The site is located on remote USFS land and part of an RNA.

Management Urgency Rank Comments (M4): Although not currently threatened, management may be needed in the future to maintain current quality of element occurrences.

Off-Site Considerations: Hydrological processes originating outside of the planning boundary, including water quality, quantity, timing and flow must be managed to maintain site viability.

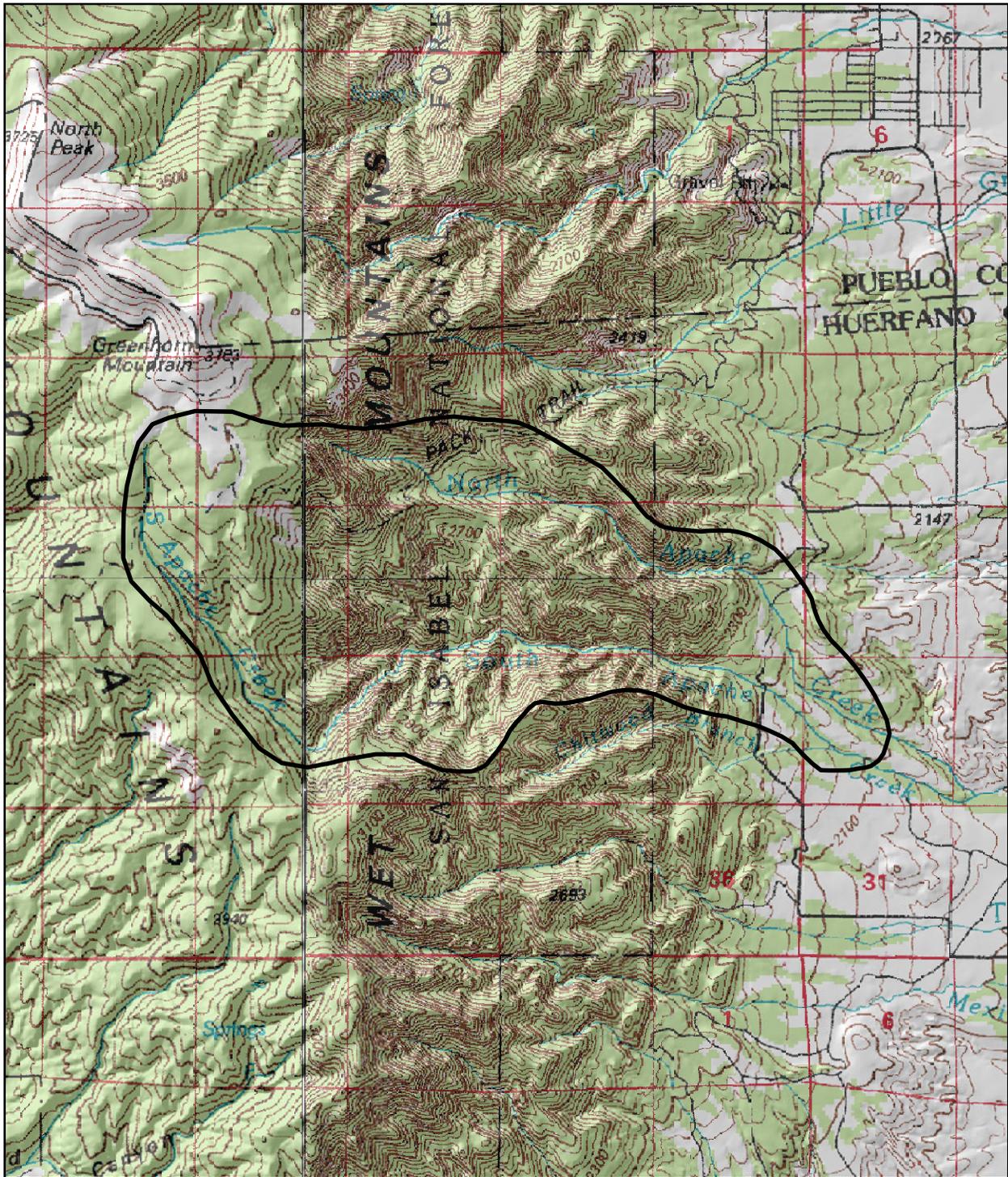
Information Needs: Current information on quality of cutthroat trout occurrences is needed. Lower South Apache Creek was dry in 2015.

References

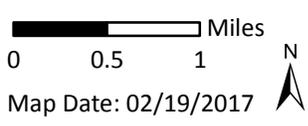
Brekke, E. and D. Gilbert. 1990. Bureau of Land Management Field Survey at South Apache Creek.

Version Author: Loar, A.M. and C.C. Fleming

Version Date: 06/20/1997

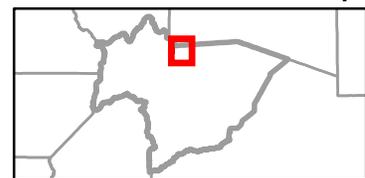


 PCA Boundary



30x60 Minute Digital Raster Graphics
 by the U.S. Geological Survey
 Walsenburg, 37104-E1
 Blanca Peak, 37105-E1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

South Apache Creek Potential Conservation Area, B3: High Biodiversity Significance

South Middle Creek

Biodiversity Rank - B3: High Biodiversity Significance

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

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

U.S.G.S. 7.5-minute quadrangles: McCarty Park, La Veta Pass

Size: 331 acres (134 ha)

Elevation: 8,000 - 8,600 ft. (2,438 - 2,621 m)

General Description: The South Middle Creek site is a tributary to Middle Creek, which eventually flows into the Cucharas River just northeast of the Town of La Veta. It is a first order stream that starts at La Veta Pass on the county border with Costilla County. Soils are sandy loam from the Sangre de Cristo Formation (USDA NRCS 2008). The headwaters begin in a narrow canyon with little floodplain to a wider reach with a floodplain between 25-100 ft wide. The riparian forest is an early- to mid-seral stage of a mature narrowleaf cottonwood (*Populus angustifolia*)-dominated plant associations and a diverse understory of willows and other shrubs. The shrub understory (15-85% cover) consistently includes two or more willow species of the following: coyote willow (*Salix exigua*), strap-leaf willow (*Salix ligulifolia*), Rocky Mountain willow (*Salix monticola*), and Drummond's willow (*Salix drummondiana*). New Mexico locust (*Robinia neomexicana*) is scattered throughout the shrub layer, as is whitestem gooseberry (*Ribes inerme*), snowberry (*Symphoricarpos occidentalis*), alder (*Alnus incana*), and chokecherry (*Prunus virginiana*) although none individually exceeds 10% cover. The herb layer is generally low in total cover (10-30% cover forbs, 10-15% cover graminoids). The herbaceous layer is low in cover but is very diverse and includes cow parsnip (*Heracleum maximum*), cutleaf coneflower (*Rudbeckia montana*), sneezeweed (*Hymenoxys hoopesii*), white checkerbloom (*Sidalcea candida*), and bog orchid (*Platanthera aquilonis*). The graminoid layer is dominated by longstyle rush (*Juncus longistylis*), swordleaf rush (*J. ensifolius*), knotted rush (*J. nodosus*), Nebraska sedge (*Carex nebrascensis*), meadow sedge (*C. praegracilis*), and woolly sedge (*C. pellita*). There are a few introduced species such as clover (*Trifolium* spp.), Kentucky bluegrass (*Poa pratensis*), and smooth brome (*Bromus inermis*). The uplands consist of Gambel's oak (*Quercus gambelli*) woodlands.

Key Environmental Factors: Key factors include seasonal flooding and no impediment of flows from water storage structures.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Biodiversity Significance Rank Comments (B3): The site supports a good (B-ranked) occurrence of a globally vulnerable (G3/S2) riparian woodland. This riparian woodland association is known from the Colorado Plateau, the San Juan Mountains, and the Great Basin areas of Colorado, Utah and Nevada. There are an estimated 20-50 occurrences in Colorado. Information on occurrences in Utah and Nevada is not available. The biophysical

conditions necessary for establishment of this association are also widespread. The process of cottonwood regeneration requires periodic flooding. Stands naturally occur in relatively small bands and patches throughout its range. Improper livestock grazing and flood control have undoubtedly decreased the areal extent of this plant association over the past 200 years and it continues to be threatened by improper livestock grazing, heavy recreational use, streamflow alterations, and invasion of exotic plants across its entire range.

Natural Heritage element occurrences at the South Middle Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Populus angustifolia / Salix (monticola, drummondiana, lucida) Woodland	Narrowleaf Cottonwood / Mixed Willows Montane Riparian Forest	G3	S2				B	2016-07-08

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

Boundary Justification: The boundary encompasses the entire immediate watershed from La Veta Pass to the confluence with Middle Creek main stem. The boundary includes a buffer to allow for flooding processes. Only private properties with written permission were field surveyed.

Protection Urgency Rank Comments (P3): The majority of the site is under private ownership, but numerous owners are conservation minded.

Management Urgency Rank Comments (M4): One management concern is to be proactive with invasive, non-native plants.

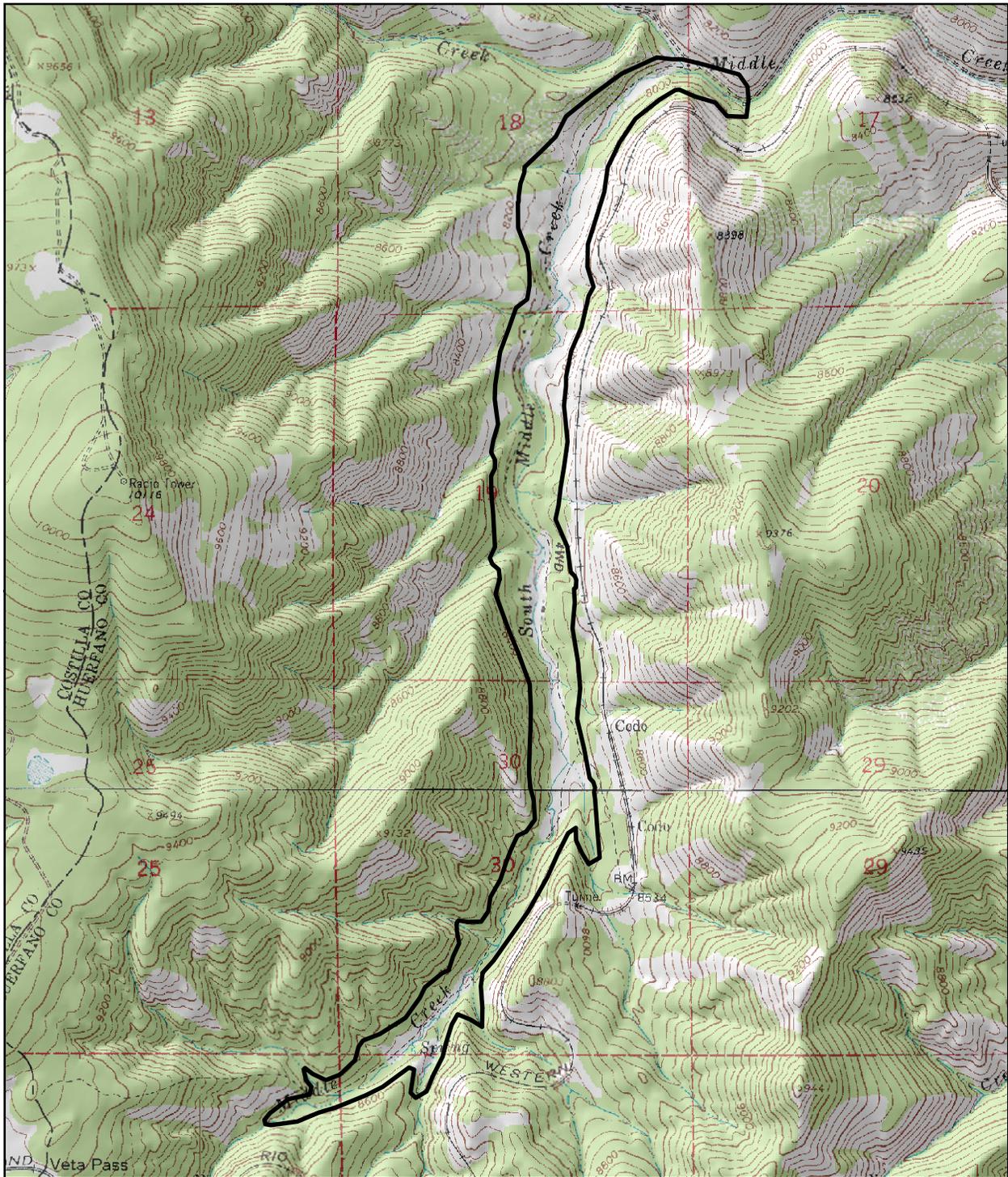
References

Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

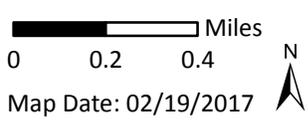
USDA Natural Resource Conservation Service. 2008. Soil Survey Geographic (SSURGO) Database for Huerfano County, Colorado. Fort Worth, TX: U.S. Environmental Protection Agency. 2010. Watershed Assessment, Tracking & Environmental Results database.

Version Author: Culver, D.R.

