



**NATURAL HERITAGE RESOURCES
OF DOUGLAS COUNTY
AND THEIR CONSERVATION**

A report to the

Douglas County Department of Planning and Community Development

prepared by

C.A. Pague, A.R. Ellingson, S.M. Kettler,
S.C. Spackman, J. Burt, and K.D. Essington
Colorado Natural Heritage Program
Colorado State University, College of Natural Resources
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EXECUTIVE SUMMARY

In 1993, The Colorado Natural Heritage Program (CNHP) was contracted by the Douglas County Department of Planning and Community Development to assess and prioritize the ecological values of lands throughout the county. The goal of the project was to accumulate and examine existing biological data, incorporate appropriate portions into the CNHP's Biological Conservation Database, and with appropriate field surveys, identify significant natural heritage resources (rare or imperilled plant and animal species or significant natural communities). We were also asked to make recommendations on actions that will protect these resources.

The Natural Heritage Inventory was conducted in several steps:

Identify rare or imperilled species and significant natural communities with potential to occur in Douglas County.

Rare species potentially occurring in Douglas County were identified using known range and life history information, as well as known locations within Douglas County and the surrounding region. Over 70 natural heritage resources were targeted in these surveys.

Collect existing information.

CNHP databases were updated with information about both species' biology and locations within Douglas County. Sources included museum collections, scientific literature, and local naturalists and biologists including expert sources at the Colorado Division of Wildlife.

Identify targeted survey areas.

Using available information, targeted survey areas were identified based on several factors including the presence of potential habitat for rare or imperilled species and areas with little evident disturbance.

Conduct field surveys.

Preselected sites and habitats were surveyed at appropriate times based on the phenology of each of the targeted plant and animal species. The precise location and extent of each rare species occurrence was mapped. Brief habitat, population, and disturbance information was collected at all sites supporting natural heritage resources. An estimate of overall quality of the site was made in order to prioritize potential conservation actions.

Assimilate results and delineate conservation planning sites.

Conservation sites were identified based on the occurrence of rare or imperilled species or other significant element of natural diversity. For Natural Heritage Sites **preliminary conservation planning boundaries** were determined. In developing this boundary, a number of factors were considered including: habitat for rare species,

protection of water quality, buffers from potentially detrimental land uses, and the maintenance of ecological processes necessary for the perpetuation of the significant elements in the area.

The delineation of a preliminary conservation planning boundary in this report does not confer any regulatory protection on recommended areas. These boundaries are intended to be used to support planning and decision-making for the conservation of these significant areas. CNHP offers its assistance in working with the Douglas County to ensure protection of these areas.

Results.

Thirty-one rare or imperilled plant or animal species and three significant natural communities were documented in Douglas County through this study. Several of these natural heritage resources are of global significance. The Preble's meadow jumping mouse, a globally imperilled subspecies found only on the Colorado and Wyoming front range, was found in several sites. Also of global significance, Parry's oatgrass grasslands, a natural community known from fewer than 20 occurrences world-wide, was found on several of the scenic buttes in the County. The remainder of rare or imperilled species and natural communities found in the county are of a state-wide significance. Overall, the concentration of rare or imperilled species and significant natural communities indicates that conservation in Douglas County will have state-wide as well as global consequences.

Based on the information collected in this study, 19 conservation sites have been identified in Douglas County. These sites vary from very small sites that contain a single rare or imperilled plant species, to entire streams that contain an assemblage of rare or imperilled plants and animals. Several sites in Douglas County rate as globally significant, meaning that the ultimate fate of the natural heritage resources that these site support will be affected by what happens to these sites in Douglas County.

The report includes several recommendations for Douglas County:

1. **Develop an implementation plan for designation and protection of conservation sites.**
2. **Incorporate the information included in this report in the review of activities in or near areas identified as significant.**
3. **Increase public awareness of the benefits of protecting areas determined to be significant to Colorado and the Nation's natural diversity.**
4. **Promote cooperation among landowners and pertinent organizations in the protection of natural diversity.**
5. **Encourage proper management of significant elements of natural diversity that exist within Douglas County.**

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The Colorado Natural Heritage Program would like to acknowledge and sincerely thank the following individuals and organizations for their assistance in completing this project: the Colorado Field Office of the Nature Conservancy; the Colorado Division of Wildlife, especially Jim Staley, Paul Jones, Dave Weber, Kathi Green, and Judy Sheppard; Hugh Kingery and the Breeding Bird Atlas; Anne Bonnel; Dr. Dave Armstrong, Roseanne Humphries, and the University of Colorado Museum; Dr. Paul Opler and Dr. Boris Kondratieff of the C.P. Gillette Museum at Colorado State University; Dr. Richard Knight at Colorado State University; other staff of the CNHP who contributed to field work including Peter Cutter, Vicki Frei, Gwen Kittel, John Sanderson, Judy Koch, and Katie Pague, volunteers for the CNHP including Marissa Wilson, Ishtvan Gyarmathy, and Laura; and of course all of the helpful and concerned landowners of Douglas County who participated in this natural heritage survey.

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1.0 INTRODUCTION

1.1 Purpose of study

The Colorado Natural Heritage Program was contracted by Douglas County Department of Planning and Community Development in 1993 to conduct a county-wide assessment of existing natural values and prioritize them on a global and state wide basis. The goal of the project was to assist Douglas County in achieving several objectives outlined in the Douglas County Master Plan, such as "to preserve critical ecosystem components, including wetlands, significant wildlife habitats, and migration corridors, (and) significant stands of trees and shrubs, large expanses of prairie grasses, and unique forms of vegetation" (Douglas County, 1992). The project was also to help fulfill the objectives discussed in the Open Space Master Plan, specifically to, "preserve, (and) maintain important natural features within the County for their environmental and aesthetic values" (Douglas County, 1990). Therefore the objectives of this study were: 1. to develop an inventory to prioritize specific areas for conservation efforts and 2. to provide a basis for implementation of a methodical, scientific-based approach to preserving the County's natural diversity.

This report summarizes extensive research in area herbariums, museums, and libraries, discussions with appropriate resource management agencies (state and federal), scientific experts and local naturalists, and two field seasons of surveys. It compares the recorded ecological elements with other, similar occurrences from around the western hemisphere to give an overall assessment of the county's biological diversity. Other items contained in this report include a discussion of conservation issues (such as habitat destruction, degradation and fragmentation), recommendations for further management of selected biological elements, and maps indicating the location of selected element occurrences and conservation sites. Studies for this project did not include the Pike National Forest nor did it include the state parks of Roxborough, Chatfield, and Castlewood Canyon.

The Colorado Natural Heritage Program does not consider this project completed with the submission of this final report, however. The partnerships developed between CNHP, Douglas County, and private landowners during this project are valuable and strong. These should be nurtured further, promoting sound natural resource management and wise land-use planning as the county continues to experience growth pressures.

The report includes several recommendations for Douglas County:

1. **Develop an implementation plan for designation and protection of conservation sites.**
2. **Incorporate the information included in this report in the review of activities in or near areas identified as significant.**
3. **Increase public awareness of the benefits of protecting areas determined to be significant to Colorado and the Nation's natural diversity.**

4. **Promote cooperation among landowners and pertinent organizations in the protection of natural diversity.**
5. **Encourage proper management of significant elements of natural diversity that exist within Douglas County.**

1.2 Overview of Douglas County

Douglas County is located in central Colorado, along the interface between the mountains and high plains known as the Colorado Piedmont. It encompasses 842 square miles, although the study area did not include the 225 square miles of Pike National Forest in the southwest portion of the county. Elevation ranges in Douglas County from roughly 5600 ft. in the northwest corner (at Chatfield Reservoir) to 9748 ft. in the west (Devil's Head Peak), although the highest elevation in the study area was 7881 ft. in the extreme southern end of the county (at Bald Mountain). The study area is delineated on **Map 1.1**.

1.2.1 Topography

The northern third of the county consists of rolling hills and sweeping grasslands, with several creeks running from higher elevations in the middle and western portions of the county, to the south into the South Platte River or Cherry Creek. Over one-quarter of the county (in the west and southwest portion) is part of the foothills of the Rocky Mountains with deep canyons and high peaks, and is managed by the U.S. Forest Service (Pike National Forest). Extending out from the foothills through the lower half of the county to the east and south into adjacent Elbert and El Paso Counties is the Palmer Divide which separates the Platte and Arkansas River watersheds. This region of bluffs, hills, gullies, and washes is dominated by a grassland-shrubland-woodland mosaic.

1.2.2 Climate

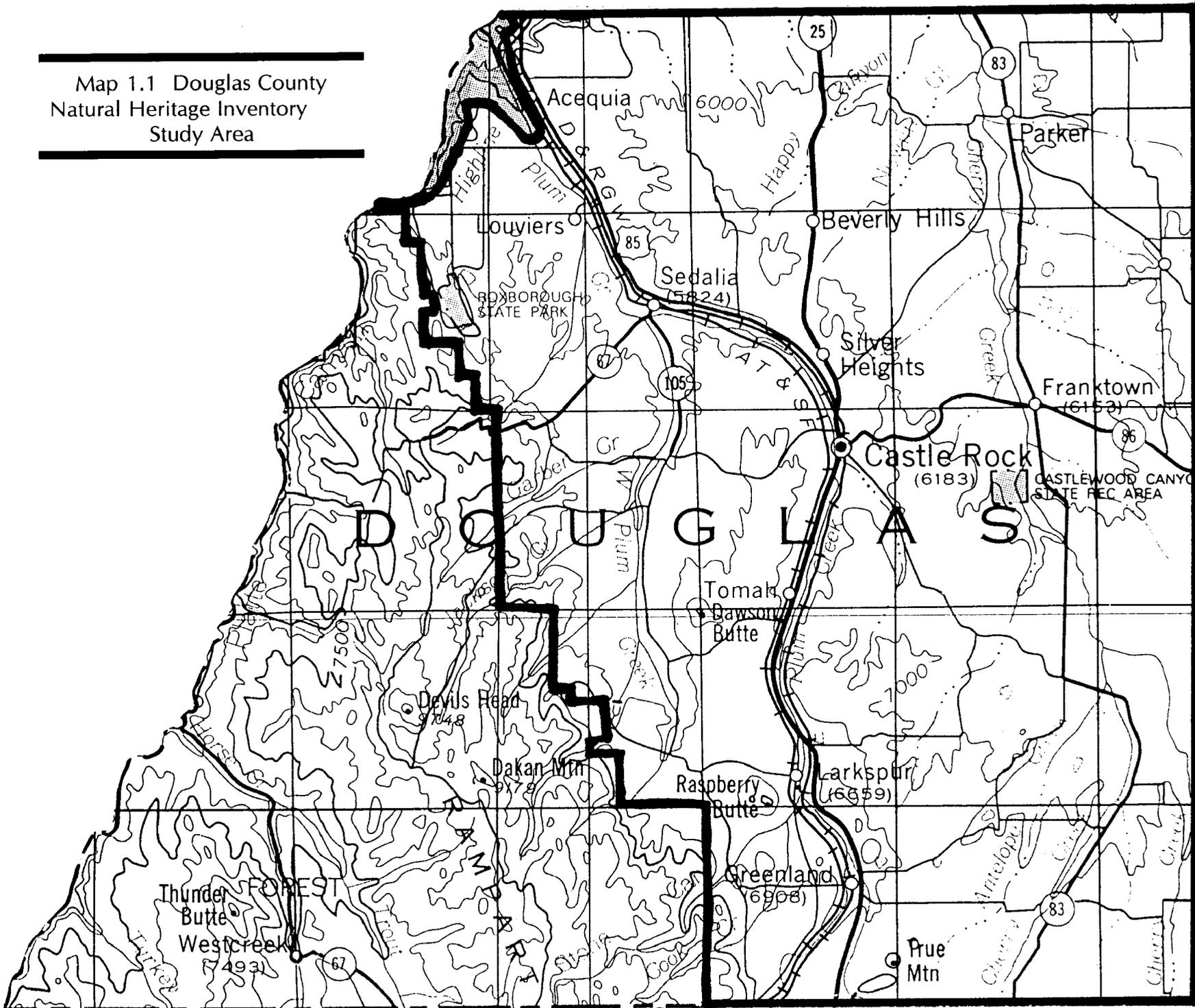
The climate of Douglas County is dominated, like all of the Colorado Piedmont, by continental air masses. Winters are generally cool and dry, while summers are warm and punctuated by sudden thunderstorms. Precipitation events originate in the Pacific, Arctic, or the Gulf of Mexico. The continental divide, 60 miles to the west, is also influential in determining the area's climate, generating occasional high winds and summer precipitation. The Palmer Divide also plays an important role in influencing local climatic effects to the north and south by inhibiting slow moving, shallow storm systems. Air temperature at Castle Rock averages 73.5° in July and 30.0° in January. The study area is considered semi-arid, with a mean annual relative humidity of roughly 50%. Rainfall averages 14.56 inches annually at Castle Rock. The Palmer Divide receives the Front Range's most violent weather, averaging almost 19 inches of precipitation annually, primarily from spring and summer thunderstorms. In fact, the six heaviest downpours on record from Ft. Collins to Colorado Springs have occurred on the Palmer Divide (Hansen, et al, 1978).

1.2.3 Soils

The soils in the study area range from loamy alluvial material (Sampson association) in flood plains and terraces, to deep sandy gravelly soils (Findis-Kutch

association and others) on uplands to shallow gravely soils (Juget-Rockland association) in mountainous areas (U.S. Department of Agriculture, 1980).

Map 1.1 Douglas County
Natural Heritage Inventory
Study Area



1.2.4 Geology

The geology of the study area is typical to most of the Colorado Piedmont. The soils mentioned above overlie terrace gravels and the Castle Rock Conglomerate from which many of the buttes in the middle portion of the study area are derived. Supporting these are a series of sandstone formations laid down over the last 320 million years. The geologic column down to precambrian granite consists of, in descending order, the Dawson, Laramie, Fox Hills, Pierre, Dakota, Morrison, Lyons, and Fountain formations. Faulting in the study area is minimal (Von Ahlefeldt, 1992).

1.2.5 Land use

Human use and development of Douglas County is highest in the northern third of the county. It is considered an integral part of the Denver metropolitan area, with major transportation corridors dissecting the area and providing access to other south Denver localities. This area contains many bedroom communities, such as Highlands Ranch, which consist primarily of single-family homes whose occupants generally commute to Denver or its suburbs for employment. The rest of the county, however, still retains a semblance of rural or small-town character, although that too is increasingly threatened by growth. Agriculture, primarily livestock production, is widespread, as are equestrian enterprises. Areas such as Sedalia, Franktown, and Louviers, have been designated Rural Town Centers by the county, offering a more rural lifestyle than that of the larger towns of Castle Rock and Parker.

1.2.6 Biota (Fauna and Flora)

Due to Douglas County's unique topography, climate, and location on the Colorado Piedmont, the flora and fauna are representative of both the High Plains and the Southern Rocky Mountains. This diverse mixture of geography, geology and biology, or ecotones, contributes to Douglas County's unique ecological character. Transition zones like these tend to support higher levels of biological diversity than other, "non-transitional" areas (Odum, 1972; Brewer, 1990).

No vertebrates and few invertebrates at the species level are endemic to the study area (Andrews and Righter 1992, Ferris and Brown 1981, Woodling 1985, Armstrong 1972, Hammerson 1982, Kippenhan 1990). However, there are some species that are endemic to the Colorado Piedmont that are found in the area, such as Preble's meadow jumping mouse (*Zapus hudsonius preblei*), a plains pocket gopher subspecies (*Thomomys talpoides macrotis*), Bell's twinpod (*Physaria bellii*), and Hop's vine blue butterfly (*Celastrina* undescribed species). Also, Opler (1995) has determined that the Front Range of Colorado is one of the nation's four most important areas for the conservation of lepidoptera (butterflies and moths) due to the area's very high species richness.

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

A large number of breeding passerine birds are known to breed in the study area. Raptors, including northern harriers, prairie falcon, and many hawks are also common. Shorebirds are less common, but great blue herons (*Ardea herodius*) breed at dispersed rookeries throughout Douglas County. The mixture of bird species in Douglas County is very diverse. Species typical of prairies such as killdeer (*Charadrius vociferus*), western meadowlarks (*Sturnella neglecta*), and plains sharp-tailed grouse (*Tympanuchus phasianellus jamesii*) are found in close proximity to species with montane affinities such as Steller's jays (*Cyanocitta stelleri*), pygmy nuthatches (*Sitta pygmaea*), and Cooper's hawks (*Accipiter cooperii*).

The fish of Douglas County are similarly diverse in the transition zone streams typical of the study area. Such streams lie between headwaters and their cold water environment and the warm waters of the eastern plains, and support fish species from both regions. The streams of Douglas County are especially significant for containing perhaps the last best example of a native transition zone stream fish community including several rare or imperilled species (Bestgen and Culver 1985). Fish and their aquatic habitats have been highly impacted in Colorado due to water development and declines in water quality (Woodling, 1985).

Amphibians are naturally rare in the study area due to its semi-xeric conditions, although northern leopard frogs (*Rana pipiens*) are common to abundant in riparian areas and wetlands and tiger salamanders (*Ambystoma tigrinum*) can be found in stock ponds and other pools. Reptiles such as plains garter snake (*Thamnophis radix*), western terrestrial garter snake (*Thamnophis elegans*), and western rattlesnake (*Crotalus viridis*) are common (Hammerson, 1982).

In some ways, the vegetation of the study area is typical of the foothills/prairie ecotone on Colorado's Front Range (Marr 1961). Grasslands of the northern County are on well drained sandy soils and receive less moisture than those to the south near the Palmer Divide. The resulting composition of grasslands generally follows this north to south hydrologic gradient, with typical shortgrass prairie species such as blue gramma (*Bouteloua gracilis*) dominating in the north, and midgrass species such as western wheatgrass (*Agropyron smithii*), needle-and-thread grass (*Stipa comata*), and little bluestem (*Schyzachirium scoparium*) becoming more common to the south. Tallgrass species such as big bluestem (*Andropogon gerardii*) are not uncommon in the uplands. The summits of the higher buttes in the County support grasslands more typical of montane biomes including globally imperilled Parry's oatgrass (*Danthonia parryi*) communities.

Gambel's oak shrublands are a dominant feature of the Douglas County flora, creating a mosaic of shrubs and grassland that cover the rolling hills of most of the

central regions of the County. These shrublands also occur in areas of mixed woodland with ponderosa pine. Riparian areas consist of dense shrubs, especially hawthorn and coyote willow, with some stands of small cottonwoods. Wetlands comprise a small but important portion of the study area and comprised mainly of graminoid types at springs or seeps, or shrub-dominated in riparian areas. Coniferous forests of ponderosa pine dominate the mountainous western portions and extend eastward on the higher mesas and along the Palmer Divide. Cooler microhabitats on north aspect slopes contain mostly Douglas-fir forests with patches of aspen.

1.3 What is Biodiversity?

The term *biodiversity* has multiple meanings depending on the biological scale to which the term is being applied. Most commonly, biological diversity refers to the full range of *species* on Earth, including single-celled organisms such as bacteria, viruses, and protista, as well as multicellular organisms such as plants, animals, and fungi. At finer levels of organization, biological diversity includes the genetic variation within species, both among geographically separated populations and among individuals within single populations. On a wider scale, biological diversity includes variations in the biological communities in which species live, the ecosystems in which communities exist, and the interactions among these levels. The continued survival of species and natural communities require the preservation of biodiversity at all of these scales.

Given these various scales of biodiversity, the biological diversity of an area can be described at four levels:

1. Genetic Diversity – the genetic variation within a population and among populations of a plant or animal species. The genetic makeup of a species is variable between populations of a species within its geographic range. Loss of a population results in a loss of genetic diversity for that species and a reduction of total biological diversity for the region. This unique genetic information cannot be reclaimed. This level of biodiversity is critical in order for a species to adapt to changing circumstances and to continue to evolve in the most advantageous direction for that species.
2. Species Diversity – the total number and abundance of plant and animal species and subspecies in an area.
3. Community Diversity – the variety of natural communities or ecosystems within that area. These communities may be representative of or even endemic to an area. It is within these ecosystems that all life dwells.
4. Landscape Diversity – the type, condition, pattern, and connectedness of natural communities or ecosystems within a landscape. Fragmentation of landscapes, loss of connections and migratory corridors, and loss of natural communities all result in a loss of biological diversity for a region. Humans

and the results of their activities are integral parts of most landscapes.

The conservation of natural diversity must include all levels of diversity: genetic, species, community, and landscape. Each level is dependent on the other levels and inextricably linked. In addition, and all too often omitted, humans are also linked to all levels of this hierarchy. We at the Colorado Natural Heritage Program believe that a healthy natural and human environment go hand in hand, and that recognition of the most imperiled elements is an important step in comprehensive conservation planning.

1.4 Conservation Status of Douglas County

In the course of our study, it was found that some threats to biological diversity are pervasive throughout the county and should be addressed on a scale larger than individual conservation sites. While these threats are obviously interrelated, and certain actions may be placed in more than one category, generalized categories can be defined.

1.4.1 Human alteration of the landscape

Human alteration and development of the landscape has taken many forms in Douglas County. An agriculture-dominated county until recently, development generally took the form of sparse buildings and roads, plowed fields, fences, and water diversion and impoundment. These developments significantly altered the landscape, but retained large areas of open spaces that were sparsely inhabited by humans. Today, while remnants of the agricultural economy remain, housing and commercial development increasingly dominate land use in Douglas County and present new challenges to the protection of biological diversity.

Agriculture

Agriculture, both crop and livestock production, have been traditional land uses in Douglas County since European settlement. Many crops were planted when settlers first arrived, but few could be economically grown in the area. Wheat became one of the few viable crops in the area. Most agriculture in Douglas County has been, and continues to be, livestock production.

The ecological effects of the landscape alterations that result from agricultural land uses are varied and controversial. In recent years, however, conservation biologists have paid special attention to this problem and have come closer to understanding the detrimental as well as desirable effects of agricultural practices.

Cropland in Douglas County is of limited extent and is concentrated in the northern and most increasingly urbanized portion of the County. Native plant communities in these areas are totally supplanted with monotypic stands of crop species. This totally alters the grassland habitat within the field, but also has the effect of fragmenting formerly continuous grasslands in the area. Since cropland is so totally altered and is therefore likely slow to recover, its current ecological value is relatively low. When continued land alteration is to

take place, such as residential and commercial development, further damage may be minimized by building on these heavily altered areas in favor of converting still intact natural areas.

Livestock production in Douglas County is the most prevalent land use and has significant effects on the natural ecosystems. Fleischner (1994) concludes that livestock grazing has affected all major attributes of ecosystems: Native plant diversity and densities are typically decreased by grazing, and indirect effects can have profound impacts on animal populations, including birds, small mammals, reptiles, and fish, as well. The result is an alteration of natives community species composition. Fundamental ecosystem functions such as plant succession can also be disrupted by preventing seedling establishment of certain species. The physical structure of environments is often changed by livestock grazing, altering habitats for the organisms that occur there.

The effects of grazing in arid or semi-arid climates such as Colorado are most severe in riparian areas (Flieschner 1994 and references therein). The ecological importance of riparian areas for various wildlife including many species that are rare or imperilled is broadly demonstrated (Johnson et al. 1977, Steven et al 1977, Brode and Bury 1984, Laymon 1984, Johnson 1989).

In Douglas County, many species of concern are found in intact riparian and aquatic habitats, including Preble's meadow jumping mouse (*Zapus hudsonius preblei*), several species of fish, and at least one species of plant. The globally imperilled Preble's meadow jumping mouse may be sensitive to grazing induced structural alteration of its habitat by decreasing the density of understory cover (Compton and Hugie 1993). Our field investigations of riparian habitats in Douglas County indicate that they have been noticeably altered by years of livestock grazing. The presence of significant ecological values in the same habitats that are favored by cattle is cause for concern.

Residential and commercial development.

Direct effects of residential and commercial development are typically total alteration of the natural habitat where construction of buildings, roads, parking lots, and other infrastructure takes place. While affecting a relatively small percentage of the landscape, these effects may have devastating consequences when placed in habitats that are limited in extent. Wetlands and riparian areas are habitats that are typically limited, but other habitats may be so reduced by widespread alterations that only remnants remain. Similarly, the habitats and sites that support rare or imperilled species are by their nature limited in extent and need to be protected from such wholesale alteration.

Exceeding direct habitat destruction in the percentage of the landscape affected are a variety of indirect effects that result from the increase in human density and the accompanying increase in development structures including buildings, roads, and fences (see Knight et al. 1995 and references therein).

Human disturbances often effect natural interactions between species and between individuals, resulting in the alteration of animal communities and changing the number and types of species present (Knight and Gutzwiller 1995). The effects of these disturbances, including noise, human presence, and security lights, can be particularly acute when they

occur in or near critical or sensitive habitats.

The effects of **exotic plant and animal species** is well known and discussed at greater length below. Since native species are rarely used in landscaping and erosion control, and many exotic species are favored by soil disturbance, developments can act as epicenters for exotic species dispersal to adjacent areas (Harty 1986).

Habitat fragmentation, also presented separately in this report, is a major effect of rural development. Roads and fences can create significant barriers to dispersal for both large animals such as antelope and also smaller ones such as rodents and even butterflies. Furthermore, these same barriers may also act as corridors for dispersal of to other species including exotic plants and animals (references in Schonewald-Cox and Buechner 1993). Increased mortality from roads also effects certain species.

Increased densities of **domestic cats and dogs** generally occur as human population density increases. Free roaming cats are known to consume large number of native rodents and songbirds (Parmalee 1953, Eberhard 1954, Jones and Coman 1981, Liberg 1984, Churcher and Lawton 1987). Aside from population effects to these animals directly, especially those which are rare or imperilled, native small-to-medium-sized predators, such as raptors, coyotes, and bobcats, may also be affected by reduced availability of prey (George 1974, Triggs et al. 1984).

Chemical and organic pollution of rivers and streams is one of the most visible threats to the health and survival of intact ecosystems. While it is unlikely that any riverine species have been driven extinct by pollution alone, it has been estimated (Miller et al. 1989) that pollution has played a role in 38% of the known extinctions in North America. For rare or imperilled river dwelling species, the effects of chemical and organic pollution may present a serious problem (Allan and Flecker 1993).

Likely sources of chemical pollution in Douglas County include the obvious such as industrial and sewage plants, but also the less conspicuous non-point sources such as fertilizer and pesticide runoff from suburban lawns and golf courses, spilled oil and gas, mud and silt, and lead from automobile emissions. Excessive use of an area by livestock can also result in excess enrichment and eutrophication of water sources, as well as increased siltation. All of these can have negative effects on aquatic habitats (Woodling 1985).

Lastly, increased rural development is likely to restrict **landscape level processes** such as fire, disease, predation, and movement of animals, processes which are integral to the maintenance of the entire spectrum of biological diversity (Knight et al. 1995).

1.4.2 Exotic Species

The problem of invasive exotic plants and animals is one of the greatest threats facing native habitats and the conservation of biological diversity (Primack 1986, Soule 1990). Such invasive aliens can have a number of impacts on natural systems (Bratton 1982, DeLoach 1991, Harty 1986, Hester 1991). Exotic organisms that become established in natural areas often displace the native plants and animals, altering the composition of native communities, and affecting any other organisms that may have relied on these native communities. In some cases, the species being displaced are rare or imperilled plants and

animals (Moore and Keddy 1988). Since most invasive exotic organisms are adapted to habitats that have been disturbed in some way, the greatest impacts tend to occur in areas that have experienced the greatest landscape modification (White et al.1993). This disturbance can take the form of soil removal, severe livestock grazing, changes in the regime of water fluctuations, adjacent forest clearance, fire suppression, and many others.

The origins of exotic plants and animals in Douglas County are varied. Many plants have been brought to this continent for use as garden and landscaping ornamentals, but have since "escaped" and established themselves in the wild. In fact, many exotic plants are recommended to gardeners on the basis of their "hardiness" or their ready adaptability to our local environments. Recent trends in "xeriscaping" are certainly needed and well intentioned, but many of the plants used in such plans are in fact such hardy exotic plants, some of which may establish wild populations.

Certain agricultural practices have also resulted in large scale exotic introductions. Pasture "improvements" have taken place which seeded with various exotic grasses meant to increase the forage value for domestic livestock. The results are large areas dominated by a few exotic grasses and very few natives. This has been the fate of most of the grasslands throughout the county. Additionally, cultivated hay is rarely composed of native grasses. Hay fields are typically monocultures of exotic grasses which, aside from displacing the former grassland or wetland, serve as a source of seeds for invasion of surrounding areas. These hay grasses, and any other weeds that may grow in the hay fields, are also spread by livestock.

The control of excess erosion is essential to preventing the loss of topsoil and the maintenance of good water quality. Unfortunately, the control of erosion is often at the expense of native species, a serious problem in itself. Typically, areas such as ditches and roadcuts are reseeded with a seed mix recommended for our climate and soils. Unfortunately, these mixes rarely contain seeds of the locally native vegetation, instead containing "hardy" exotic species that are chosen for their ability to thrive in this area. This has been the fate of nearly every reseeded area in the county, which are now dominated by various exotic grasses. Furthermore, these areas serve as a source for the subsequent invasion of adjacent areas.

Exotic animals are also found in natural areas in parts of Douglas County. Perhaps of greatest concern is the potential for introduced fish species to alter the native fish communities of Douglas County's unique streams, potentially impacting many rare or imperilled species. Brook trout (*Salvelinus fontinalis*) are one exotic species that has been introduced in Douglas County. Its presence in some of the most ecologically important habitats in Douglas County is reason for concern.

Efforts to minimize the ecological damage done by invasive exotic plants and animals in Douglas County should attempt to prevent new introductions, contain small or recent infestation, and attempt to control exotic species populations especially in significant conservation areas.

1.4.3 Fragmentation

By using natural resources, building towns and cities and their suburbs, and creating new agricultural land, human beings gradually create patches of natural habitats within human dominated landscapes. Conservation biologists term this breaking up of natural habitats "fragmentation." Many scientists consider fragmentation one of the greatest threats to biological diversity (Noss and Cooperrider 1994). Wilcove et al. (1986) describe fragmentation as 1) decrease of a habitat type and 2) breaking up of remaining habitat into smaller, more isolated pieces.

Currently, the greatest mechanism of fragmentation in Douglas County is rural and suburban housing development and concurrent road and highway development. In the past, agricultural field and pasture development likely fragmented the Douglas County landscape. Rural and suburban housing development divides the landscape with roads, fences, new homes, and artificial landscaping.

In forest environments, fragmentation often allows more light into the forest interior, changing the plant species that can live there, and allowing more weedy species to colonize. Animal species that prefer open habitats will often be able to invade, displacing those species adapted to the forest interior. While these changes might be less obvious in a grassland or shrubland, the same processes occur. Exotic species are able to invade, displacing the natives, often reducing the total number of species able to survive. Animal species associated with native grasslands and shrublands may not be able to survive in an area with only exotic, weedy vegetation.

Roads that accompany housing development often act as impenetrable barriers to animals, especially small animals, and may encourage the spread of weedy plant species along them. There may also be significant mortality on roads, especially where animals formerly used the area where the road now exists. Fences may also act as barriers to animals, especially species like pronghorn antelope that do not jump over them.

Fragmentation is a process that occurs through many means, and usually occurs over several months, years, or decades. The fragmentation process may not result in immediate loss of plants, animals, and natural communities from an area, but an area may experience gradual turnover of plant and animal species able to survive. In some cases the results of fragmentation are not seen for several years as species gradually leave or die off within a fragment. The fragment size and surrounding landscape greatly influence the impacts on species and natural communities within the fragment.

Small patches of natural habitat, such as those created by large scale suburban development or large scale conversion of land to agriculture, will probably house few large animals, and will be unable to support plants and animals dependent on large areas of contiguous habitat. These small fragments may also experience a change in species composition, supporting more weedy plant and animal species. While the number of species may remain the same, small habitat fragments surrounded by suburban or agricultural development will likely experience species turnover and end up with more common and even pest plants and animals.

Large habitat fragments are less vulnerable to complete change in species composition. However, even a large habitat area can experience loss of native, habitat

specific plants and animals, especially on its edges. Intensive urban and suburban development at the edges of even a large natural area may cause changes in the species able to survive within the natural area.

Fragmentation threatens the significant natural features of Douglas County. Only concerted and well informed development and conservation planning are likely to save the remaining high quality natural areas in the County. The negative effects of fragmentation can be reduced by: concentrating housing and road development, leaving some areas relatively free from such pressures; planting only native species in lawns and gardens; leaving large buffers of open space around nature preserves, and discouraging the building of roads within these buffers; planning for large fragments as opposed to small ones; and educating local residents about impacts of fragmentation on the natural world.