Version Date: 10/13/2016

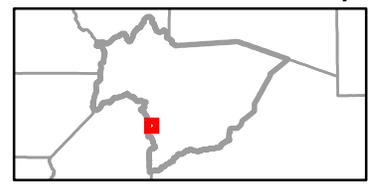


 PCA Boundary



7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
La Veta Pass, 37105-E2
McCarty Park, 37105-D2

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

South Middle Creek Potential Conservation Area, B3: High Biodiversity Significance

Stanley Creek

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: Mosca Pass, Red Wing

Size: 477 acres (193 ha)

Elevation: 8,400 - 11,000 ft. (2,560 - 3,353 m)

General Description: The Stanley Creek site is located on the north flank of Slide and Green mountains. Its headwaters are located on Slide Mountain and it is one of the major tributaries to the Huerfano River. The underlying geology is derived from sedimentary rocks of the Pennsylvanian Age, Minturn Formation (Tweto 1979). The riparian vegetation is a blue spruce / thin-leaf alder woodland which occurs in montane-subalpine riparian areas throughout Colorado, Wyoming and possibly New Mexico. This occurrence is in deep, shaded canyons and narrow valleys along Stanley Creek in small patches but continuous for several river miles. The Stanley Creek floodplains and stream benches are variable in width but are located in areas with cold-air drainage and limited sunlight. Soils are shallow and loamy sand over gravel, cobbles, or boulders. Vegetation is characterized by an open to moderately dense canopy (20-70% cover) that is strongly dominated by blue spruce (*Picea pungens*) with 10-70% cover in overstory. Other trees present include Douglas-fir (*Pseudotsuga menziesii*), narrowleaf cottonwood (*Populus angustifolia*), and Engelmann spruce (*Picea engelmannii*). White fir (*Abies concolor*) is present with 10% cover. There is evidence of regeneration with many seedlings and saplings recorded. The thick shrub understory is confined to a narrow band lining the stream channel. Shrub species include 35% cover of *Alnus incana*, 10% cover of Drummond's willow (*Salix drummondiana*), 10% cover each of Rocky Mountain willow (*Salix monticola*) and Rocky Mountain maple (*Acer glabrum*), and 0-10% cover of twinberry (*Lonicera involucrata*). Additional shrubs include wild rose (*Rosa woodsii*), shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*), prickly currant (*Ribes lacustre*), and elderberry (*Sambucus racemosa*). The forb layer is species-rich with a total of up to 50% cover. Forb species include baneberry (*Actaea rubra*), Rocky Mountain hemlock-parsley (*Conioselinum scopulorum*), cowbane (*Oxypolis fendleri*), Richard's geranium (*Geranium richardsonii*), cow parsley (*Heracleum maximum*), false lily of the valley (*Maianthemum stellatum*), stream bluebells (*Mertensia ciliata*), cutleaf coneflower (*Rudbeckia laciniata*), and horsetail (*Equisetum arvense*). Graminoids often include bluejoint reedgrass (*Calamagrostis canadensis*), mountain brome (*Bromus ciliatus*), rushes (*Juncus* spp.) and sedges (*Carex* spp.).

Key Environmental Factors: Key factors include snowmelt and unimpeded stream flows.

Biodiversity Significance Rank Comments (B3): The site supports an excellent (A-ranked) occurrence of a globally imperiled (G3/S3) riparian woodland, blue spruce / alder plant community (*Picea pungens* / *Alnus incana*). This riparian plant community is somewhat widespread, known from less than 100 occurrences in Colorado, Wyoming, and New Mexico. However, most occurrences are not in excellent condition, typically impacted

from improper livestock grazing and hydrological impacts.

Natural Heritage element occurrences at the Stanley Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Picea pungens / Alnus incana Woodland	Montane Riparian Forests	G3	S3				A	2015-07-07

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

Boundary Justification: The boundary is drawn to include known ecological processes to support the riparian woodland. The boundary extends from Stanley Creek's headwaters on Slide Mountain to its confluence with the Huerfano River.

Protection Urgency Rank Comments (P4): This site lies within the BLM, Royal Gorge Field Office and has very limited access, only by horse or foot.

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

References

Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

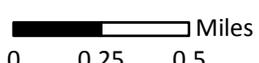
Tweto, O. 1979. Geologic Map of Colorado, 1:500,000. United States Geological Survey, Department of Interior, and Geologic Survey of Colorado, Denver, CO.

Version Author: Culver, D.R.

Version Date: 10/13/2016

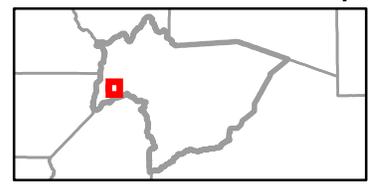


 PCA Boundary

 Miles
 0 0.25 0.5
 Map Date: 02/19/2017 

7.5 Minute Digital Raster Graphics
 by the U.S. Geological Survey
 Mosca Pass, 37105-F4
 Red Wing, 37105-F3

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Stanley Creek Potential Conservation Area, B3: High Biodiversity Significance

Upper Cucharas River

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: Cuchara

Size: 1,400 acres (567 ha)

Elevation: 7,200 - 8,400 ft. (2,195 - 2,560 m)

General Description: The Upper Cucharas River site is located in the scenic valley between La Veta and Cucharas. The Cucharas River headwaters are located at the base of Teddys Peak on the east flank of the Culebra Range. The Cucharas River and its main tributaries, Baker, Bonnet, Dodgeton, White creeks and the Chaparral River, flow north along Highway 12 which is intersected by several radiating dikes, e.g., Devils Stairstep. The underlying geology is comprised of sedimentary rocks from the Cuchara Formation (Tweto 1979). Soils are sandy loam with cobbles and gravel (USDA NRCS 2008). The vegetation consists of a riparian forest of narrowleaf cottonwood (*Populus angustifolia*) with a shrub layer dominated by river birch (*Betula occidentalis*), which is an indicator of a well-drained, rocky and coarse-textured alluvial soil. Water tables are generally between 0.5-4 m below the surface. The upper tree canopy is open (typically less than 60% cover) and is dominated by narrowleaf cottonwood, with boxelder (*Acer negundo*) occasionally co-dominating in late-seral stands. River birch forms a moderate to dense short-tree/tall-shrub canopy, often forming a thicket along the stream. Other species, such as New Mexico locust (*Robinia neomexicana*), alder (*Alnus incana*), Rocky Mountain maple (*Acer glabrum*) and several species of willow (*Salix ligulifolia*, *S. lucida* ssp. *lasiandra*, and *S. monticola*), may be present. The moderately dense short-shrub layer contains wild rose (*Rosa woodsia*), golden currant (*Ribes aureum*), and snowberry (*Symphoricarpos* spp.). The herbaceous layer may be sparse to dense, depending on the density of the shrub and tree layers. Common species include horsetail (*Equisetum arvense*), woolly sedge (*Carex pellita*), Nebraska sedge (*Carex nebrascensis*), beaked sedge (*Carex utriculata*), false lily of the valley (*Maianthemum stellatum*), yarrow (*Achillea millefolium*), and the non-natives smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), and Canada thistle (*Cirsium arvense*).

Key Environmental Factors: Key environmental factors include flooding processes and unimpeded groundwater discharge and recharge along the river corridor.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Land Use History: The Upper Cucharas Valley was once known as Nunda Canyon (nunda is an Indian word for potato), a crop that early settlers grew (Keating 2011).

Cultural Features: The word Cucharas means "spoon" in Spanish.

Biodiversity Significance Rank Comments (B3): The site supports a good (B-ranked) occurrence of a globally vulnerable (G3/S3) riparian woodland (*Populus angustifolia* / *Betula occidentalis*). Although this association appears stable, the condition of high-quality occurrences is extremely threatened because of easy access to this low-elevation community. Development, heavy recreational use, expansion and maintenance of roads and railroads, improper grazing, and modification of hydrologic processes threaten this community with the introduction of non-native species, accelerated erosion, and damage to native vegetation. Hydrologically modified streams may lack the processes necessary to regenerate the narrowleaf cottonwood tree canopy.

Natural Heritage element occurrences at the Upper Cucharas 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
Natural Communities	<i>Populus angustifolia</i> / <i>Betula occidentalis</i> Woodland	Montane Riparian Forest	G3	S3				B	2015-09-10

** 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 capture the ecological processes that support the riparian plant community. A buffer is included to define the floodplain and portions of tributaries. The site was designed using satellite and aerial photography. Only private properties with written permission were field surveyed.

Protection Urgency Rank Comments (P3): All of the site is under private ownership; however, numerous land owners are conservation minded.

Management Urgency Rank Comments (M4): Currently there are no known management concerns; however, introduction of invasive plants is always a possibility.

References

Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

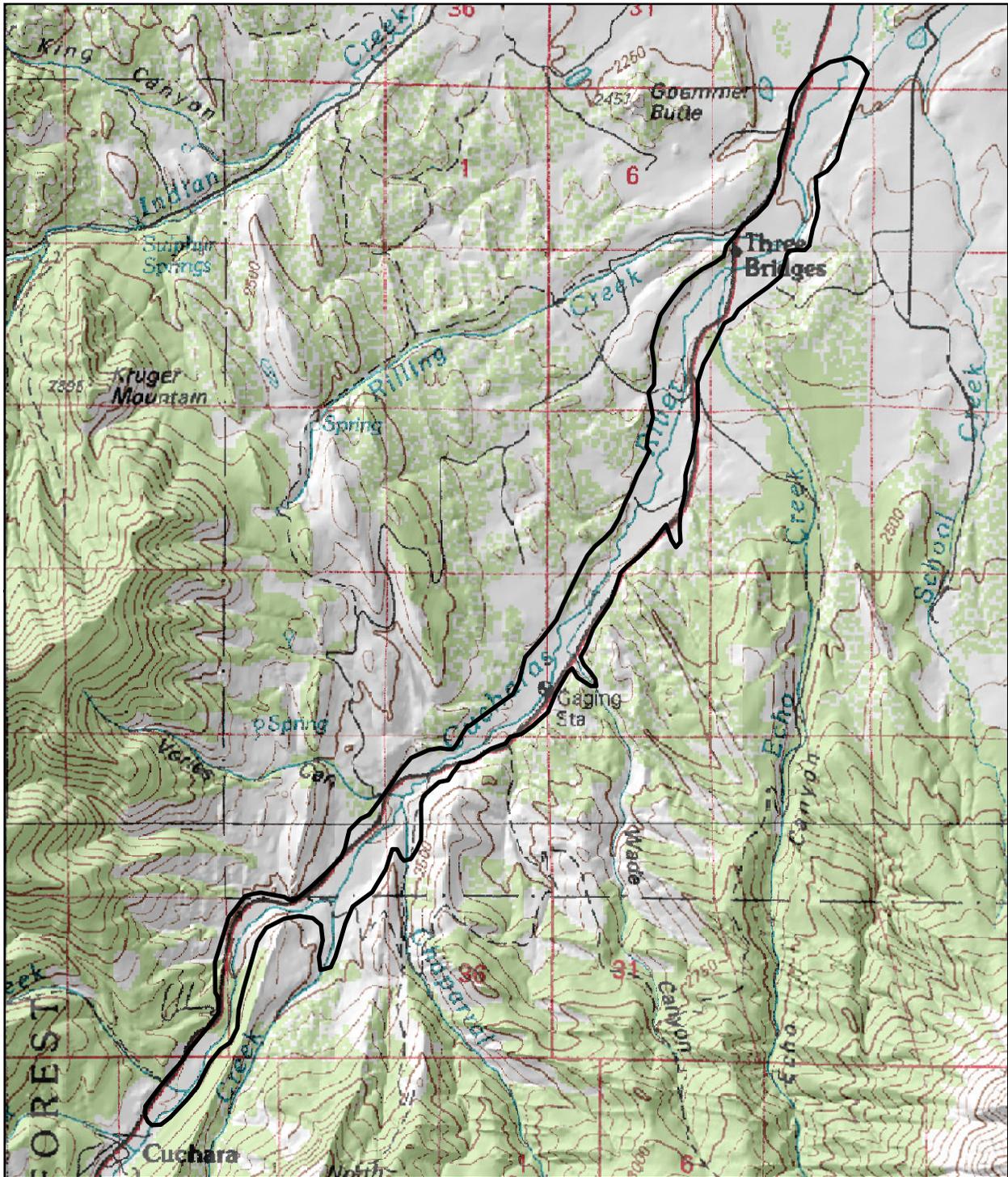
Keating, R. C. 2011. Colorado's Spanish Peaks Region: An Exploration Guide to History, Natural History, Trails, and Drives. Missouri Botanical Garden, St. Louis, MO.

Tweto, O. 1979. Geologic Map of Colorado, 1:500,000. United States Geological Survey, Department of Interior, and Geologic Survey of Colorado, Denver, CO.

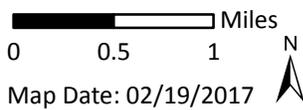
USDA Natural Resource Conservation Service. 2008. Soil Survey Geographic (SSURGO) Database for Huerfano County, Colorado. Fort Worth, TX: U.S. Environmental Protection Agency. 2010. Watershed Assessment, Tracking & Environmental Results database.

Version Author: Culver, D.R.

Version Date: 10/13/2016



 PCA Boundary



30x60 Minute Digital Raster Graphics
by the U.S. Geological Survey
Alamosa, 37105-A1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Upper Cucharas River Potential Conservation Area, B3: High Biodiversity Significance

Upper Huerfano River

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: Mosca Pass, Red Wing

Size: 953 acres (386 ha)

Elevation: 8,300 - 9,200 ft. (2,530 - 2,804 m)

General Description: The Upper Huerfano River site delineates the second order stream portion of the Huerfano River. The Huerfano River and its tributaries, Deep, Strawberry, Sheep and Stanley creeks, drain Blanca Peak located in the Sangre de Cristo Mountains. The Huerfano River flows northeast through the glacially carved valley, with its headwaters at Lily Lake at the base of Blanca Peak. The underlying geology consists of sedimentary rocks from the Madera and Sharpsdale Formations (Tweto 1979). The riparian vegetation is dominated by narrowleaf cottonwood (*Populus angustifolia*) with scattered white fir (*Abies concolor*) and aspen (*Populus tremuloides*) with a mix of Rocky Mountain willow (*Salix monticola*), strap-leaf willow (*S. ligulifolia*), Drummond's willow (*S. drummondiana*), and coyote willow (*S. exigua*). Other shrubs include thinleaf alder (*Alnus incana*), twinberry (*Lonicera involucrata*), Rocky Mountain maple (*Acer glabrum*), and chokecherry (*Prunus virginiana*). The understory is a mix of hay grasses with Nebraska sedge (*Carex nebrascensis*), beaked sedge (*C. utriculata*), and Arctic rush (*Juncus arcticus* ssp. *littoralis*). Numerous songbirds were observed as well as the American Dipper. The uplands are dominated by Gambel's oak and Douglas-fir woodlands.

Key Environmental Factors: Key factors include ample snowpack and unimpeded snowmelt flow.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Biodiversity Significance Rank Comments (B3): The site supports a good (B-ranked) example of a globally vulnerable (G3/S2) riparian woodland, narrowleaf cottonwood / willow (*Populus angustifolia* / *Salix* (*monticola*, *drummondiana*, *lucida*)). This riparian woodland association is known from the Colorado Plateau, the San Juan Mountains, and the Great Basin areas of Colorado, Utah and Nevada. There are an estimated 20-50 occurrences in Colorado. The biophysical conditions necessary for establishment of this association are also widespread. The process of cottonwood regeneration requires periodic flooding. Stands naturally occur in relatively small bands and patches throughout its range. Improper livestock grazing and flood control have undoubtedly decreased the areal extent of this plant association over the past 200 years.

Natural Heritage element occurrences at the Upper Huerfano 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
Natural Communities	Populus angustifolia / Salix (monticola, drummondiana, lucida) Woodland	Narrowleaf Cottonwood / Mixed Willows Montane Riparian Forest	G3	S2				B	2016-06-07

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

Other Values: An historical occurrence from 1977 for greenback cutthroat trout (*Oncorhynchus clarkii stomias*) is documented to the south of the PCA.

Boundary Justification: The boundary includes the second order portion of the Huerfano River, with buffers drawn to include adjacent tributaries.

Protection Urgency Rank Comments (P4): The site is mainly under private ownership, with conservation minded owners. The central portion runs through the publically owned Huerfano State Wildlife Area. This riparian plant association continues to be threatened by improper livestock grazing, heavy recreational use, streamflow alterations, and invasion of exotic plants across its entire range.

Management Urgency Rank Comments (M4): Management suggestions would be to avoid excess sedimentation from road maintenance activities from entering the watershed.

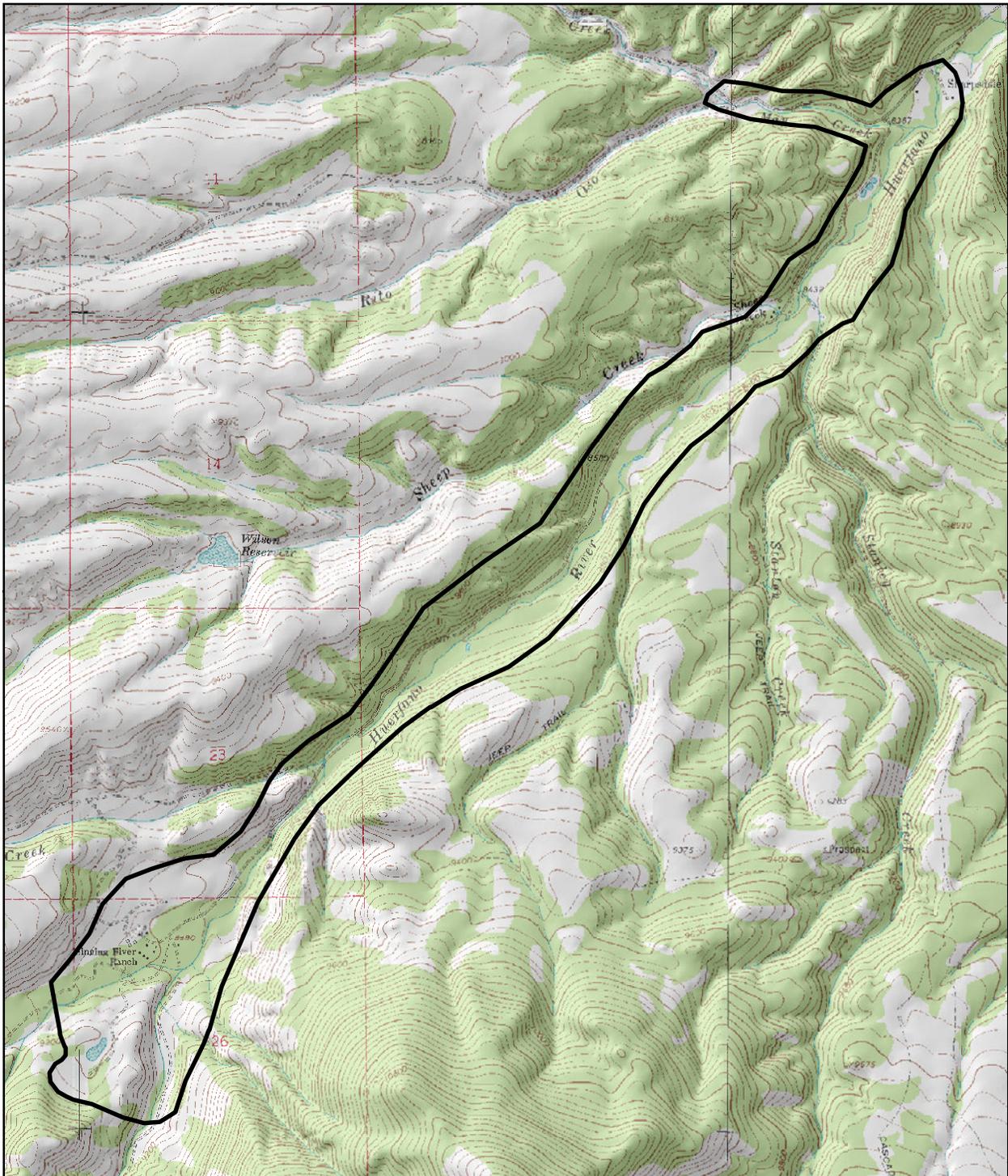
References

Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

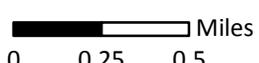
Tweto, O. 1979. Geologic Map of Colorado, 1:500,000. United States Geological Survey, Department of Interior, and Geologic Survey of Colorado, Denver, CO.

Version Author: Culver, D.R.

Version Date: 10/13/2016

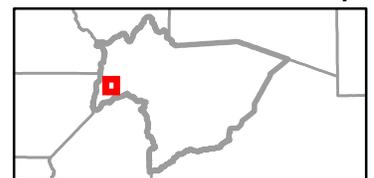


 PCA Boundary

 Miles
 0 0.25 0.5
 Map Date: 02/19/2017 

7.5 Minute Digital Raster Graphics
 by the U.S. Geological Survey
 Mosca Pass, 37105-F4
 Red Wing, 37105-F3

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Upper Huerfano River Potential Conservation Area, B3: High Biodiversity Significance

Vigil and Saint Vrain

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: South Rattlesnake Butte, Snowden Lake, North Rattlesnake Butte, Red Top Ranch, Goat Butte, Cedarwood, Capps Springs, Delhi, Jones Lake Spring, Little Dome, Hog Ranch Canyon, Chicos Well, Graneros Flats, Sanford Hills, Sun Valley Ranch, Hidden Valley Ranch, Doyle Bridge, Myers Canyon, Lascar, Cucharas Reservoir

Size: 362,501 acres (146,700 ha) **Elevation:** 4,800 - 5,800 ft. (1,463 - 1,768 m)

General Description: The site consists of about 150,000 acres of shortgrass prairie and juniper woodlands dissected by canyons formed by the Huerfano and Cucharas rivers and other smaller streams. Swales or arroyos start on the more level prairie and eventually cut down to bedrock to form canyons several hundred feet deep. Blue grama (*Bouteloua gracilis*) is the dominant prairie grass species, with galleta grass (*Hilaria jamesii*) also frequently found in abundance. Sand dropseed (*Sporobolus cryptandrus*) and ring muhly (*Muhlenbergia torreyi*) are present in variable quantities. Cholla (*Opuntia imbricata*) and yucca (*Yucca glauca*) generally occur in low to moderate abundance across the grasslands, but are occasionally abundant. Two major limestone ridges occur east of the Huerfano River, and several major sandstone ridges (e.g., The Beardsley and Turkey Ridge) are found within the site. One-seeded juniper (*Juniperus monosperma*) woodlands, occasionally co-dominated by pine (*Pinus edulis*), are found across many of these ridges, with an understory generally dominated by sideoats grama (*Bouteloua curtipendula*), blue grama, galleta grass, and hairy grama (*Bouteloua hirsuta*). Ponderosa pine (*Pinus ponderosa*) is scattered around the some of the canyons and outcrops at higher elevations. Elevations range from approximately 4800 feet at the north end of the ranch to 5800 feet at the southern end of the ranch. The fauna of the area is typical of the southern shortgrass prairie, but with the addition of some montane elements. Atypically for a system east of the Rocky Mountains, the ranch supports populations of elk, both whitetail and mule deer, pronghorn, swift and red fox, and coyotes. Both mountain lion and bear signs have been seen on the ranch. Only a few small prairie dog towns still exist. Riparian and wetland areas consist of small canyons with intermittent streams, splash pools, some permanent pools associated with springs, the Huerfano and Cucharas rivers which do occasionally cease flowing during dry periods (Rick Tune, personal communication), and ephemeral shallow ponds (playa lakes). The riparian and wetland areas receive heavy cattle use. In the canyons, riparian and wetland vegetation consists of either non-native weeds (e.g., tamarisk (*Tamarix ramosissima*), kochia (*Bassia sieversiana*), and Russian thistle (*Salsola australis*)), non-native grass species (e.g., Kentucky bluegrass (*Poa pratensis*) and redtop (*Agrostis stolonifera*)), or native species strongly resistant to grazing (e.g., alkali muhly (*Muhlenbergia asperifolia*) and threesquare (*Scirpus pungens*)). The portion of the Huerfano River at the north end of the site contains plains cottonwood (*Populus deltoides*) plant communities that probably resemble their native state, however non-native species, especially tamarisk but also Russian olive (*Elaeagnus*

angustifolia), are still common to abundant, and the native herbaceous vegetation tends to be composed of increasers (e.g., saltgrass (*Distichlis spicata*)). Cottonwood regeneration is abundant on this part of the river.

Land Use History: The area southeast of Colorado has a rich history that extends from inhabitation by indigenous peoples through the earliest settlements of Europeans, to the current ranching culture adjacent a growing urban center, the city of Pueblo. This region of the Great Plains was known to be inhabited by large herds of bison, therefore also the Indian tribes. Trappers, explorers, and settlers mentioned the Huerfano River and its canyon as prominent landmarks and waters. However, little is mentioned about the area of the watershed on the current Butler Ranch. However, the ranch is part of the original Vigil St. Vrain Spanish Land Grant.

Biodiversity Significance Rank Comments (B3): This site contains good (B-ranked) and fair (C-ranked) occurrences of globally vulnerable communities, a fair (C-ranked) occurrence of the globally vulnerable (G3/S3) swift fox (*Vulpes velox*), good (B-ranked) and fair (C-ranked) occurrences of the state critically imperiled (G5?/S1S2) Elton's lip fern (*Cheilanthes eatonii*), several extant and fair (C-ranked) occurrences of the state rare (G4/S3) black-tailed prairie dog (*Cynomys ludovicianus*), and one fair occurrence of Simius roadside skipper (*Amblyscirtes simius*) that is vulnerable in Colorado (G4/S3). The globally rare Colorado checkered whiptail (*Aspidoscelis neotesselata*) is historically known from the site.