1.4.4 Domestic predators.

Domestic cats (*Felis catus*) are naturally inclined to hunt and, as most cat owners know, often hunt small birds and rodents. Scientific evidence supports this notion and has demonstrated that small mammals and songbirds constitute a large proportion of the diet of free-ranging domestic cats (Parmalee 1953, Eberhard 1954, Jones and Corman 1981, Liberg 1984, Churcher and Lawton 1987). In fact, domestic predators such as cats have been implicated in the local extirpation and extinctions of songbirds and small mammals (Emlen 1974, Humphrey and Barbour 1981, Holler et al. 1989, Scott and Morrison 1990). Cats can have additional negative impacts on natural ecosystems, if not by eliminating certain prey species, then by reducing prey numbers to such an extent as to compete with native predators such as raptors (George 1974, Triggs et al 1984). Cat predation may also be of concern to hunters and game managers since their prey includes game species such as rabbits, ring-necked pheasants, northern bobwhites, and possibly others (Hubbs 1951, Liberg 1984, Warner 1985).

One reason that the effects of cat predation are so severe is that cat numbers are kept artificially high by supplemental feeding by their owners. While native predator numbers respond to changes in prey density, domestic cats do not. Thus, even when prey populations are very low, cats continue to kill. Cats continue to kill wild prey despite being fed at home (Davis 1957, Polsky 1975, Adamec 1976).

The threat posed by these domestic predators is believed to be proportional to the number of cats present in a given area. Coleman and Temple (1993) demonstrated that most free-ranging domestic cats in rural areas are associated with non-farm rural residences. Although farm residences typically support a higher number of cats per household, the higher densities of non-farm rural housing results in a higher number of cats in an area. In some areas cat density was found to equal that of native predators, and in certain instances exceeded the number of native predators by several fold. This suggests that rural development may present an indirect, but serious, threat to certain species.

Protecting important or sensitive areas from excess cat predation will be pertinent to conservation of rare and imperilled species in Douglas County. Some suggestions on

minimizing this threat can be made: 1.) Since increasing housing development is related to increasing cat densities, planning should consider limiting the density of housing near areas that may be especially susceptible to excess predation, such as those identified in this report. Cats are known to use an area of approximately one mile radius from their feeding place (Coleman 1995). This suggests that homes within this distance may pose a threat to certain native species. 2.) It may be possible for developers or homeowners' associations to agree to limit the number of cats that will be present at developments within this distance from sensitive areas. 3.) Where housing already exists minimizing the number of cats will require enlisting the help of cat owners. Coleman and Temple (1993) found that many people were willing to reduce the number of cats they kept to benefit wildlife, suggesting that free-ranging cats could be substantially reduced in number if cat owners could be informed of the negative impacts of their cats. Providing means for residents to control the reproductive output of the cats may also serve to reduce their numbers. The effects of declawing have not been studied.

1.4.5 Hydrological Modifications

Natural areas and their constituent plant and animal species often depend on an intact hydrologic regime to persist as do many of the rare and imperiled species and significant natural communities in Douglas County. Changes in hydrology and related changes in water quantity, quality, and periodicity threatens many natural areas across the United States, and threaten high quality natural areas in Douglas County.

Human induced modification of the hydrologic regimes often change the quantity, place, and timing of natural water flow. Activities at one place can impact areas many miles downstream. Modifications to hydrology are caused by: water diversions or removal; groundwater depletion; vegetation removal and subsequent stream channelization; dam building; and housing and road construction.

Water diversion and water removal from natural water courses effects water flow downstream. These activities often cause formerly perennial streams to run intermittently. Fish species that depend on having water throughout the year will not be able to survive these hydrologic modifications even if they take place many miles upstream. A reduction in water flow will often cause the entire drainage to dry up. Plants and animals that depend on year round moisture will usually disappear from these drainages. Wells usually do not remove water directly from a naturally wet area, but it may lower the water table sufficiently to cause ephemeral aquatic habitats to be eliminated. Lowering the water table will eventually have the same effects as direct water removal. Streams will run intermittently, and the plant and animal species associated with them will not be able to survive. Vegetation removal from riparian areas from grazing, agriculture, or housing/commercial real estate development will probably change the natural water flow. Water flows much more quickly across the surface causing greater erosion rates. This in turn will change habitats dependent on water. Wetlands associated with streams will often disappear as groundwater levels decrease, and species that depend on them will disappear. Urban environments are

designed to move water off more quickly, causing greater erosion and decreased replenishment of ground water. When water eventually reaches streams or wetlands it often carries eroded materials that cloud the water, and potentially harm native plants and animals dependent upon the water.

Related to hydrologic modifications are changes in water quality. Chemicals that run off agricultural fields and lawns into streams and wetlands may poison plant and animal species living in these areas. Excess nutrients in natural waters may cause growth of certain algae species to explode, depleting oxygen levels and eventually killing water dependent animals, especially fish.

Changes in water quality and quantity must be considered in planning for protection of significant natural features of Douglas County. Conservation of these features will often mean considering the hydrologic modifications far away from the actual conservation site, as well as in the immediate vicinity. Potential long term impacts of certain types of development to hydrology and water quality must be addressed. New developments should not be placed next to streams and rivers. New water diversions upstream of significant natural areas should be avoided. Well drilling and use must be considered with respect to the maintenance of the water table. Run off from fields and cattle lots should be carefully monitored to ensure the runoff is not negatively impacting conservation areas.

1.4.6 General observations.

From our field observations, several general conclusions can be made regarding the overall status of natural areas in Douglas County.

- Over 100 years of human habitation and accompanying land uses such as cattle grazing, timbering, and quarries have left an indelible mark. Nearly all of Douglas County's landscapes are somewhat altered.
- High priority conservation areas identified in this report support rare or imperilled species or significant natural communities. This suggests that some sensitive species and communities have escaped deleterious effects or are resistant to such impacts.
- Grasslands have been especially impacted through years of agricultural use. The impacts of grazing are debateable. Land management such as pasture seeding, irrigation, and excessive grazing have left very little of the grasslands in the county unaltered. Natural grassland types persist in a few small remnants and are important as reference areas and educational tools. As noted in the conservation site profiles, the topographically isolated mesa summits typical of the southern half of the county are an exception to this trend.
- The riparian and aquatic habitats of Douglas County comprise many of the highest priority conservation sites. This indicates that the processes which create and

support these habitats are still intact, even though the vegetational composition of the riparian communities is altered throughout. These include hydrological processes such as flooding, seasonal flow variation, and water quality. These processes are currently threatened.

- Shrub-steppe habitats are extensive in the county, representing the core of this habitat on the Front Range of Colorado. While much of this habitat remains, some of it in relatively high quality, it has been greatly fragmented by rural development and accompanying roads. The decline of the Plains sharp-tailed grouse in its last Colorado stronghold, is likely related to a decrease in the ecological integrity of this habitat type.
- Open savannas of ponderosa pine were once found along the eastern edge of the county. Today few good example of this habitat remain. Most areas that were potentially savanna have been encroached upon by dense growths of young trees and shrubs, likely due to years of fire suppression. No rare elements or significant natural communities were located in such habitats.
- The conifer forests that usually dominate north-facing slopes in the county are in relatively natural condition. Although likely cut for timber near the turn of the century, these forests have mostly recovered enough that the past events are barely perceptible. Furthermore, these habitats occur naturally in separate patches that are not directly affected by the fragmentation of habitats that has occurred elsewhere in the county. No rare elements or significant natural communities were located in such habitats, but examples of these habitats are included in some conservation sites.
- Wetlands in Douglas County have been drastically altered by past land uses. Most wetlands in Douglas County are associated with rivers and streams (see discussion of riparian areas above), in old oxbows, or creek confluences where water spreads out over a larger area, and remains throughout the year to support wetland vegetation. Typical for the Colorado Piedmont in general, most wetlands in the County have been modified by grazing, water diversions, or conversion to hay meadows. Those remaining tend to be small and contain a high percentage of weedy plant species. Still, a few Douglas County wetlands remains relatively intact and provide important functions such as wildlife habitat and flood abatement. These remaining wetlands, while somewhat degraded, still merit conservation efforts. Douglas County wetlands are discussed in detail in Section 7.1.
- CNHP botanists searched for the federally endangered orchid, Ute lady's tress (*Spiranthes diluvialis*), in Douglas County for two summers without finding any occurrences. The area of potential habitat is restricted to the western portion of the study area in places underlain with quaternary alluvium. The subirrigated

meadows and riparian areas considered potential habitat visited by botanists were often overgrown with weed or very heavily grazed. Many places with potential habitat could not be visited because landowners denied access.

- Prairie dogs are still common in parts of the County, however few large and viable colonies exist. Remnant colonies are most common in the northern sections of the County where development is proceeding most rapidly. Some relatively large colonies do remain, at Garber Creek and areas just south west of Parker.

1.5 Identifying Douglas County's Natural Heritage

1.5.1 The Natural Heritage Network and Biodiversity

Colorado is well known for its rich diversity of geography, wildlife, plants, and natural communities. However, like many other states, it is experiencing a loss of much of its flora and fauna. This decline in biodiversity is a global trend resulting from human population growth, land development, and subsequent habitat loss. Globally, the loss in species diversity has become so rapid and severe that Wilson (1988) has compared the phenomenon to the great natural catastrophes at the end of the Paleozoic and Mesozoic eras.

The need to address this loss in biodiversity has been recognized for decades in the scientific community. However, many of the conservation efforts made in this country were not scientifically based upon preserving biodiversity. Instead, they primarily focused on preserving game animals, striking scenery, and locally favorite open spaces. To address this lack of a methodical, scientifically based approach to preserving biodiversity, Peter Jensen, in association with The Nature Conservancy, developed the Heritage Methodology in 1978.

Recognizing that rare species are more disposed to become extinct than common ones, the Heritage Methodology ranks species according to their rarity or degree of imperilment. The ranking system is scientifically based upon the number of known locations of the species as well as its biology. By ranking the relative rareness of a species, the quality of its populations, and the importance of associated conservation sites, the Heritage Methodology can assist in prioritizing conservation efforts so that the most imperiled species can be preserved first. As the scientific community began to realize that communities are equally important as individual species, the Heritage Methodology has also been applied to ranking and preserving significant natural communities.

The Heritage Methodology is utilized by Heritage Programs throughout North, Central, and South America, forming an international database network. The Natural Heritage Network currently includes 85 primary data centers, which cover all 50 U.S. states, 5 provinces of Canada, and 13 countries in Latin America and the Caribbean. This network enables scientists to monitor the status of species from a state, national, and global perspective. It also enables conservationists and natural resource managers to make informed, objective decisions in prioritizing and focussing conservation efforts.

1.5.2 Colorado's Natural Heritage Program

The Colorado Natural Heritage Program (CNHP) is the state's primary comprehensive biological diversity data center, gathering information and field observations to help develop statewide conservation priorities. Its primary role is to collect, maintain, and disseminate information on rare, threatened, and endangered plants, animals, and significant natural communities in Colorado. After operating in Colorado for 14 years, the Program was relocated from the State Division of Parks and Outdoor Recreation to the University of Colorado Museum in 1992, and more recently to the College of Natural Resources at Colorado State University. The multi-disciplinary team of scientists and information managers gathers comprehensive information on rare, threatened, and endangered species and significant natural communities of Colorado. Life history, status, and locational data are incorporated into a continually updated data system. Sources include published and unpublished literature, museum and herbarium labels, and field surveys conducted by knowledgeable naturalists, experts, agency personnel, and our own staff of botanists, ecologists, and zoologists. Information management staff carefully plot the data on 1:24,000 scale USGS topographical maps and enter it into the Biological and Conservation Data System. The database can be accessed by many categories, including taxonomic group, global and state rarity rank, federal and state legal status, source, observation date, county, quadrangle map, watershed, management area, township, range, section, precision, and conservation area.

In addition to participating in an international network of conservation data centers, CNHP has effective relationships with several state and federal agencies, including the Colorado Department Natural Resources, the Colorado Natural Areas Program, the Colorado Division of Wildlife, and the U.S. Forest Service. Numerous local governments and private entities also work closely with CNHP. Use of the data by many different individuals and organizations, including Great Outdoors Colorado, encourages a proactive approach to development and conservation thereby reducing the potential for conflict. Information collected by the Heritage Programs throughout the globe provides a means to protect species before the need for legal endangerment status arises.

2.0 SYNOPSIS OF HIGH PRIORITY SPECIES, NATURAL COMMUNITIES, AND SITES FROM DOUGLAS COUNTY

The following sections summarize the results of the Douglas County survey. Maps of the identified conservation sites (Natural Heritage Sites, Significant Wetlands, and Habitat Conservation Areas) and tables of potential and known species and natural communities are presented.

2.1 Identified Conservation Sites

After conducting a survey for the most significant "natural" areas in Douglas County, the Colorado Natural Heritage Program identified 53 conservation sites. These areas are recommended for conservation attention. There are 19 Natural Heritage Conservation Sites, 26 significant wetlands, and 8 Habitat Conservation Areas identified on the maps. Each of the 53 sites is discussed in more detail in Section 4.0.

2.2 Tables of Potential Elements of Natural Diversity in Douglas County

Table 2.2.1. Rare or imperilled vertebrates potentially occurring in Douglas County.

<u>common name</u>	<u>scientific name</u>	<u>global rank</u>	<u>state rank</u>	<u>federal status</u>	<u>state status</u>
AMPHIBIANS					
Northern leopard frog	<i>Rana pipiens</i>	G5	S3S4		SC
BIRDS					
American peregrine falcon	<i>Falco peregrinus</i>	G3	S2B,SZN	LE	T
Mexican spotted owl	<i>Strix occidentalis lucida</i>	G3T3	S1B	LT	T
Ferruginous hawk	<i>Buteo regalis</i>	G4	S3B,S5N	C2	SC
Loggerhead shrike	<i>Lanius ludovicianus</i>	G4	S3B,SZN	C2	
Plains sharp-tailed grouse	<i>Tympanuchus phasianellus jamesi</i>	G5T5	S1		
American redstart	<i>Setophaga ruticilla</i>	G5	S1?B,SZN		
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	G5	S1B		
Least flycatcher	<i>Empidonax minimus</i>	G5	S1B,SZN		
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	G5	S2B		
Ovenbird	<i>Seiurus aurocapillus</i>	G5	S2B		
Long-billed curlew	<i>Numenius americanus</i>	G5	S2B,SZN	3C	SC
White-faced ibis	<i>Plegadis chihi</i>	G5	S2B,SZN	C2	
Wood Duck	<i>Aix sponsa</i>	G5	S2B,SZN		
Chestnut-sided warbler	<i>Dendroica pennsylvanica</i>	G5	S2B,SZN		
Evening grosbeak	<i>Coccothraustes vespertinus</i>	G5	S2S3B,S5N		
Eastern yellow-billed cuckoo	<i>Coccyzus americanus americanus</i>	G5TU	S3B		
Cedar waxwing	<i>Bombycilla cedrorum</i>	G5	S3B,S5N		
Great blue heron	<i>Ardea herodias</i>	G5	S3B,SZN		
Red-eyed vireo	<i>Vireo olivaceus</i>	G5	S3B,SZN		
Turkey vulture	<i>Cathartes aura</i>	G5	S3B,SZN		
Bobolink	<i>Dolichonyx oryzivorus</i>	G5	S3B,SZN		
FISH					
Plains topminnow	<i>Fundulus sciadicus</i>	G4	S2	C2	SC
Northern red-bellied dace	<i>Phoxinos eos</i>	G5	S1		SC
Iowa darter	<i>Etheostoma exile</i>	G5	S2		SC
Common shiner	<i>Notropis cornutus</i>	G5	S2		SC
Johnny darter	<i>Etheostoma nigrum</i>	G5	S3		SC
MAMMALS					
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	G5T2	S2	C2	SC

<u>common name</u>	<u>scientific name</u>	global <u>rank</u>	state <u>rank</u>	federal <u>status</u>	state <u>status</u>
Plains pocket gopher subspecies	<i>Thomomys talpoides</i> <i>macrotis</i>	G5TU	S1		
REPTILES					
Lined snake	<i>Tropidoclonium</i> <i>lineatum</i>	G5	S3		

Table 2.2.2 Rare or imperilled invertebrates potentially occurring in Douglas County

<u>common name</u>	<u>scientific name</u>	<u>global rank</u>	<u>state rank</u>	<u>federal status</u>	<u>state status</u>
BUTTERFLIES					
Pawnee montane skipper	<i>Hesperia leonardus montana</i>	G4T1	S1	LT	
Hops vine blue	<i>Celastrina species 1</i>	G2	S1?		
Regal fritillary	<i>Speyeria idalia</i>	G3	S1	C2	
Ottoo skipper	<i>Hesperia ottoe</i>	G3?	S2		
Mottled dusky wing	<i>Erynnis martialis</i>	G4	S2S3		
Rhesus skipper	<i>Polites rhesus</i>	G4	S2S3		
Snow's skipper	<i>Paratrytone snowi</i>	G4	S3		
Colorado blue	<i>Euphilotes rita coloradensis</i>	G4T2T3	S2S3		
Moss's elfin	<i>Incisalia mossi</i>	G4T3	S2S3		
Eastern tiger swallowtail	<i>Papilio glaucus</i>	G5	S3		
Sister	<i>Adelpha bredowii</i>	G5	S3		
Cross-line skipper	<i>Polites origenes</i>	G5	S3S4		
Long dash	<i>Polites mystic</i>	G5	S3S4		
California tortoise shell	<i>Nymphalis californica</i>	G5	S3S4		
Nitra swallowtail	<i>Papilio zelicaon nitra</i>	G5T5	S3S4		
DRAGONFLIES AND DAMSELFLIES					
Sedge darner	<i>Aeshna juncea</i>	G5	S3		
TIGER BEETLES					
	<i>Cicindela nebraskana</i>	G5	S2		
	<i>Cicindela duodecimguttata</i>	G5	S3		

2.2.3 Rare or imperilled plants potentially occurring in Douglas County

<u>common name</u>	<u>scientific name</u>	global <u>rank</u>	state <u>rank</u>	federal <u>status</u>	state <u>status</u>
Bell's twinpod	<i>Physaria bellii</i>	G2	S2	C2	
Ute ladies' tresses	<i>Spiranthes diluvialis</i>	G2	S2	LT	
Dwarf milkweed	<i>Asclepias uncialis</i>	G3	S2	C2	
Grass-fern	<i>Asplenium septentrionale</i>	G3G4	S3S4		
Lavender hyssop	<i>Agastache foeniculum</i>	G4G5	S1		
Peck sedge	<i>Carex peckii</i>	G4G5	S1?		
Pictureleaf wintergreen	<i>Pyrola picta</i>	G455	S2		
American currant	<i>Ribes americanum</i>	G5	S1		
Richardson alum-root	<i>Heuchera richardsonii</i>	G5	S1		
Toothcup	<i>Rotala ramosior</i>	G5	S1?		
Prairie violet	<i>Viola pedatifida</i>	G5	S2		
Yellow lady's slipper	<i>Cypripedium pubescens</i>	G5	S2		
Showy prairie gentian	<i>Eustoma russellianum</i>	G5	S3		
Wood lily	<i>Lilium philadelphicum</i>	G5	S3		
Sensitive fern	<i>Onoclea sensibilis</i>	G5	SH		
Yellow hawthorn	<i>Crataegus chrysocarpa</i>	G5	S1S2		
Selkirk violet	<i>Viola selkirkii</i>	G5?	SH		
Colorado butterfly weed	<i>Gaura neomexicana ssp coloradensis</i>	G4T2	S1	C1	
New mexico butterfly weed	<i>Gaura neomexicana ssp neomexicana</i>	G5T5	S1		
	<i>Woodsia neomexicana</i>	G4?	S2		
Carrion-flower	<i>Smilax lasioneura</i>	G5	S3S4		

2.2.4 Rare or imperilled natural communities potentially occurring in Douglas County

<u>common name</u>	<u>scientific name</u>	<u>rank</u>	<u>rank</u>	<u>status</u>	<u>status</u>
Montane grassland	<i>Danthonia parryi</i>	G2	S2	-	-
Montane grassland	<i>Muhlenbergia montana-Danthonia parryi</i>	G3G4	S2?	-	-
Montane grassland	<i>Muhlenbergia montana-Danthonia parryi</i>	G3G4	S2?	-	-
Oak shrubland	<i>Quercus gambelii-Cercocarpus montanus/Muhlenbergia montana</i>	GU	S?	-	-
Xeric tallgrass prairie	<i>Andropogon gerardii-Schizachyrium scoparium</i>	G2	S2	-	-
Foothills shrubland	<i>Cercocarpus montanus/Stipa comata</i>	G2	XX	-	-
Foothills shrubland	<i>Quercus gambelii-Cercocarpus montanus/Muhlenbergia montana</i>	GU	SU	-	-

Using existing information from the Colorado Natural Heritage Program’s databases, the Colorado Division of Wildlife, the Douglas County Department of Planning and Community Development, various museums, and the scientific literature, the Colorado Natural Heritage Program identified the species and natural communities presented in this table as targets of our inventory.

2.3 Table of Documented Elements of Natural Diversity in Douglas County

The table presents a list of species and natural communities that are known to be documented from Douglas County.

Table 2.3.1 Rare or imperilled vertebrates known from Douglas County

VERTEBRATES					
<u>common name</u>	<u>scientific name</u>	<u>global rank</u>	<u>state rank</u>	<u>federal status</u>	<u>state status</u>
AMPHIBIANS					
Northern leopard frog	<i>Rana pipiens</i>	G5	S3S4		SC
BIRDS					
Mexican spotted owl	<i>Strix occidentalis lucida</i>	G3T3	S1B	LT	T
Plains sharp-tailed grouse	<i>Tympanuchus phasianellus jamesi</i>	G5T5	S1		
American redstart	<i>Setophaga ruticilla</i>	G5	S1?B,SZN		
Least flycatcher	<i>Empidonax minimus</i>	G5	S1B,SZN		
Ovenbird	<i>Seiurus aurocapillus</i>	G5	S2B		
Evening grosbeak	<i>Coccothraustes vespertinus</i>	G5	S2S3B,S5N		
Eastern yellow-billed cuckoo	<i>Coccyzus americanus americanus</i>	G5TU	S3B		
Cedar waxwing	<i>Bombycilla cedrorum</i>	G5	S3B,S5N		
Great blue heron	<i>Ardea herodias</i>	G5	S3B,SZN		
Red-eyed vireo	<i>Vireo olivaceus</i>	G5	S3B,SZN		
Chestnut-sided warbler	<i>Dendroica pennsylvanica</i>	G5	S2B,SZN		
FISH					
Plains topminnow	<i>Fundulus sciadicus</i>	G4	S2	C2	SC
Northern red-bellied dace	<i>Phoxinos eos</i>	G5	S1		SC
Iowa darter	<i>Etheostoma exile</i>	G5	S2		SC
Common shiner	<i>Notropis cornutus</i>	G5	S2	SC	
Johnny darter	<i>Etheostoma nigrum</i>	G5	S3		SC
MAMMALS					
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	G5T2	S2	C2	SC
Plains pocket gopher subspecies	<i>Thomomys talpoides macrotis</i>	G5TU	S1		
REPTILES					
none					

Table 2.3.2 Rare or imperilled invertebrates known from Douglas County.

<u>common name</u>	<u>scientific name</u>	<u>global rank</u>	<u>state rank</u>	<u>federal status</u>	<u>state status</u>
BUTTERFLIES					
Pawnee montane skipper	<i>Hesperia leonardus montana</i>	G4T1	S1		LT
Hops vine blue	<i>Celastrina</i> sp. 1	G2	S1?		
Ottoe Skipper	<i>Hesperia ottoe</i>	G3	S2		
Moss's elfin	<i>Incisalia mossi</i>	G4T3	S2S3		
DRAGONFLIES AND DAMSELFLIES					
Sedge darner	<i>Aeshna juncea</i>	G5	S3		
TIGER BEETLES					
	<i>Cicindela nebraskana</i>	G5	S2		
	<i>Cicindela duodecimguttata</i>	G5	S3		

Table 2.3.3 Rare or imperilled plants known from Douglas County.

<u>common name</u>	<u>scientific name</u>	<u>global rank</u>	<u>state rank</u>	<u>federal status</u>	<u>state status</u>
American currant	<i>Ribes americanum</i>	G5	S1		
Richardson alum-root	<i>Heuchera richardsonii</i>	G5	S1		
Prairie violet	<i>Viola pedatifida</i>	G5	S2		
Wood lily	<i>Lilium philadelphicum</i>	G5	S3		
Selkirk violet	<i>Viola selkirkii</i>	G5?	SH		
Carrion-flower	<i>Smilax lasioneura</i>	G5	S3S4		

Table 2.3.4 Rare or imperilled natural communities known from Douglas County.

<u>common name</u>	<u>scientific name</u>	<u>global rank</u>	<u>state rank</u>	<u>federal status</u>	<u>state status</u>
Montane grassland	<i>Danthonia parryi</i>	G2	S2	-	-
Montane grassland	<i>Muhlenbergia montana-Danthonia parryi</i>	G3G4	S2?	-	-
Montane grassland	<i>Muhlenbergia montana-Danthonia parryi</i>	G3G4	S2?	-	-
Oak shrubland	<i>Quercus gambelii-</i> <i>Cercocarpus montanus/</i> <i>Muhlenbergia montana</i>	GU	S?	-	-
Xeric tallgrass prairie	<i>Andropogon gerardii-</i> <i>Schizachyrium scoparium</i>	G2	S2	-	-
Foothills shrubland	<i>Cercocarpus montanus/Stipa comata</i>	G2	XX	-	-
Foothills shrubland	<i>Quercus gambelli-</i> <i>Cercocarpus montanus/</i> <i>Muhlenbergia montana</i>	GU	SU	-	-

3.0 CONSERVATION PLAN FOR DOUGLAS COUNTY (TO BE CONSTRUCTED BY LISA HEADINGTON)

3.1 Report Recommendations

1. Develop an implementation plan for protection of Conservation Sites.

This work has documented the existence of several elements deemed to be significant for the protection of Colorado's natural diversity.

2. Incorporate the information included in this report in the review of activities in or near areas identified as significant.

The areas identified in this study are known to support unique or exemplary natural communities and rare species. As proposed activities within Douglas County are considered, they may be compared to the maps presented herein. Should any proposed project potentially impact these sites, planning personnel can decide if it is desirable to contact persons, organizations, or agencies with expertise. The Colorado Natural Heritage Program, Colorado Natural Areas Program, and Colorado Division of Wildlife routinely conduct environmental reviews statewide and should be considered available resources.

3. Increase public awareness of the benefits of protecting areas determined to be significant to Colorado's natural diversity.

Natural lands are becoming ever more scarce especially in near proximity to densely populated metropolitan areas. Rare species will continue to decline if not given appropriate protective measures. Increasing the public's knowledge of the remaining significant areas will build support for the programmatic initiatives necessary to protect them. Such activities could be done through interpretive facilities, conferences or meetings to stimulate public involvement, and information pamphlets. Finally, it would be desirable for the county to publicize significant conservation actions taken to build awareness of County's commitment to the protection of sites of national ecological significance.

4. Promote cooperation among pertinent organizations in the protection of natural diversity.

The long-term protection of natural diversity in Douglas County will be facilitated with the cooperation of many organizations. The Douglas County Planning Department has played a leadership role in attempting to incorporate diverse opinions in the planning process. Efforts to this end should continue, providing stronger ties among federal, state, and local and private interests involved in the

protection or management of natural lands.

5. Encourage sound management of significant elements of natural diversity within Douglas County.

The first step in accomplishing this recommendation would be the appropriate designation of the identified conservation site. In doing so, the development of management plans would be a necessary component of the site designation. Several organizations and agencies are available for consultation in the development of Management Plans for significant natural lands (e.g. Colorado Natural Areas Program, The Nature Conservancy, and the CNHP). We would also encourage the development of partnerships that could research and develop techniques for maintaining or restoring conservation sites to aid in the preservation of rare, threatened, or endangered species or significant natural communities (e.g. Colorado Division of Wildlife, Colorado Native Plant Society, The Nature Conservancy, and various academic institutions). Because some of the most serious threats to the Douglas County ecosystems are large-scale (altered hydrology, residential encroachment, exotic species invasion), these partnerships become essential to the long term protection of the area.

6. Conduct further inventory efforts to assess other natural heritage resources.

7. Consider tax incentives for conservation actions on private lands.

3.2 How to use the guide/document; description of maps

3.3 Include Section 6.6 of draft document

4.0 CONSERVATION SITES

4.1 Categories of Conservation Sites

The end result of this study is the recommendation of the most important areas in Douglas County to be conserved, protected, managed, or planned for conservation purposes. The following sections identify those sites that we determined to be the most important for conservation. There are three types of sites that we are recommending: Natural Heritage Sites, Significant Wetlands, and Habitat Conservation Areas.

4.1.1 Natural Heritage Conservation Sites

CNHP conservation sites are recommended to Douglas County as places in need of special conservation actions. These are areas that are known to support elements of biological diversity that are found in very few other places, either in Colorado or on Earth. Additionally, many of these sites contain assemblages of several rare or imperilled animal and plant species. Such sites are of the highest conservation priority since, if they are lost or degraded, species that are not found elsewhere may be lost with them.

In some cases, these elements are globally rare (such as Preble's meadow jumping mouse and Parry's oatgrass grasslands) and their conservation is of global importance. In other words, **the protection of these species and natural communities in Douglas County will have major consequences across their ranges; the people of the world will depend on Douglas County to take the responsibility for these species.** Other sites are significant for their contribution to the State's biological diversity. Some sites are relative "hotspots" of biological diversity, containing both globally and state rare organisms within a relatively large and intact habitat complex. The West Plum Creek macrosite, for example, supports the globally rare Preble's meadow jumping mouse as well as six species of state rare fishes, and one species of state rare plant.

It is in no way implied that other areas of the county are not of importance in terms of conserving the County's natural values. The sites presented here, 19 of them, represent the highest land protection priorities for the County. Ideally, these sites could serve as core natural areas that are surrounded by adequate buffer zones and connected to other core sites with well designed corridors. Therefore, it will be necessary to adequately plan and protect lands beyond those recommended in this report if these highly significant sites are to retain their full natural value. Furthermore, other kinds of sites may be worthy of conservation actions based on other values such as aesthetics or recreation. Unlike the conservation sites here, however, those sites typically contain species and natural communities that are relatively common and found at many other sites as well.

4.1.2 Significant Wetlands

Wetlands and riparian areas have historically been areas with intense human activity. As a result of these activities, many wetlands have been heavily disturbed (Cooper 1989). Wetlands and riparian areas in Douglas County are no exception. The area between Denver and Colorado Springs has been subject to intense disturbance for over 100 years. Agriculture, grazing, and water diversions are probably the activities that have most

significantly impacted wetlands and riparian areas in Douglas County. Fertile soils and available water for irrigation made land near the floodplains well suited for agricultural development. In more arid climates grazing animals tend to concentrate around wetlands and riparian areas, often heavily impacting the vegetation. More recently, hydrologic diversions have been developed for irrigation and for drinking water supplies.

The Colorado Natural Heritage Program tracks rare plant communities or high quality examples of common plant communities as a "coarse filter" for protection of biodiversity. Because of the long history of intense use, finding undisturbed wetlands and riparian areas in the county was not very likely. Field surveys confirmed this. Although no wetland/riparian areas were found to be of significance for natural heritage purposes, it was understood that these areas may have other values. Wetland/riparian areas serve a variety of valuable purposes apart from providing habitat for natural heritage resources (Mitsch and Gosselink 1993, Cooper 1988). Heritage scientists identified and evaluated wetland/riparian sites in Douglas County not only on the basis of heritage resources, but also in terms of size, degree of modification, and other factors that may indicate the ability of these sites to provide additional important functions to Douglas County citizens.

Since the mid-1970's (and earlier for certain hunting and wildlife groups) wetland/riparian areas were recognized in the United States as unique systems that provide functions valuable to humans (Mitsch and Gosselink 1993). These functions include: 1. ground water recharge, 2. ground water discharge, 3. flood water retention/detention/storage, 4. sediment trapping, 5. nutrient retention, 6. food chain support, 7. fish and wildlife habitat, and 8. human recreation (Cooper 1988). Water quantity and quality in Douglas County, as well as flood control and wildlife may be critically linked to maintenance of these systems.