Natural Heritage element occurrences at the Vigil and Saint Vrain 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>Amblyscirtes simius</i>	Simius Roadside Skipper	G4	S3				C	1994-06-05
Mammals	<i>Vulpes velox</i>	Swift Fox	G3	S3		SC	BLM/US FS	C	2009-05-29
Mammals	<i>Cynomys ludovicianus</i>	Black - tailed Prairie Dog	G4	S3		SC	BLM/US FS	E	2009-06-18
Mammals	<i>Cynomys ludovicianus</i>	Black - tailed Prairie Dog	G4	S3		SC	BLM/US FS	E	2009-05-21
Mammals	<i>Cynomys ludovicianus</i>	Black - tailed Prairie Dog	G4	S3		SC	BLM/US FS	C	2009-05-27
Mammals	<i>Cynomys ludovicianus</i>	Black - tailed Prairie Dog	G4	S3		SC	BLM/US FS	C	2002-06-27
Natural Communities	<i>Bouteloua gracilis</i> - <i>Pleuraphis jamesii</i> Herbaceous Vegetation	Shortgrass Prairie	G2G4	S2				B	1996-10-30
Natural Communities	<i>Bouteloua gracilis</i> - <i>Pleuraphis jamesii</i> Herbaceous Vegetation	Shortgrass Prairie	G2G4	S2				C	1998-09-12
Natural Communities	<i>Bouteloua gracilis</i> - <i>Pleuraphis jamesii</i> Herbaceous Vegetation	Shortgrass Prairie	G2G4	S2				B	2009-05-21
Natural Communities	<i>Panicum obtusum</i> Herbaceous Vegetation	Vine - mesquite Herbaceous Vegetation	G3?	S2				B	1998-09-12
Natural Communities	<i>Juniperus monosperma</i> / <i>Bouteloua curtipendula</i> Woodland	Foothills Pinyon - Juniper Woodlands	G5	S1S2				B	1996-10-30
Natural Communities	<i>Juniperus monosperma</i> / <i>Bouteloua gracilis</i> Woodland	Foothills Pinyon - Juniper Woodlands	G5	S1				B	1996-10-30
Natural Communities	<i>Opuntia imbricata</i> Ruderal Shrubland	Shortgrass Prairie	GNA	S1				B	1996-10-30
Reptiles	<i>Aspidoscelis neotesselata</i>	Colorado Checkered Whiptail	G2G3	S2		SC		H	1988-09-06
Vascular Plants	<i>Cheilanthes eatonii</i>	Eaton's lip fern	G5?	S1S2				C	2009-06-17

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	Cheilanthes eatonii	Eaton's lip fern	G5?	S1S2				B	1996-10-30

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

Boundary Justification: The boundaries for this site were generated from maps and aerial photos from the Pueblo and Huerfano county soils surveys. The boundary includes 80,000 acres that were field surveyed and an additional 100,000 acres that are similar habitat. Lands to the south and north show evidence of alteration for agricultural purposes. The eastern boundary is a natural break in the dissected nature of the landscape (assumed to be somewhat of a barrier for the elk). The western boundary generally follows the Huerfano River but the ecological boundaries may still extend to the west.

Protection Urgency Rank Comments (P3): This site is located about 20 miles southeast of Pueblo and therefore is conceivably within the range of suburban expansion over the long term. Large ranches in the vicinity of this site have been sold to development firms.

Management Urgency Rank Comments (M3): Management needs vary considerably across the site. Parts of the site support well-managed cattle operations. The shortgrass prairie and juniper woodlands are dominated by native species and ecological processes appear to be intact. Some restoration or special management actions are needed in the riparian areas to return the plant communities to more natural condition.

Information Needs: Further Inquiry: How closely does the current flow regime in the Huerfano River approximate the historic flow regime? Monitor tamarisk and Russian olive. What is the success rate of the tamarisk seedlings? Is the total cover of tamarisk increasing? Are the numbers of Russian olive trees increasing? Potential habitat exists for six globally imperiled and five state rare plant species: *Oxybaphus rotundifolius* has been documented between Pueblo and Canon City on the Smoky Hill Member of Niobrara Shale and on Fort Hayes Limestone at the junction of this formation with the Niobrara Formation. Fort Hayes and Greenhorn limestones are the limestones found at the site (pers. comm. Rich Rhoades 1996) and appear to be broken in larger fragments than the shales and limestones that support typical *O. rotundifolius* occurrences to the northwest. Overall, the potential of locating *O. rotundifolius* on the site is low to moderate. *Nuttallia chrysantha* is known from Niobrara shale and Bentonite clay outcrops in the Arkansas Valley between Canon City and Pueblo. *N. chrysantha* has not been documented in Pueblo County, and the site is about 50 miles from the closest known occurrence. During our survey we covered approximately 40% of the potential habitat for this species. Given the persistent quality of the stems and fruit of *N. chrysantha*, it is likely that we would have seen this species if it was present. However, the potential of finding this species during future surveys should not be ruled out. The potential of locating *N. chrysantha* on the site is low to moderate. *Oonopsis puebloensis* is known from exposures of Niobrara shale between Canon City and Pueblo. This is a newly described species (Greg Brown, in press) so wide ranging inventories have not been

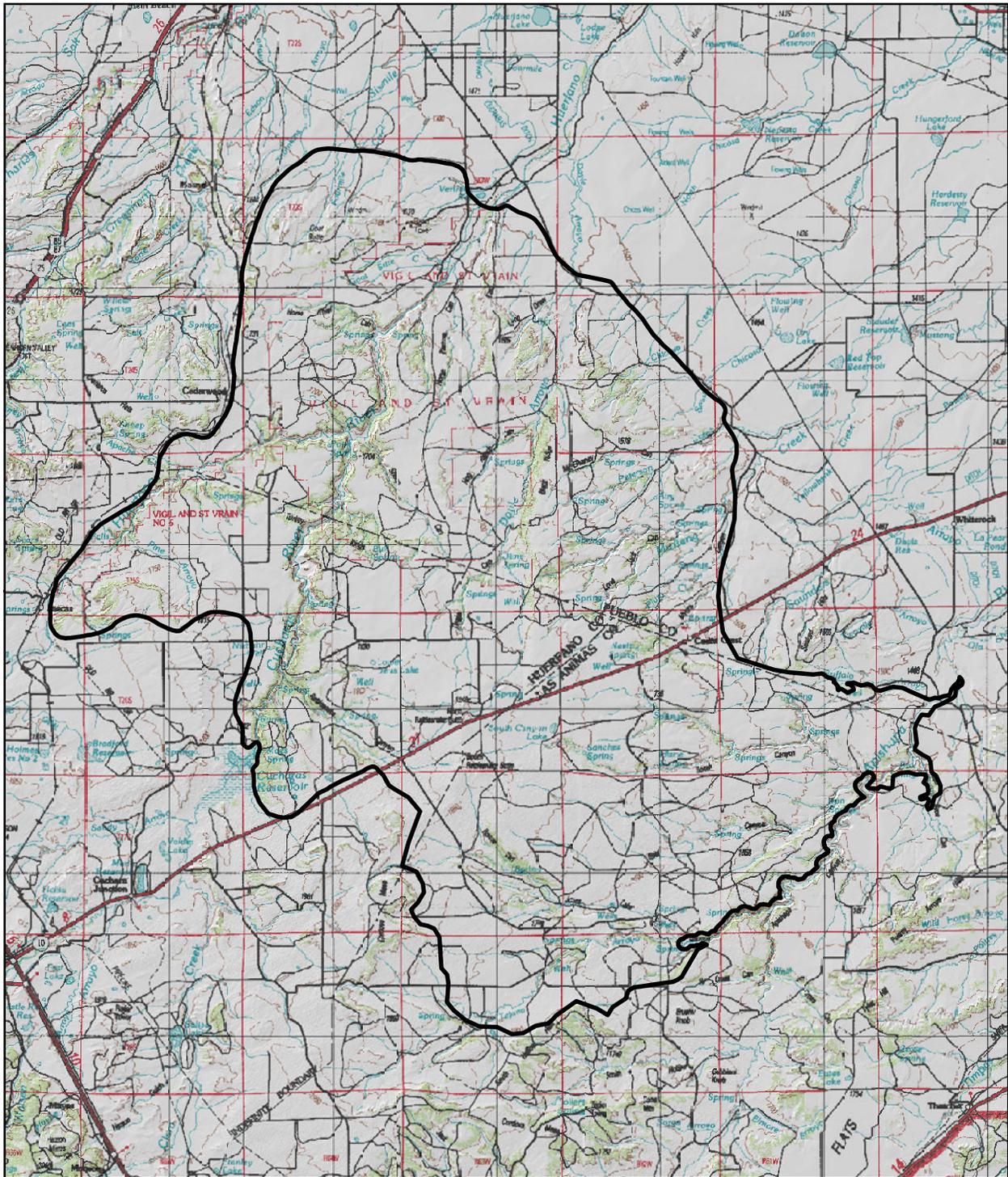
conducted nor have specific habitat requirements been determined. The closest occurrence of this species to the site is about 25 miles. Overall, the potential of locating *O. puebloensis* is low to moderate, although it is likely that future inventories in southeastern Colorado will locate additional occurrences. *Bolophyta tetraneuris* is known from limestone and shale outcrops of the Niobrara and Dry Union formations. It is the most common of the globally rare species that we believe have potential for occurring on the site. The site is about 25 miles from the closest known occurrence of this species. Overall, the potential of locating *B. tetraneuris* is moderate. *Asclepias uncialis* has been found historically in a wide variety of habitats in short grass prairie systems. The closest occurrence of this species to the site is about 10 miles away. It is highly likely that this species exists at the site. *Frasera coloradensis* has been documented in areas closely associated with greenhorn limestone, Graneros shale, and Dakota sandstone in similar ecological settings to the site. This species is known from a global range of about 25 miles x 75 miles in an area about 50 miles from the site. Overall, the potential for locating *F. coloradensis* is low to moderate. *Notholaena standleyi*, *Cheilanthes wootonii*, *Pellaea atropurpurea*, *Pellaea wrightiana*, and *Asplenium platyneuron* are state rare fern species that could occur on the sandstone outcrops of the area. Extensive inventory of the animals is warranted. The butterflies of the area are poorly known. Also we need more information about the fish community of the Huerfano River.

References

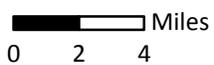
Kettler, S.M., J. Sanderson, S. Spackman, D. Clark, and E. VanWie. 1996. Colorado Natural Heritage Program Field Survey to the Butler Ranch.

Version Author: Spackman, S.C.

Version Date: 09/16/2003



 PCA Boundary

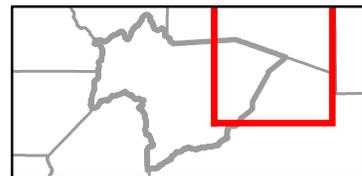
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Map Date: 02/19/2017



1x2 Degree Digital Raster Graphics
by the U.S. Geological Survey
Trinidad, 37104-A1
Pueblo, 38104-A1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Black Hawk Playas

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: Santa Clara

Size: 523 acres (212 ha)

Elevation: 6,810 - 6,900 ft. (2,076 - 2,103 m)

General Description: Black Hawk Playa is located within a small intermountain basin between Black Hawk Canyon and Schultz Canyon in south-central Huerfano County. The site encompasses numerous playas, freshwater, shallow, depressional wetlands with clayey soils (USDA NRCS 2008), that fill seasonally with precipitation. This site is located on sedimentary rocks of the Poison Canyon geologic formation common in this portion of the County (Tweto 1979). Soils are classified as Noden-Bond loam typical of playa wetlands. The dominant plant communities change with the fluctuating water levels, giving the overall appearance of "bath tub rings" within the playa. The outer, driest ring is dominated by stiff greenthread (*Thelesperma filifolium*), wedge-leaf frogfruit (*Phyla cuneifolia*), western wheatgrass (*Pascopyrum smithii*), foxtail (*Hordeum jubatum*), skeletonleaf bur ragweed (*Ambrosia tomentosa*), poison suckleya (*Suckleya suckleyana*), spreading yellowcress (*Rorippa sinuata*), and gumweed (*Grindelia squarrosa*). The next ring is a mudflat with saturated clayey soils, dominated by common spikerush and needle spikerush (*Eleocharis palustris* and *E. acicularis*), water mudwort (*Limosella aquatica*), and bushy knotweed (*Polygonum ramosissimum*). The center ring with standing water is dominated by hairy waterclover (*Marsilea vestiga*), water buttercup (*Ranunculus aquatilis*), and spikerushes. The soil profile within the mudflat is gleyed with 10-20% mottles with clayey sand texture. The uplands are dominated by pinon pine and one-seeded juniper shrubland.

Key Environmental Factors: Key factors include summer precipitation and deposition of fine sediments within the playa basins.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Land Use History: The site is located on private and State Wildlife lands. Grazing is the dominant use and the site was grazed moderately at the time of the survey. There is no evidence of damming or altering the playas for cattle.

Biodiversity Significance Rank Comments (B4): The site supports a fair (C-rank) occurrence of a globally common (G5/S5) common spikerush herbaceous plant community. This plant community is very common; however, the wetland type, playa, is not as common, especially within Huerfano County. This site represents an integral component of the biodiversity of the County and Colorado.

Natural Heritage element occurrences at the Black Hawk Playas 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	Eleocharis palustris Herbaceous Vegetation	Emergent Wetland	G5	S5				C	2015-07-14

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

Boundary Justification: The boundary includes the playas that were identified from satellite imagery and field surveys. Playas are not connected to adjacent creeks and canyons. Precipitation is water source, so riparian areas were not included. Not all playas were accessed for the field survey. Only properties with written permission from landowners and lessees were ground surveyed.

Protection Urgency Rank Comments (P3): The ownership of the site is both State and privately owned. The State portion is leased for cattle production.

Management Urgency Rank Comments (M2): Suggested management items include moving the cattle more frequently so that the level of water and the water chemistry are not adversely impacted.

Land Use Comments: Need to contact the private land owner/lessee before accessing the site.