The sites presented below do not result from a full functional wetland assessment (c.f. Cooper and Cottrell 1989; Cooper 1988), but represent sites that potentially serve several of the functions detailed above. The largest wetlands and riparian areas in Douglas County, that are the least altered by human activities should provide the greatest benefit. Many non-native plant species occur in riparian areas and wetlands. This is probably the result of both natural and anthropogenic disturbance and is a factor that will probably not change. Plant communities invaded by non-native species are considered less valuable in the Heritage Methodology (for conservation of biological diversity) than a natural community with few or no non-native species. For this and other reasons no wetlands or riparian areas in the county were identified as elements of conservation for CNHP. For many animal species it appears that the presence of non-native plant species may not make the habitat unsuitable for those animals. The vegetation structure may be more important than the species composition (eg. Preble's meadow jumping mouse, several warm water minnows). Wetland and riparian areas in the county were identified that undoubtedly provide other important functions. These sites are potentially worthy of consideration in the Douglas County planning process. CNHP staff are recommending two categories of wetland/riparian areas in the county. Wetland/riparian areas presented first are the highest priority sites in the County. These sites may be inhabited by non-native species or have some hydrologic modification but they were identified as some of the highest quality wetland/riparian areas in the county. The second list presents more disturbed or degraded but still appear

to provide some of the functions listed above. These would be considered moderate priority for the county. Locations of these sites are provided on accompanying maps.

4.1.2.1 Initial Wetland Site Selection

Initial site selection was accomplished by examining available maps and aerial photographs of the county. High-altitude color infrared photo's were used, in conjunction with U.S.F. & W.S. National Wetland's Inventory base maps and USGS topographic maps of comparable scale (1:24,000), to distinguish areas worthy of field survey. Selection criteria at this level involved evaluations of: 1) overall size and complexity (ie. vegetation structure and/or composition), 2) relative position within the drainage basin, 3) adjacent land-use practices, and 4) the probable extent of human-induced modification and/or disturbance. Forty-eight wetland/riparian sites were identified as preliminary survey sites.

4.1.2.2 Preliminary Field Check

Where possible, actual condition of preliminary survey sites was examined by visually inspecting the area from public roads. The intent was to eliminate sites that were heavily impacted and to concentrate on the sites in the best condition. Fourteen preliminary survey sites were rejected resulting in 34 priority survey sites.

Preliminary survey sites were rejected, and hence excluded from further consideration, if they exhibited any of the following characteristics:

- 1) the lack of a discernable wetland/riparian plant community (ie., no distinct boundary between the wetland and upland community-types)
- 2) severe disturbance within the wetland proper (e.g., heavy livestock grazing, haying, agricultural tilling, residential/commercial development, road construction, gravel mining or other physical alteration)
- 3) spatial extent being relatively small;
- 4) evidence of being a "relic wetland/riparian area" (ie. the necessary hydrologic conditions are no longer operative in the contemporary landscape (e.g., severe die-back of plant communities).

Many of the riparian/wetland areas identified as potential conservation sites are located in relatively close proximity to each other within a watershed or within conservation sites included for rare species. These sites may represent opportunities to protect large, relatively natural systems that provide a variety of benefits as well as protecting biodiversity. It is well known that a wetland site is affected, to a least some degree, by activities within the entire watershed. While protection of an entire watershed is not always feasible, protection of core sites within the watershed may allow continuation of natural functions and provide many benefits to the citizens of Douglas County.

4.1.2.3 Wetland Sites

Sites evaluated by on-the-ground survey are marked with an asterisk before the site

name. Sites not evaluated on the ground were done by analyzing National Wetland Inventory maps, viewing from public roads, and/or interpretation of aerial photos. Sites not field checked should be visited to insure the accuracy of the information before any conservation action is taken. These sites are illustrated on the accompanying folded maps (Maps 2.1A and 2.1B).

4.1.3 Habitat Conservation Areas

Large areas with low levels of disturbance are known to be of high natural value. Many animals require large ranges such as pronghorn, bear, elk, and deer. Landscape-level natural processes are more likely to function in these areas. In addition, these large natural areas have scenic and aesthetic values.

CNHP staff identified relatively large unfragmented tracts of land as potential habitat conservation areas. It is understood that outright purchase of these sites is probably not realistic, but by using different levels of protection (purchase, conservation easements, etc.) these areas may be afforded some long term protection.

Aerial photographs, both 1:24,000 color (1984) infrared and 1:12,000 orthophotos (1991), were analyzed to find large, intact parcels of land representing the major vegetation types within Douglas County. The major vegetation types were woodlands (mainly ponderosa pine [*Pinus ponderosa*]), shrublands (mainly Gambel's oak [*Quercus gambelii*] and mountain mahogany [*Cercocarpus montanus*]), and grasslands. Many of these types were intermixed on the landscape and several may be included within one site.

Many of these sites were viewed from public roads or had smaller parts surveyed on the ground but most are still unsurveyed. Although roads, buildings, plowed fields, and other areas with major disturbances are visible on aerial photographs, sites with smaller scale disturbances such as weed invasion, planting of hay meadows or grassland conversion, and overgrazing, are not. Because of this it should be noted that the potential habitat conservation areas may be degraded by smaller scale disturbances.

4.2 Douglas County conservation sites

Fifty-three conservation sites have been identified in the study area. As mentioned previously, these sites range in conservation significance from global to local concern. Similarly, the protection and management urgencies also vary considerably. These sites summarized on the table below and the site profiles that follow.

Table 4.1 A list of the 53 identified conservation sites in Douglas County and the respective page numbers where site descriptions can be found in this document. See Maps 2.1A and 2.1B for locations.

<u>Site name</u>	<u>Page</u>
Antelope Creek (W37)	41
Antelope Creek Headwaters (W45)	42
Antelope-Haskel Creeks (W50)	43
Bear Creek-West Plum Creek (W59)	44
Bucks Mountain	45
Cherokee Mountain	46
Cherry Creek Canyon	47
Cook Creek (W57)	51
Dawson Butte Slopes	52
Dawson Butte	53
East Plum Creek Macrosite	56
Elk Creek (W33)	61
Garber Creek	62
Garber Creek Marsh (W63)	67
Glen Grove Hogback	68
Greenland Ranch	72
Indian Creek	75
Jackson Creek	78
Jarre Canyon	82
Kinney Creek (W44)	85
Lake Gulch (W52)	86
Larkspur Butte Seep (W49)	87
Lone Tree School	88
Lone Tree (W60)	89
Louviers East (W68)	90
Lower West Plum Creek at Hwy 67 (W65)	91
Moonshine Gulch	92
Newlin Gulch	93
Newlin Gulch (W76)	98
Parker Regional Park	99
Perry Park	102
Prairie Canyon Wetland (W39)	106
Rattlesnake-Nemrick Buttes (W48)	107
Reed Hollow North	108
Roxborough Hogbacks	111
South Castle Rock East Ranch	112
South Castlewood Park	113
Spring Creek	114
Spruce Mountain	118
True Mountain	122
Upper East Cherry Creek	125
Upper East Cherry Creek complex (W11)	128
Upper East Plum Creek	129
Upper Lake Gulch (W51)	132

Upper West Cherry Creek (W46)	133
West Cherry Creek at Crowfoot Creek (W34)	134
West Cherry Creek at Greenland Road (W36)	135
West Cherry Creek at Russellville Rd. (W31)	136
West Plum Creek at Garber Creek (W62)	137
West Plum Creek at Perry Park South Ranch (W58)	138
West Plum Creek at Sedalia (W64)	139
West Plum Creek Macrosite	140
Wildcat Canyon (W41)	146

SITE NAME: ANTELOPE CREEK (W37)

SITE TYPE: Moderate Priority Wetland

SIZE: Approx. 100 acres

LOCATION: T9S R66W sections 25, 26

QUADRANGLE: Cherry Valley School (3910426)

GENERAL DESCRIPTION: The site contains a riparian wetland complex with small, scattered patches of emergent vegetation upstream and narrow shrub dominated vegetation downstream.

Land use appears to be moderate to heavy mainly from livestock grazing and agriculture. Grazing impact appears to be heavy with the exception of an isolated area east of the road which appears to be excluded and contains a well developed graminoid community. The hydrology is fairly natural although there is one upstream modification (impoundment).

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the hydrological processes is essential to the long term biological integrity of the site. Management should include the maintenance of a significant buffer around the wetland/riparian vegetation (100 meters is preferable). The buffer should be used to moderate impacts to the core area, the wetland, of livestock. Access to the wetland could be restricted to reduce observed impacts.

SITE NAME: ANTELOPE CREEK HEADWATERS (W45)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 100 acres

LOCATION: T10S R66W sections 29, 31, 32

QUADRANGLE: Greenland (3910427)

GENERAL DESCRIPTION: The site contains a narrow linear riparian/wetland complex with several natural springs distributed throughout. The hydrology appears to be natural.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the apparently natural hydrological processes, particularly the upstream character of the stream, is essential to the long term biological integrity of the site. A buffer around the riparian vegetation is warranted could be as much as 100 meters wide. The springs in the site should be given a high degree of protection.

SITE NAME: ANTELOPE-HASKEL CREEKS (W50)

SITE TYPE: High Priority Wetland

SIZE: Approximately 110 acres.

LOCATION: T9S R66W section 35 (NW 1/4)

QUADRANGLE: Greenland (3910427), Cherry Valley School (3910426)

GENERAL DESCRIPTION: The site contains a riparian wetland complex at the confluence of Haskel and Antelope Creeks. The floodplain is relatively wide. Impacts appear to be low to moderate although access to the site was denied. The area is used for agriculture and impoundments exist both upstream and downstream of the site.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Maintenance of at least the existing flow regime is essential for the long term protection of the site. Restoration of the upstream modifications to the hydrological regime would benefit the site. Protection of ground water will be important over the long term.

SITE NAME: BEAR CREEK-WEST PLUM CREEK (W59)

SITE TYPE: High Priority Wetland

SIZE: Approximately 210 acres

LOCATION: T9S R68W sections 2, 11.

QUADRANGLE: Dawson Butte (3910438)

CONSERVATION SITE: This wetland is contained in the **West Plum Creek Macrosite**.

GENERAL DESCRIPTION: The site contains a riparian wetland complex at the confluence of Bear and West Plum Creeks. The vegetation in the riparian area contains a mosaic of cottonwood (*Populus* sp.), willow (*Salix* spp.) and mixed herbaceous patches which occupy a broad floodplain.

Livestock grazing and some haying occur on the site. The hydrology is relatively natural with slight modifications (small stockponds excavated within area).

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological regime is essential to the long term integrity of the site. Management should include the maintenance of a significant buffer around the riparian vegetation (at least 100 meters is preferable). If there is a continue desire or need to maintain livestock on the property, water access should be restricted to selected points. Restoration could include the restoration of the stockponds.

SITE NAME: BUCKS MOUNTAIN

SITE TYPE: Habitat Conservation Area

SIZE: 2,620 acres

LOCATION: T10S, R65W, Sec. 19, 20
T10S, R66W, Sec. 23, 24, 25, 26

QUADRANGLE: Cherry Valley School (3910426)

GENERAL DESCRIPTION: The site is dominated by a small mesa that rises approximately 250' from the surrounding grasslands. The major vegetation types include ponderosa pine woodlands, ponderosa pine forests, and grasslands. The vegetation is largely native and some in very good condition. The rocks on Buck's Mountain were observed to harbor unidentified bats in the crevices. The site could be an important bridge or corridor to the Black Forest in El Paso County.

CURRENT STATUS: Private and unprotected. The owners were highly interested in the findings and were sympathetic to conservation needs of the area.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Improper use by livestock and overly dense residential development should be prevented. To maintain the woodlands of the area, prescribed fire is desirable.

SITE NAME: CHEROKEE MOUNTAIN

SITE TYPE: Habitat Conservation Area

SIZE: 11,680 acres

LOCATION: T6S, R67W, Sec. 28,29,30,32
T6S, R68W, Sec. 22,24,25,26,27,35,36
T7S, 67W, Sec. 5,6,7,8,17,18
T7S, 68W, Sec. 1,2,3,11,12,13

QUADRANGLE: Sedalia (3910448)
Highlands Ranch (3910458)

GENERAL DESCRIPTION: Extensive hills with Gambel's oak and mountain mahogany dominate the landscape. There are also ponderosa pine woodlands and grasslands amid the patches of oaks. Rock outcrops and in a few cases cliffs are present. This is habitat for the plains sharp-tailed grouse and golden eagles. There is a resident herd of elk that use the area and mountain lions are still reported.

CURRENT STATUS: The land is largely privately owned, but it also contains some State Land Board and Denver Mountain Parks parcels. There are two major private landowners: Highlands Ranch and Tweet Kimball (of Cherokee Ranch). Highlands Ranch has designated some of the area as the Wildcat Mountain Wildlife Sanctuary, but the plans have never received outside review. The "preserve design" was accomplished prior to modern methods.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Much of the land is heavily utilized by cattle. Cherokee Ranch is heavily invaded by knapweed. Management will be needed to protect the active golden eagle nests of the area. The entire area should be used as a corridor to the open lands west into the mountains.

SITE NAME: CHERRY CREEK CANYON

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 300 acres

BIODIVERSITY RANK: B5

COMMENTS: This site supports occurrences of three species of rare and imperilled plants.

PROTECTION URGENCY RANK: P4

COMMENTS: The topography of this site affords some natural protection to these occurrences. Surrounding land conversion has potential to impact these occurrences.

MANAGEMENT URGENCY: M4

COMMENTS: Although the plant occurrences at this site are largely sheltered from direct disturbance, invasive exotic plants may threaten their persistence.

LOCATION: Cherry Creek Canyon, east of State Highway 83
T8S, R66W, Section 25 and 26

QUADRANGLE: Russellville Gulch

GENERAL DESCRIPTION:

The Cherry Creek Canyon site abuts Castlewood Canyon State Park and encompasses a box canyon lined with steep walls and cliffs. This canyon harbors unique habitats that are moist and sheltered within the surrounding dry, open grasslands. The canyon offers unusual conditions that provide homes for several unique plant species with natural heritage significance. The canyon's inaccessibility to grazing animals, agriculture, and housing development leaves it in relatively pristine condition with predominantly native plant communities and few invasive exotic weeds. The Cherry Creek Canyon site is underlain by Castle Rock conglomerate, a very light colored sedimentary rock made up of sands and gravels cemented together by silicate minerals (Chronic 1980). Soils are classified as Coni rock loams (SCS 1974), characterized as thin, poorly developed soils with parent material near the surface. In many places, the canyon's steep slopes have prevented soil development and there is only exposed rock. The canyon's flat bottom varies from 40 to 750 feet wide, with the stream bed 10 to 25 feet wide. In most years the stream runs perennially in the spring and early summer, and then intermittently into autumn. Cliffs and steep canyon walls rise 60 to 80 feet above the canyons floor.

The vegetation of this site is described by ESCO (1980): Above Cherry Creek Canyon lie extensive grasslands, typical of short to mid-grass prairie. The dominant

plants include blue grama (*Bouteloua gracilis*), side oats grama (*Bouteloua curtipendula*), junegrass (*Koeleria macrantha*), Sandberg bluegrass (*Poa secunda*), Canby bluegrass (*Poa canbyi*), and needle-and-thread grass. Several native forbs are also present in these grasslands. While containing a large assemblage of native species, these grasslands are being invaded by spotted knapweed. If left unmanaged, this noxious weed could largely destroy the native grassland surrounding Cherry Creek Canyon.

Along the upper slopes of Cherry Creek Canyon is a ponderosa pine/Gambel's oak-dominated woodland with predominantly native vegetation. Below this woodland, on the east-facing canyon wall is a "cliff shrubland" that provides a home to four natural heritage plants and two other uncommon plant species. The cliff shrubland is a band of moist, sheltered habitat created by seepage and runoff from the steep slopes and cliffs above. The moisture is maintained by shading from the above canyon walls. The shrubs that dominate in this area are typical of moist areas. These include raspberry, mountain maple, beaked hazelnut, redstem hawthorn, rock spiraea, cliff Jamesia, gooseberry, peachleaf willow, red osier dogwood, and snowberry. Many herbaceous species, also typical of moist areas live here as well.

The canyon bottom contains many weedy plant species, particularly on terraces just above the current floodplain. These areas have been grazed, and the abundance of weedy and exotic species reflects both the natural (flooding) and human induced disturbance regime. Right along the stream channel are several small wetlands where lack of flooding has permitted wetland plants to establish. While these wetlands do support some very weedy species such as reed canary grass, they also provide home for giant burreed and Sprengel sedge, both species uncommon in Colorado.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
<i>Heuchera richarsonii</i>	Richardson alum root	C	G5	S1	-	-
<i>Ribes americanum</i>	American currant	C	G5	S1	-	-
<i>Woodsia neomexicana</i>	Woodsia fern	C	G4?	S2	-	-

Each of these plant species is more common in other parts of their ranges, in Colorado they are rare or imperilled. Richardson alum root occurs much more commonly farther east. It is known from only six locations in Colorado, and may be threatened by development on the front range. American currant also occurs more commonly in moister regions of the United States farther east. It is known from only 13 locations in Colorado and is considered highly threatened by hydrologic modifications to its habitat. Woodsia fern occurs throughout the southwestern United States, but is known from only 14 locations in Colorado.

CURRENT STATUS:

The current status of this site is unknown. This site was visited by ESCO Associates Inc. in 1988. The Colorado Natural Heritage Program received no response from the landowner in attempting to access the site in 1993 and 1994. [Note: The State

of Colorado has since acquired the land. This should create an opportunity to assess the property at some future date.]

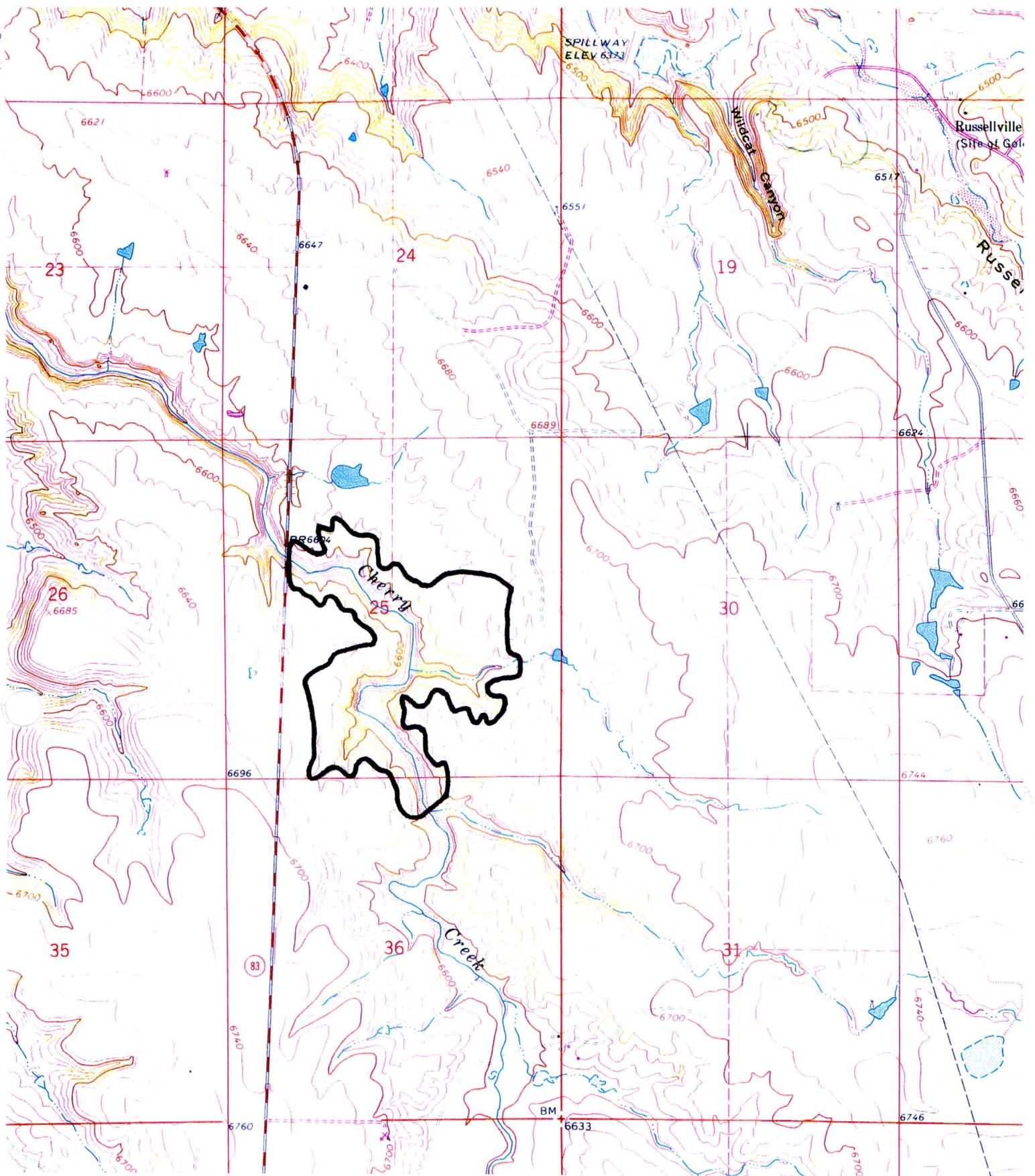
BOUNDARY JUSTIFICATION:

The boundary encompasses the significant portions of Cherry Creek Canyon. As located, this boundary should protect the canyon's intact plant communities, particularly the significant plant species from invasion by weeds, and changes in the hydrologic regime that may impact moisture at the canyons bottom. It should be noted that this boundary is not intended to protect the grasslands above Cherry Creek Canyon from weed invasions.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

While the boundary described above should protect the site's natural heritage elements from direct impacts, it does not account for changes in hydrologic regime upstream, or above the canyon. Water flow from the canyons top, to the moist areas at the base of its cliffs must remain intact for the elements to be protected. Housing developments near the canyon could change water flow patterns, and may threaten these elements. Similarly, changing stream flow upstream of the site by water diversions, well construction, or dam construction will very likely negatively impact elements at this site. Upstream and off site developments and water usage should be carefully monitored and changes should be avoided if possible.

Exotic species may also threaten this site, although the natural heritage elements may be less vulnerable than native plants growing farther up the canyon slopes and the grasslands along the creek as well as those above the canyon. Cattle grazing should be avoided in the canyon as this will encourage the spread of weedy species. Any potential recreational use should be directed away from the cliff shrubland area.



Map 4.21 Cherry Creek Canyon Conservation Site

SITE NAME: COOK CREEK (W57)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 120 acres.

LOCATION: T10S R67W sections 9, 16

QUADRANGLE: Larkspur (3910428)

GENERAL DESCRIPTION: The site contains an extensive wetland complex greater than one mile in length. The vegetation is a mosaic of forest, shrub, and herbaceous plant communities. Land adjacent to the riparian area is hayed and livestock-grazed throughout. The hydrology is fairly natural with some modification (stockpond excavation).

CURRENT STATUS: Unprotected and State Land Board and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological processes, particularly the groundwater system supporting the wetland, is essential to the long term biological integrity of the site. A buffer around the wetland vegetation is warranted and could be as much as 100 meters wide. Greater buffers between the hay fields and the wetlands are desirable. Livestock activities should be restricted to access points and monitored to determine the real extent of the impacts. Long term restoration should consider modifications to the existing stockponds.

SITE NAME: DAWSON BUTTE SLOPES

SITE TYPE: Habitat Conservation Area

SIZE: 5,340 acres

LOCATION: T8S, R67W, Sec. 19,29,30,31,32
T8S, R68W, Sec. 36
T9S, R67W, Sec. 4,5,6,7,8,9
T9S, R68W, Sec. 1

QUADRANGLE: Dawson Butte (3910438)

GENERAL DESCRIPTION: The entire area is covered with Gambel's oak shrublands and patches of grasslands. The vicinity of Dawson Butte would contribute significantly to protecting the oak habitat, known to be rich in species. In addition, this area can form a highly useful function as a biological corridor from the mountains to the west to the prairies and mesa to the east. This habitat conservation area includes the Dawson Butte Conservation Site.

CURRENT STATUS: Nearly all of the area is privately-owned and considered unprotected.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Maintenance of large fragments of the oak scrub is an important strategy. The area could be a buffer to the small populations of sharp-tailed grouse that are known from a short distance to the west. Fire is a natural process that occurs in the oak scrub. Its role in the area is in conflict with the use of the area as a residential neighborhood.

SITE NAME: DAWSON BUTTE

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 850 acres

BIODIVERSITY RANK: B3

COMMENTS: This site contains a moderate quality occurrence of a globally imperilled grassland community.

PROTECTION URGENCY RANK: P2P3

COMMENTS: The topographic position of this occurrence provides some natural protection. Increasing residential land conversion on the slopes of the butte is of concern.

MANAGEMENT URGENCY: M2

COMMENTS: Weed invasion poses a significant threat to this occurrence. Preventative weed control is recommended, but weeds already present on the site may require active measures.

LOCATION: Dawson Butte; T8S, R67W, Section 31; T8S, R68W, Section 36; T9S, R67W, Section 5, 6; T9S, R68W, Section 1.

QUADRANGLE: Dawson Butte

GENERAL DESCRIPTION:

Dawson Butte is a prominent feature in Douglas County rising 800 feet above surrounding grasslands and woodlands. Dawson Butte is representative of the buttes that characterize Douglas County. Geologically, the butte is made up of sandstone and other sedimentary rock called the Dawson Formation. Wall Mountain Tuff, a volcanic rock lies at the buttes' summit. Soils on the site are classified as "stony steep land-cold" (USDA 1974). At the base of Dawson Butte is a ponderosa pine (*Pinus ponderosa*) forest with openings supporting little bluestem (*Schizachyrium scoparium*), although exotic knapweed (*Centaurea* sp.) is beginning to invade. The sides of Dawson Butte are dominated by thick ponderosa pine and Gambel's oak (*Quercus gambelii*) community with occasional openings supporting prairie sandreed (*Calamovilfa longifolia*) and other native grasses. There are also patches of mountain mahogany (*Cercocarpus montanus*) shrubland with native grassland understory. Grazing and light logging have occurred on the side slopes, however the area appears not to be heavily impacted, except where exotic species have invaded near the base.

Dawson Butte's summit is surrounded by cliffs that make access difficult. This also means that the area was never grazed by cattle. The top of the butte has a rolling terrain dominated in grassy areas by mountain muhly (*Muhlenbergia montana*) with islands of Gambel's oak. Ponderosa pine and mountain mahogany are also present. A

Parry oatgrass (*Danthonia parryi*) montane grassland also lies at the top of Dawson Butte.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Danthonia parryi grassland	Parry's oatgrass grassland	C	G2?	S2?	-	-

A Parry oatgrass (*Danthonia parryi*) montane grassland also lies at the top of Dawson Butte. Most of these plant communities in Colorado have been highly altered or destroyed by grazing and urban development. Although this grassland is invaded by Kentucky bluegrass (*Poa pratensis*) in the understory, the rarity of this natural community suggests that even slightly degraded occurrences need protection.

CURRENT STATUS:

The site is under multiple ownership. The summit is split into parcels as small as 40 acres. The slopes are in larger parcels, but much of this is being subdivided as development continues.

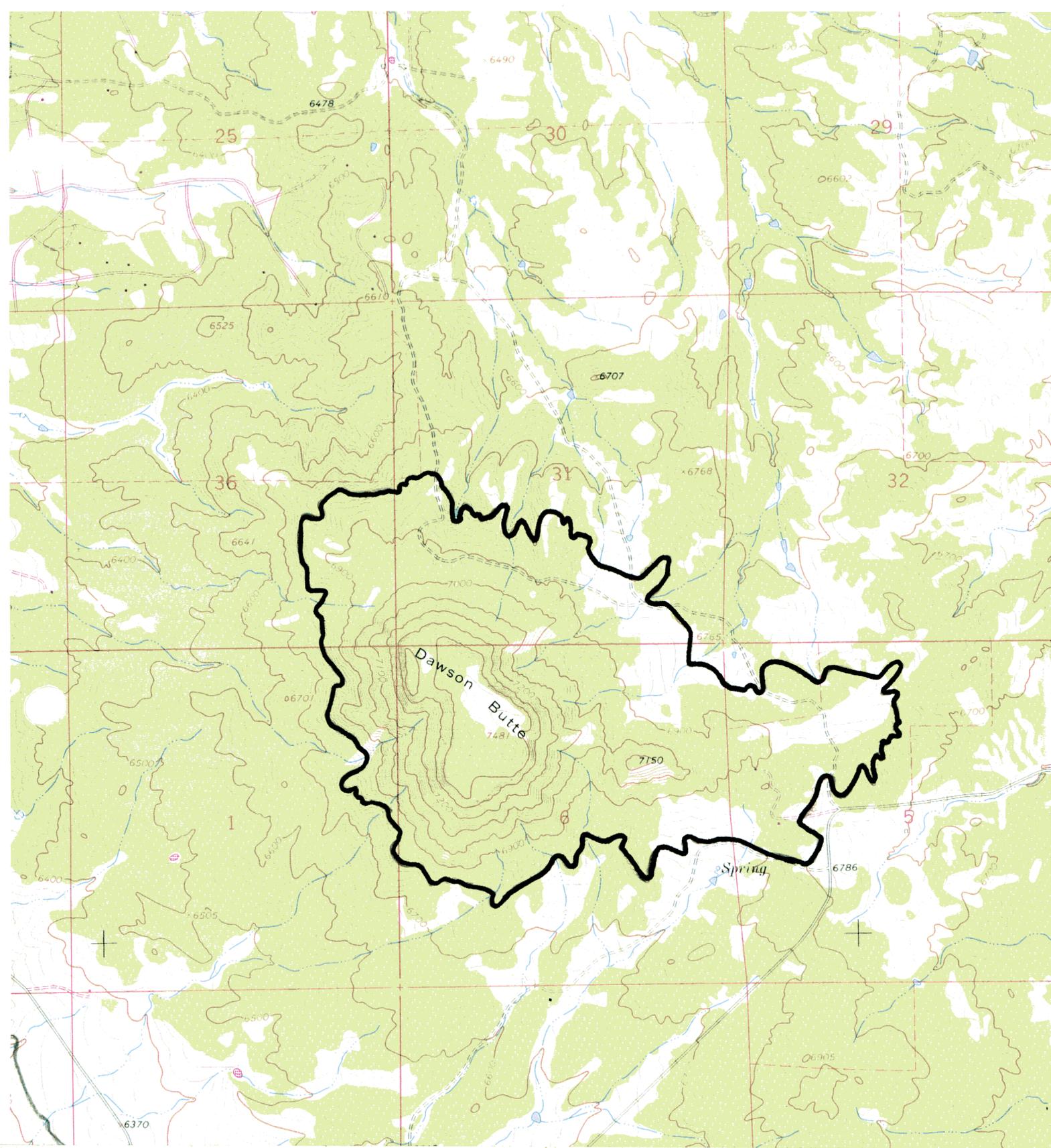
BOUNDARY JUSTIFICATION:

The site boundary is drawn to protect the entire butte from direct influences of land conversion and other activities that may degrade the Parry oatgrass montane grassland occurrence and other relatively intact plant communities. This boundary provides a small buffer around the most pristine areas to protect them from exotic plant and animal invasions, and other degradation.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

The area surrounding this site is currently being subdivided and developed. New roads and homes are being built. These activities may increase exotic weed invasion at Dawson Butte and degrade natural plant and animal communities. Weed control measures may need to be taken to ensure the long term survival of the important natural elements at this site.

Furthermore any new activities which could provide a means for increased weed invasion of the summit should be discouraged or mitigated. Trails or roads can act as a conduit for weed dispersal, and may pose a threat if constructed to the summit of the butte. If such construction ever does take place, it should avoid the significant grassland on the summit, and active weed control along its length is recommended.



Map 4.22 Dawson Butte Conservation Site

SITE NAME: EAST PLUM CREEK MACROSITE

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approximately 2,850 acres.

BIODIVERSITY RANK: B4

COMMENTS: This site contains two occurrences of a globally imperilled mammal subspecies as well as occurrences of two species of imperilled fish and a marginally imperilled amphibian.

PROTECTION URGENCY RANK: P3

COMMENTS: This site is located near especially rapidly developing parts of the County. Surrounding land conversion and potentially ground water diversion may threaten this site.

MANAGEMENT URGENCY: M3?

COMMENTS: Current management is extremely varied within the site. Some areas are impacted by livestock and weed invasion.

LOCATION: On East Plum Creek from 2.5 miles north of Tomah south to 1 mile south of Larkspur, also Carpenter Creek south to Rattlesnake Butte and its unnamed eastern tributary south to springs 1 mile west of True Mountain.
T8S R67W parts of sections 27, 33, and 34
T9S R67W parts of sections 4, 9, 16, 21, 22, 27, 33, and 34
T10S R67W parts of sections 2, 3, 4, 11, 13, 14, 23, 24, and 26

QUADRANGLE: Larkspur, Greenland, Dawson Butte, Castle Rock South

GENERAL DESCRIPTION:

East Plum Creek is a permanent stream with headwaters in the Rampart Range, but fewer western tributaries than West Plum Creek. The stream channel is typically shallow and braided, flowing over fine-grained substrates of sand. The continually shifting nature of the stream bed limits the formation of pools or aquatic vegetation. Undercut banks are common and provide some habitat diversity.