References

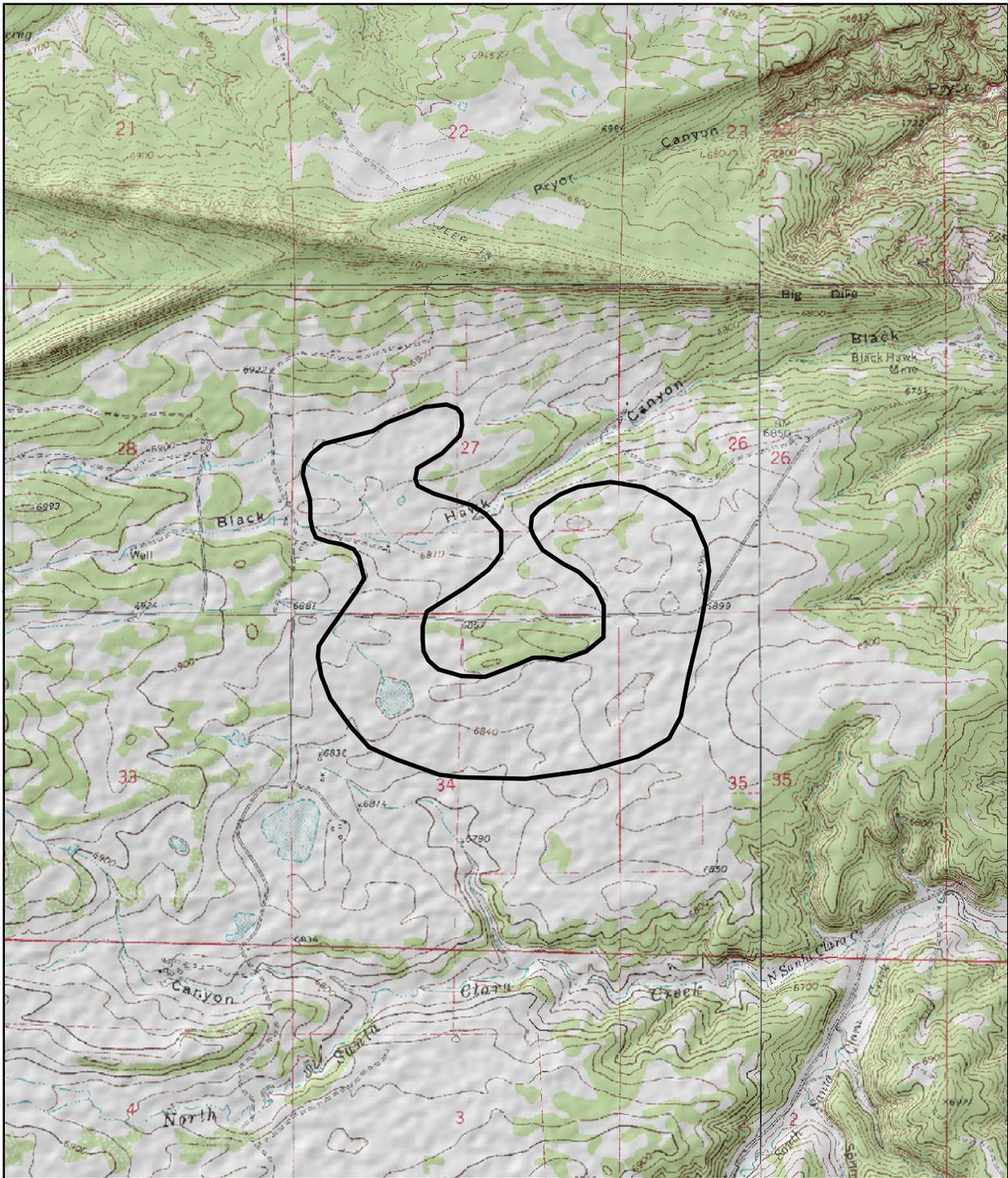
Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

Tweto, O. 1979. Geologic Map of Colorado, 1:500,000. United States Geological Survey, Department of Interior, and Geologic Survey of Colorado, Denver, CO.

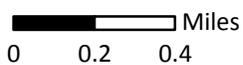
USDA Natural Resource Conservation Service. 2008. Soil Survey Geographic (SSURGO) Database for Huerfano County, Colorado. Fort Worth, TX: U.S. Environmental Protection Agency. 2010. Watershed Assessment, Tracking & Environmental Results database.

Version Author: Culver, D.R.

Version Date: 10/13/2016



 PCA Boundary

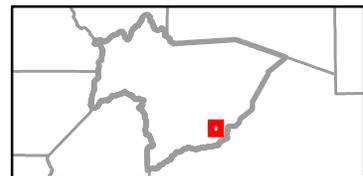
 Miles
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Map Date: 02/19/2017



7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
Santa Clara, 37104-D7

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Black Hawk Playas Potential Conservation Area, B4: Moderate Biodiversity Significance

Greenhorn Mountain Wetland

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

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

U.S.G.S. 7.5-minute quadrangles: San Isabel

Size: 2,238 acres (906 ha)

Elevation: 11,170 - 11,460 ft. (3,405 - 3,493 m)

General Description: The Greenhorn Mountain Wetland site is a subalpine wetland meadow along the western flank of Greenhorn Peak (12,334) which is the highest summit of the Wet Mountains. Throughout the wet meadow are hummocks and small ponds with floating mats of sedges. The soils are peaty muck with 5% mottling within several soil pits (USDA NRCS 2008). Wetland-dependent graminoids dominate the meadow and include tall cottongrass (*Eriophorum angustifolium*), aquatic sedge (*Carex aquatilis*), beaked sedge (*C. utriculata*), tufted hairgrass (*Deschampsia cespitosa*), bluejoint reedgrass (*Calamagrostis canadensis*), Drummond's rush (*Juncus drummondii*), and wood rush (*Luzula spicata*). Forbs constitute about 25% cover and include Rocky Mountain hemlockparsley (*Conioselinum scopulorum*), marsh marigold (*Caltha leptosepala*), elephant head lousewort (*Pedicularis groenlandica*), stonecrop (*Rhodiola rhodantha*), and felwort (*Swertia perennis*). Shrubs within the wetland are less than 10% cover and include planeleaf willow (*Salix planifolia*), Rocky Mountain willow (*S. monticola*), and shrubby cinquefoil (*Dasiphora floribunda*). The surrounding uplands consist of Engelmann spruce (*Picea engelmannii*) forest.

Key Environmental Factors: Snowmelt and spring discharge from the adjacent wet mountains is key to maintaining the site's hydrology.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Land Use History: Area has been utilized by ranching and recreation.

Biodiversity Significance Rank Comments (B4): The site contains a good (B-ranked) occurrence of a globally common (G5/S5) water sedge-beaked sedge (*Carex aquatilis* - *C. utriculata*) wetland.

Natural Heritage element occurrences at the Greenhorn Mountain Wetland PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Carex aquatilis - Carex utriculata Herbaceous Vegetation	Montane Wet Meadows	G4	S4				B	2016-09-02

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

Other Values: There is a large population of tall cottongrass (*Eriophorum angustifolium*), a globally common wetland plant.

Boundary Justification: The boundary is drawn to include the immediate ecological processes with a buffer that includes the slope above the site to maintain the hydrologic connections.

Protection Urgency Rank Comments (P4): The entire site falls within the jurisdiction of the Pike-San Isabel National Forest. It is impacted by cattle trailing in many areas, thus creating ditches that are slowly draining the wetland.

Management Urgency Rank Comments (M2): Improper cattle grazing is impacting the wetland to the degree that it will be lost within 5 years. Field observations noted areas that were drying out due to cattle trailing/pugging that creates ditches and eventually drains portions of the wet meadow.

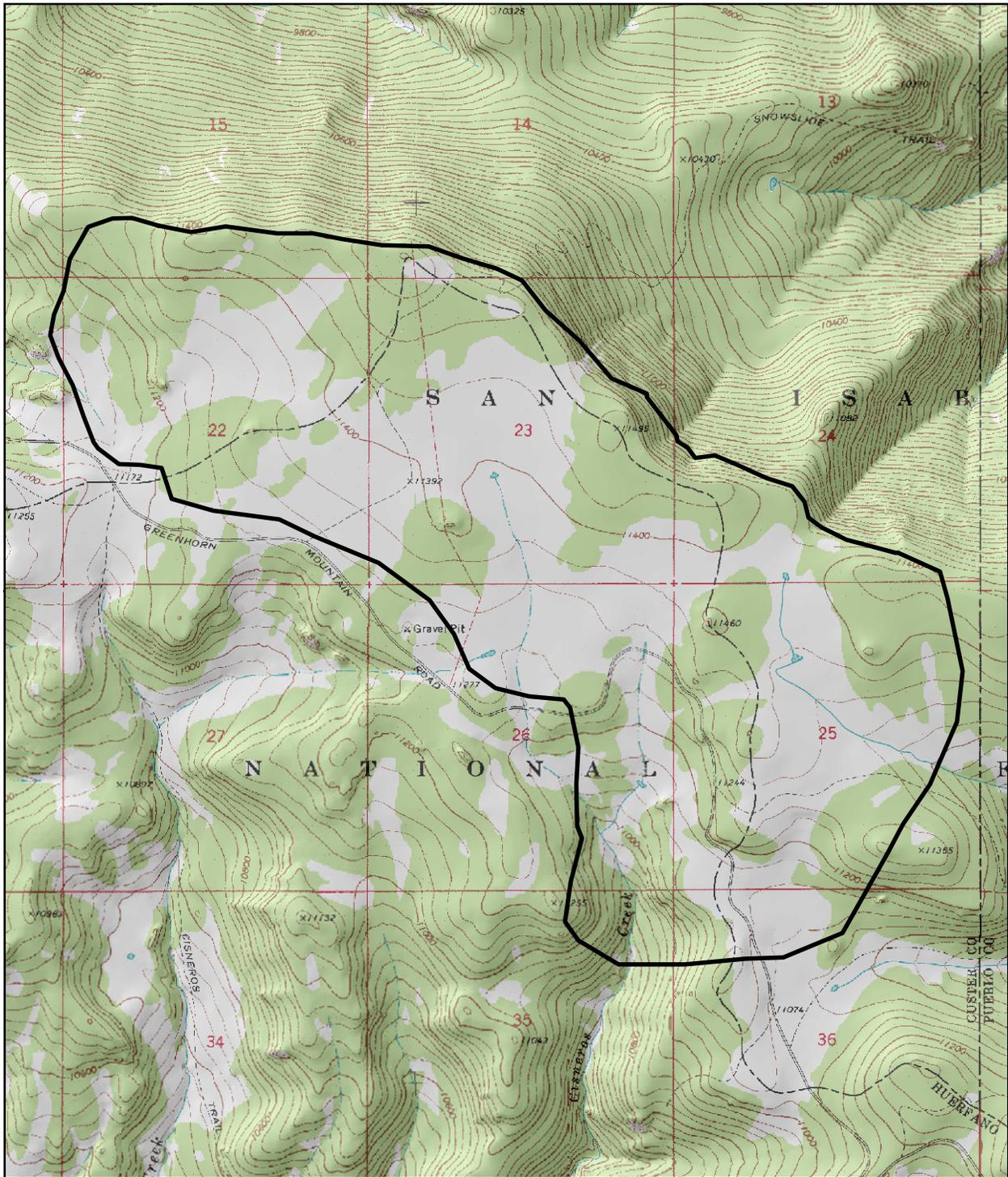
References

Culver, D.R. and P. Smith. 2017. CNHP Final Report: Survey of Critical Wetland Resources in Huerfano, CO. Colorado Natural Heritage Program, Fort Collins, CO.

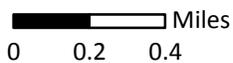
USDA Natural Resource Conservation Service. 2008. Soil Survey Geographic (SSURGO) Database for Huerfano County, Colorado. Fort Worth, TX: U.S. Environmental Protection Agency. 2010. Watershed Assessment, Tracking & Environmental Results database.

Version Author: Culver, D.R.

Version Date: 10/13/2016



 PCA Boundary

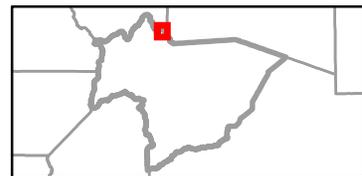
 Miles
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Map Date: 02/19/2017



7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
San Isabel, 37105-H1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Greenhorn Mountain Wetland Potential Conservation Area, B4: Moderate Biodiversity Significance

Hezron Gulch

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P?: Unknown

Management Urgency Rank - M?: Unknown

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

Size: 483 acres (195 ha)

General Description: The site includes grasslands and barren areas surrounding Hezron Gulch and nearby streams, just west of an interstate.

Biodiversity Significance Rank Comments (B4): This site includes large roadside occurrences of a globally rare (G3/S3) plant, Arkansas Valley evening primrose (*Oenothera harringtonii*).

Natural Heritage element occurrences at the Hezron 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>Oenothera harringtonii</i>	Arkansas Valley evening primrose	G3	S3				C	2003-06-05
Vascular Plants	<i>Oenothera harringtonii</i>	Arkansas Valley evening primrose	G3	S3				E	1998-06-04

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

Boundary Justification: This site includes the roadside occurrence and some additional suitable habitat to allow additional plants to establish over time.

Protection Urgency Rank Comments (P?): Protection rank unknown.

Management Urgency Rank Comments (M?): Management urgency rank unknown.