Riparian vegetation is dominated by plains cottonwoods (*Populus deltoides*) and various willow species (*Salix* spp.) with graminoid understories. Grasses and sedges sometimes form dense stands along the stream.

The eastern headwaters of East Plum Creek near True Mountain originate from springs that form out of the prairie.

Much of the stream is surrounded by artificial structures. For much of its length it is bounded by Interstate 25 on one side, and the railroad tracks on the other.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	C	G5T2	S2	C2	SC
<i>Etheostoma exile</i>	Iowa darter	C	G5	S2	-	SC
<i>Notropis cornutus</i>	Common shiner	C	G5	S3	-	SC
<i>Rana pipiens</i>	Northern leopard frog	C	G5	S3S4	-	SC

The Preble's meadow jumping mouse was found at two locations within this site in 1995. The habitat here is apparently typical for this animal, and good quality habitat is continuous throughout the site.

The aquatic habitats that support the Iowa darter, common shiner, and Northern leopard frog are also continuous throughout the site, suggesting that this represents a relatively intact riverine ecosystem.

CURRENT STATUS:

The area contained in the East Plum Creek Macrosite is large and diverse. As one would expect, the ownership and management within the site are also diverse. The site is entirely in private ownership. Tract size within the site varies from approximately 35 acres to large ranches covering greater than 1000 acres. Land uses also differ, but livestock have access to most of the site. The differences in land management along the creek are often extreme and evident as sharp ecological boundaries that correspond to fences and property lines. Upland development around the site also varies from the small town of Larkspur to miles of open ranch land, and some dispersed residential development. New development pressure is particularly severe at the northern end of this site near Castle Rock.

BOUNDARY JUSTIFICATION:

The boundary encompasses all riparian and aquatic habitats that contain permanent or semi-permanent stream flows. This is necessary to insure that the populations of fish in West Plum Creek and its tributaries do not become fragmented by alterations to the stream habitats. Furthermore, this boundary includes a small buffer on the surrounding uplands that generally extends 1000 feet from the edge of the riparian vegetation, which corresponds with the edge of the primary floodplain. Not only does this include the majority of the available habitat for the significant species found here, but such a buffer is necessary to maintain the quality of riparian and aquatic habitats by reducing opportunities for adjacent disturbances that are likely to directly affect these sensitive habitats. When existing roads or structures fall within this 1000 foot buffer, they have generally been excluded from the site since they retain little of their natural value and probably do not act as an effective buffer.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Effective protection of the East Plum Creek system will require a variety of approaches as well as cooperation between land planners, private owners, and

conservation organizations. Furthermore, the conservation site presented here represents only the core area in need of most stringent protection. As a large aquatic system, the processes which shape and maintain it are necessarily complex and widespread.

While under private ownership, up to now this site has benefitted from the relatively large size of the parcels and the general concern of some land owners for the health of their land. These landowners should be encouraged to maintain the relatively natural condition and uniqueness of this site. Education, incentives, and technical support in areas such as weed control and conservation management will be beneficial to the conservation of this site.

While acquisition of areas within the site by land trusts and the County is recommended on a willing seller basis, an effective conservation plan for the site will necessarily include large areas of private land and will accommodate some forms of development in certain areas. It will be essential to not only steer future development within the East Plum Creek watershed, but also to work effectively with the large number of private owners that have already developed here. Our experience indicates that many owners are not aware of the uniqueness of this area and often take pride in it once informed of its significance. Simple notification and support of land owners within the site may be effective and will be necessary to protect such a large system.

Of primary concern is the maintenance of the hydrologic integrity of the aquatic system. The present integrity and natural functioning of this system is strongly implied by the number of rare aquatic and riparian species present and the relative quality of the riparian plant communities. Natural processes, such as seasonal and catastrophic flooding, still work to shape and maintain the biological diversity of the system.

These major hydrological processes may be highly threatened by any future diversion of groundwater within this system. Maintaining minimum flow during dry seasons is necessary, but is not alone sufficient. Natural variations in flow throughout the year are also needed for the natural system to persist.

Additionally, activities within and adjacent to the site need to be evaluated for their potential impact to the water quality of the system. Excess siltation is a common effect of construction that could be detrimental to the aquatic species present. Water pollution from fertilizers, pesticides, and herbicides also have a high potential of endangering this site if the contaminants reach the streams. Likely sources for such pollution in this area include residential lawns and hay fields that may be treated with fertilizers and weed killers that penetrate to the groundwater or enter the streams as surface runoff. Weed control efforts that involve herbicide application should avoid the site and need to be carefully planned and implemented where water quality may be effected. Similarly, insect eradication efforts on agricultural fields or pastures, or for mosquito control need to be planned so that they do not contaminate the aquatic system. Generally, protection of this rare aquatic resource will preclude the use of chemical such as fertilizers and pesticides within the conservation site. Their use within the West Plum Creek watershed should be evaluated in terms of their potential to impact the water quality.

Since this site also supports a significant species that inhabits the floodplain and adjacent uplands, Preble's meadow jumping mouse, consideration must also be given to

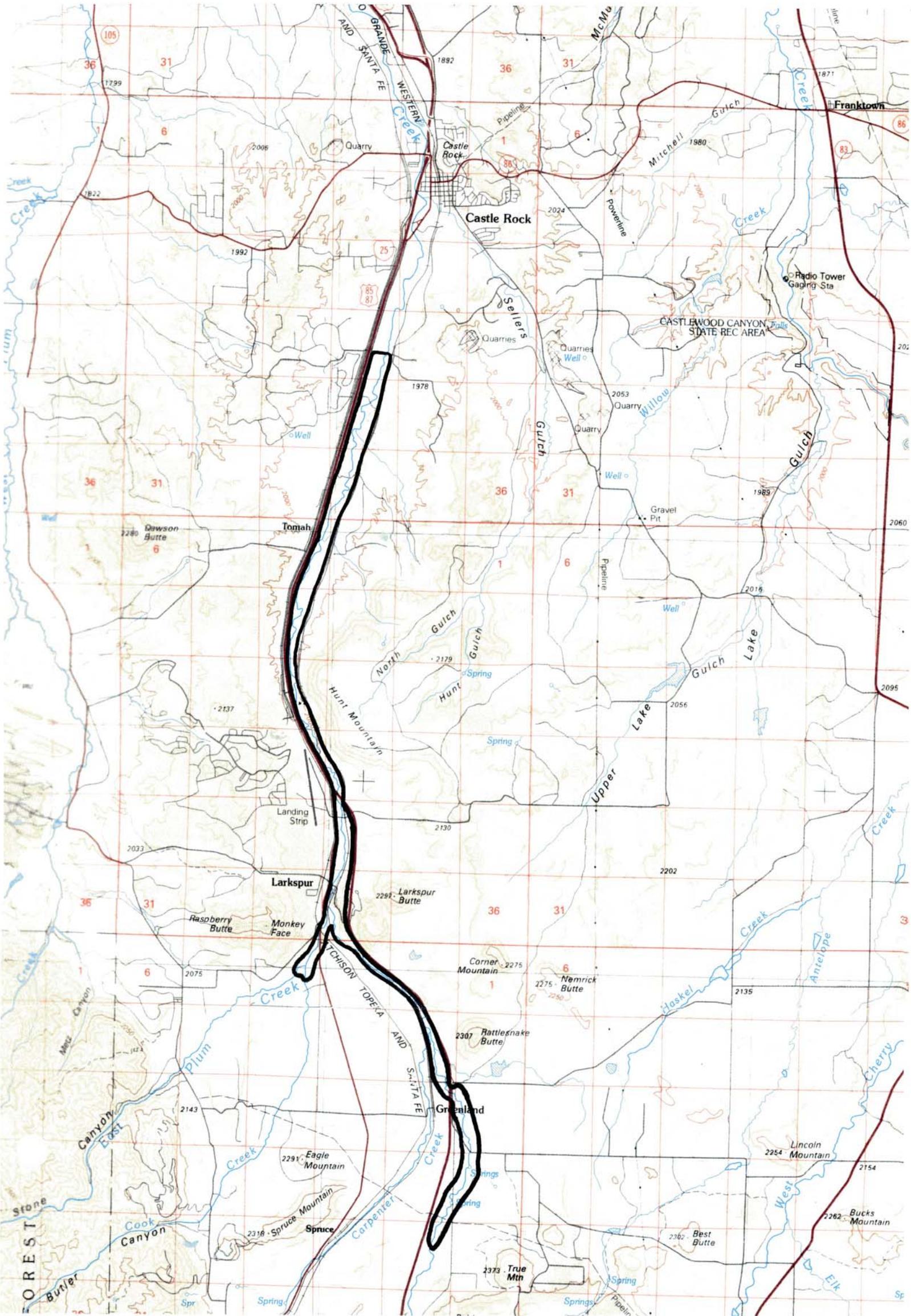
protection of the terrestrial habitats within the site. Hydrological issues mentioned above are important to maintaining these habitats as well. In addition, some considerations effect only the terrestrial components. As a small mammal and likely prey species, the Preble's meadow jumping mouse is likely vulnerable to increased predation by domestic pets such as cats, and less common, dogs. The potential for such domestic predators to effect native wildlife is well established (see section 1.4.3) and the rarity of the jumping mouse likely makes it especially vulnerable to over-predation. Therefore, residential development should either restrict such domestic pets, or be placed at a distance from the site that minimizes their effect.

As with all conservation sites in Douglas County, exotic plant invasion is a major concern. Unfortunately, many exotic species are already well established within the site. Therefore, primary efforts should be focused to contain these infestations and prevent more species of exotics from establishing here. Exotic grasses, mostly from hay, are ubiquitous here and may pose only a minimal threat. They have apparently reduced the diversity of plants in the riparian understory and reduces the overall quality of the plant communities, but still provide a semi-natural structure to the habitat that supports the significant species found here. Perhaps more threatening are invasive forbs such as knapweed (*Centaurea* spp.), leafy spurge (*Euphorbia esula*), and thistles (*Cirsium* and *Carduus* spp.) which tend to form monotypic stand that do not resemble the natural structure of the understory. Also, larger exotic plants such as russian olive have the potential to change the higher structure of the habitat by displacing native cottonwoods and willows. All of these invasive species are currently found within the site. Their control will be extremely difficult, especially since their proximity to water precludes most chemical treatments. Mechanical control may be effective in some cases. While tamarisk, or salt cedar (*Tamarix* sp.), was not detected anywhere within the county, this aggressive plant is present and expanding in waterways throughout Colorado including the South Platte watershed. This weedy shrub should be watched for and its establishment here prevented.

Exotic animals also pose a serious threat to this site. Introduced game fish such as various trout species (*Salmo* and *Salvelinus* spp.), and others have the potential to directly effect the rare and imperilled native fish that this sites intends to protect. Predation or competition for limited resources can limit native fish populations and could conceivably result in their local extirpation. Stocking of fish within this site should be prevented.

Although livestock grazing can negatively affect riparian systems (Ames 1977, others), it has historically been the primary land use at this site. While its impact on the plant communities is evident in places, it is significant that a concentration of rare or imperilled species occurs here. This may be due to sound land management or to the historically restricted distribution of the elements present. In either case, management practices that protect the riparian and wetland communities from overuse by livestock will likely benefit both the rare fish and plant species present.

Map 4.23 East Plum Creek Conservation Macrosite



SITE NAME: ELK CREEK (W33)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 200 acres.

LOCATION: T10S R66W section 26

QUADRANGLE: Cherry Valley School (3910426), Greenland (3910427)

GENERAL DESCRIPTION: The site contains a riparian seep with emergent wetland plant community. A large impoundment is located immediately downstream.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the groundwater sources is essential to the long term biological integrity of the site. Management should include the maintenance of a significant buffer around the wetland vegetation (100 meters is preferable). It is unclear what effects the downstream impoundment has on the existing quality of the wetland.

SITE NAME: GARBER CREEK

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 1,200 acres

BIODIVERSITY RANK: B4

COMMENTS: This site contains several rare or imperilled fish species and is the State's stronghold for one of these species. It also supports a rare or imperilled plant species.

PROTECTION URGENCY RANK: P4

COMMENTS: This site is primarily under the ownership of a land trust that is concerned with ecological values.

MANAGEMENT URGENCY RANK: M3

COMMENTS: Invasive exotic plant infestation at this site is of concern. Active weed control is recommended. Livestock continue to use the site and need to be managed in ways consistent with maintaining the site's ecological integrity.

LOCATION: West of West Plum Creek
T8S R68W sec. 9,10,11
T7S R68W sec. 2

QUADRANGLES: Dawson Butte, Devils Head, Sedalia, Kassler

GENERAL DESCRIPTION:

This site is located within the West Plum Creek Macrosite. Garber Creek is a "transition zone" stream that drains parts of the Rampart Range and flows briefly east across the piedmont to its confluence with West Plum Creek less than four miles from the base of the foothills. The creek supports riparian vegetation typical of such streams. Willows (*Salix* spp.) dominate the stream sides, with occasional stands of taller plains cottonwood (*Populus deltoides*). Two large wetland complexes are contained within the site. Uplands within the site are comprised of a mosaic of Gambel's oak thickets and grassland patches. The grasslands and understories throughout the site are significantly disturbed and dominated by various exotic grasses and noxious weeds.

Several ponds are included in the drainage. All are either spring fed or filled by Garber Creek itself. None of these ponds are entirely natural; some are natural ponds that have been augmented, others are of artificial construction.

In spite of the degraded condition of the plant communities, this site provides suitable habitat for a variety of wildlife. Both the oak thickets and the riparian areas contain rich bird faunas. Few grassland birds were observed, possibly owing to the altered condition of the grasslands. Signs of deer, elk, and coyote are common at the

site.

Two wetland complexes have been identified within this site, one on Garber Creek at Pine Cliff Ranch, and another at the confluence of Garber Creek and West Plum Creek. While both of the areas have been significantly altered they still retain enough natural character to provide the beneficial functions to wildlife habitat, including the imperilled fishes discussed below, and water quality.

A large prairie dog colony is located just north of Garber Creek. While the prairie dog itself is not a rare animal, large naturally functioning prairie dog towns are becoming increasingly threatened throughout the Great Plains. Furthermore, such colonies are known to support a variety of other wildlife including raptors and carnivorous mammals. Within Douglas County, this particular colony is notable for its large size, lack of fragmentation by development, and its occurrence on protected land.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
<i>Phoxinos eos</i>	Northern red-bellied dace	B	G5	S1	-	SC
<i>Notropis cornutus</i>	Common shiner	C	G5	S2	-	SC
<i>Etheostoma exile</i>	Iowa darter	C	G5	S2	-	SC
<i>Fundulus sciadicus</i>	Plains topminnow	B	G4	S2	C2	SC
<i>Ribes americanum</i>	American currant	C	G5	S1?	-	-

It has been known for some time that the West Plum Creek drainage supported a unique fish fauna (Probst 1982, Bestgen and Culver 1985). Garber Creek, in particular, was noted for harboring the unusual Northern red-bellied dace. Currently, four fish species of special concern are known to exist in the Garber Creek site. In addition, one plant species of special concern has also been located here.

Garber Creek represents the stronghold for the Northern red-bellied dace in Colorado. While it has been extirpated from other parts of the state, population numbers here are high and have persisted at the site for at least 14 years.

The Common shiner, contrary to its name, is quite rare in Colorado. Unfortunately, this species has lost much of its habitat in Colorado to water pollution and siltation (Bestgen and Culver 1985). Its presence at this site further points to the quality of the aquatic habitats of Garber Creek.

The Iowa darter enjoys a wider distribution in Colorado, but is also threatened by reduction in natural aquatic habitats (Woodling 1985). It is considered a species of special concern by the Colorado Division of Wildlife as well.

The Plains topminnow is another fish whose range is restricted in Colorado. Some evidence for range-wide declines has led to its inclusion as a Category 2 species by USFWS (a candidate for the Endangered Species Act).

The American currant, a relatively common species in the Northeastern United States, is known from only nine locations in Colorado. Less than 600 total individuals

have been documented in Colorado (10-200 individuals at each site). Although the Garber Creek population is degraded (the herbaceous layer is dominated by exotic species such as *Bromus tectorum*), it is among the largest populations in the state.

CURRENT STATUS:

The site, located on private property, has been placed in the trust of Colorado Open Lands in an effort to preserve the rural ranching heritage of the area. The ranch manager is aware of the general natural value of the area, and of the unique fish present. Furthermore, he has stated an interest in developing a stewardship plan and may be amenable to collaboration with and/or advice from some outside agencies. Currently there are no protection or management policies in place.

BOUNDARY JUSTIFICATION:

The elements present at the Garber Creek site are either aquatic or riparian organisms. Both depend on the natural functioning of the aquatic system. Only some of the factors affecting this system can be addressed at the site. Others, such as changes in the water table or upstream alterations, are off-site considerations that will have to be addressed in order to maintain a sustainable system.

The preliminary conservation boundary presented here encompasses the surface water and associated vegetation within and around the known locations of natural heritage elements. A small buffer of 1000 feet from either the riparian vegetation or the steepened stream bank has been included to properly manage these areas.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

The maintenance of a natural hydrological regime may be the most important consideration for the persistence of the elements at this site. While this partially depends on off-site influences, on-site threats that should be avoided include: physical alteration of the stream or pond (i.e. channelization, augmentation), water pollution through herbicide/pesticide application or nitrification by livestock, and local depletion of the water table.

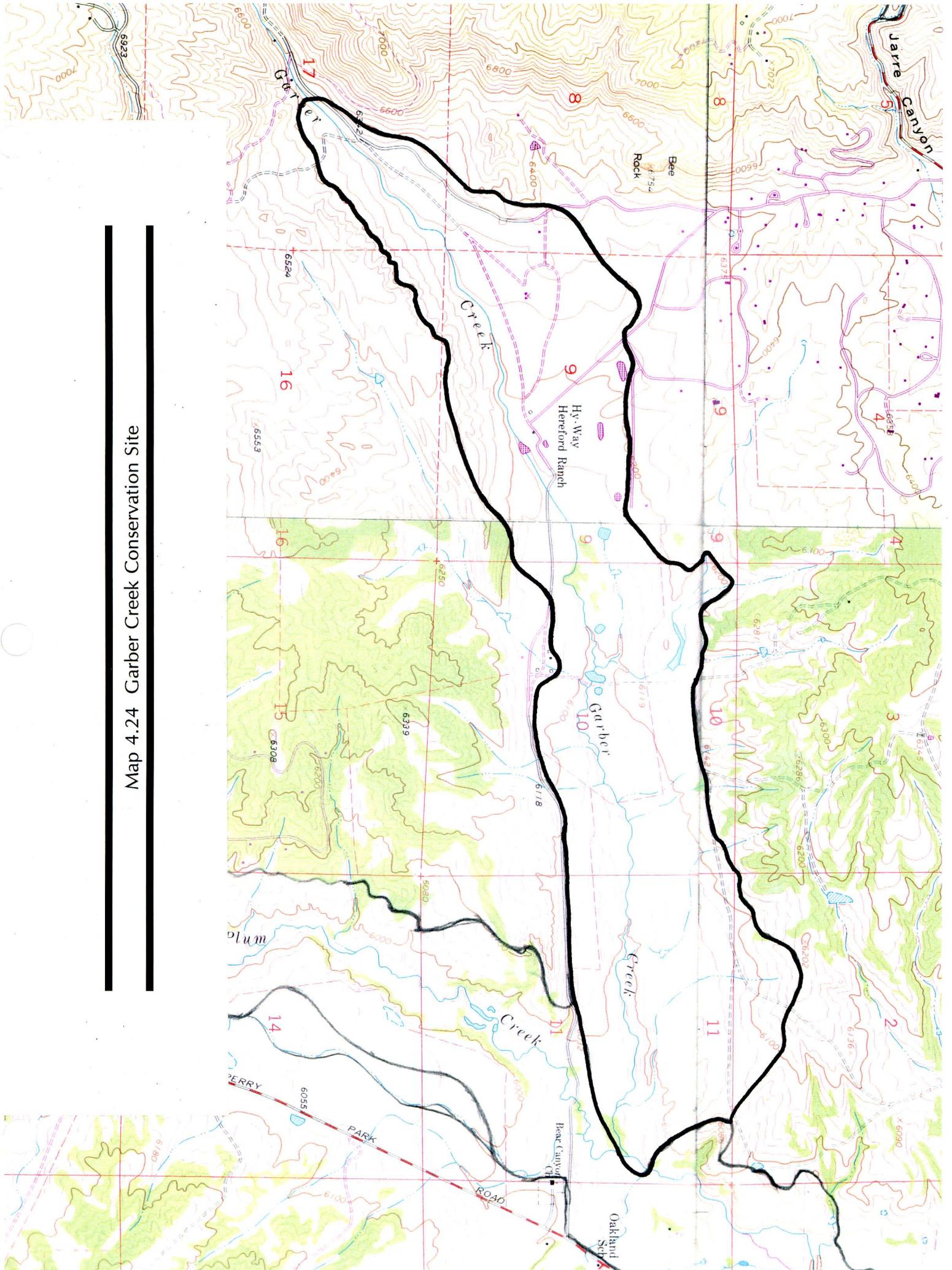
Although livestock grazing can negatively affect riparian systems (Ames 1977, others), it has historically been the primary land use at this site. While its impact on the plant communities is evident, it is curious that a concentration of rare elements occurs here. This may be due to sound land management which has maintained the water quality and natural hydrology of the creek in spite of altering the vegetation. Management practices that protect the riparian and wetland communities from overuse by livestock will likely benefit both the rare fish and plant species present.

We expect the concentration of noxious weeds at the site to present a threat, either by directly out-competing the native flora and/or through the resulting alteration of the vegetational structure. Since the invasion of most of the exotic plants has occurred relatively recently, the impact on the elements supported at this site may have yet to manifest itself. An aggressive, yet carefully executed, weed control program may be able to improve the condition of the plant communities and prevent further degradation. The use of herbicides should be limited, and only sparingly used in the riparian and wetland

areas when necessary.

A system of monitoring the populations of rare elements at the site is necessary in order to measure successful or detrimental management practices.

Map 4.24 Garber Creek Conservation Site



SITE NAME: *GARBER CREEK MARSH (W63)

SITE TYPE: High Priority Wetland

SIZE: Approximately 96 acres.

LOCATION: T8S R68W sections 9, 10

QUADRANGLE: Dawson Butte (3910438)

CONSERVATION SITE: This wetland is contained in the **West Plum Creek Macrosite**.

GENERAL DESCRIPTION: The site contains a wetland riparian complex with localized areas of standing surface water. The vegetation is characterized by herbaceous (cattails and graminoids) plant communities on the northern portion, while a well-developed forested community (eg. Peachleaf Willow and Alder) comprises the southern portion.

The local hydrology has been modified by road construction, excavation of drainage ditches, and the creation of off-channel impoundments within the reach. The site has been used historically for cattle ranching, which continues through the present. The riparian wetland communities of interest are currently excluded from grazing.

The black current (*Ribes americanum*) was found within the riparian area. It is relatively rare on the site, occurring along the more mesic upland borders.

CURRENT STATUS: Unprotected and privately owned, but with Colorado Open Lands conservation currently developing a management plan.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological regime is essential to the long term integrity of the site. Management should include the maintenance of a significant buffer around the riparian vegetation (100 meters is preferable). If there is a continue desire or need to maintain livestock on the property, water and riparian vegetation access should be restricted to selected points. Weed control may be desirable.

SITE NAME: GLEN GROVE HOGBACK

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 300 acres

BIODIVERSITY RANK: B3

COMMENTS: This site contains several significant natural community occurrences including two globally imperilled types of moderate quality.

PROTECTION URGENCY RANK: P3

COMMENTS: Increasing residential land conversion in the area is of concern. Hogback areas seem to be desirable housing sites.

MANAGEMENT URGENCY RANK: M3

COMMENTS: Weed invasion poses a significant threat to these occurrences. Preventative control is recommended, but the current presence of weeds within the site may require some active measures as well.

LOCATION: West of West Plum Creek and north of Perry Park
T9S R68W section 23
T9S R68W section 24

QUADRANGLES: Dawson Butte

GENERAL DESCRIPTION:

The Glen Grove hogbacks are two east-west trending hogbacks in southern Douglas County at an elevation of 6400-6800 feet. This situation is somewhat unusual as most of the hogbacks in Douglas County are north-south trending. The north slope of the southern hogback is in relatively good condition and represents an unusual mixture of the dominant native species. The east end of the hogback is dominated by mountain mahogany (*Cercocarpus montanus*) shrublands with an understory dominated by the grass mountain muhly (*Muhlenbergia montana*). As one proceeds to the west ponderosa pine (*Pinus ponderosa*) and Gambel's oak (*Quercus gambelii*) become more dominant. Spike fescue grass (*Leucopoa kingii*) and mountain muhly dominate the understory. The lower slope below the Gambel oak zone has patches of a big bluestem-little bluestem (*Andropogon gerardii-Schizachyrium scoparium*) grassland. A mountain mahogany/needle-and-threadgrass (*Stipa comata*) community occurs on the south slope of the southern hogback. The communities intergrade along the hogback. Various non-native or native weedy species are common but not dominant.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Andropogon gerardii-Schizachyrium scoparium	Xeric tallgrass prairie	C	G2	S2	-	-
Cercocarpus montanus/Stipa comata	Foothills shrubland	CD	G2	S2	-	-
Quercus gambelli-Cercocarpus montanus/Muhlenbergia montana	Foothills shrubland	BC	GU	SU	-	-

The big bluestem-little bluestem (*Andropogon gerardii-Schizachyrium scoparium*) xeric tallgrass prairie was found at the base of the southern hogback in small patches below the gambel oak zone. This plant community is rare throughout its range.

The mountain mahogany-needle and threadgrass (*Cercocarpus montanus/Stipa comata*) foothills shrubland occurs on the south slope of the southern hogback in small patches. This plant community is rare throughout its range and seems to be susceptible to invasion by exotic species which has happened at this site.

The ponderosa pine/mountain muhly (*Pinus ponderosa/Muhlenbergia montana*) woodland is secure globally but somewhat rare in Colorado.

All of the above mentioned plant communities have been somewhat degraded by invasion of exotic plant species.

CURRENT STATUS:

The site is under private ownership and operated as a equestrian training facility. Conversion to housing has taken place on adjacent parcels.

BOUNDARY JUSTIFICATION:

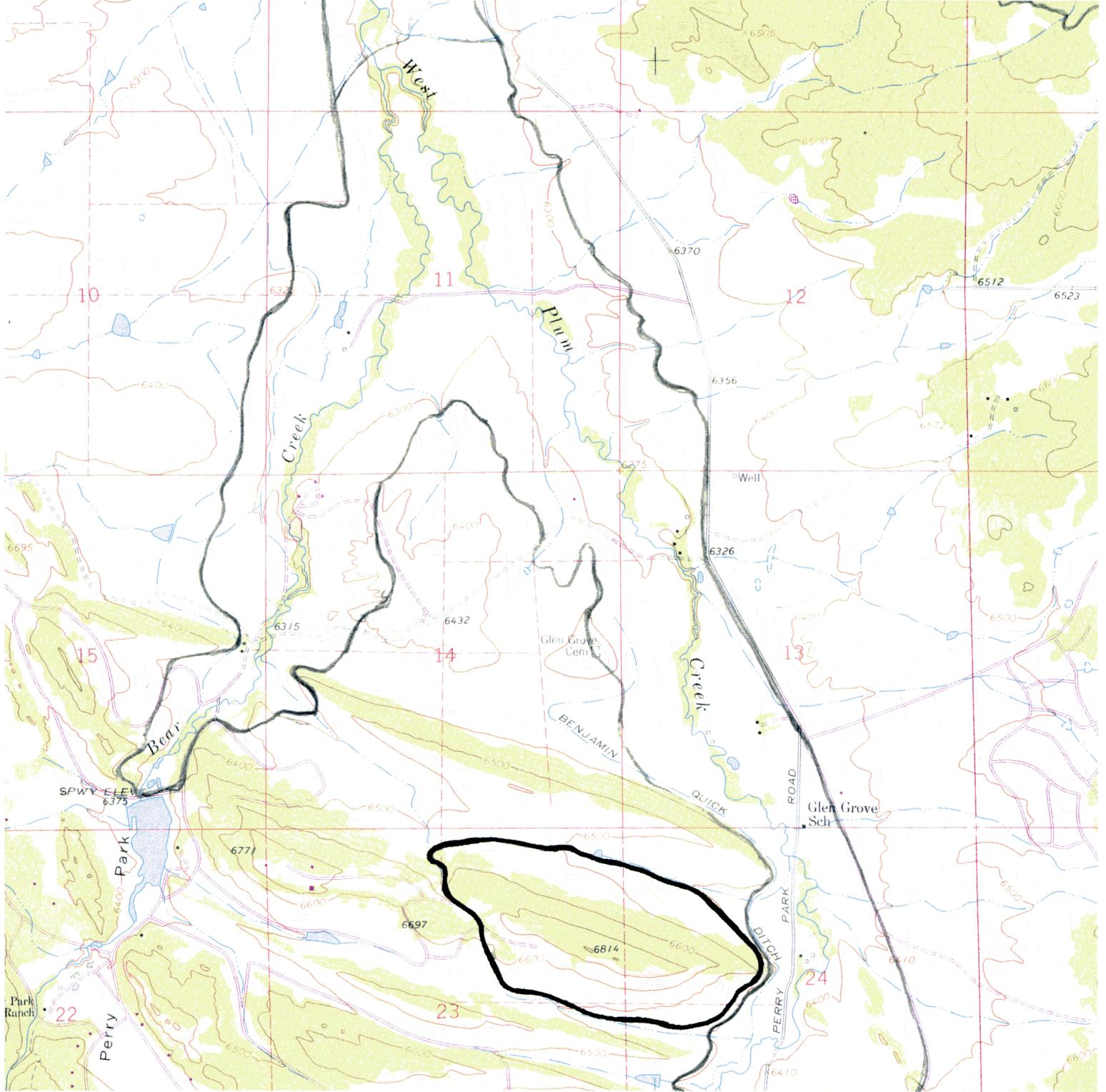
The boundary presented here is intended to encompass the element occurrences and a buffer to prevent direct disturbance. The boundary includes the southern hogback and adjacent grasslands. Plant communities that occur within the context of natural surrounding lands are generally thought to be more viable and provide greater chance of continued natural processes and protection of associated species (Harris 1984).

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Future land conversion, as has occurred on other hogbacks in Douglas County such as Perry Park and near Roxborough State Park, likely poses the greatest threat to this site. The visual beauty of these rock formation makes for attractive home sites. Surrounding land conversion should ideally be minimized as well to maintain the viability of these natural communities (Harris 1984).

In the absence of full land conversion, invasion by exotic or weedy native plant species appears to be the greatest threat to the elements present at the site. New weed invasions should be minimized by well planned-management. Livestock often spread seeds and provide disturbance that aids in weed establishment. Trails and roads also

often provide conduits for weed dispersal. It is therefore recommended that livestock use of the site be minimized and that new trails or roads be set outside of the site.



Map 4.25 Glen Grove Hogback Conservation Site

SITE NAME: GREENLAND RANCH

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 1450 acres

BIODIVERSITY RANK: B2

COMMENTS: This site contains occurrences of several significant natural communities including a good quality example of a globally imperilled type.

PROTECTION URGENCY RANK: P3

COMMENTS: The topographic position of these occurrences provides some natural protection from livestock. Pressure to convert the area to residential use poses some threat.

MANAGEMENT URGENCY RANK: M3

COMMENTS: Weed invasion poses a significant threat to all of these natural community occurrences. Preventive and active weed control is recommended.

LOCATION: North and east of Greenland, Colorado.

T10S R66W sects. 6, 7

T10S R67W sect. 1, 11, 12

QUADRANGLES: Greenland

GENERAL DESCRIPTION:

The Greenland Ranch site is located in southern Douglas County and is characterized by rolling grasslands and isolated, steep-sided buttes. The grasslands appear to have been utilized as rangeland for cattle for many years and show various levels of impact. Patches of tallgrass species have been viewed from county roads and may be remnants of plant communities that were more common historically but are now more rare. The buttes are steep-sided and generally vegetated with Gambel's oak (*Quercus gambelii*) occasionally with ponderosa pine (*Pinus ponderosa*) and mountain mahogany (*Cercocarpus montanus*). Patches of Douglas-fir (*Pseudotsuga menziesii*) and some aspen (*Populus tremuloides*) are present on north facing slopes near ravines. Timber was harvested from the area approximately 50-75 years ago (Baker 1984 - memo to TNC). The tops of several prominent buttes are dominated by grasslands, including significant examples of rare types. The edges of the buttes often have extensive cliffs, of which several are current and historic breeding sites for prairie falcons and golden eagles.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Significant elements of natural diversity are found on slopes and tops of the buttes. Wetlands in the area have been somewhat impacted by livestock grazing but still contain natural vegetation. Field verification was not performed because of lack of

access to private property.