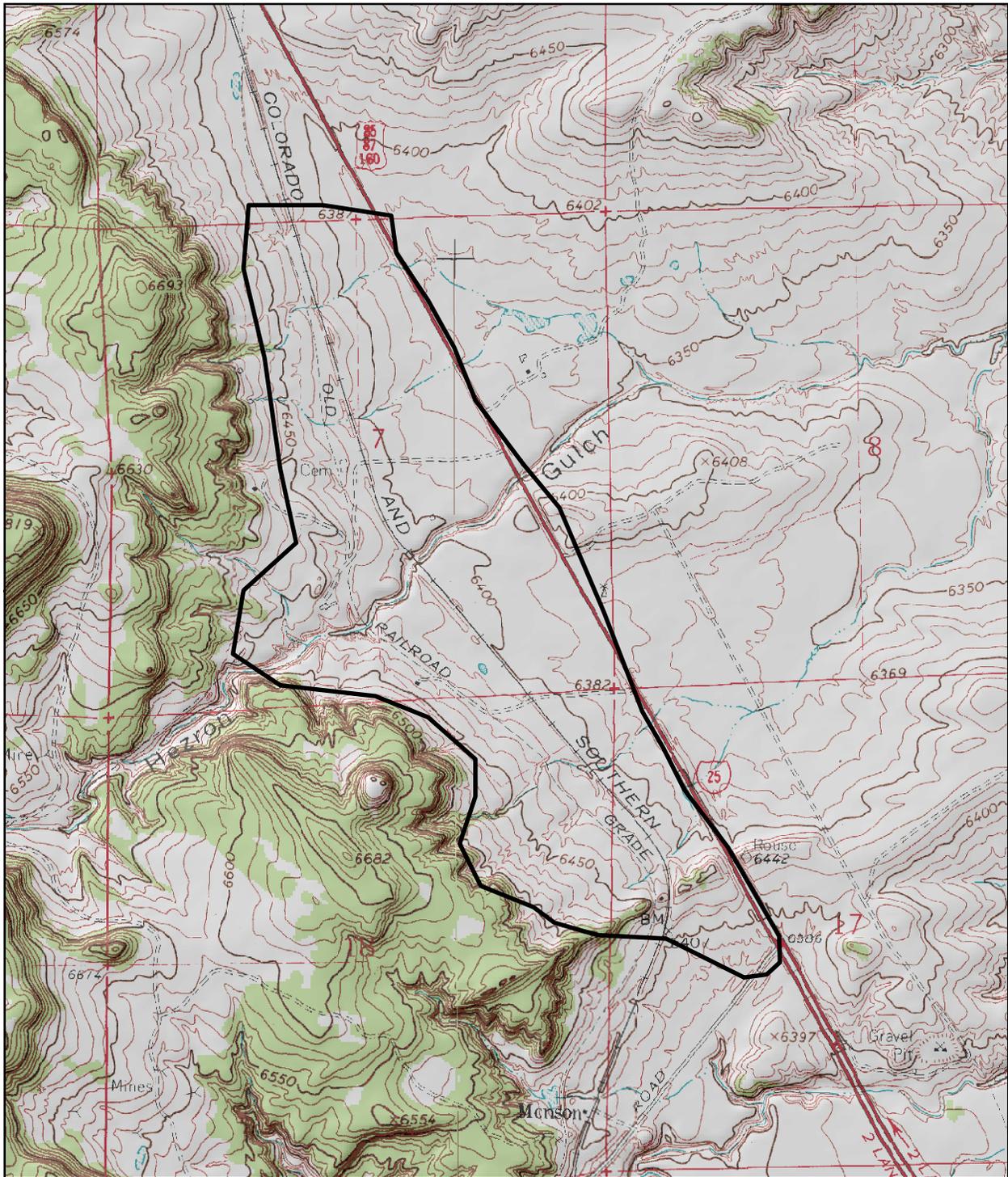
References

Abbott, R. 2003. Colorado Natural Heritage Program Field Survey.

Spackman, S. and K. Fayette. 1998. Colorado Natural Heritage Program Field Survey of the Arkansas Watershed.

Version Author: Fayette, K.K.

Version Date: 12/21/1998



 PCA Boundary

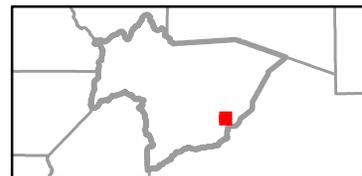
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Map Date: 02/19/2017



7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
Pryor, 37104-E6

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Hezron Gulch Potential Conservation Area, B4: Moderate Biodiversity Significance

Huerfano River from Gardner to Farista

Biodiversity Rank - B4: Moderate Biodiversity Significance

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

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

U.S.G.S. 7.5-minute quadrangles: Gardner, Badito Cone, Farisita

Size: 1,186 acres (480 ha)

Elevation: 6,600 - 6,920 ft. (2,012 - 2,109 m)

General Description: The Huerfano River from Gardner to Farista site drains Huerfano Park and the eastern slope of the Sangre de Cristo Mountains and the southern flank of the Wet Mountains. The major tributaries that confluence with the Huerfano River include: Muddy, Williams, Turkey, and Oak creeks. The site lies completely on the Nacimiento Formation, a sedimentary rock formation that expands from western New Mexico into southern Colorado (Tweto 1979). It is composed of shale, siltstone, and sandstone that were deposited in floodplain, fluvial and lacustrine settings 64 to 61 million years ago, during the early Paleocene (Keating 2011). The early-seral riparian vegetation is dominated by plains cottonwood with coyote willow forest (*Populus deltoides* - (*Salix amygdaloides*) / *Salix exigua* forest). Plains cottonwood is the dominant species in this community, although coyote or sandbar willow is generally more dominant in the initial stage following a major flood event. Peachleaf willow (*Salix amygdaloides*) is rare to co-dominant, perhaps outcompeted by non-native shrubs e.g., tamarisk and Russian olive. The shrub/sapling layer is conspicuous, especially near the streambank, and consists mainly of coyote willow and saplings of cottonwood. The herbaceous stratum is variable. Graminoids include Emory's sedge (*Carex emoryi*), woolly sedge (*C. pellita*), Nebraska sedge (*C. nebrascensis*) and western wheatgrass (*Pascopyrum smithii*). Horsetail (*Equisetum arvense*) and wild licorice (*Glycyrrhiza lepidota*) are common forbs in these sites. Widely distributed species that are adapted to these sites include Cuman ragweed (*Ambrosia psilostachya*), sandbur (*Cenchrus longispinus*), leafy spurge (*Euphorbia esula*), gumweed (*Grindelia squarrosa*), prairie sunflower (*Helianthus petiolaris*), woolly aster (*Heterotheca villosa*), fogfruit (*Phyla lanceolata*), Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), redtop (*Agrostis stolonifera*), cheatgrass (*Bromus tectorum*), Canada thistle (*Cirsium arvense*), kochia (*Bassia scoparia*), clovers (*Melilotus* spp.), dandelion (*Taraxacum officinale*), and salsify (*Tragopogon dubius*). Tamarisk (*Tamarix chinensis*) and Russian olive (*Elaeagnus angustifolia*) dominate the shrub canopy for the majority of the occurrence. The active, adjacent floodplain supports many sloughs and back channels that fill from spring runoff. Groundwater discharge is observable during the summer from the Collegiate Loam Soil Series (USDA NRCS 2008), sandy texture, which adds to the stream flow. Agricultural activities, residential homes, and gravel ponds are located throughout the site.

Key Environmental Factors: Key factors include uninhibited spring runoff to provide flushing of floodplains and to keep surface levels high for maintenance of native trees, shrubs, and fish.

Climate Description: Climate is continental and varied, with warm summers and cold

winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Land Use History: Ranching and agriculture.

Cultural Features: Jose Fabian Baca and Pedro Martinez were two of the first settlers in the area. They established ranches two miles east of Badito on the Huerfano River (Mitchell No Date).

Biodiversity Significance Rank Comments (B4): The site supports a fair (C-ranked) occurrence of a globally common (G3G4/S3) riparian forest (*Populus deltoides* - (*Salix amygdaloides*) / *Salix exigua*). This cottonwood - willow woodland is found widely in the central Great Plains of the United States. In the absence of regular flooding, many sites with this plant community will undergo succession to later seral stages. This stretch of the Huerfano River is highly valued for its ecological and societal values. It provides retention of spring flood waters, recharges groundwater storage, stabilizes the river bank from erosion, plus removes nutrients and sediments from water flow.

Natural Heritage element occurrences at the Huerfano River from Gardner to Farista 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 deltoides</i> - (<i>Salix amygdaloides</i>) / <i>Salix</i> (<i>exigua</i> , interior) Woodland	Plains Cottonwood Riparian Woodland	G3G4	S3				C	2016-07-07

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

Other Values: Landowners have observed that the riparian area and adjacent meadows support raptors, passerines, butterflies, mule and white-tailed deer, bear, and elk.

Boundary Justification: The boundary is drawn to encompass the ecological processes inherent in the riparian plant community, e.g., intact floodplain, along the Huerfano River and its tributaries. The boundary includes private lands that were identified using aerial photography. Private lands were only accessed with written permission.

Protection Urgency Rank Comments (P3): All of the site is owned privately and many landowners are conservation minded. Landowners have kept the number of animal unit months low and have fenced off sections of the Huerfano River to start restoration of banks.

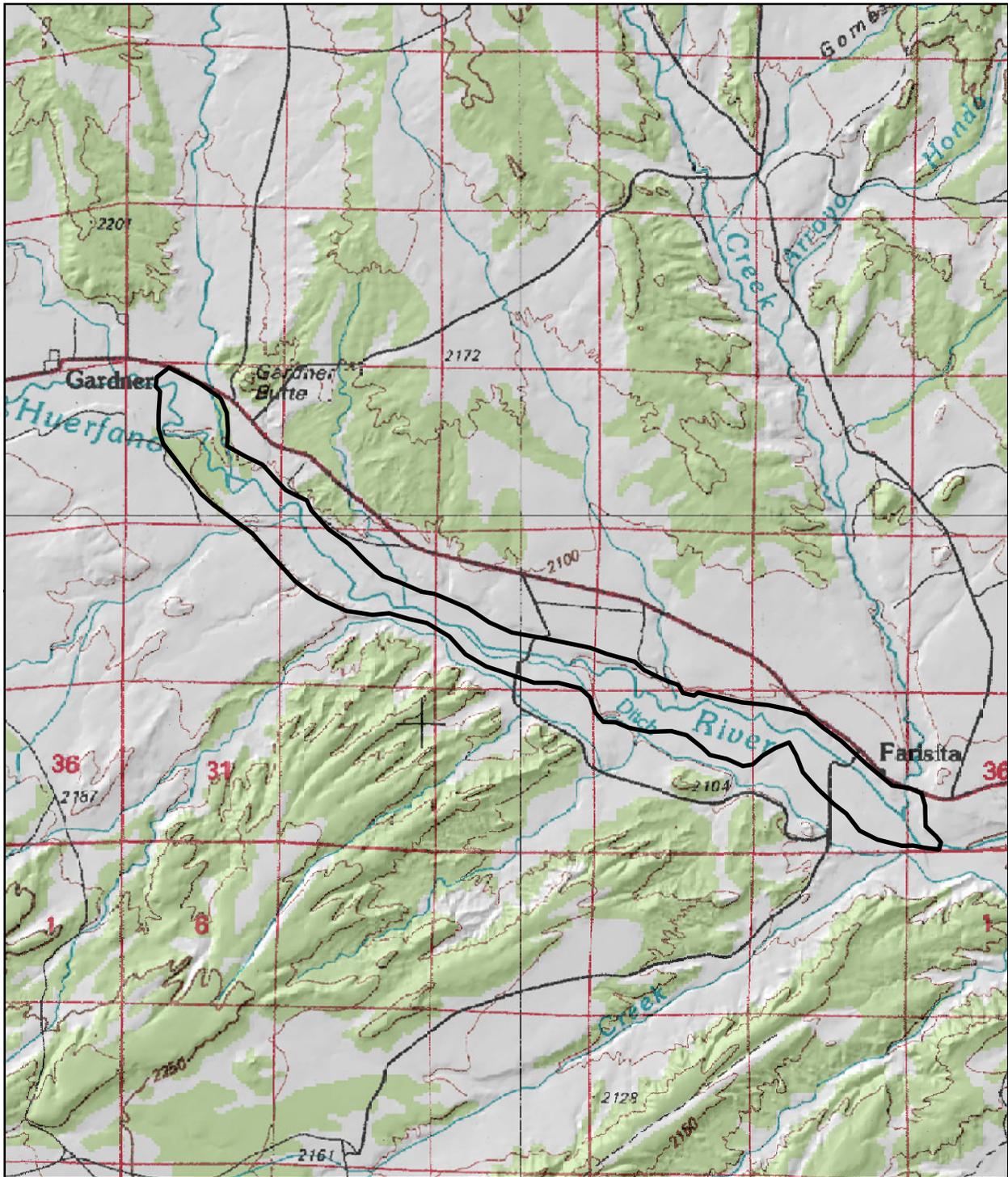
Management Urgency Rank Comments (M3): Non-native woody plants are dominating many stretches of the Huerfano River. Weed management needs to be considered with the current land uses and climate change effects. Currently there are no large scale dams on this portion of the Huerfano River which keeps the invasion of tamarisk and Russian olive somewhat in check. However, if a water storage project was to be implemented, the tamarisk and Russian olive, as well as the non-native forbs would dominate the entire stretch of the Huerfano River.