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Danthonia parryi	Montane grassland	B	G2?	S2?	-	-
Muhlenbergia montana-Danthonia parryi	Montane grassland	C	G3G4	S2?	-	-
Muhlenbergia montana-Danthonia parryi	Montane grassland	B	G3G4	S2?	-	-
Quercus gambelii- Cercocarpus montanus/ Muhlenbergia montana	Oak shrubland	C	GU	S?	-	-

The big bluestem-gray prairie dropseed (*Andropogon gerardii-Sporobolus heterolepis*) grassland is rare throughout its range and has been documented from only a few sites in Colorado.

The Parry's oatgrass (*Danthonia parryi*) grassland is documented mainly from the Front Range of Colorado from Las Animas County, north to Larimer County. This community generally occurs in small patches from 7000-9500 feet in elevation. Currently there are fewer than 20 known occurrences of this community.

The mountain muhly-Parry's oatgrass (*Muhlenbergia montana-Danthonia parryi*) grassland is thought to be uncommon to common throughout its range. Good condition occurrences are rare in Colorado.

The status of the Gambel's oak-mountain mahogany/mountain muhly (*Quercus gambelii-Cercocarpus montanus/Muhlenbergia montana*) shrublands is unknown at this time.

CURRENT STATUS:

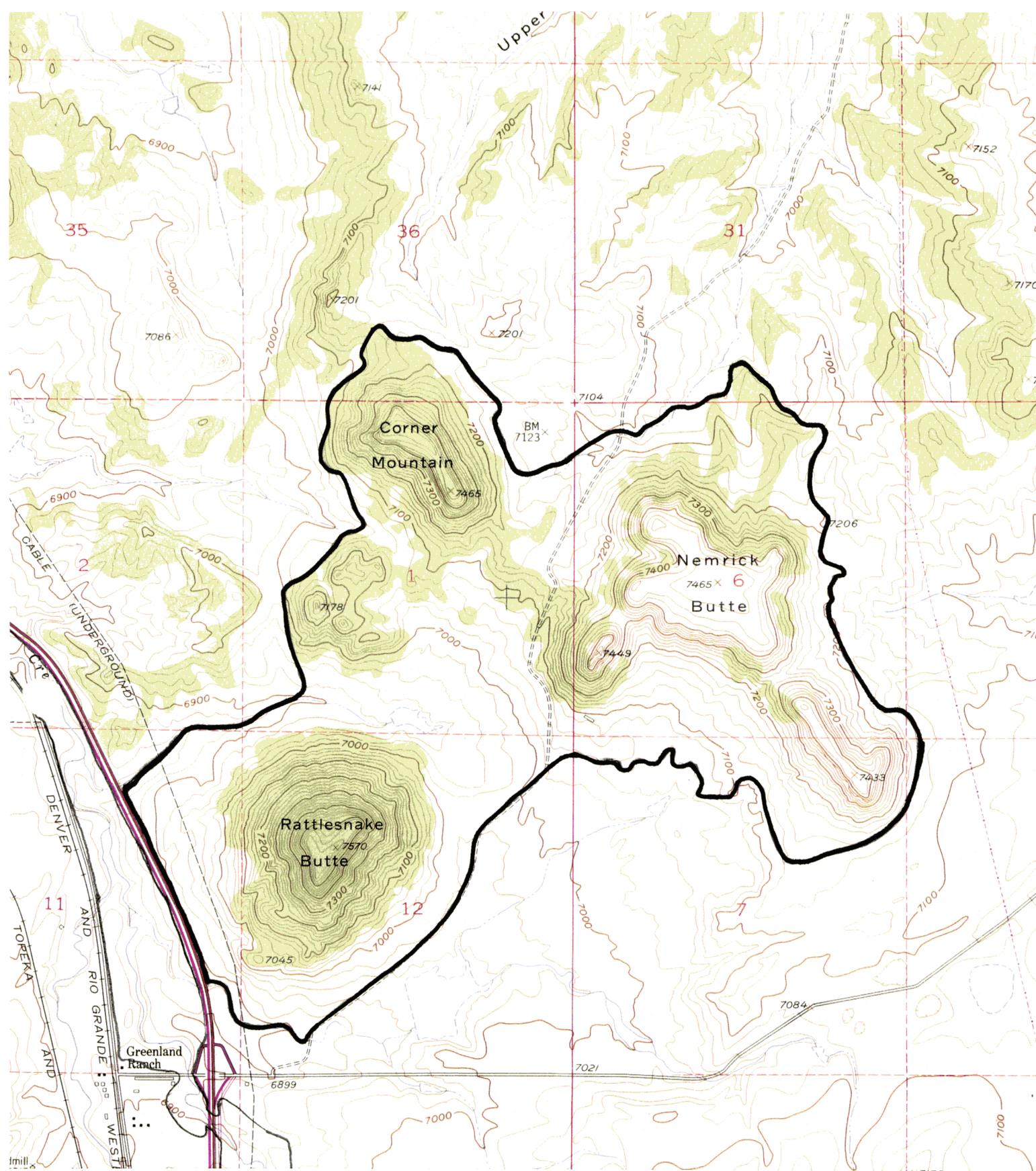
The entire area is privately owned by a single owner. The Greenland Ranch is an active ranch that grazes cattle within and around the site.

BOUNDARY JUSTIFICATION:

The boundary presented here is intended to encompass the element occurrences and a buffer to prevent direct disturbance. The boundary includes the slopes and tops of Corner Mountain, Nemrick Butte, and Rattlesnake Butte and the grassland between the buttes. Plant communities that occur within the context of natural surrounding lands are generally thought to be more viable and provide greater chance of continued natural processes and protection of associated species (Harris 1984).

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Land use conversion may be the biggest threat to the area. In general, the area can sustain multiple use if protection is provided to the buttes with significant natural diversity values. Fragmentation of the landscape may reduce the long term viability of the plant communities and the animal communities which they support (Harris 1984).



Map 4.26 Greenland Ranch Conservation Site

SITE NAME: INDIAN CREEK

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 170 acres

BIODIVERSITY RANK: B5

COMMENTS: This site contains occurrences of rare and imperilled bird and butterfly species.

PROTECTION URGENCY RANK: P3

COMMENTS: This site occurs on a private ranch and is given no formal protection.

MANAGEMENT URGENCY: M2?

COMMENTS: This site is used by livestock to such an extent that the occurrences here may be threatened. Invasive exotic plants are also found throughout the site.

LOCATION: 1 mile northwest of Jarre Canyon, at Indian Creek at base of foothills. T7S R68W parts of sections 31 and 32

QUADRANGLE: Kassler

GENERAL DESCRIPTION:

Indian Creek drops steeply out of the foothills to the west and this site is situated precisely at the transition from foothill to plain environments. The riparian area is dominated by narrow-leaf cottonwood (*Populus angustifolia*), Gambel's oak (*Quercus gambelli*), and exotic grasses such as smooth brome (*Bromus inermis*) and timothy (*Phleom*). The ephemeral drainage to the south of Indian Creek is also included in this site. It sustains only temporary water flow during peak runoffs, but maintains small puddles for longer periods. This drainage is dominated by Gambel's oak and various native and exotic grasses. Uplands are typical of the area, generally supporting Gambel's oak and mountain mahogany (*Cercocarpus montanus*) shrublands on south facing slopes, and conifer woodlands of ponderosa pine (*Pinus ponderosa*) and douglas fir (*Pseudotsuga menziessii*) with understories of Gambel's oak and (*Mahonia repens*) on north facing slopes.

A high diversity of bird species was found in the riparian areas of Indian Creek, including many neotropical migrants. Similarly, the ephemeral drainage to the south was found to contain a concentration of butterfly species, especially around puddles and mud flats.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
<i>Seiurus aurocapillus</i>	Ovenbird	B	G5	S2	-	-
<i>Incisalia mossii</i>	Moss' elfin butterfly	C	G5	S3	-	-

Ovenbirds are a neotropical migrant bird species (one that spends winters in American tropics). In Colorado, this species is known to occur in fewer than 20 occurrences. Within Douglas County, this is one of only two occurrences, and the only occurrence within the study area. The habitat here is typical of other Colorado sites that support this bird, and like other occurrences in this state, contains relatively few birds. This occurrence was believed to contain up to eight pairs of birds in 1994 and breeding here was confirmed by the presence of a nest with eggs.

Moss' elfin is an inconspicuous butterfly species that was documented in the ephemeral drainage just south of Indian Creek. This represents typical habitat for this species which is generally confined to the base of the foothills in areas that support large numbers of its host plant, stonecrop (*Sedum lanceolatum*). The rock outcrops and shallow soils of this area provide ideal substrates for this plant.

CURRENT STATUS:

The site is consolidated under a single owner who uses it for cattle grazing.

BOUNDARY JUSTIFICATION:

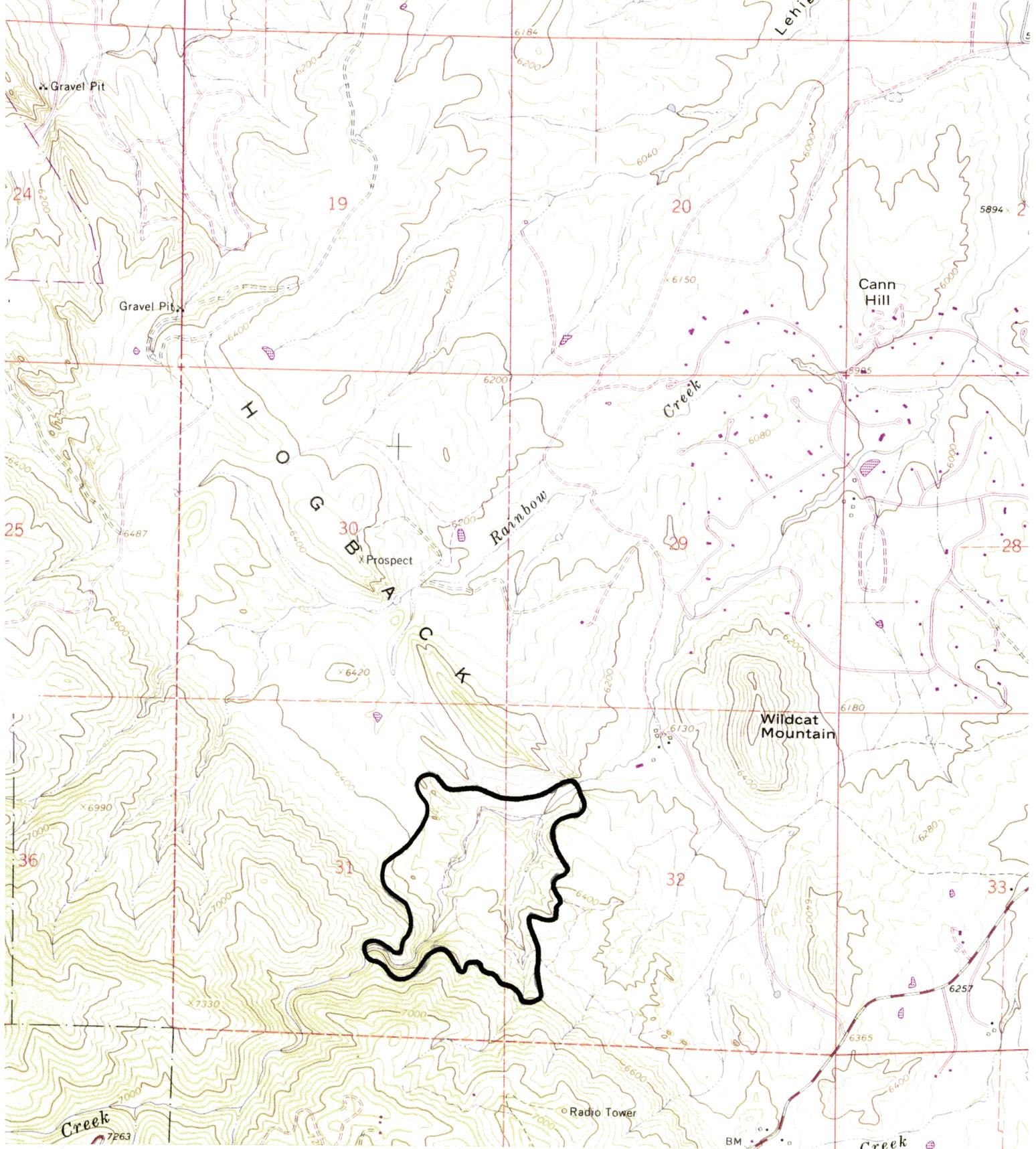
This boundary encompasses the habitats at the foothill interface around Indian Creek. It includes all the known occupied habitat of the two elements named above as well as a buffer that includes the locally continuous habitat available to the species. Activities within this boundary have a potential to directly impact these imperilled species occurrences by directly altering the habitat or fragmenting the occurrences.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Although past management at this site is not known, current management may pose a threat to the ovenbird occurrence at this site. Our observations indicate that the cattle tend to congregate within the ovenbird nesting area, and the result appears to be some trampling and reduction of cover in the understory. Since this species nest on the ground, these alterations in habitat may directly affect these birds. Conservative management to favor this imperilled species could exclude livestock from a relatively small stretch of riparian and adjacent oak shrub habitat at the foothill interface.

Exotic plants are present within the site and on the surrounding grasslands. Within the nesting area of the ovenbirds, weeds were more scarce, but are present within the Moss' elfin butterfly habitat. The threat posed directly to these species by exotic plants is unknown. Again, conservative management to favor these species may include a weed control or containment program. Simply preventing excessive soil disturbance, such as by construction or severe overgrazing, will help contain present weed infestations.

Should housing density ever increase in the area, domestic cats would pose a severe threat to the ovenbirds. See Section 2.4.4 for information regarding such domestic predators.



Map 4.27 Indian Creek Conservation Site

SITE NAME: JACKSON CREEK

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 500 acres

BIODIVERSITY RANK: B5

COMMENTS: This site contains the occurrences of two species of rare or imperilled fish as well as a marginally rare or imperilled amphibian species.

PROTECTION URGENCY RANK: P3

COMMENTS: None of the site is protected for its ecological values. Increasing land conversion in the area poses a threat if impacts to the stream system are not planned for.

MANAGEMENT URGENCY: M4

COMMENTS: Current management is varied, but is primarily for livestock production. Excessive grazing poses a threat. Invasive exotic plants are found throughout and may require active means for their control.

LOCATION: Jackson Creek is western tributary of West Plum Creek that lies south of Garber Creek and north of Spring Creek. The site encompasses the length of the stream from the base of the foothills to its confluence.
T8S R68W parts of sections 14, 15, 21, 22, 28

QUADRANGLE: Dawson Butte, Devils Head

GENERAL DESCRIPTION:

Jackson Creek is a major western tributary of West Plum Creek. The headwaters originate high in the Rampart Range and provide a permanent source of water for the stream. Stream substrate is predominately sand and the channel is shallow and braided. Some off-channel pools, both natural and augmented, add to the habitat diversity of the site and support some of the rare and imperilled species found here. The water temperature in Jackson Creek is significantly lower than that in West Plum Creek and the fish species found here reflect this cold-water habitat (Bestgen and Culver 1985).

Jackson Creek is typical of West Plum Creek's western tributaries in terms of the structure of the stream and the dominant riparian vegetation. Willows (*Salix* spp.) and cottonwoods (*Populus deltoides*) dominate the woody vegetation, and understories are typically dominated by exotic grasses, especially smooth brome (*Bromus inermis*).

Livestock grazing has been the predominant land use within and surrounding the site. Its impacts are evident in the form of exotic grass species, a few water diversions, and some bank erosion.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Phoxinos eos	Northern red-bellied dace	D	G5	S1	-	SC
Etheostoma exile	Iowa darter	D	G5	S2	-	SC
Rana pipiens	Northern leopard frog	C	G5	S3S4	-	SC

Like the other western tributaries to West Plum Creek, this site also supports aquatic species that indicate this sites importance in the conservation of the County's biological diversity. Interestingly, not all of the rare or imperilled fish species found in other tributaries or West plum Creek are found in Jackson Creek. The Northern red-bellied dace recorded here is represented by very few captures that may have been dispersing from a larger source population. The Iowa darters were also found in relatively low numbers. Even if these are peripheral to the main populations elsewhere in the drainage, these records show that Jackson Creek does provide suitable habitat for these species. Furthermore, Jackson Creek is a major tributary to West Plum Creek and its continued ecological integrity will have a major effect on the integrity of West Plum Creek itself.

CURRENT STATUS:

Approximately half of the site is on the Jackson creek Ranch, but the rest of the site is under multiple ownership. Housing development on the surrounding uplands is less than other parts of the West Plum Creek Macrosite.

BOUNDARY JUSTIFICATION:

The elements present at the Jackson Creek site are aquatic organisms which depend on the natural functioning of the aquatic system. Only some of the factors affecting this system can be addressed at the site. Others, such as changes in the water table or upstream alterations, are off-site considerations that will have to be addressed in order to maintain a sustainable system.

The preliminary conservation boundary presented here encompasses the surface water and associated vegetation within and around the known locations of natural heritage elements. A small buffer of 1000 feet from either the riparian vegetation or the steepened stream bank has been included to properly manage these areas.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Of primary concern is the maintenance of the hydrologic integrity of the aquatic system. The present integrity and natural functioning of this system is strongly implied by the number of rare aquatic and riparian species present and the relative quality of the riparian plant communities. Natural processes, such as seasonal and catastrophic flooding, still work to shape and maintain the biological diversity of the system.

These major hydrological processes are potentially highly threatened by any future diversion of groundwater within this system. Perhaps more important in this tributary to West Plum Creek will be the maintenance of natural flow of water from the mountains to the west. Maintaining minimum flow during dry seasons is necessary, but is not alone sufficient. Natural variations in flow throughout the year are also needed for the natural

system to persist.

Additionally, activities within and adjacent to the site need to be evaluated for their potential impact to the water quality of the system. Excess siltation is a common effect of construction that could be detrimental to the aquatic species present. Water pollution from fertilizers, pesticides, and herbicides also have a high potential of endangering this site if the contaminants reach the streams. Likely sources for such pollution in this area include residential lawns and hay fields that may be treated with fertilizers and weed killers that penetrate to the groundwater or enter the streams as surface runoff. Weed control efforts that involve herbicide application need to be carefully planned and implemented where water quality may be effected. Similarly, insect eradication efforts on agricultural fields or pastures, or for mosquito control need to be planned so that they do not contaminate the aquatic system. Generally, protection of this rare aquatic resource will preclude the use of chemical such as fertilizers and pesticides within the conservation site. Their use within the Jackson Creek watershed should be evaluated in terms of their potential to impact the water quality.

Although livestock grazing can negatively affect riparian systems (Ames 1977, others), it has historically been the primary land use at this site. While its impact on the plant communities is evident, it is significant that a concentration of rare elements occurs here. This may be due to sound land management that have maintained water quality and other natural hydrological factors in spite of altering the vegetation. Management practices that protect the riparian and wetland communities from overuse by livestock will likely benefit both the rare fish species present.

SITE NAME: JARRE CANYON

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 80 acres

BIODIVERSITY RANK: B5

COMMENTS: This site contains an occurrence of an imperilled plant species.

PROTECTION URGENCY RANK: P4

COMMENTS: This site is well protected under current ownership. The landowner is interested in protecting this plant.

MANAGEMENT URGENCY: M3

COMMENTS: Invasive exotic plants are increasing in the area and pose some threat to this occurrence.

LOCATION: 1.2 miles west of mouth of Jarre Canyon, south of road and east of driveway (not on 7.5' map).
T8S, R68W, Sections 5, 6.

QUADRANGLE: Kassler

GENERAL DESCRIPTION:

The Jarre Canyon site is a small site consisting of Gambel's oak (*Quercus gambelii*) woodland on gently sloping land. The site lies on gravely and rocky soils over pink granite bedrock. It supports scattered ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*). Service berry (*Amelanchier alnifolia*) and snowberry (*Symphoricarpos rotundifolia*) are the dominant understory shrubs. There is a moist, seepy area within the Gambel's oak woodland that provides habitat for a regionally rare wood lily (*Lilium philadelphicum*). While roads and homes surround this site, the vegetation is predominantly native, and this development does not seem to have yet heavily degraded the area.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Lilium philadelphicum	Wood Lily	C	G5	S3	-	-

The wood lily is a large, showy plant, uncommon in Colorado. While the wood lily does occur more commonly in moister regions farther east, it is rare in drier areas of the United States such as Colorado. It occurs in small populations with few individuals. This plant is vulnerable to people picking it because of its pretty orange flowers. It may also be vulnerable to exotic species invasion and habitat destruction by housing development. Because this plant is regionally rare, and may be threatened by collection,

exotic species invasion, and habitat development, it is of special concern.

CURRENT STATUS:

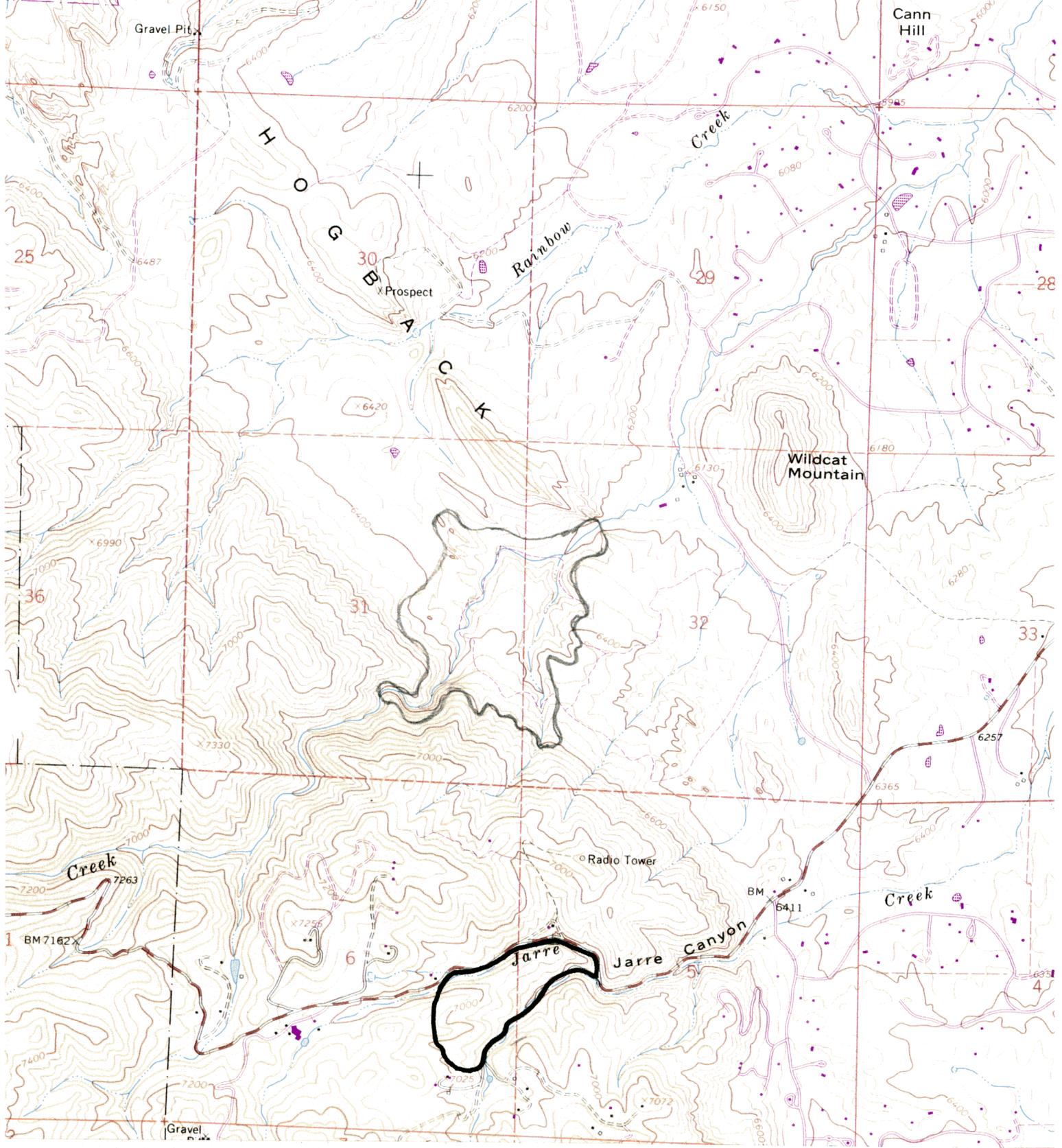
This site is under single ownership. The landowners are aware of the wood lily's occurrence on their property and are interested in its protection.

BOUNDARY JUSTIFICATION:

The recommended site boundary includes the wood lily populations and all adjacent contiguous habitat. This boundary should protect the wood lily from direct impacts such as new home development, road construction, or other modifications that would directly change the site. The boundary also provides a small buffer to protect surrounding similar habitat, should the plant disperse to surrounding areas in the future.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Within the current ownership, the wood lily should remain secure at this site. The landowners are aware of its existence and interested in its protection. The greatest threat to this site is likely increasing exotic species invasion due to new development in the area. Although the area supports few weedy species and invasive exotics now, this could change in the future. The site should be monitored for presence of invasive plants, and their presence should be immediately tended. Care should be used when using herbicides as these may kill the wood lily in addition to invasive weeds. The other potential threat to this species is collection by people. The wood lily has pretty, large orange flowers that are often tempting to pick. Under the current ownership however, this population should be secure from this threat.



Map 4.29 Jarre Canyon Conservation Site

SITE NAME: *KINNEY CREEK (W44)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 90 acres

LOCATION: T7S R66W section 2

QUADRANGLE: Ponderosa Park (3910446), Castle Rock North (3910447)

GENERAL DESCRIPTION: This site contains a well-developed riparian wetland complex. The vegetation is characterized by a forest canopy encompassing shrub and herbaceous plant communities. It appears that grazing has had low impact in the area. The hydrology is mostly natural, but there are several off-channel impoundments.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the hydrological processes, particularly the upstream character of the stream, is essential to the long term biological integrity of the site. A buffer around the riparian vegetation is warranted.

SITE NAME: LAKE GULCH (W52)

SITE TYPE: High Priority Wetland

SIZE: Approximately 150 acres

LOCATION: T9S R66W section 3

QUADRANGLE: Castle Rock South (3910437)

GENERAL DESCRIPTION: The site contains a riparian wetland complex with a wide floodplain and the confluence of a small tributary. The vegetation matrix consists of a linear cottonwood (*Populus*) formation along the "creek bank", shrub willows (*Salix* spp.) in the understory with scattered herbaceous patches. Impacts appear to be low. The area is used for low density residential development and light agriculture and grazing. The hydrology appears to be natural with no upstream or downstream impoundments. The surrounding area is used for cattle grazing, but the wetland area does not seem to be grazing-disturbed. The lack of hydrologic alteration and grazing in the riparian area is rare in Douglas County.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological regime is essential to the maintenance of the site. Management should include the maintenance of a significant buffer around the riparian vegetation (at least 100 meters is preferable).

SITE NAME: LARKSPUR BUTTE SEEP (W49)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 90 acres

LOCATION: T9S R67W sections 26, 27

QUADRANGLE: Greenland (3910427)

GENERAL DESCRIPTION: A seep/riparian wetland complex occurs on the site and covers an extensive area. The surrounding landscape has not been extensively developed. Impacts to the site appear to be low to moderate. The area is used for livestock grazing and the hydrology has been modified by an upstream impoundment.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological processes, particularly the groundwater system, is essential to the long term biological integrity of the site. A buffer around the wetland vegetation is warranted and could be as much as 100 meters wide. Livestock activities should be restricted to access points and monitored to determine possible impacts. Long term restoration should consider modifications to the upstream impoundment.

SITE NAME: LONE TREE SCHOOL

SITE TYPE: Habitat Conservation Area

SIZE: 1,620 acres

LOCATION: T8S, R67W, Sect. 21,22,23,26,27

QUADRANGLE: Dawson Butte (3910438)
Devils Head (3910531)

GENERAL DESCRIPTION: The low, rolling hills between Jackson Creek and Spring Creek are covered with a moderately dense shrubland, largely Gambel's oak. The space between oak patches is composed of native or non-native species. Cheatgrass, smooth brome, knapweed are found in many areas.

CURRENT STATUS: Private and unprotected.

PROTECTION AND MANAGEMENT CONSIDERATIONS: The habitat here should be protected from further fragmentation. The shrublands should be maintained, but with occasional disturbances such as fire. Weedy areas should be considered intervention areas and managed to eliminate or severely reduce the weeds.

SITE NAME: LONE TREE (W60)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 125 acres.

LOCATION: T8S R68W sections 23, 26

QUADRANGLE: Dawson Butte (3910438)

CONSERVATION SITE: This wetland is contained in the **West Plum Creek Macrosite**.

GENERAL DESCRIPTION: The site contains a wide riparian floodplain ecosystem. The vegetation is dominated by a moderately dense shrub community. The area has had low density residential development and livestock grazing resulting in low to moderate impacts on the land. The hydrology is fairly natural with some modification (small-scale impoundment and excavation).

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological processes is essential to the long term biological integrity of the site. A buffer around the wetland vegetation is warranted and could be as much as 100 meters wide. Livestock activities should be restricted to access points and monitored to determine the real extent of the impacts. Long term restoration should consider modifications to the existing impoundments and excavations.

SITE NAME: *LOUVIERS EAST (W68)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 90 acres.

LOCATION: T7S R68W section 4
T6S R68W section 33

QUADRANGLE: Sedalia (3910448), Kassler (3910541)

CONSERVATION SITE: This wetland is contained in the **West Plum Creek Macrosite**.

GENERAL DESCRIPTION: The site contains a riparian corridor and floodplains with a wetland complex located within the drainage bottom. An abandoned railroad bed crosses the riparian corridor.

The wetland complex is composed predominantly of willow (*Salix* spp) dominated plant communities. These open canopy shrub communities are situated on lower floodplain terraces. A narrow band of forested wetland (ie. *Populus deltoides*, *Salix fragilis* and *Salix amygdaloides*) is established at the periphery of the wetland complex. Scattered throughout the active channel region are channel bars supporting emergent herbaceous plant communities composed mainly of rushes, grasses and forbs. Non-native species are well established on site.

Currently, the site is used as open pasture for horses, and probably cattle. The area is also a popular recreation area, as was evident by newly constructed deer-stands and ATV tracks. There are no on site modifications to local hydrology (e.g. channel excavation, impoundment construction, etc.).

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological processes is essential to the long term biological integrity of the site. A buffer around the riparian vegetation is warranted and could be as much as 100 meters wide. Livestock activities should be restricted to access points and monitored to determine the actual extent of the impacts. Limitations to off-road access are desirable. Long term restoration should consider modifications to the existing impoundments and excavations.

SITE NAME: *LOWER WEST PLUM CREEK AT HWY 67 (W65)

SITE TYPE: High Priority Wetland

SIZE: Approximately 95 acres.

LOCATION: T7S R68W sections 23, 24, 25.

QUADRANGLE: Sedalia (3910448)

CONSERVATION SITE: This wetland is contained in the **West Plum Creek Macrosite**.

GENERAL DESCRIPTION: The site contains a broad, flat bottomland adjacent to West Plum Creek, just upstream of the confluence with East Plum Creek. Owing to its position within the Plum Creek drainage basin, it is probably a natural wetland area, commonly experiencing materials retention (e.g. water, sediments, organic matter, etc.). Severe channel downcutting was evident within portions of the complex. There are no hydrological modifications within the reach. Well-developed Willow (*Salix*) shrub community dominates the wetland area, with interspersed emergent-herbaceous patches. A plains cottonwood (*Populus deltoides*) gallery forest occurs on higher terraces. Non-native species (eg. mullein, knapweed, leafy spurge) are prevalent on drier (ie. higher elevation) washes.

The riparian corridor is grazed, and the communities look relatively intact and in good condition on other properties (viewed from HWY 105). The long term effect of groundwater withdrawal should be investigated and may be detrimental to the riparian plant communities.

This is a very large, well developed wetland complex within the Plum Creek drainage basin. It is one of the best preserved, and easily defensible wetland complexes within Douglas County.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the existing hydrological regime, including the local groundwater, is essential to the long term integrity of the site. Management should include the maintenance of a significant buffer around the riparian vegetation (100 meters is preferable). If there is a desire or need to maintain livestock on the property, water and riparian vegetation access should be restricted to selected points. Weed control is desirable, but should assure the protection of the existing wetlands.