References

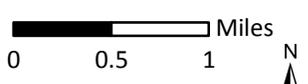
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- Keating, R. C. 2011. Colorado's Spanish Peaks Region: An Exploration Guide to History, Natural History, Trails, and Drives. Missouri Botanical Garden, St. Louis, MO.
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- USDA Natural Resource Conservation Service. 2008. Soil Survey Geographic (SSURGO) Database for Huerfano County, Colorado. Fort Worth, TX: U.S. Environmental Protection Agency. 2010. Watershed Assessment, Tracking & Environmental Results database.

Version Author: Culver, D.R.

Version Date: 10/13/2016



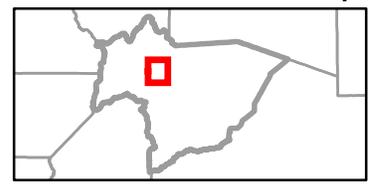
 PCA Boundary



Map Date: 02/19/2017

30x60 Minute Digital Raster Graphics
by the U.S. Geological Survey
Blanca Peak, 37105-E1

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Huerfano River from Gardner to Farista Potential Conservation Area, B4: Moderate Biodiversity Significance

Malachite Fen

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: Red Wing

Size: 275 acres (111 ha)

Elevation: 7,600 - 7,800 ft. (2,316 - 2,377 m)

General Description: The Malachite Fen site is a peat-accumulating wetland that receives groundwater discharge from numerous springs through the Collegiate Loam soil series (USDA NRCS 2008). Fens are classified by an accumulation of at least 40 cm (16 inches) of organic material in the upper 80 cm (32 inches) of the soil profile. Peat accumulates extremely slowly, at a rate of 20 cm (8 inches) per 1,000 years (Culver and Lemly 2013). At Malachite fen, the peat was more than 45 cm. Fens in Colorado are common at elevations greater than 8,000 feet and usually on public lands. This fen was the only fen on private lands that was documented during this survey. The vegetation was dominated by sedges, in particular, analogue sedge (*Carex simulata*) with Nebraska sedge (*C. nebrascensis*), water sedge (*C. aquatilis*), and beaked sedge (*C. utriculata*). Common spikerush (*Eleocharis palustris*) and Arctic rush (*Juncus arcticus* ssp. *littoralis*) are also present. Grasses that were documented are bluejoint reedgrass (*Calamagrostis canadensis*) and tufted hairgrass (*Deschampsia cespitosa*). Short-stature shrubs occurred along the drier edges and on hummocks, and include bog birch (*Betula glandulosa*) and shrubby cinquefoil (*Dasiphora fruticosa*). Taller willows include strap-leaf willow (*Salix ligulifolia*), whiplash willow (*S. lucida* var. *caudata*), and Rocky Mountain willow (*S. monticola*).

Key Environmental Factors: Groundwater discharge is key to the persistence of this fen for thousands of years.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Land Use History: Agriculture

Cultural Features: In the 1900s, Malachite was a copper town with a school, mills, and stores. The school building is still present (Keating 2011, Mitchell No Date).

Biodiversity Significance Rank Comments (B4): The site supports a good (B-ranked) occurrence of a large, common wetland plant community, analogue sedge (*Carex simulata*) herbaceous community. This is the only occurrence of a fen on private lands documented during the 2015-16 field seasons. Fens are an uncommon, irreplaceable wetland in the Intermountain West. The peat accumulates at an extremely slow rate, 20 cm (8 inches) per 1,000 years. Fens are considered a Resource Category 1 within the U.S. Fish and Wildlife Service and an irreplaceable resource within the National Forest.

Natural Heritage element occurrences at the Malachite Fen PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Carex simulata Herbaceous Vegetation	Wet Meadow	G4	S3				B	2015-07-15

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

Boundary Justification: The boundary includes the uplands above the fen that likely connect to the numerous springs that are fed by snowmelt from the Sangre de Cristo Mountains.

Protection Urgency Rank Comments (P4): The site is located within private lands with conservation minded owners.

Management Urgency Rank Comments (M4): Management suggestions are to continue with Russian olive eradication and other non-native forbs such as Canada thistle and common mullein.

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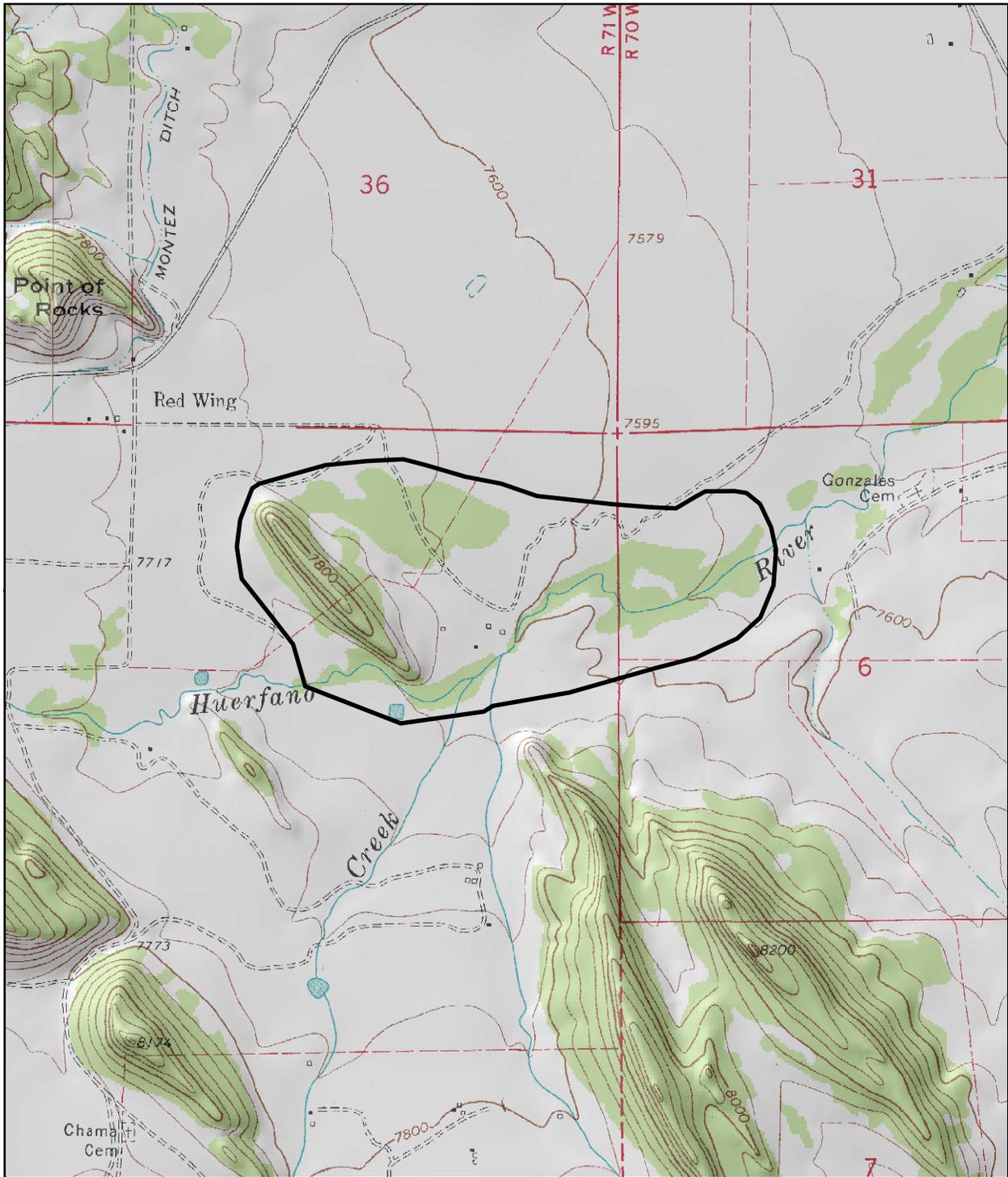
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Version Author: Culver, D.R.

Version Date: 10/13/2016



 PCA Boundary

 Miles

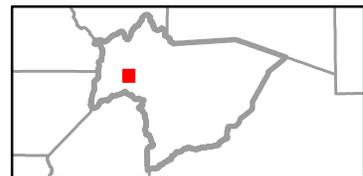
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Map Date: 02/19/2017



7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
Red Wing, 37105-F3

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Malachite Fen Potential Conservation Area, B4: Moderate Biodiversity Significance

McCarty Park Wetland

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: McCarty Park

Size: 107 acres (43 ha)

Elevation: 9,000 - 9,400 ft. (2,743 - 2,865 m)

General Description: The McCarty Park Wetland is a depression wetland that is located along the Sangre de Cristo Mountains. The wetland drains to the south into South Middle Creek, eventually into the Cucharas River. The soils range from clayey loam to mucky peat derived from the Sangre de Cristo Formation (USDA NRCS 2008). The outer drier edge of the pond is dominated by bluejoint reedgrass (*Calamagrostis canadensis*), canary reedgrass (*Phalaris arundinaceae*), longstyle rush (*Juncus longistylis*), and tufted hairgrass (*Deschampsia cespitosa*). The next "ring" is wetter, mucky peat that is dominated by woolly sedge (*Carex pellita*), silvery sedge (*C. canescens*), beaked sedge (*C. utriculata*), and water sedge (*C. aquatilis*). The wettest "ring", with surface water, is dominated by wheat sedge (*Carex atherodes*) along with numerous aquatic plants in the open water which include variableleaf pondweed (*Potamogeton gramineus*), common mare's tail (*Hippuris vulgaris*), water smartweed (*Polygonum amphibium*), and shortspike watermilfoil (*Myriophyllum sibiricum*). The surrounding uplands are dominated by limber pine (*Pinus flexilis*), lodgepole pine (*Pinus contorta*), and white fir (*Abies concolor*).

Key Environmental Factors: Key factors include undisturbed hydrology.

Climate Description: Climate is continental and varied, with warm summers and cold winters. Precipitation falls primarily as snow during the winter and spring, although summer convective showers make a significant contribution to the total.

Biodiversity Significance Rank Comments (B4): The site supports a good (B-ranked) example of a globally secure, but state rare (G3G5/S1) wetland plant community. In Huerfano County, this type of wetland, depressional, is uncommon. The documentation of *Carex atherodes* is a newly recorded species in the county.

Natural Heritage element occurrences at the McCarty Park Wetland 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>Carex atherodes</i> Herbaceous Vegetation		G3G5	S1				B	2016-08-29

** 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 immediate watershed with a small buffer.

Protection Urgency Rank Comments (P2): The site is entirely within the Pike-San Isabel National Forest. There are numerous dispersed camping sites around the pond. The potential of mudding within the pond is high. This would interrupt the hydrology and the plant community would no longer persist.

Management Urgency Rank Comments (M2): Management should consider fencing off or erecting signs around the pond especially near the dispersed camping areas.

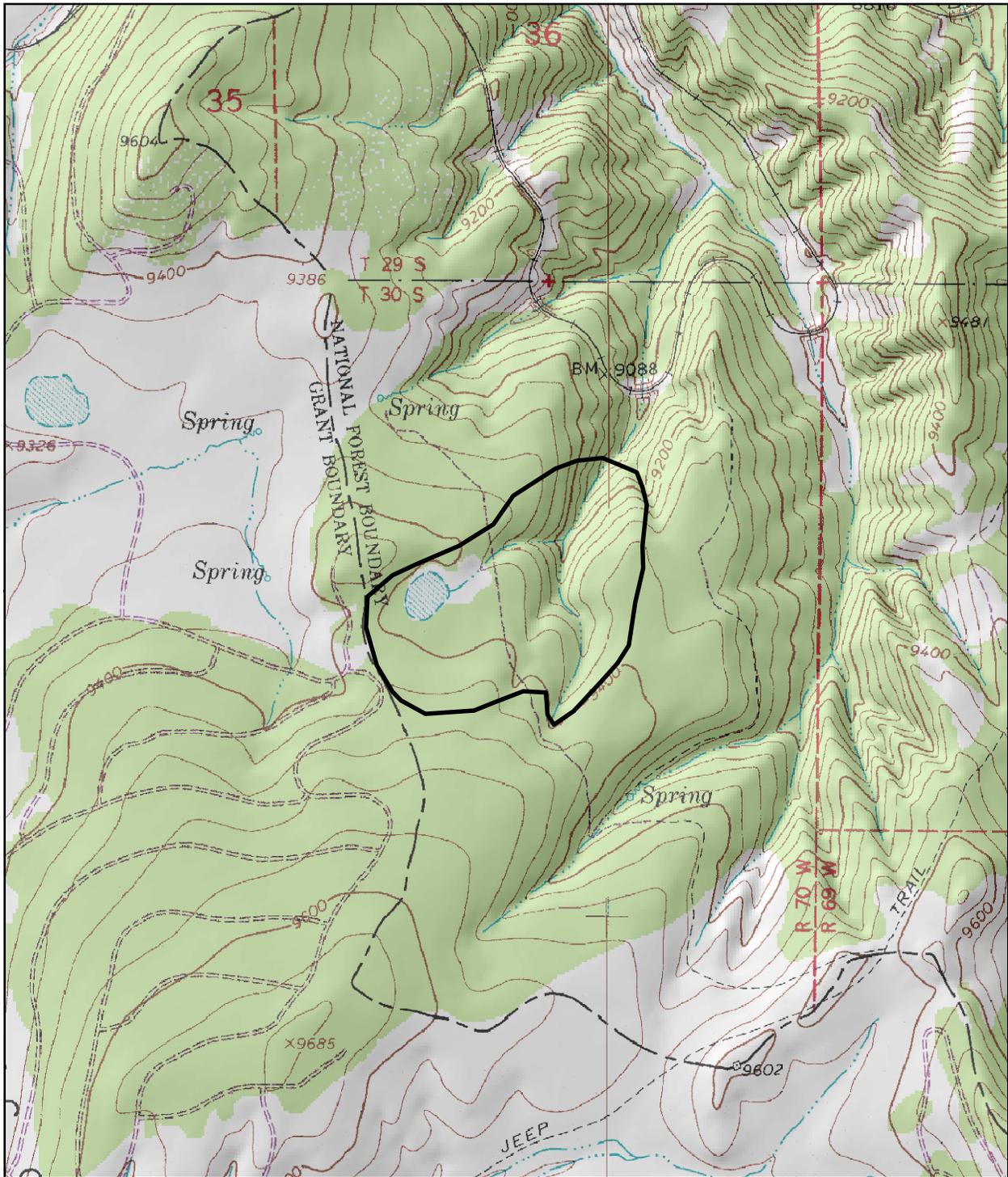
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Version Author: Culver, D.R.