SITE NAME: MOONSHINE GULCH

SITE TYPE: Habitat Conservation Area

SIZE: 2,080 acres

LOCATION: T7S, R65W, Sec. 17,18,19,20
T7S, R66W, Sec. 13, 24

QUADRANGLE: Ponderosa Park (3910446)

GENERAL DESCRIPTION: The rolling topography is covered with a ponderosa pine savanna. Native grasses dominated the understory and patches between pines. The birds were typical of the pine woodlands (i.e. there were no signs of disturbed bird communities).

CURRENT STATUS: Private and unprotected.

PROTECTION AND MANAGEMENT CONSIDERATIONS: This habitat almost certainly was maintained by periodic fires. Herbivory was no doubt also an important ecological process. Should this area get protected, these ecological elements should be protected.

SITE NAME: NEWLIN GULCH

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 10,500 acres

BIODIVERSITY RANK: B3

COMMENTS: This site supports a good quality occurrence of globally imperilled animal subspecies.

PROTECTION URGENCY RANK: P2

COMMENTS: Effective protection will not exclude all land uses, but must take place soon if this area is to retain its ecological integrity. Commercial and residential land conversion is occurring rapidly within and adjacent to the site.

MANAGEMENT URGENCY: M4

COMMENTS: This site will probably not require active management for the animal subspecies of concern, but weedy invasion is occurring throughout the site.

LOCATION: Northeastern Douglas County, approximately 9 miles north of Castle Rock between I-25 and Parker.

QUADRANGLE: Parker, Castle Rock North

GENERAL DESCRIPTION:

This site contains a rolling expanse of short grass prairie that is dissected by ephemeral sandy drainages and scattered stands of oak shrublands. The grasslands are dominated by blue gramma (*Bouteloua gracilis*) and june grass (*Koeleria macrantha*). Stands of Gambel's oak (*Quercus gambelli*) and mountain mahogany (*Cercocarpus montanus*) occur on hill sides throughout the area, creating a mosaic of grassland and shrubland habitats. Numerous springs and seeps dot the area. The largest seep is found in Newlin Gulch proper and is described in **Section 7.2** of this report.

Weed infestation is most severe in the gullies and low areas while many of the hilltops and ridges are relatively free of exotic plants. Field alyssum (*Alyssum minus*) is the most common invasive exotic plant found, but knapweed (*Centaurea* spp.) is very common in the broad sandy gulch bottoms and leafy spurge (*Euphorbia esula*) is present in some of the spring-fed wetlands.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Thomomys talpoides macrotis	Plains pocket gopher subspecies	B	G5T2	S2	-	-

While the total global range of this animal falls mostly within Douglas County, extending into northeastern Elbert and eastern Arapaho Counties. This entire area is very close to the Denver metro area and is being rapidly converted into land uses incompatible with the gopher's survival (C. A. Pague, personal observation). The small range of this subspecies and the degree of threat from rapid land conversion are the basis for the element's imperilled status.

This globally imperilled subspecies is found throughout northern and eastern Douglas County. However, it is rarely found in large natural habitats such as this site. It is therefore recommended that this species be protected not by defending every occurrence in modified and unnatural habitats, but by preserving a few large areas of natural habitat such as this. **With proper fore sight, this subspecies can be conserved without causing major land planning conflicts.**

In addition, this site encompasses the largest remaining unfragmented grasslands in Douglas County. Maintaining such an area will be critical not only for rare and imperilled species such as this subspecies of the plains pocket gopher, but also for the large wildlife such the pronghorn antelope (*Antilocapra americana*) and coyote (*Canis latrans*) that still can be found on this site.

CURRENT STATUS:

This area is mostly under private ownership, but the parcels here remain large. The core of this area is actively ranched by the landowner and tenant. The State Land Board owns a section of the site that is under a grazing lease. The rest of the site is also currently used for livestock grazing, but is owned by development corporations and is only leased for ranching purposes.

BOUNDARY JUSTIFICATION:

This boundary encompasses an area of continuous gopher habitat that remains in dominated by natural ecosystem processes. We propose that the conservation of this area is needed for the gopher to persist in its natural habitat and performing its natural ecological functions.

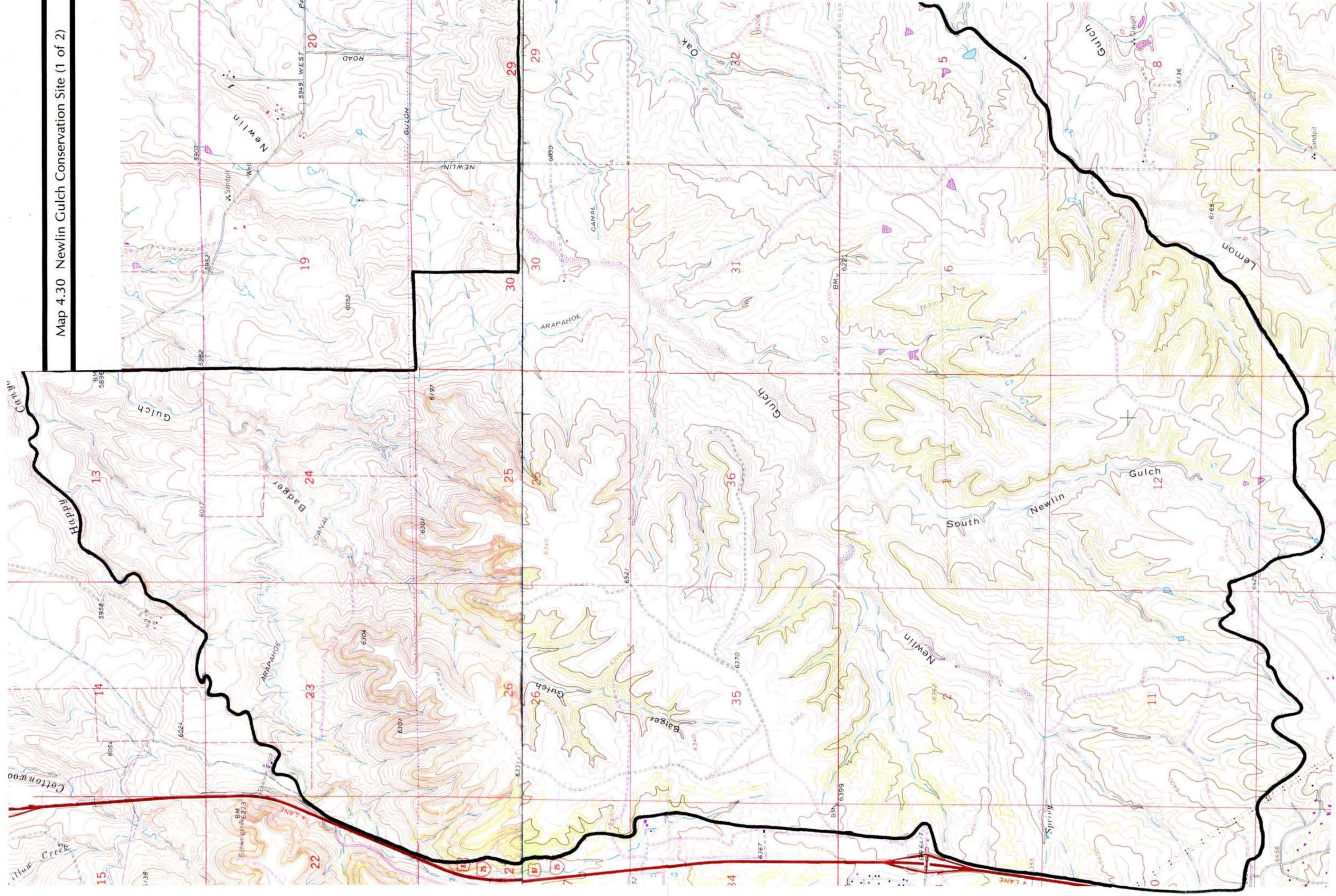
PROTECTION AND MANAGEMENT CONSIDERATIONS:

The plains pocket gopher subspecies that is present here (*Thomomys talpoides macrotis*), appears to be tolerant of many kinds of disturbance. Our observations in Douglas County indicate that this element can survive in roadside ditches and areas infested with exotic plants. However, for the long term survival of this globally significant subspecies, it will be necessary to maintain some areas of natural habitat (as opposed to altered ones such as ditches), where the animal can carry out its normal ecological functions. We propose that this will require large areas that remain unfragmented to gopher dispersal and that retain at least a semblance of the native grassland that once dominated the county. Land uses which appear to be incompatible to gopher persistence and that create fragmentation of the habitat include high density housing, high-traffic roads, and areas where gopher control is practiced such as nurseries, golf courses, and maintained turfs such as ball fields. Compatible land uses in this area include livestock grazing, recreational open space, and well-planned low density housing. Well-planned housing development would minimize the area of disturbance, emphasize native landscaping and restoration, and minimize fragmentation of open

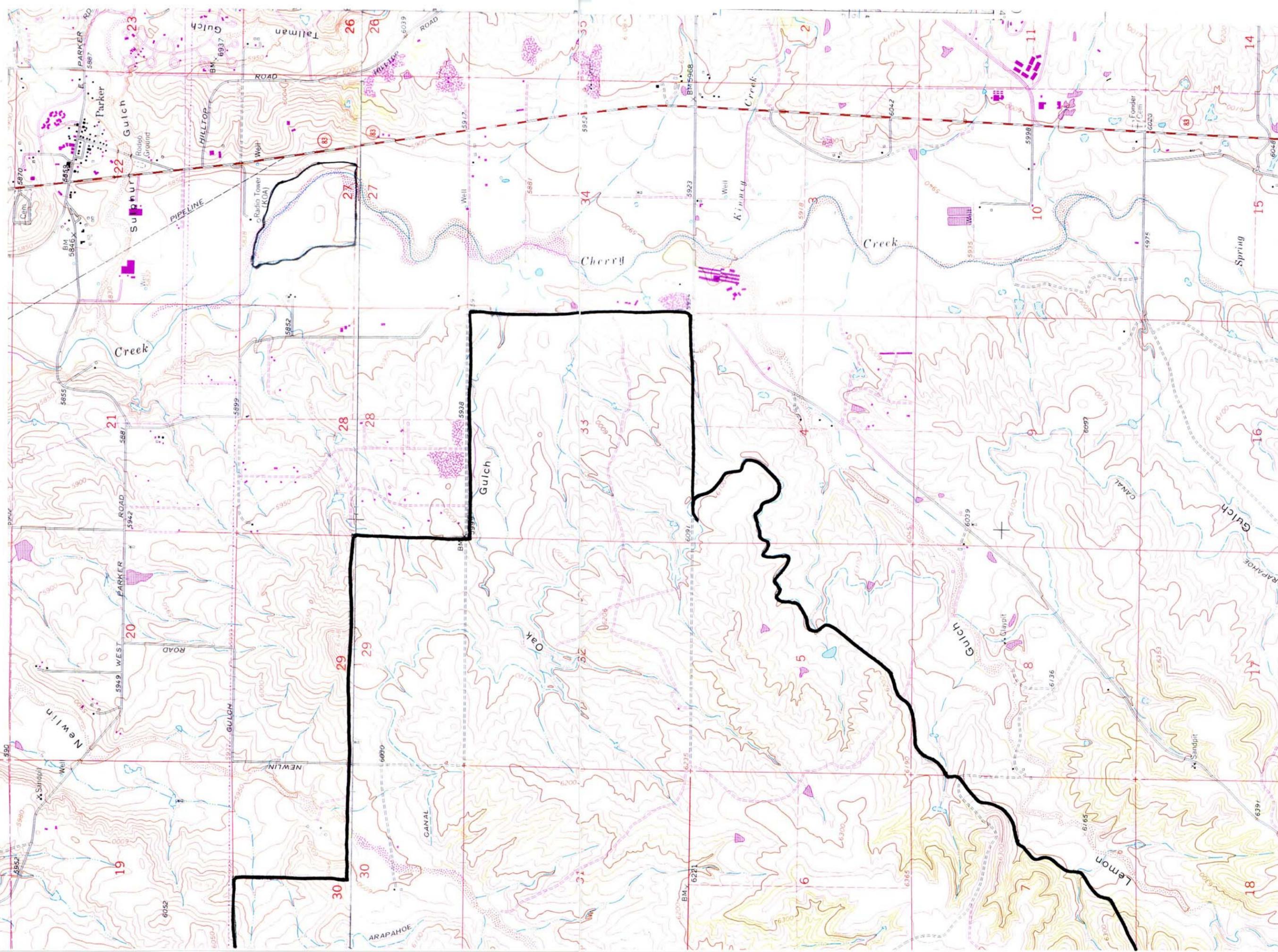
spaces by roads or other structures. Development which preserves natural habitats that are discontinuous will not effectively conserve this subspecies.

Domestic cats may pose a threat to this element since small mammals comprise that majority of cats' wild prey (Parmalee 1953, Eberhard 1954, Jones and Corman 1981, Churcher and Lawton 1987). Since housing density is likely related to density of cats, high-density housing could again pose a problem. Even in low density housing, measures should be taken to keep cat densities low. The maintenance of large parcels of natural habitat, as mentioned above, will be helpful in this regard as well.

Map 4.30 Newlin Gulch Conservation Site (1 of 2)



Map 4.31 Newlin Gulch Conservation Site (2 of 2)



SITE NAME: *NEWLIN GULCH SEEP (W76)

SITE TYPE: High Priority Wetland

SIZE: 45 acres

LOCATION: T6S R66W sections 17, 19, 20, 30, 31.
T6S R67W section 36
T7S R67W sections 1, 2, 10, 11

QUADRANGLE: Castle Rock North (3910447)

GENERAL DESCRIPTION: Newlin Gulch is a broad gulch with a deep sand substrate. Several smaller gulches drain into the main channel. Generally the water table is below the channel surface but numerous seeps appear in the area. Seep areas contain dense stands of rushes and some trees and shrubs. Adjacent upland flats are somewhat weedy. Although non-native species are common there are patches of upland grasslands that are dominated by native prairie grasses.

CURRENT STATUS: Unprotected and largely privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the groundwater sources is essential to the long term biological integrity of the site. Management should include the maintenance of a significant buffer around the wetland vegetation (100 meters is preferable). If there is a desire or need to maintain livestock on the property, water and riparian vegetation access should be restricted to selected points. Weed control is desirable, particularly in adjacent uplands areas, but should assure the protection of the existing wetlands.

SITE NAME: PARKER REGIONAL PARK

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 90 acres

BIODIVERSITY RANK: B5

COMMENTS: This small site contains nesting locations for three species of imperilled birds as well as a high diversity of other breeding song birds.

PROTECTION URGENCY RANK: P4

COMMENTS: Already in public ownership, this site will be adequately protected if site management effectively addresses its ecological significance.

MANAGEMENT URGENCY: M3?

COMMENTS: While current management plans are not known, they should be such that they do not negatively impact the imperilled species present.

LOCATION: Cherry Creek near Parker
T6S R68W section 27

QUADRANGLE: Parker

GENERAL DESCRIPTION:

This site is dominated by riparian vegetation that is typical of lower Cherry Creek. Plains cottonwood (*Populus deltoides*) and willow (*Salix* spp.) form the upper strata of this plant community, while the understory is largely comprised of exotic grasses and forbs. The creek here is braided within a wide sandy channel.

Adjacent land is heavily modified, an irrigated field to the west and suburban development and the highway to the east.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Coccyzus americanus americanus	E. yellow-billed cuckoo	C	G5	S2	-	-
Bombycilla cedrorum	Cedar waxwing	C	G5	S3	-	-
Passerina cyanea	Indigo bunting	C	G5	S3S4	-	-

Although this site is small and represents only a remnant of the natural riparian habitat of Cherry Creek, it supports an extraordinary number of breeding songbirds including three species which are considered rare or imperilled. Thirty-seven species are known to be nesting here, and over 50 additional species have been observed as vagrants or migrating birds (TenBrink 1995). For such a small area, this is indeed a diverse area for birds. Furthermore, the presence of three rare and imperilled bird species indicates that,

although the area is relatively disturbed and surrounded by a modified landscape, this remnant of natural habitat contributes significantly to the overall biological diversity of Douglas County.

CURRENT STATUS:

Most of this site is a town park owned by the Town of Parker. Current management plans are unknown to the authors.

BOUNDARY JUSTIFICATION:

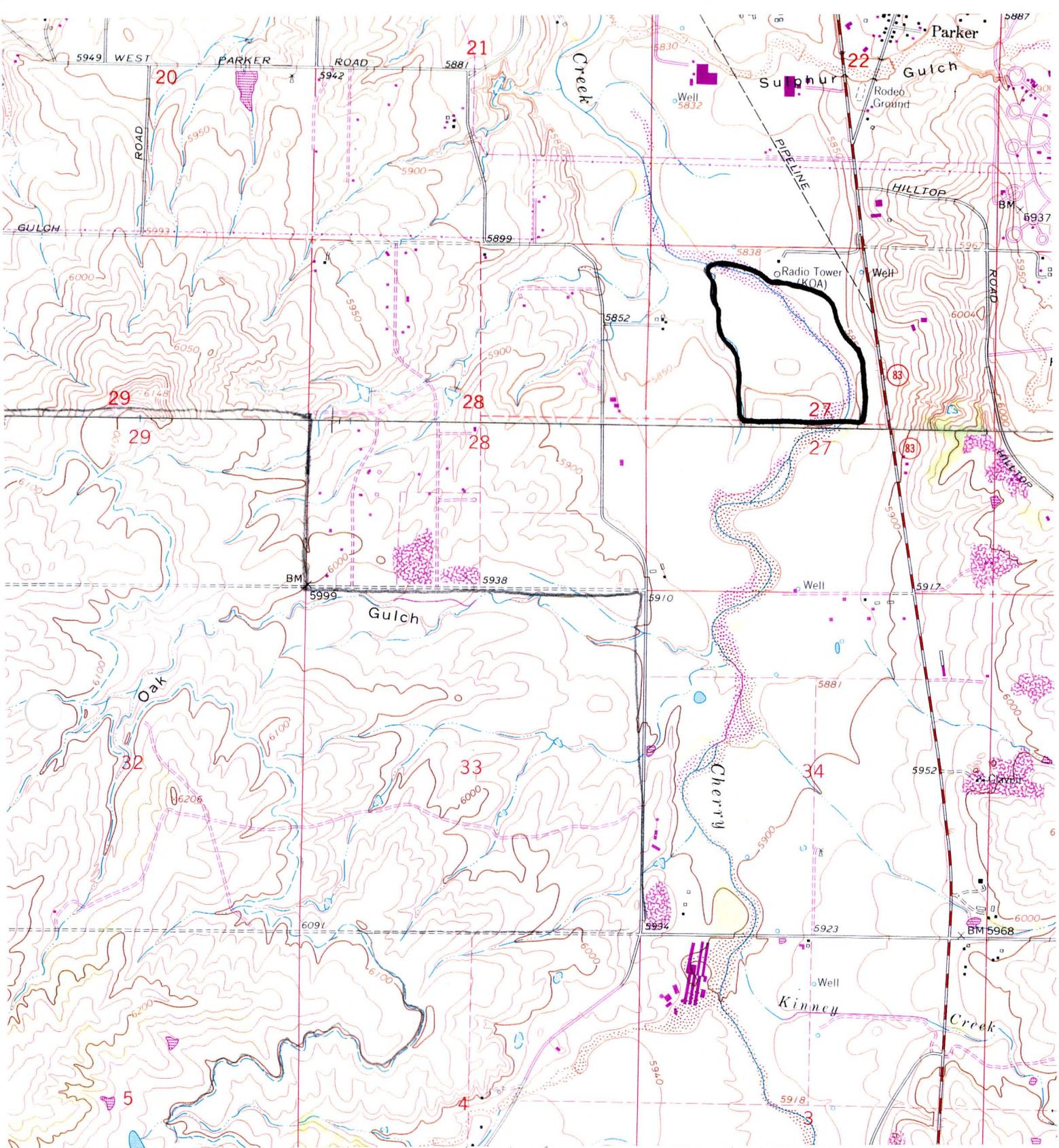
This boundary contains only a very small remnant of riparian vegetation along Cherry Creek. This marks all of the continuous forested riparian habitat near the occurrence. Adjacent areas are heavily modified and are excluded from the site.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Since this site is such a small remnant, any further losses to the area of available habitat will be significant. Similarly, further development of the immediately adjacent land will have the effect of reducing the available habitat by creating a more drastic habitat edge at the development interface. The site itself should be maintained in its present condition without further disturbance. Immediately adjacent land should be developed in ways that will reduce the contrast at the edge of the site. Native landscaping with riparian trees and shrubs, agriculture, low density housing, or the maintenance of open space are likely compatible uses.

Management at the site should maintain the present habitats and allow for tree regeneration. As much of the area as possible should be kept in natural condition. The diversity of breeding birds at this site may be enhanced by maintaining the present variety of habitats and food sources. Tenbrink (1995) suggests that the adjacent sunflower field not be mowed so that seed eating bird species will be favored.

Public interest in the preservation of this site may be generated by providing interpretive markers and small nature trails that point out the variety of birds one can see here, including the locally rare and imperilled species.



Map 4.31 Parker Regional Park Conservation Site

SITE NAME: PERRY PARK

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 1700 acres

BIODIVERSITY RANK: B4

COMMENTS: This site contains the occurrences of at least 11 rare or imperilled riparian and aquatic dwelling animals. It represents the most significant site within the West Plum Creek Macrosite.

PROTECTION URGENCY RANK: P3

COMMENTS: None of this site is protected for its ecological values, but ownership is consolidated and the owner is concerned.

MANAGEMENT URGENCY: M3

COMMENTS: Current management is sound, but increasing invasive plant invasion is a concern that will require active control measures. Exotic fish here also need to be contained.

LOCATION: West Plum Creek at Perry Park
T9S R68W parts of sections 25, 26 and 35

QUADRANGLE: Larkspur

GENERAL DESCRIPTION:

The riparian area is broad and perennially wet, with ample surface water throughout the year. Bottomland (marsh) vegetation is composed of intermingling patches of cattail (*Typha latifolia*) and coyote willow (*Salix exigua*), forming an extensive, structurally heterogeneous bottomland habitat. Adjacent upland sites contain dry grassland communities. Habitat quality at this particular site is maintained by both natural drainage patterns associated with topographic position and hydrological alteration caused by beaver and human activity within the basin. Non-native plants are prevalent throughout the landscape and are especially frequent along the upper stream terraces and dry upland areas. Dry grass communities of adjacent upland sites are impacted by haying and livestock grazing.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	C	G5T2	S2	C2	SC
<i>Fundulus sciadicus</i>	Plains topminnow	C	G4	S2	C2	SC
<i>Notropis cornutus</i>	Common shiner	B	G5	S2	-	SC
<i>Etheostoma exile</i>	Iowa darter	B	G5	S2	-	SC
<i>Etheostoma nigrum</i>	Johnny Darter	B	G5	S3	-	-
<i>Phoxinos eos</i>	Northern red-bellied dace	D	G5	S1	-	SC
<i>Nycticorax nycticorax</i>	Black-crowned night-heron	D	G5	S3B, S2N	-	-
<i>Ardea herodias</i>	Great blue heron	C	G5	S3B, S2N	-	-
<i>Bombycilla cedrorum</i>	Cedar waxwing	C	G5	S3B, S5N	-	-
<i>Aeshna juncea</i>	Sedge darner dragonfly	C	G5	S3	-	-
<i>Rana pipiens</i>	Northern leopard frog	A	G5	S3S4	-	SC

All of the above rare or imperilled species and their habitats are associated with the West Plum Creek riparian corridor. The Preble's meadow jumping mouse was discovered along West Plum Creek within this site. Three juvenile mice were located, indicating that the mice are reproducing at this occurrence. Most of these unique fish species (common shiners, Iowa darters, and Johnny darters) were netted throughout this stretch of stream up to the impoundment. Each of these species were abundant, and their presence here has been documented for over 15 years. The Black-crowned night-heron fledglings were found in the extensive beaver complex just above Red Rocks road. While this species usually occurs in higher numbers, the presence of fledglings strongly suggests that the bird breeds in the site. Cedar waxwings were observed in the upper reaches of the site, utilizing the narrow portion of the riparian area. These birds are probably breeding here since pairs and singing males were observed. The sedge darner dragonfly is a species that has more northern affinities and is believed to be rare in Colorado. It was found patrolling the stream corridor in the upper portions of the site. The Northern leopard frog was observed in high numbers throughout the site.

CURRENT STATUS:

This site is under multiple private ownership. Much of the upper portion is consolidated under the Haystack Ranch and is actively used for hay production and cattle grazing, as are other parcels within the site.

BOUNDARY JUSTIFICATION:

This boundary encompasses the continuous riparian and aquatic habitats that support these rare and imperilled species. In addition, a buffer of approximately 1000 feet of upland is included to reduce potential negative effects of adjacent land uses. While much of the area within this site is already disturbed, disruptive activities within this boundary should be avoided.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

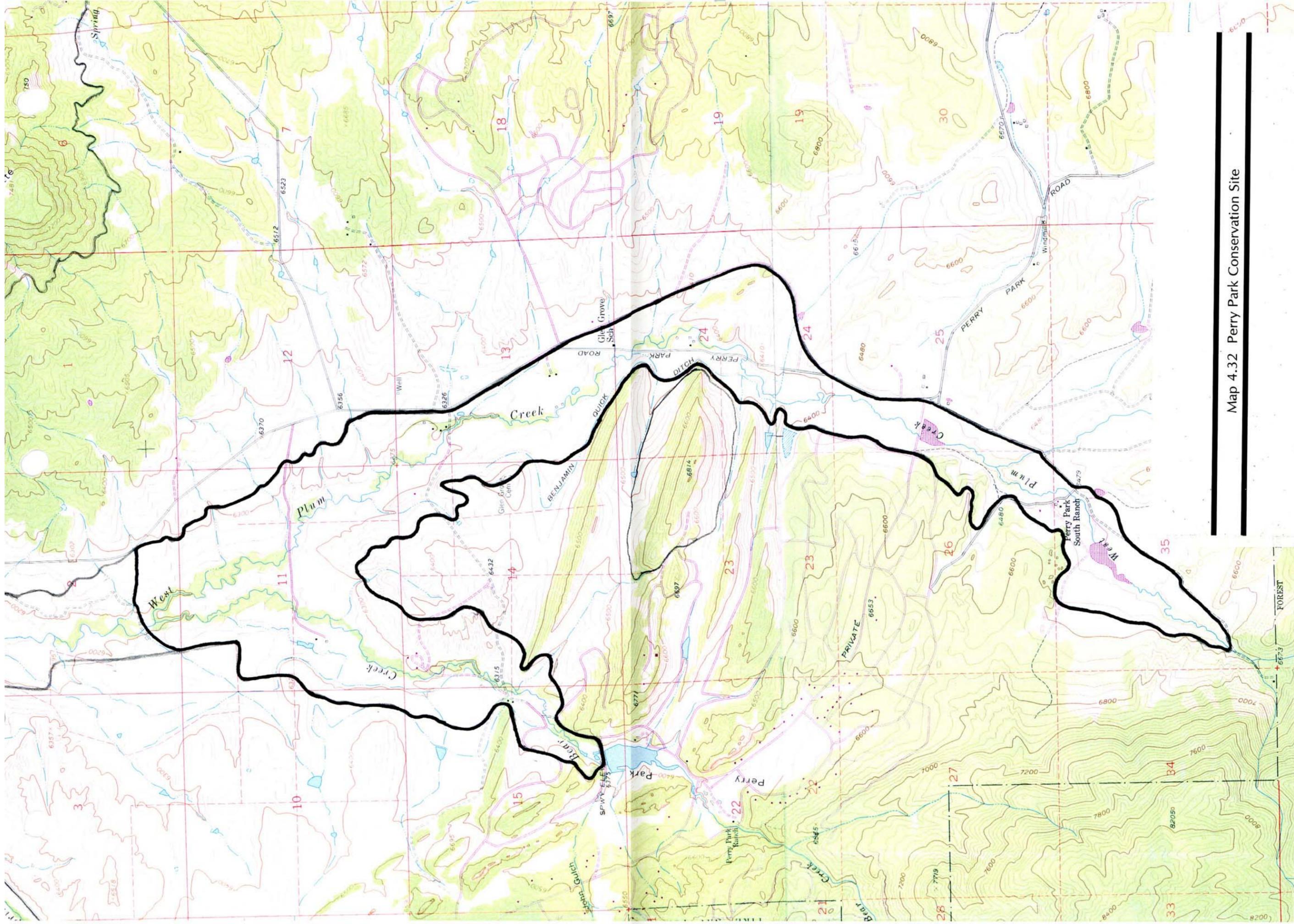
While under private ownership, this site benefits from the relatively large size of the parcels and the general concern of some land owners for the health of their land. These landowners should be encouraged to maintain the relatively natural condition and uniqueness of this site. Education, incentives, and technical support in areas such as weed control and conservation management will be beneficial to the conservation of this

site.

As stated in the West Plum Creek Macrosite profile, maintenance of hydrological integrity is of the greatest concern at this site. Preventing further disturbance to the stream channel, excessive withdrawal of water, and water pollution will all be important.

Exotic fish species are present at this site. Specifically, brook trout (*Salvelinus fontinalis*) have been stocked in the impoundment at the upper end of this site. This impoundment also corresponds precisely to the upper limit of the native rare and imperilled fish distribution. The impoundment forms a total barrier to upstream dispersal of fish, but some fish do apparently make their way downstream over the barrier since brook trout were found in the deeper pools in the stream itself. The continuing dispersal of trout out of the impounded pond would be a more significant threat if there was more suitable trout habitat in the stream. However, the stream is relatively shallow and provides few places for trout to persist. Renewed stocking would not be prudent in terms of protecting the native fish. Similarly, alterations to the stream that provide more trout habitat, such as deeper pools, should be discouraged.

Domestic predators, especially cats, may pose a real threat to the Preble's meadow jumping mouse at this site. Current housing density is not high, but the rural homes that are present are likely to support at least a few cats. Cats already present can probably only be controlled voluntarily by owners, but it will be helpful to prevent the increased density of cats that is likely as the area becomes more developed. Landowner cooperation will still be necessary, but the maintenance of open space buffers on either side of the stream will help to keep cat number low in the riparian areas.



Map 4.32 Perry Park Conservation Site

SITE NAME: *PRAIRIE CANYON WETLAND (W39)

SITE TYPE: High Priority Wetland

SIZE: Approximately 75 acres

LOCATION: T9S R66W section 1 (east 1/2)

QUADRANGLE: Russellville Gulch (3910436)

GENERAL DESCRIPTION: The Prairie Canyon site is centered on a portion of East Cherry Creek that provides habitat for several common riparian and wetland plant communities.

The vegetation is dominated by sedge (*Carex* sp.), cattail and bulrush (*Typha latifolia* and *Scirpus* sp.), and coyote willow (*Salix exigua*) communities. Although native species dominate the wettest portion of the riparian zone, non-native species such as Canada thistle (*Cirsium arvense*) and smooth brome (*Bromus inermis*) dominate seasonally flooded areas. Along most of this riparian area, adjacent uplands consist of common prairie plants with occasional patches of non-native species included. Needle-and-thread grass (*Stipa comata*) is especially noticeable. Hay is cultivated in a portion of the area adjacent to the riparian zone.

Fencing around most of the main stem of East Cherry Creek has kept the area free from cattle impacts. Hydrologic processes of seasonal flooding and stream meandering appear intact.

One plant species and one animal species increase the significance of Prairie Canyon. Northern leopard frogs (*Rana pipiens*) appear to be thriving along much of the stream length. Apparent declines in regional populations of this species suggest that its long-term viability in the area may require current protection of healthy populations. Broadfruited burreed (*Sparganium eurycarpum*), once thought possibly extirpated from the Denver area (Weber 1976), grows abundantly on the site

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Maintenance of at least the existing flow regime is essential for the long term protection of the site. Protection of ground water will be important over the long term. Finally, noxious weed control that is sensitive to native vegetation types will be highly beneficial.

SITE NAME: RATTLESNAKE-NEMRICK BUTTES (W48)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 225 acres.

LOCATION: T10S R67W section 12
T10S R66W sec 7

QUADRANGLE: Greenland (3910427)

GENERAL DESCRIPTION: This site contains an extensive seep/riparian community with the drainage from the adjacent buttes. Land use impacts appear to be low with some grazing. The hydrology has been modified as the wetland is located between two impoundments, the larger being downstream.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Restoration of the natural hydrological processes, particularly the upstream character of the stream, is essential to the long term biological integrity of the site. A buffer around the riparian vegetation is warranted and could be as much as 100 meters wide. Livestock activities should be restricted to access points and monitored to determine possible impacts. Long term restoration should consider modifications to the upstream and downstream impoundments.

SITE NAME: REED HOLLOW NORTH

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 100 acres

BIODIVERSITY RANK: B4

COMMENTS: This site contain a moderate quality occurrence of a globally imperilled plant community.

PROTECTION URGENCY RANK: P4

COMMENTS: This site is within a low density residential development but is well protected from immediate threats.

MANAGEMENT URGENCY RANK: M3

COMMENTS: The continued persistence of this occurrence may require active management to simulate natural ecological processes such as fire.

LOCATION: 3 miles east and 1.5 miles south of Franktown.
T8S R65W section 7

QUADRANGLES: Russellville Gulch

GENERAL DESCRIPTION:

The site is dominated by ponderosa pine (*Pinus ponderosa*) and Gambel's oak (*Quercus gambeli*) on moderate to steep slopes at an elevation of 6440-6560 feet.

Steep, rocky slopes are dominated by mountain mahogany (*Cercocarpus montanus*) shrublands usually contain scattered ponderosa pine. The understory is dominated by various tallgrass and midgrass species. The communities intergrade along the slopes. Various non-native or native weedy species are common but not dominant.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Pinus ponderosa/Cercocarpus montanus/ Andropogon gerardii	Foothills woodland	CD	G2	S2	-	-

The ponderosa pine/mountain mahogany/big bluestem (*Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii*) foothills woodland occurs on the rocky soils on the site. This plant community is imperilled throughout its range.

CURRENT STATUS:

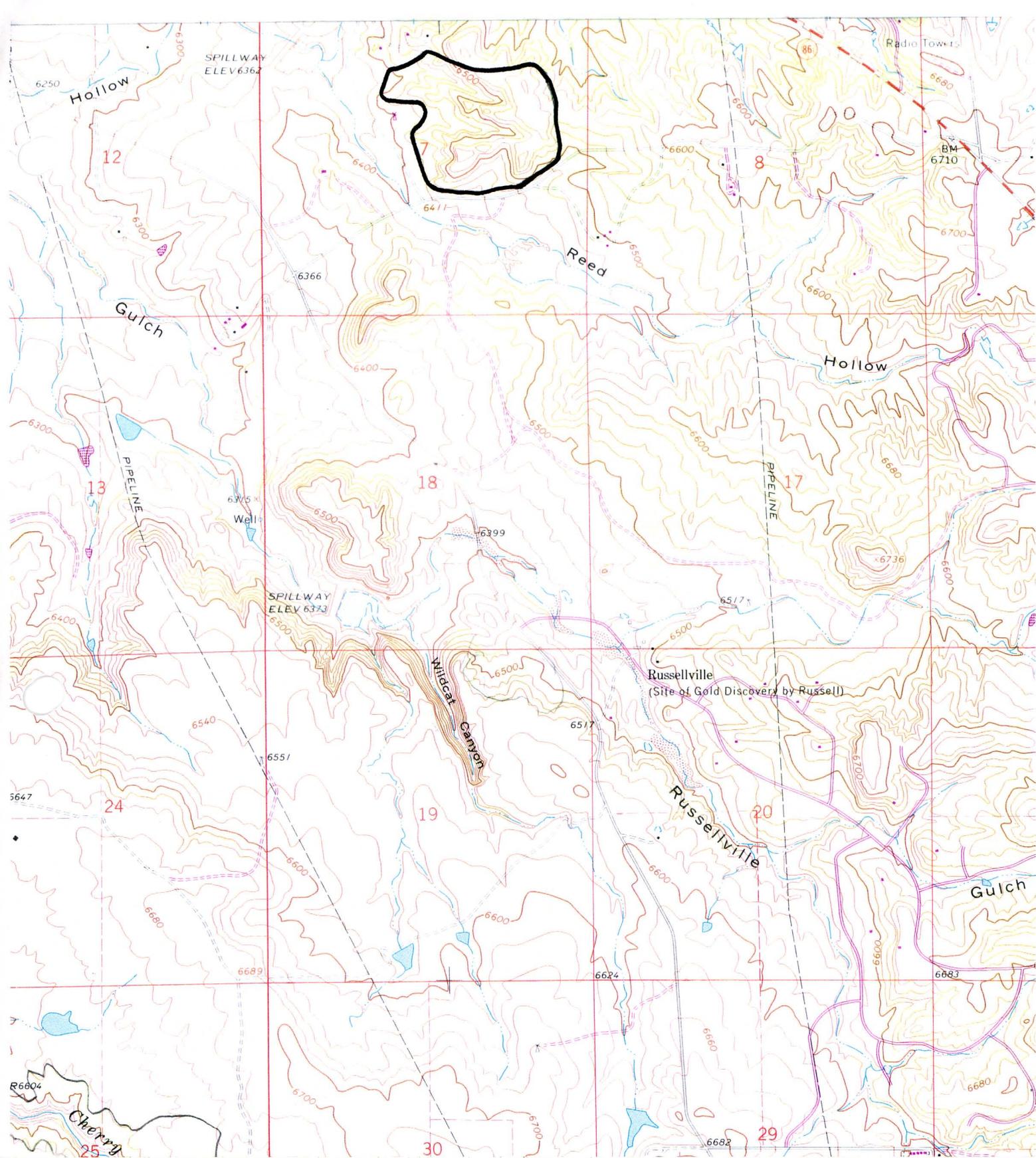
The site is under private ownership and operated as an equestrian training facility. Development for housing has taken place on adjacent parcels. Use by the horses seems to be mostly confined to the meadows below the woodlands.

BOUNDARY JUSTIFICATION:

The boundary presented here is intended to encompass the element occurrences and a buffer to prevent direct disturbance. The boundary includes most of the ponderosa pine woodlands and the grassland to the east. The occurrence of the foothills woodland may continue to the north but a field survey was not conducted because of unknown land ownership. Plant communities that occur within the context of natural surrounding lands are generally thought to be more viable and provide greater chance of continued natural processes and protection of associated species (Harris 1984).

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Invasion by exotic or weedy native plant species appears to be the greatest threat to the elements present at the site. It is not known if lack of fire may be allowing the ponderosa pine to expand coverage but if this is the case prescribed fire or limited timber harvest may be necessary for continued preservation of the occurrence.



Map 4.32 Reed Hollow North Conservation Site

SITE NAME: ROXBOROUGH HOGBACKS

SITE TYPE: Habitat Conservation Area

SIZE: 7,840 acres

LOCATION: T7S, R68W, Sec. 6,7,8,17,18,19,20,29,30,31,32
T7S, R69W, Sec. 11,12,13,14,23,24

QUADRANGLE: Kassler (3910541)

GENERAL DESCRIPTION:

The hogbacks of the Front Range extend from Wyoming south to Colorado Springs and beyond. They are already known for their unusual geology as well as a unique flora and fauna. Lying directly on the ecotone between Great Plains and the Rocky Mountain foothills, the species diversity in this area is usually high, owing to influences from both of these regions. While parts of this hogback complex in Douglas County have recognized high conservation value (Indian Creek Site, Glen Grove Hogbacks site, Roxborough State Park), this area represent the largest unfragmented section of hogbacks in the County. This area's proximity to Roxborough State Park enhances its value, and its protection would provide necessary a buffer to Roxborough and the Indian Creek site.

CURRENT STATUS: Roxborough State Park and South Downs are owned by the State of Colorado. Most of the remainder of the property is privately owned and unprotected.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection will need to include a much larger area than is currently managed. In addition, the area should be managed for the Sharp-tailed grouse. Weeds are a considerable problem in the area, including knapweed populations. The human use of the State Park is very high and its impacts on the biota are not assessed. Some control and restrictions may be necessary. This area will provide a necessary link to Cherokee Mountain.

SITE NAME: SOUTH CASTLE ROCK EAST RANCH

SITE TYPE: Habitat Conservation Area

SIZE: 23,720 acres

LOCATION: T10S, R66W, Sec. 4,5,6,7,8
T10S, R67W, Sec. 1,2,11,12
T09S, R66W, Sec. 17,18,19,20,28,29,30,31,32,33
T09S, R67W, Sec. 1,2,3,9,10,11,12,13,14,15,16,22,23,24,25,26,27,34,
35, 36
T08S, R67W, Sec. 23,25,26,27,34,35,36

QUADRANGLE: Castle Rock South (3910437)
Dawson Butte (3910438)
Greenland (3910427)
Larkspur (3910428)

GENERAL DESCRIPTION: This area comprises the largest open space remaining in Douglas County. Land holdings are very large with only a few owners. The lower elevations are dominated by grasslands and contain some large wetland complexes. Several large buttes dominate the area and are covered with significant grasslands. The slopes of the mesas are covered with oak scrub and ponderosa pine woodlands.

This area was largely unsurveyed due to a lack of private land access. However, what information is available suggests that this area is likely to contain the best quality natural communities in the County. It also has high potential for harboring a number of rare or imperilled species, especially grassland butterflies such as the globally imperilled Ottoe skipper butterfly (*Hesperia ottoe*, G3/S2). This area's large, unfragmented character is unique to the county, and is likely to allow for large scale ecosystem processes that are maintaining biological diversity and are otherwise inhibited in other areas. Large wildlife species such as mule deer, elk, black bear, and mountain lion, if they are to persist in Douglas County, will rely heavily on such intact landscapes.

CURRENT STATUS: Privately owned and unprotected. There are several parcels of land owned by the State Land Board. Conservation planning for the area is ongoing through the Conservation Fund.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Douglas County has its last opportunity to protect its natural heritage at the landscape scale here in the Greenland Ranch and vicinity. Large mammals still contribute significantly to the biological diversity. Water development for livestock uses and grazing has had some impact on the vegetation. There are several ranchette developments in the area which pose local threats. Any protection strategy should consider the most sensitive species and communities, but also the connectors to adjacent open areas.

SITE NAME: SOUTH CASTLEWOOD PARK

SITE TYPE: Habitat Conservation Area

SIZE: 4,650 acres

LOCATION: T9S, R66W, Sec. 3,4,5
T8S, R66W, Sec. 21,22,27,28,29,32,33,34

QUADRANGLE: Castle Rock South (3910437)

GENERAL DESCRIPTION: Located the south and west of Castlewood Canyon State Park, this area consists largely of grasslands and shrublands. Much of the shrub habitat is of Gambel's oak. Antelope still graze in this area.

CURRENT STATUS: Most of the area is private and unprotected.

PROTECTION AND MANAGEMENT CONSIDERATIONS: The largest consideration in this area is to maintain the open nature and a native vegetation. Many of Douglas County's best known species reside in the shrublands. Grazing should emulate natural patterns. Consideration should be given for the role that fire must have played in the maintenance of this system.

SITE NAME: SPRING CREEK

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 650 acres

BIODIVERSITY RANK: B5

COMMENTS: This site supports occurrences of two species of rare or imperilled fish.

PROTECTION URGENCY RANK: P3

COMMENTS: Current management is varied, but is primarily for livestock production. Excessive grazing poses a threat. Invasive exotic plants are found throughout and may require active means for their control.

MANAGEMENT URGENCY: M3

COMMENTS: Current management is varied, but is primarily for livestock production. Excessive grazing poses a threat. Invasive exotic plants are found throughout and may require active means for their control.

LOCATION: Spring Creek is a western tributary of West Plum Creek which lies south of Jackson Creek and north of Bear Creek. The site encompasses the length of the stream from the base of the foothills to its confluence.

T9S R68W parts of sections 35, 35

T10S R68W parts of sections 3, 4, 9, 16, 17

QUADRANGLE: Dawson Butte, Devils Head

GENERAL DESCRIPTION:

Spring Creek is also a major western tributary to West Plum Creek, flowing northeast from its origin on the east slope of Dakan Mountain. Similar to West Plum Creek and its other tributaries the substrates consist of sand. Unlike the other western tributaries the channel is quite narrow, less than 2 m wide, and is deeply entrenched in places. The flow in Spring Creek apparently becomes subterranean in certain areas. The stream is impounded where it forms a deep pool that provided habitat for the rare or imperilled species present at the site.

Vegetation is typical of the transition zone streams within the West Plum Creek drainage, consisting predominately of willow (*Salix* spp.) and cottonwoods (*Populus deltoides*) with graminoid understories. As usual, exotic grasses, especially smooth brome (*Bromus inermis*) are found throughout the riparian communities.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Etheostoma exile	Iowa darter	C	G5	S2	-	SC
Notropis cornutus	Common shiner	C	G5	S3	-	SC

This site contains some of the same rare or imperilled species found elsewhere throughout the site, and are likely a peripheral component of these large populations. Their persistence within this tributary seems, at present, to depend on the artificial impoundments that create permanent water within the channel. The creek is otherwise ephemeral in its flows. While such alteration leaves this site in less than ideal conditions, the presence of significant natural heritage resources in high numbers here indicates that some altered sites are still of importance to conservation in Douglas County. In addition to the rare and imperilled species known from this site, Bestgen and Culver (1985) noted that some parts of this site contain suitable habitat for the Northern red-bellied dace (*Phoxinos eos*), another rare and imperilled fish species found elsewhere in the West Plum Creek drainage.

CURRENT STATUS:

This site is under multiple private ownership. The surrounding uplands are becoming increasingly developed, especially south of the creek.

BOUNDARY JUSTIFICATION:

The elements present at the Spring Creek site are aquatic organisms which depend on the natural functioning of the aquatic system. Only some of the factors affecting this system can be addressed at the site. Others, such as changes in the water table or upstream alterations, are off-site considerations that will have to be addressed in order to maintain a sustainable system.

The preliminary conservation boundary presented here encompasses the surface water and associated vegetation within and around the known locations of natural heritage elements. A small buffer of 1000 feet from either the riparian vegetation or the steepened stream bank has been included to properly manage these areas.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Of primary concern is the maintenance of the hydrologic integrity of the aquatic system. The present integrity and natural functioning of this system is strongly implied by the number of rare aquatic and riparian species present and the relative quality of the riparian plant communities. Natural processes, such as seasonal and catastrophic flooding, still work to shape and maintain the biological diversity of the system.

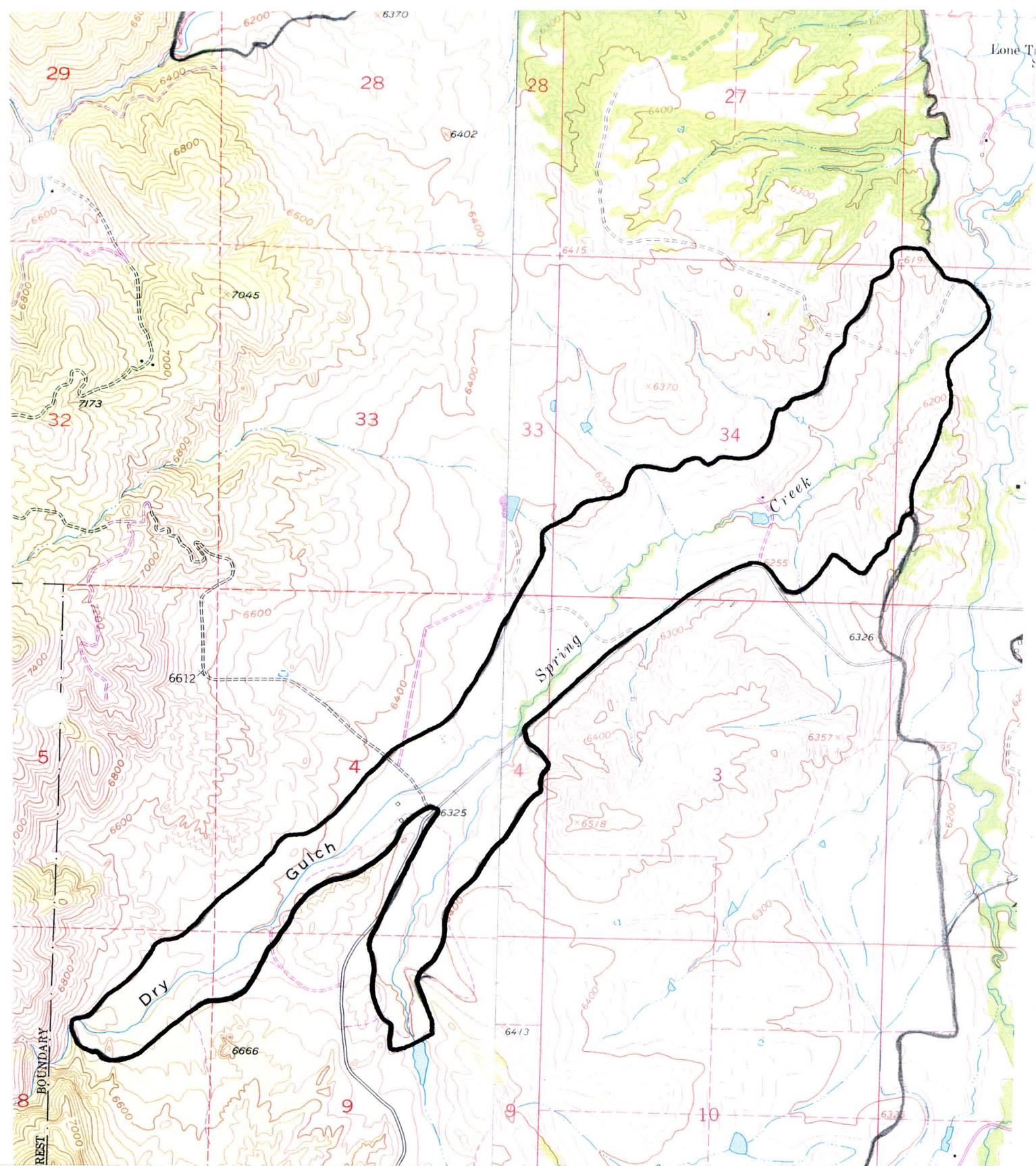
These major hydrological processes are potentially highly threatened by any future diversion of groundwater within this system. Perhaps more important in this tributary to West Plum Creek will be the maintenance of natural flow of water from the mountains to the west. Since this stream is apparently naturally intermittent, maintaining minimum flow during dry seasons is not necessarily preferred. Natural variations in flow throughout the year are needed for the natural system to persist.

Additionally, activities within and adjacent to the site need to be evaluated for their potential impact to the water quality of the system. Excess siltation is a common effect

of construction that could be detrimental to the aquatic species present. Water pollution from fertilizers, pesticides, and herbicides also have a high potential of endangering this site if the contaminants reach the streams. Likely sources for such pollution in this area include residential lawns and hay fields that may be treated with fertilizers and weed killers that penetrate to the groundwater or enter the streams as surface runoff. Weed control efforts that involve herbicide application need to be carefully planned and implemented where water quality may be effected. Similarly, insect eradication efforts on agricultural fields or pastures, or for mosquito control need to be planned so that they do not contaminate the aquatic system. Generally, protection of this rare aquatic resource will limit the use of chemical such as fertilizers and pesticides within the conservation site. Their use within the Spring Creek watershed should be evaluated in terms of their potential to impact the water quality.

Although livestock grazing can negatively affect riparian systems (Ames 1977, others), it has historically been the primary land use at this site. While its impact on the plant communities is evident, it is curious that a concentration of rare elements occurs here. This may be due to sound land management which has preserved the water quality and other hydrological factors in spite of altering the vegetation. Management practices that protect the riparian and wetland communities from overuse by livestock will likely benefit both the rare fish species present. The exotic fish, brook trout (*Salvelinus fontinalis*), is found locally in Spring Creek. The species threat posed by the presence of this introduced species is unknown, but detracts from the natural value of the site.

Lastly, the aquatic habitat of Spring Creek is fragmented by the outflow pipe to the impoundment which creates a one-way barrier to upstream dispersal. Ironically, it is this impoundment that creates a permanent habitat for the fish species concerned. Since this barrier occurs near the periphery of the West Plum Creek populations, its effect is less than if it occurred on the mainstem. It is probably not advisable or necessary to remove the impoundment at this point in time.



Map 4.33 Spring Creek Conservation Site

SITE NAME: SPRUCE MOUNTAIN

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 700 acres

BIODIVERSITY RANK: B5

COMMENTS: This site supports occurrences of an imperilled tiger beetle as well as a nesting location of a marginally imperilled raptor.

PROTECTION URGENCY RANK: P3

COMMENTS: The topography of the site affords some natural protection, but increasing land conversion in the area poses a threat.

MANAGEMENT URGENCY: M5

COMMENTS: Current management is minimal and largely adequate. The increasing presence on exotic plants on adjacent lands is cause for some concern.

LOCATION: Spruce Mountain lies two miles north of the El Paso county line and 1.5 miles west of I-25. The site encompasses Spruce Mountain and adjacent Eagle Mountain.

T10S R67W parts of sections 16, 21, 22, 27, 28

QUADRANGLE: Larkspur

GENERAL DESCRIPTION:

Spruce Mountain and Eagle Mountain are both capped buttes of Castle Rock conglomerate that rise about 400 feet above the rolling prairies below. The vegetation of the two buttes is similar and typical of other buttes in southern Douglas County. The cooler north slopes support forests of ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziessii*) with a lower strata of currant (*Ribes* sp.) and Waxflower (*Jamesia americana*). Quaking aspen (*Populus tremuloides*) can be found in the gulches, and Gambel's oak (*Quercus gambelli*) grows at the transition between the forests and the surrounding grasslands. Drier south slopes are more open and continuously dominated by gambel's oak. Mostly vertical cliffs of sandstone conglomerate surround the summit, providing numerous ledges and crevices for cliff dwelling organisms. The summit supports a plant community of ponderosa pine, gambel's oak, and kinnikinik (*Arctostaphylos uva-ursi*). Springs flow from the cap rock of the butte on the south and east sides.

The surrounding grasslands have been modified by introduced pasture grasses and years of livestock grazing. Only small remnants of native vegetation remain.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
<i>Cicindela nebraskana</i>	a tiger beetle	C	G5	S2	-	-
<i>Falco mexicanus</i>	Prairie falcon	C	G5	S3S4B, S4N	-	-

This tiger beetle (*Cicindela nebraskana*) was found to be inhabiting the summit of Spruce Mountain. It is believed to be common in most of its range and globally secure. Its status in Colorado, however, is less secure. Fewer than ten records are currently known within the state, and this is the first record of this species in Douglas County.

The habitat here is in natural condition with few apparent disturbances. The size of the population is unknown, but the observation of more than a single individual suggests that it is a resident on the site.

A nest of the prairie falcon is also found at this site, on the southern cliffs of eagle Mountain. This species is also secure across its range as a whole, but is believed to be marginally rare in Colorado. More than 200 nests are believed to be active within the state. This nest was active in 1994. The habitat here is typical of the species. The surrounding grasslands probably provide ample foraging, and the nest is not threatened by human disturbance.

CURRENT STATUS:

This site is under private ownership. The owners were pleased to grant permission for this study, and appeared to have genuine concern for maintaining the natural value of their property.

Like most all property in Douglas County, the future status of the site is unknown. The area offers pleasant views, privacy, and is very near to the rapidly developing areas of Palmer Lake and the Black Forest.

BOUNDARY JUSTIFICATION:

The boundary presented here is intended to encompass the element occurrences, the habitat that contains them, and a sufficient buffer to prevent indirect disturbance. This has been delineated around the base of the two buttes at the grassland interface. This buffer is believed to be sufficient to prevent habitat degradation to the summit and cliffs of the buttes (habitats that support elements) by weed invasion and fragmentation, and to prevent disturbance to the nest. Actions taken within this boundary should take place only after careful consideration of their effects on these elements. We note that fire management may be necessary to maintain the natural communities of the area.

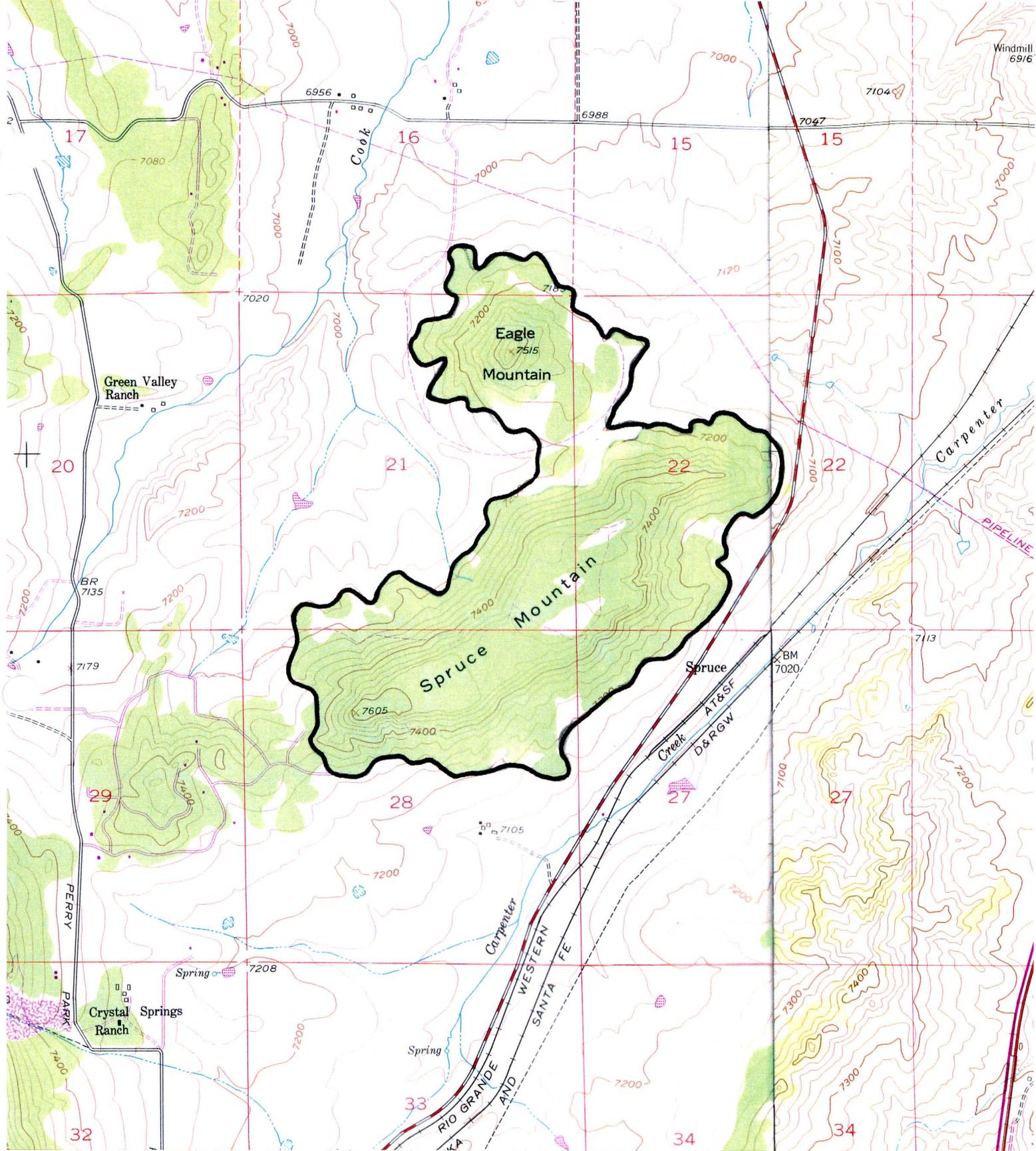
PROTECTION AND MANAGEMENT CONSIDERATIONS:

The effective protection of these elements will require, first, that their respective habitats within the site are maintained.

The tiger beetle, *Cicindela nebraskana*, occupies the summit of spruce Mountain. Future development of the summit should be avoided to maintain this habitat. Weed invasion may be a concern in maintaining this habitat. While the steep slopes of the butte may serve as a partial barrier to weed dispersal (and are therefore included in the site boundaries), activities which disturb the soils on the site will only increase the

chances of weed invasion. Also, artificial corridors such as trails or roads may provide a way for weeds to overcome the barrier of the steep slopes. In general, the higher the traffic on these roads or trails, the higher the chances of weed dispersal become. The trail to the summit currently receives little traffic and poses a minimal threat to the habitat. If weeds are found to be invading the summit, it is recommended that a control program be implemented as soon as possible.

The cliff-side nesting habitat of the prairie falcon is not directly threatened, but the suitability of this site for nesting may be effected by future human disturbance in the immediate vicinity, especially during the nesting season. This suggests that any future development of the area should be dispersed and should not be as far from the nest site as possible. Construction should not take place during nesting, and continual disturbance such as traffic or barking dogs should be minimized near the nest site.



Map 4.34 Spruce Mountain Conservation Site

SITE NAME: TRUE MOUNTAIN

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 180 acres

BIODIVERSITY RANK: B2

COMMENTS: This site contains a high quality occurrence of a globally rare grassland community.

PROTECTION URGENCY RANK: P4

COMMENTS: The site is currently well protected under current ownership. Protection urgency could increase with sale of the property.

MANAGEMENT URGENCY: M2

COMMENTS: Invasive weeds pose a significant threat to this occurrence. Preventative and active weed control is recommended.

LOCATION: Southeast of Greenland

T10S R66W sec. 30

T10S R67W sec. 25

QUADRANGLE: Greenland

GENERAL DESCRIPTION:

True Mountain is an isolated butte rising about 500 feet above the surrounding plains in south-central Douglas County. The top of the butte reaches 7784 feet in elevation and is difficult to access because of steep slopes on all sides. The slopes are generally dominated by dense Gambel's oak (*Quercus gambelii*) thickets with some Ponderosa pine (*Pinus ponderosa*). The top of the butte is open grassland, part of which is dominated by Parry's oatgrass (*Danthonia parryi*). The site currently receives only light recreational use and has not been grazed at least since it was purchased by the current owners in 1959.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Danthonia parryi	Parry's oatgrass	B	G2?	S2?	-	-
grassland	Montane grassland					

The Parry's oatgrass community is documented mainly from the Front Range of Colorado from Las Animas County, north to Larimer County. This community generally occurs in small patches from 7000-9500 feet in elevation. Currently there are fewer than 20 known occurrences of this community.

This is the best occurrence of this community in Douglas County. It is the largest, and at this time is nearly weed free.

CURRENT STATUS:

The entire conservation site lies within property owned by the Colorado Baptist General Convention. The property is managed and access controlled by the Reverend Joe Chambers. Groups using the conference center at the site are allowed to hike to the top of True Mountain. Several informal trails have been established to the top and a formal trail is currently being built. The main threat to the site is the spreading of exotic plant species into the Parry's oatgrass community, which is relatively weed free.

BOUNDARY JUSTIFICATION:

The preliminary conservation boundaries encompass the top of the butte and the shrub dominated slopes as a buffer. These boundaries should protect the Parry's oatgrass occurrence and provide a buffer from activities on adjacent lands.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

The slopes and the top of True Mountain have been invaded by exotic plants in various proportions. Further trail development may accelerate the spread of these exotic species. If the trail currently under construction is placed within or adjacent to the Parry's oatgrass community, it may provide a corridor for exotic plant species to invade. Placing the trail to avoid the Parry's oatgrass community would help to ensure the long term survival of this community.

Heavy livestock grazing would likely result in reduced cover of *Danthonia parryi* and increased cover of weedy forbs and shrubs. There has been no grazing at this site since 1959, and it is doubtful that there was ever significant livestock grazing on the summit.

The current land manager is aware of the significance of the site and may be open to some management recommendations.

SITE NAME: UPPER EAST CHERRY CREEK

SITE TYPE: Natural Heritage Conservation Site

SIZE: Approx. 20 acres

BIODIVERSITY RANK: B5

COMMENTS: This site supports a small population of an imperilled plant species.

PROTECTION URGENCY RANK: P4

COMMENTS: This small site falls mostly on a single property where the owners are concerned about maintaining natural values of their land. Well protected under current ownership.

MANAGEMENT URGENCY: M3

COMMENTS: The plant occurrence here is considered relatively secure except for the increasing presence of invasive exotic plants that need to be controlled.

LOCATION: Located in the southeast corner of Douglas County, 2 miles north of El Paso county and 0.5 miles west of Elbert County.
T10S R65W sec. 21

QUADRANGLE: Cherry Valley School

GENERAL DESCRIPTION:

The Upper East Cherry Creek site consists of a relatively intact riparian area and the surrounding uplands. The uplands support native vegetation types in good condition compared to much of Douglas County. A Ponderosa pine (*Pinus ponderosa*) stand occupies the hill slopes. Patches characteristic of mixed-grass prairie are scattered throughout, dominated by mountain muhly (*Muhlenbergia montana*) and big bluestem (*Andropogon gerardii*). These patches also occur at higher elevations. The area contains a high diversity of grass and forb species, with few non-native species. The regionally rare birdfoot violet (*Viola pedatifida*) was found growing in one such prairie. Some evidence of past land-use impacts (e.g., livestock grazing) was observed, but the area appears to be recovering from such activities.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Viola pedatifida	Prairie violet	C	G5	S2	-	-

The prairie violet is common throughout the moist prairie biome of the midwestern

United States. Its occurs only rarely in the more xeric prairies of the western plains. Including the population indicated above, there have been only fourteen identified occurrences in Colorado. It is the regional rarity of this species that makes it a plant of special concern.