Version Date: 10/13/2016



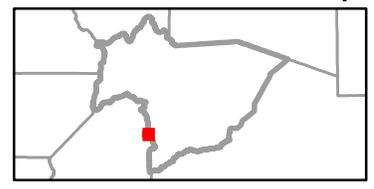
 PCA Boundary

 Miles
0 0.1 0.2

Map Date: 02/19/2017 

7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
McCarty Park, 37105-D2

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

McCarty Park Wetland Potential Conservation Area, B4: Moderate Biodiversity Significance

Mexican Springs

Biodiversity Rank - B4: Moderate Biodiversity Significance

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

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

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

Size: 645 acres (261 ha)

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

General Description: The site surrounds steep, granite cliffs along the uppermost portions of the Mexican Springs Branch Greasewood Arroyo, an intermittent stream that eventually feeds into the Greasewood Arroyo far downstream from this site.

Biodiversity Significance Rank Comments (B4): The site supports a good (B-ranked) occurrence of American Peregrine Falcon (*Falco peregrinus anatum*) with evidence of breeding which is rare in Colorado (G4T4/S2B). Breeding has been observed sporadically at this site throughout the past 20 years.

Natural Heritage element occurrences at the Mexican Springs PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Birds	Falco peregrinus anatum	American Peregrine Falcon	G4T4	S2B		SC	BLM/US FS	B	2014-07-22

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

Boundary Justification: The boundary includes the known occurrence and a buffer to protect the ecological integrity of the entire cliff complex. Note that feeding areas extend far outside of the site boundaries, warranting landscape management that is compatible with the long-term viability of the site.

Protection Urgency Rank Comments (P5): The upper end of the site is protected as USFS Wilderness. The lower portion is on private lands. Protection of private lands is unknown at this time.

Management Urgency Rank Comments (M4): Although not currently threatened, management may be needed in the future to maintain current quality of the element occurrence.

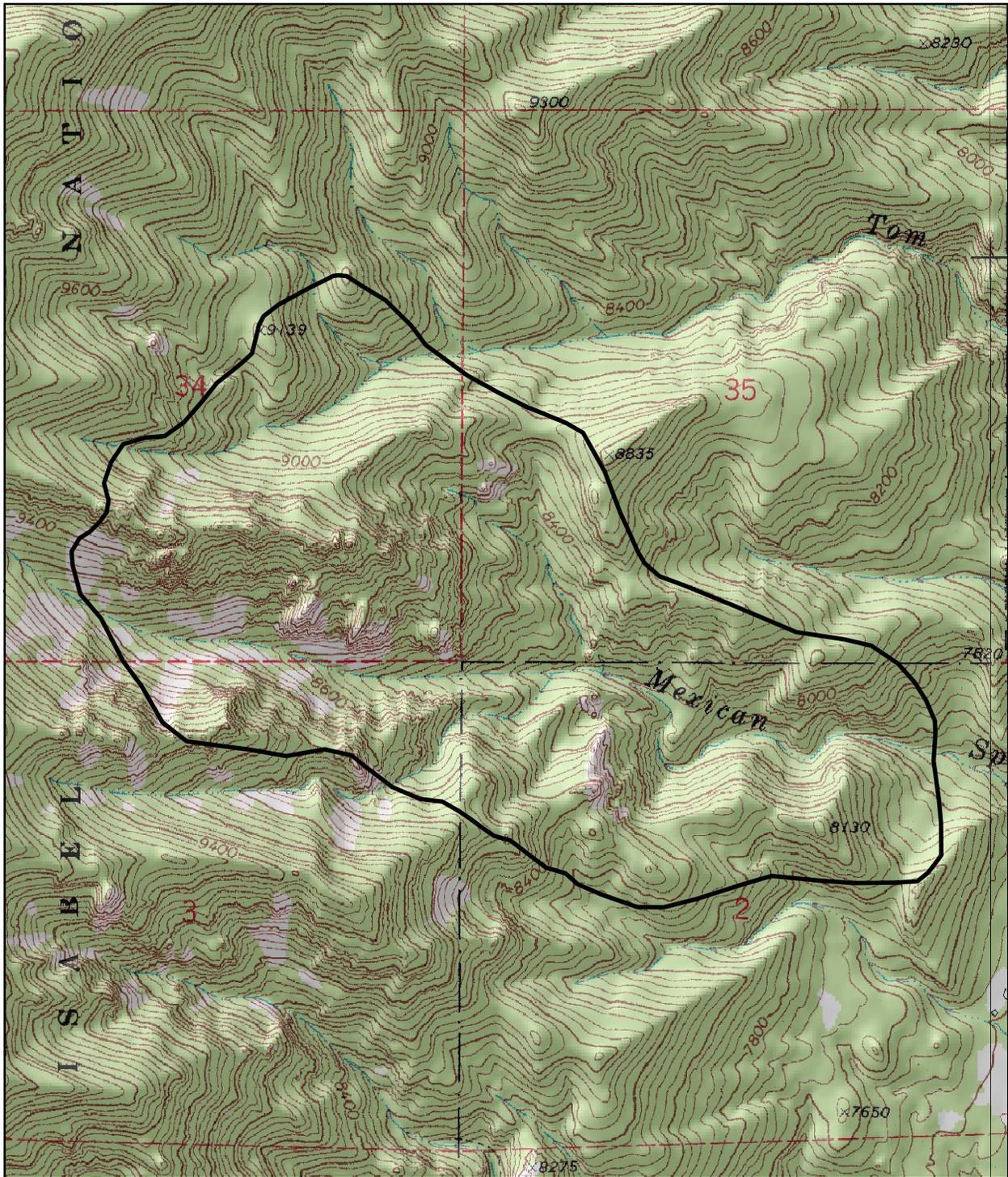
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Version Author: Fleming, C.C.

Version Date: 05/23/1997



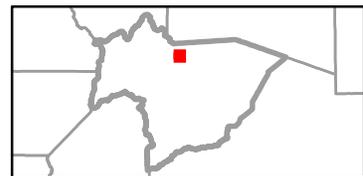
 PCA Boundary

 Miles
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Map Date: 02/19/2017 

7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
Hayden Butte, 37104-G8

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Mexican Springs Potential Conservation Area, B4: Moderate Biodiversity Significance

Teddys Peak

Biodiversity Rank - B4: Moderate Biodiversity Significance

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

Management Urgency Rank - M5: Not Needed; No Threats Anticipated

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

Size: 877 acres (355 ha)

Elevation: 10,210 - 12,550 ft. (3,112 - 3,825 m)

General Description: This high elevation site encompasses the west side of a glaciated valley. Much of the terrain is rocky and there is evidence of past wildfires. Bristlecone pine (*Pinus aristata*) extends to the treeline and to the valley bottom, where grasslands dominate.

Biodiversity Significance Rank Comments (B4): The site supports excellent (A-ranked) occurrences of two bristlecone pine communities, *Pinus aristata* / *Festuca thurberi* (G5/S2) and *Pinus aristata* / *Vaccinium myrtillus* (GU/S1).

Natural Heritage element occurrences at the Teddys Peak PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	<i>Pinus aristata</i> / <i>Festuca thurberi</i> Woodland	Lower Montane Woodlands	G5	S2				A	1994-08-11
Natural Communities	<i>Pinus aristata</i> / <i>Vaccinium myrtillus</i> Woodland	Montane Woodlands	GU	S1				A	1994-08-11

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

Boundary Justification: The boundary includes the bristlecone pine stands from the trail to the ridgeline. This should be enough area to simulate natural fire regimes.

Protection Urgency Rank Comments (P5): The site is contained on USFS land. Adjacent private lands are held under conservation easement.

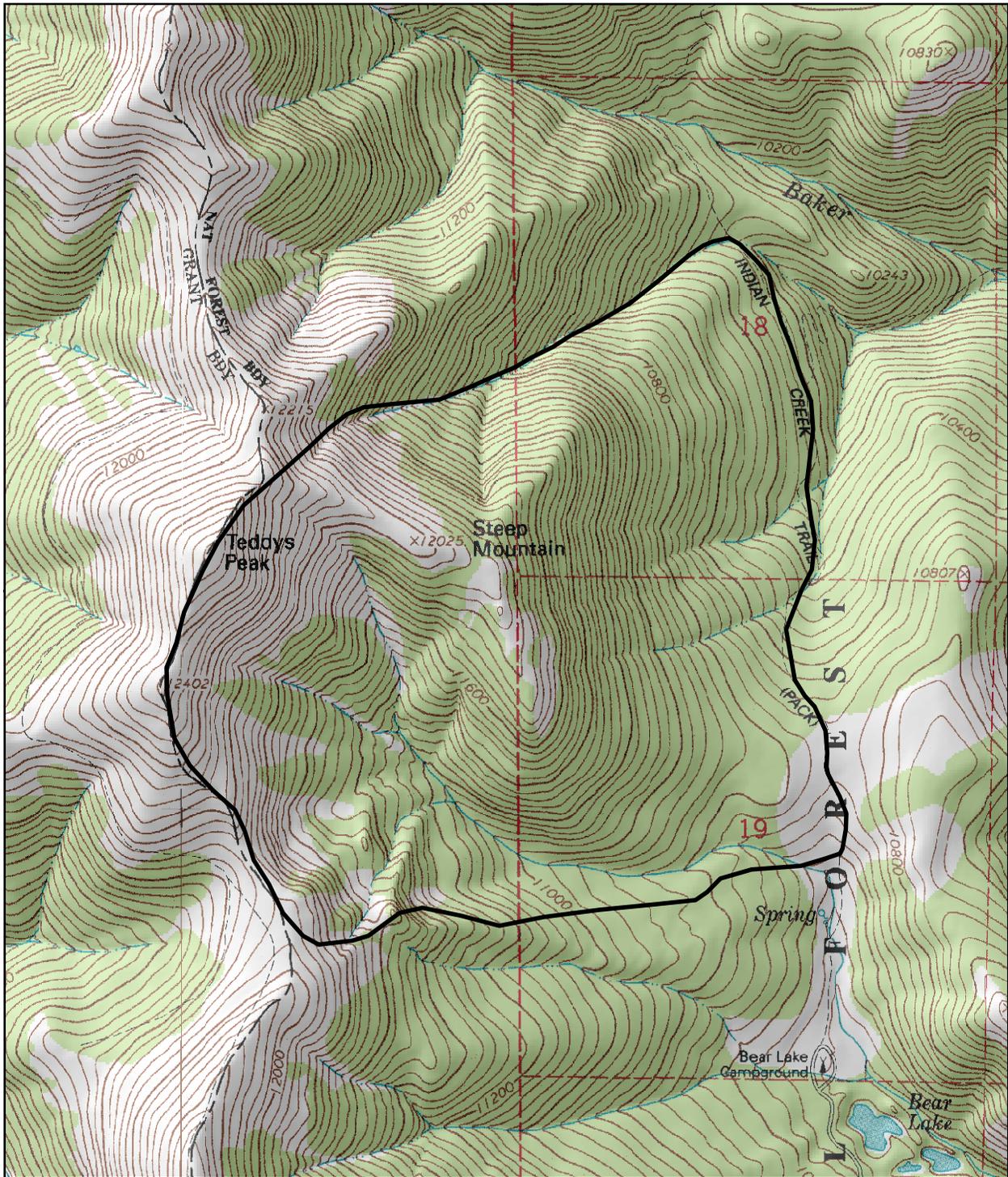
Management Urgency Rank Comments (M5): No grazing or other currently planned activities are known; however, livestock grazing, if permitted, could affect the quality of the communities. The area is primarily used for recreation, with trails and campsites evident.

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Version Author: Fleming, C.C.

Version Date: 09/02/1997



 PCA Boundary

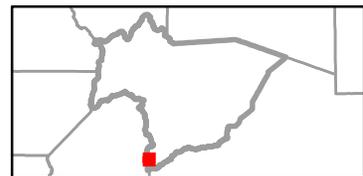
 Miles
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Map Date: 02/19/2017



7.5 Minute Digital Raster Graphics
by the U.S. Geological Survey
Trinchera Peak, 37105-C2

Location in Huerfano County



• Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University •

Teddys Peak Potential Conservation Area, B4: Moderate Biodiversity Significance

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