CURRENT STATUS:

This site is small and mostly lies on the single property that was surveyed. The boundary does include the length of the habitat patch the extends on to neighboring properties. The slopes that comprise the site do not lend themselves easily to irrigation or grazing and are believed to be in good condition throughout.

The owners of the property containing the occurrence have been informed of its significance and will likely protect it as long as it is their hands. Neighboring land owners preferred that we not conduct surveys on their properties.

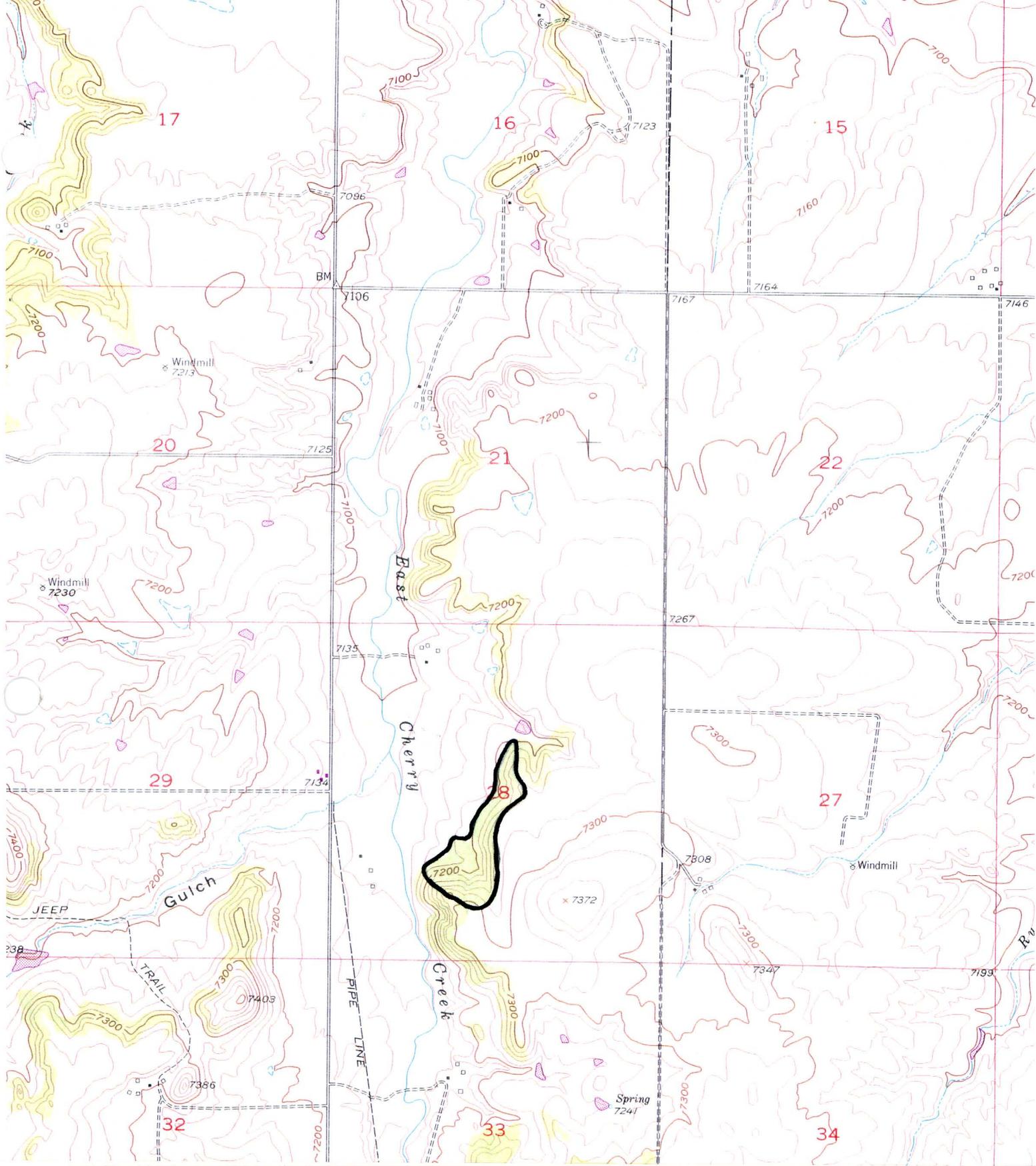
BOUNDARY JUSTIFICATION:

The boundary recommended here includes the entire birdfoot violet population and all adjacent contiguous habitat. The area encompasses the eastern slopes of the scarp dominated by Ponderosa pine woodlands on coarse soils. This boundary should be sufficient to allow long term persistence of the violet population by allowing dispersal into the most likely nearby habitat patches. This boundary also creates a buffer against direct threats to the population such as invasive weeds, overgrazing by livestock, trampling, or outright habitat destruction.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Under current ownership, the greatest threat to this occurrence is likely due to increasing presence of invasive weeds. While this area of Douglas County is still less infested than those nearer to Denver and Castle Rock, many weed species are present and, according to local landowners, increasing. Defense of this site against weed invasion will require active weed management measures both within and beyond this site. This site should, however, be especially monitored for new weed invasions and they should be immediately tended. Extra care should be taken with herbicide applications since the prairie violets could be inadvertently affected.

If grazing of the adjacent grasslands was to resume, it is recommended that the livestock be excluded from the site. Livestock, depending on their number, may or may not pose a direct threat to the plants, but are likely to exacerbate the spread on noxious weeds in the area. The owners may wish to consider a conservation easement or other means of implementing long term protection for the site.



Map 4.36 Upper East Cherry Creek Conservation Site

SITE NAME: *UPPER EAST CHERRY CREEK COMPLEX (W11)

SITE TYPE: High Priority Wetland

SIZE: Approximately 40 acres.

LOCATION: T10S R65W section 28

QUADRANGLE: Cherry Valley School (3910426)

GENERAL DESCRIPTION: Although the site was visited by CNHP botanists and zoologists during the first year of the study, access was later denied to staff ecologists. The site contains an extensive wetland complex along East Cherry Creek, immediately east of Cherry Creek Road.

The vegetation is dominated by variety of wetland types with tree, shrub and herbaceous patches and seems to be only moderately disturbed (the site is used for livestock grazing). This area appears minimally altered by tree and shrub removal and adjacent hay operations.

The hydrology is relatively natural with some upstream modification (impoundment and excavation).

CURRENT STATUS: Unprotected.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Restoration of upstream hydrology, where impacted would revive a more natural hydrological regime. Protection of ground water will be particularly important over the long term.

SITE NAME: UPPER EAST PLUM CREEK

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 50 acres

BIODIVERSITY RANK: B5

COMMENTS: This site supports a small occurrence of a rare or imperilled fish species.

PROTECTION URGENCY RANK: P4

COMMENTS: While no formal ecological protection is in place at this site, its proximity to the headwaters and adjacent USFS land reduces potential threats.

MANAGEMENT URGENCY: M4

COMMENTS: Current on-site management appears to be sufficient, but surrounding land uses may need to be mitigated.

LOCATION: This site includes the uppermost reach of east Plum Creek in the study area, from the base of the foothills downstream for approximately 1 mile.

T10S R67W parts of sections 7, 8, 17, 18

QUADRANGLE: Larkspur

GENERAL DESCRIPTION:

This headwater area of East Plum Creek sustains only minimal and ephemeral flows. Yet, shady isolated pools do remain during dry seasons, and these pools continue to support significant aquatic life including a imperilled fish species. The riparian vegetation here forms a broad zones of willow and cottonwood trees and shrubs. Neither the aquatic or riparian habitats are continuous with those found downstream.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
Etheostoma exile	Iowa darter	C	G5	S2	-	SC

This occurrence represents the upper limit of this rare and imperilled fish in East Plum Creek.

CURRENT STATUS: This site is under private ownership. Development pressure is generally lower in this part of the county than elsewhere.

BOUNDARY JUSTIFICATION:

This boundary encompasses the continuous riparian and aquatic habitats that support

these rare and imperilled species. In addition, a buffer of approximately 1000 feet of upland is included to reduce effects of adjacent land uses. While this site lies on the same creek as the East Plum Creek Macrosite, it is not included since the significant habitats are not continuous with those downstream.

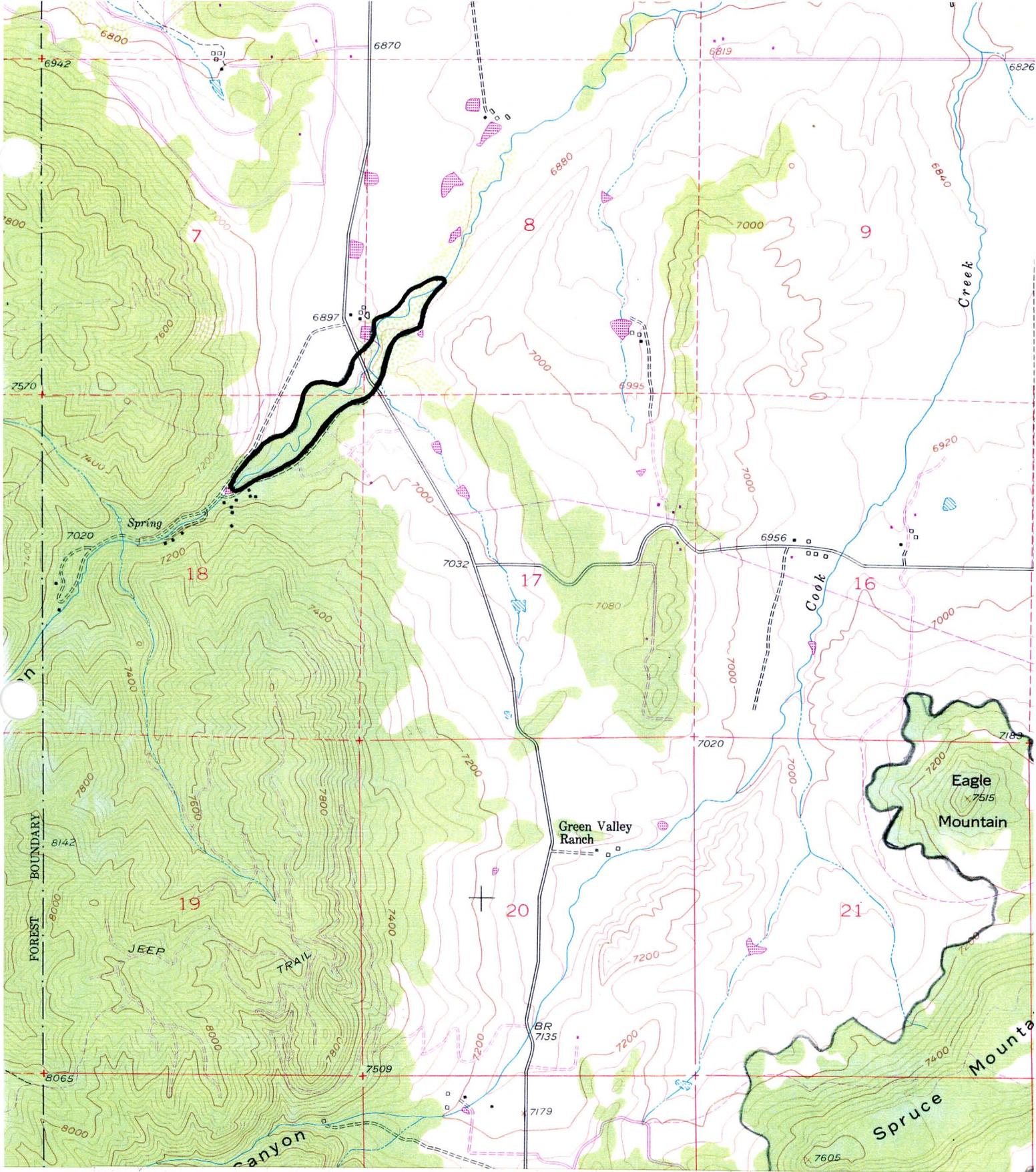
PROTECTION AND MANAGEMENT CONSIDERATIONS:

Of primary concern is the maintenance of the hydrologic integrity of the aquatic system. The present integrity and natural functioning of this system is strongly implied by the number of rare aquatic and riparian species present and the relative quality of the riparian plant communities. Natural processes, such as seasonal and catastrophic flooding, still work to shape and maintain the biological diversity of the system.

As a naturally intermittent stream, even small surface or ground water diversions may be detrimental. Since the site is situated near to its source and adjacent to partially protected USFS lands, such threats are not as great as they are in lower reaches of the stream.

Additionally, activities within and adjacent to the site need to be evaluated for their potential impact to the water quality of the system. Excess siltation is a common effect of construction that could be detrimental to the aquatic species present. Water pollution from fertilizers, pesticides, and herbicides also have a high potential of endangering this site if the contaminants reach the streams. Likely sources for such pollution in this area include residential lawns and hay fields that may be treated with fertilizers and weed killers that penetrate to the groundwater or enter the streams as surface runoff. Weed control efforts that involve herbicide application need to be carefully planned and implemented where water quality may be effected. Similarly, insect eradication efforts on agricultural fields or pastures, or for mosquito control need to be planned so that they do not contaminate the aquatic system. Generally, protection of this rare aquatic resource will preclude the use of chemical such as fertilizers and pesticides within the conservation site. Their use within the vicinity of the Upper East Plum Creek site should be evaluated in terms of their potential to impact the water quality.

Although livestock grazing can negatively affect riparian systems (Ames 1977, others), it has historically been the primary land use at this site. Management practices that protect the riparian and wetland communities from overuse by livestock will likely benefit both the rare and imperilled fish species present.



Map 4.37 Upper East Plum Creek Conservation Site

SITE NAME: UPPER LAKE GULCH (W51)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 170 acres

LOCATION: T9S R67W sections 13, 24

QUADRANGLE: Castle Rock South (3910437)

GENERAL DESCRIPTION: The site contains a spring-fed wetland with steep slopes. The vegetation is dominated by emergent plant communities. Land use impacts appear to be moderate to heavy from grazing. The hydrology is fairly natural but there is a downstream impoundment.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological processes, particularly the groundwater system supporting the spring, is essential to the long term biological integrity of the site. A buffer around the wetland vegetation is warranted and could be as much as 100 meters wide. Livestock activities should be restricted to access points and monitored to determine the real extent of the impacts. Long term restoration should consider modifications to the downstream impoundment.

SITE NAME: UPPER WEST CHERRY CREEK (W46)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 15 years.

LOCATION: T10S R66W Section 34 (?)

QUADRANGLE: Greenland (3910427)

GENERAL DESCRIPTION: This site contains a riparian wetland complex of three small tributaries. The vegetation is a mosaic of forests shrublands, and herbaceous plant communities.

Land use impacts appear to be low to moderate from livestock grazing and/or haying. The hydrology has been altered by a downstream impoundment.

SITE NAME: WEST CHERRY CREEK AT CROWFOOT CREEK (W34)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 25 acres

LOCATION: T10S R65W section 6
T9S R65W section 31

QUADRANGLE: Cherry Valley School (3910426)

GENERAL DESCRIPTION: The site contains a riparian complex at the confluence of West Cherry and Crowfoot Creeks. The vegetation is mainly dominated by emergent vegetation with scattered patches of shrubs and trees. Land use impacts are low to moderate from livestock grazing and/or dryland agriculture (haying). The hydrology is fairly natural with some local modifications (excavations and impoundments).

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the hydrological processes is essential to the long term biological integrity of the site. Management should include the maintenance of a significant buffer around the wetland vegetation (100 meters is preferable). The buffer should be used to moderate impacts to the core area, the wetland. Livestock access to the wetland should be restricted.

SITE NAME: *WEST CHERRY CREEK AT GREENLAND ROAD (W36)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 45 acres

LOCATION: T10S R66W section 1

QUADRANGLE: Cherry Valley School (3910426)

GENERAL DESCRIPTION: The site contains a wetland complex along West Cherry Creek. The vegetation is dominated by an emergent-herbaceous plant community complex with floating, submergent, and emergent species associated with standing water. Sedge-Rush patch types occupied the peripheral zones of open water. Peach-leaf willow (*Salix amygdaloides*) was scattered throughout the area. The more mesic terrace was dominated by an open shrub-tree canopy with a dense grass-sedge understory. Although non-native species were present at the site, they were mainly confined to the drier upland areas and were not present in significant densities within the wetland complex.

Livestock grazing (e.g. sheep, horses, cattle, llamas) on the site is heavy, even within the riparian area. Grazing within the wetland vegetation matrix was observable, and was especially concentrated within the sedge patches. No significant hydrological modifications occur within the site, or immediately up-stream or downstream.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the hydrological processes, including groundwater, is essential to the long term biological integrity of the site. Management should include the maintenance of a significant buffer around the wetland vegetation (100 meters is preferable). The buffer should be used to moderate impacts to the core area, the wetland. Livestock access to the wetland could be restricted to reduce observed impacts. Weed control may be desired on adjacent uplands.

SITE NAME: WEST CHERRY CREEK AT RUSSELLVILLE RD. (W31)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 30 acres

LOCATION: T9S R65W section 18

QUADRANGLE: Russellville Gulch (3910436)

GENERAL DESCRIPTION: The site contains three small, isolated wetland patches in close proximity to one another. Land use is moderate to heavy with some agriculture (plowing), but the hydrology appears to be natural.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the groundwater sources is essential to the long term biological integrity of the site. Management should include the maintenance of a significant buffer around the wetland vegetation (100 meters is preferable). Such a buffer is compatible with existing land uses, but livestock will need to have restricted access to water sources.

SITE NAME: *WEST PLUM CREEK AT GARBER CREEK (W62)

SITE TYPE: High Priority Wetland

SIZE: Approximately 135 acres

LOCATION: T8S R68W section 11.

QUADRANGLE: Dawson Butte (3910438)

CONSERVATION SITE: This wetland is contained in the **West Plum Creek Macrosite**.

GENERAL DESCRIPTION: The wetland complex is situated at the confluence of Garber and West Plum Creeks. Garber Creek is a tributary of West Plum Creek, with headwaters initiating within the Pike National Forest to the west. Garber Creek exhibits perennial surface flow, while West Plum Creek has ephemeral surface flow, yet forms broad marshes within the riparian area.

The wetland complex is fairly large (15-20 acres) and composed of a diverse mix of plant species. Wetland plant communities include both shrub and emergent-herbaceous stands. Canopy-size trees are scarce, and contribute little to total vegetative cover. Mesic soils lying to the north of Garber Creek support open willow stands. The land area adjoining Garber and West Plum Creeks is more hydric with dense stands of cattail (*Typha latifolia*) commonly fringed by patches of rushes (*Juncus* spp.) and sedges (*Carex* spp.). Mixed shrub communities occupy the largest area, and are composed of several different willow (*Salix*) species.

Local hydrology has been modified by road construction and the creation of off-channel impoundments within the reach. The site has been used historically for cattle ranching, which continues through the present.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological regime is essential to the long term integrity of the site and should be accomplished through a sub-hydrological unit plan (including the Pike-San Isabel National Forest. Management should include the maintenance of a significant buffer around the riparian vegetation (100 meters is preferable). If there is a continue desire or need to maintain livestock on the property, water access should be restricted to selected points. Weed control may be desirable.

SITE NAME: *WEST PLUM CREEK AT PERRY PARK SOUTH RANCH (W58)

SITE TYPE: High Priority Wetland

SIZE: Approximately 30 acres

LOCATION: T9S R68W sec 25, 26.

QUADRANGLE: Larkspur (3910428)

CONSERVATION SITE: This wetland is contained in the **West Plum Creek Macrosite**.

GENERAL DESCRIPTION: Large expanses of beaver-impounded standing water characterize the site. The wetland complex supports a diverse mosaic of common wetland communities. Cattail (*Typha latifolia*) communities associated with areas of standing water surround the beaver ponds, grading into areas of closed canopy willow (*Salix* spp.) communities. Submergent and emergent wetland species are prevalent. Non-native species are established on site, but comprise less than 5% of the vegetative cover. The narrow riparian-upland ecotone has an exceptionally high species diversity, supporting the establishment of chokecherry (*Prunus virginiana*), current (*Ribes* sp.), rose (*Rosa* sp.) and other wildlife forage-plants. The hydrologic integrity of the wetland is likely high due to its proximity to the headwaters. Dry upland grass communities are in relatively good condition (ie. not appearing over-grazed). Irrigated hay meadows, dominated by exotic grasses, surround the wetland.

The area is maintained as a private ranch (cattle and horse), with dryland farming (i.e. haying) being conducted in areas adjacent to the riparian corridor. There is little recent evidence of heavy grazing impact on the wetland complex.

This is a large (25-35 acres), well developed, and relatively undisturbed wetland complex. Though local hydrology has undoubtedly been altered by the downstream impoundment, this is one of the best wetland complexes in Douglas County. It covers a large area at the base of the sandstone hogback and receives drainage from Pike National Forest property, immediately to the west and southwest.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the natural hydrological regime is essential to the maintenance of the site. Planning such a regime should be done in coordination with the Pike-San Isabel National Forest. Management should include the maintenance of a significant buffer around the riparian vegetation (at least 100 meters is preferable). The presence of beaver is probably critical to the site's integrity. Maintenance of beaver may come into some conflict with a change in land uses, but assists in the retention of local ground water and important wildlife habitats.

SITE NAME: WEST PLUM CREEK AT SEDALIA (W64)

SITE TYPE: High Priority Wetland

SIZE: Approximately 160 acres

LOCATION: T7S R68W sections 25, 36.

QUADRANGLE: Sedalia (3910448)

CONSERVATION SITE: This wetland is contained in the **West Plum Creek Macrosite**.

GENERAL DESCRIPTION: The site contains an expansive riparian wetland complex. The vegetation is characterized by extensive willow (*Salix*) stands with scattered cottonwood (*Populus*) and herbaceous patches. The channel is slightly sinuous and has some sign of beaver activity. Two small tributaries feed into the site from the eastern uplands.

The site appears to have low to moderate impacts from livestock grazing and/or haying. The hydrology is relatively natural with some upstream modification (excavated stockpond).

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the existing hydrological regime is essential to the long term integrity of the site. Management should include the maintenance of a significant buffer around the riparian vegetation (100 meters is preferable). If there is a desire or need to maintain livestock on the property, water and riparian vegetation access should be restricted to selected points. Weed control may be desirable, but should assure the protection of the existing wetlands. The maintenance of beaver is considered beneficial. Also the two small tributaries should be protected from alteration.

SITE NAME: WEST PLUM CREEK MACROSITE

SITE TYPE: Natural Heritage Conservation Site

SIZE: approx. 7,500 acres

BIODIVERSITY RANK: B4

COMMENTS: This site contains a large assemblage of rare or imperilled aquatic and riparian dwelling animals and plants. It is perhaps the best remaining transition zone stream system in Colorado.

PROTECTION URGENCY RANK: P2

COMMENTS: Levels of protection are extremely varied within the site. Some areas are immediately threatened by land conversion and groundwater depletion.

MANAGEMENT URGENCY: M2

COMMENTS: Current management is also extremely varied within the site. Some areas are heavily impacted by livestock and weed invasion.

LOCATION: Located in central Douglas County, this site encompasses West Plum Creek and its major tributaries. From the base of the foothills on the west, this macrosite extends from Perry Park, 15 miles south of Sedalia, downstream to Chatfield Reservoir.

QUADRANGLE: Larkspur, Dawson Butte, Sedalia, Kassler, Devils Head

INCLUDED SITES:

This site is designated as a "macrosite" since it is very large and contains a number of smaller, interrelated sites. For purposes of conservation planning, the smaller individual sites are also presented following this profile. While these smaller sites have been separated based on ecological factors such as individual tributaries or apparent breaks in distribution of the elements present, the designation of a macrosite recognizes the importance of the larger system in the maintenance of the smaller sites.

Sites included in the West Plum Creek Macrosite include Perry Park, Spring Creek, Jackson Creek, and Garber Creek. (See the individual site profiles for these sites.)

GENERAL DESCRIPTION:

West Plum Creek is a south to north flowing tributary of the South Platte River which it joins at Chatfield Reservoir. The mountains to the west supply permanent flowing tributaries. The West Plum Creek basin drains 302 square miles above Louviers where discharge averages 33.5 ft³/sec., varying between 154,000 ft³/sec. at peak discharge and a minimum of zero (Bestgen and Culver 1985). The creek is generally shallow and braided over fine-grained sand substrates.

The riparian corridor is in relatively good condition, in that it contains native natural communities characteristic of the region. Dense expanses of willow species (*Salix* spp.)

flank the active streambed and are bordered by linear cottonwood forests in some locations. Small herbaceous patches (i.e., containing grasses, sedges and forbs) are scattered throughout the riparian zone. There is virtually no rooted aquatic vegetation due to scouring stream flows and a shifting substrate. Beaver ponds and/or remnants of past activity are common within the reach and probably are an essential component of local hydrologic patterns (Knight 1994).

Land use impacts, especially those related to livestock use, are evident throughout the riparian zone where preferential grazing on certain plant species is observable. Non-native plants (e.g., thistle [*Cirsium* and *Carduus* spp.], knapweed [*Centaurea* spp.], and leafy spurge [*Tithymalus uralensis*], etc.) are present but have not attained community dominance, as yet.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

Element	Common Name	Occur. Rank	Global Rank	State Rank	Federal Status	State Status
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	C	G5T2	S2	C2	SC
<i>Fundulus sciadicus</i>	Plains topminnow	C	G4	S2	C2	-
<i>Phoxinos eos</i>	Northern red-bellied dace	B	G5	S1	-	SC
<i>Notropis cornutus</i>	Common shiner	A	G5	S2	-	SC
<i>Etheostoma exile</i>	Iowa darter	B	G5	S2	-	SC
<i>Etheostoma nigrum</i>	Johnny darter	B	G5	S3	-	-
<i>Hybognathus hankinsoni</i>	Brassy minnow	D			-	-
<i>Nycticorax nycticorax</i>	Black-crowned night-heron	C	G5	S3	-	-
<i>Ardea herodias</i>	Great blue heron	C	G5	S3	-	-
<i>Bombycilla cedrorum</i>	Cedar waxwing	C	G5	S3	-	-
<i>Rana pipiens</i>	Northern leopard frog	A	G5	S3S4	-	SC
<i>Aeshna juncea</i>	Sedge darner dragonfly	?	G5	S3	-	-
<i>Ribes americanum</i>	American currant	C	G5	S1?	-	-

West Plum Creek contains an extraordinary number of rare or imperilled species, demonstrating that this macrosite represents a significant proportion of Douglas County's biological diversity. The aquatic habitats here, both the stream and its adjacent pools, support six species of rare or imperilled fish, the locally common Northern leopard frog, and the pond dwelling sedge darner dragonfly. The fact that these species are found in few other places in Colorado is itself significant. That they occur here together is testament to the maintained natural hydrologic integrity of this drainage. The remaining rare and imperilled species here are also associated with this aquatic resource. The great blue heron, black-crowned night heron, and cedar waxwing all use the riparian habitats for nesting, and the former two species depend on the streams and pools for food as well. The American currant is also restricted to these riparian habitats.

The Preble's meadow jumping mouse, while documented from only a single location on West Plum Creek, likely finds extensive high quality habitat throughout the site. The riparian area that it inhabits is relatively unfragmented for the length of the site, and the riparian vegetation is of the highest quality of any in Douglas County. Further research into the full extent of the Preble's meadow jumping mouse occurrence in the West Plum Creek drainage may reveal the largest contiguous population of this subspecies anywhere in its range.

West Plum Creek provides habitat for many other species of fish as well. In fact, the Plum Creek drainage is probably the best example of a nearly intact fish assemblage in the South Platte River basin and perhaps in the state (Bestgen and Culver 1985).

Our inventories of the riparian and wetland plant communities revealed several sites of local interest within this macrosite. Eight significant, relatively natural, wetland complexes were found throughout the site, especially at the creek confluences, spring or seep areas, and large beaver impoundments. Riparian wetland sites West Plum Creek at Perry Park Ranch South (W62), West Plum Creek at Bear Creek (W59), West Plum Creek and Garber Creek (W62), Garber Creek (W63), West Plum Creek at Sedalia (W64), and Lower West Plum Creek at Hwy. 67 (W65) comprise six of the twelve highest priority wetland sites identified in Douglas County. Wetlands at Lone Tree School (W60) and Louviers (W) are considered moderate priority wetlands within the County. All of these wetland sites are described in **Section 7.2**.

CURRENT STATUS:

The area contained in the West Plum Creek Macrosite is large and diverse. As one would expect, the ownership and management within the site are complex. The site is entirely in private ownership, and large sections of the mainstem and a major tributary are held by a land trust. Tract size within the site vary from approximately 35 acres to large ranches covering greater than 1000 acres. Land uses also differ. Livestock occur on most of the site, but intensity varies between parcels. The differences in land management along the creek are often extreme and evident as sharp ecological boundaries that correspond to fences and property lines. Upland development around the site also varies considerably from the dispersed housing of Perry Park to miles of open space, to industrial areas that abut the riparian zone near Louviers.

BOUNDARY JUSTIFICATION:

The conservation site boundary encompasses all riparian and aquatic habitats that contain permanent or semi-permanent stream flows. This is necessary to insure that the populations of fish in West Plum Creek and its tributaries do not become fragmented by alterations to the stream habitats. Furthermore, this boundary includes a small buffer on the surrounding uplands that generally extends 1000 feet from the edge of the riparian vegetation, which corresponds with the edge of the primary floodplain. Not only does this include the majority of the available habitat for the significant species found here, but such a buffer is necessary to maintain the quality of riparian and aquatic habitats by reducing opportunities for adjacent disturbances that are likely to directly affect these sensitive habitats. When existing roads or structures fall within this 1000 foot buffer, they have generally been excluded from the site since they retain little of their natural value and probably do not act as an effective buffer.

PROTECTION AND MANAGEMENT CONSIDERATIONS:

Effective protection of the West Plum Creek system will require a variety of approaches as well as cooperation between land planners, private owners, federal agencies, and conservation organizations. Furthermore, the conservation site presented here represents only the core area in need of most stringent protection. As a large aquatic system, the processes which shape and maintain it are necessarily complex and widespread beyond the boundaries of the site, including Pike National Forest lands to

the west.

While under private ownership, this site benefits from the relatively large size of the parcels and the general concern of some land owners for the health of their land. These landowners should be encouraged to maintain the relatively natural condition and uniqueness of this site. Education, incentives, and technical support in areas such as weed control and conservation management will be beneficial to the conservation of this site.

While acquisition of areas within the site by land trusts and the County is recommended when the opportunity arises (willing seller basis), an effective conservation plan for the site will necessarily include large areas of private land and will accommodate some forms of development in certain areas. It will be essential to not only steer future development within the West Plum Creek watershed, but also to work effectively with the large number of private owners that have already developed here. Our experience indicates that many owners are not aware of the uniqueness of this area and often take pride in it once informed of its significance. Simple notification and support of land owners within the site may be effective and will be necessary to protect such a large system.

Of primary concern is the maintenance of the hydrological integrity of the aquatic system. The present integrity and natural functioning of this system is strongly implied by the number of rare aquatic and riparian species present and the relative quality of the riparian plant communities. Natural processes, such as seasonal and catastrophic flooding, still work to shape and maintain the biological diversity of the system.

These major hydrological processes are currently highly threatened by the diversion of groundwater within this system. It is our estimate that if major water diversions continue, and if more water diversions are allowed, the continued viability of the rare and imperilled elements at this site will be in jeopardy within the near future. Maintaining minimum flow during dry seasons is necessary, but is not alone sufficient. Natural variations in flow throughout the year are also needed for the natural system to persist (Hupp 1992, McBride and Strahan 1984, Swanson et al. 1988).

Additionally, activities within and adjacent to the site need to be evaluated for their potential impact to the water quality of the system. Excess siltation is a common effect of some kinds of construction activities and could be detrimental to the aquatic species present. Water pollution from fertilizers, pesticides, and herbicides also have a high potential of endangering this site if the contaminants reach the streams. Likely sources for such pollution in this area include residential lawns and hay fields that may be treated with fertilizers and weed killers that penetrate to the groundwater or enter the streams as surface runoff. Weed control efforts that involve herbicide application should avoid the site and need to be carefully planned and implemented where water quality may be effected. Similarly, insect eradication efforts on agricultural fields or pastures, or for mosquito control need to be planned so that they do not contaminate the aquatic system. Generally, protection of this rare aquatic resource will preclude the use of chemical such as fertilizers and pesticides within the conservation site. Their use within the West Plum Creek watershed should be evaluated in terms of their potential to impact the water quality.

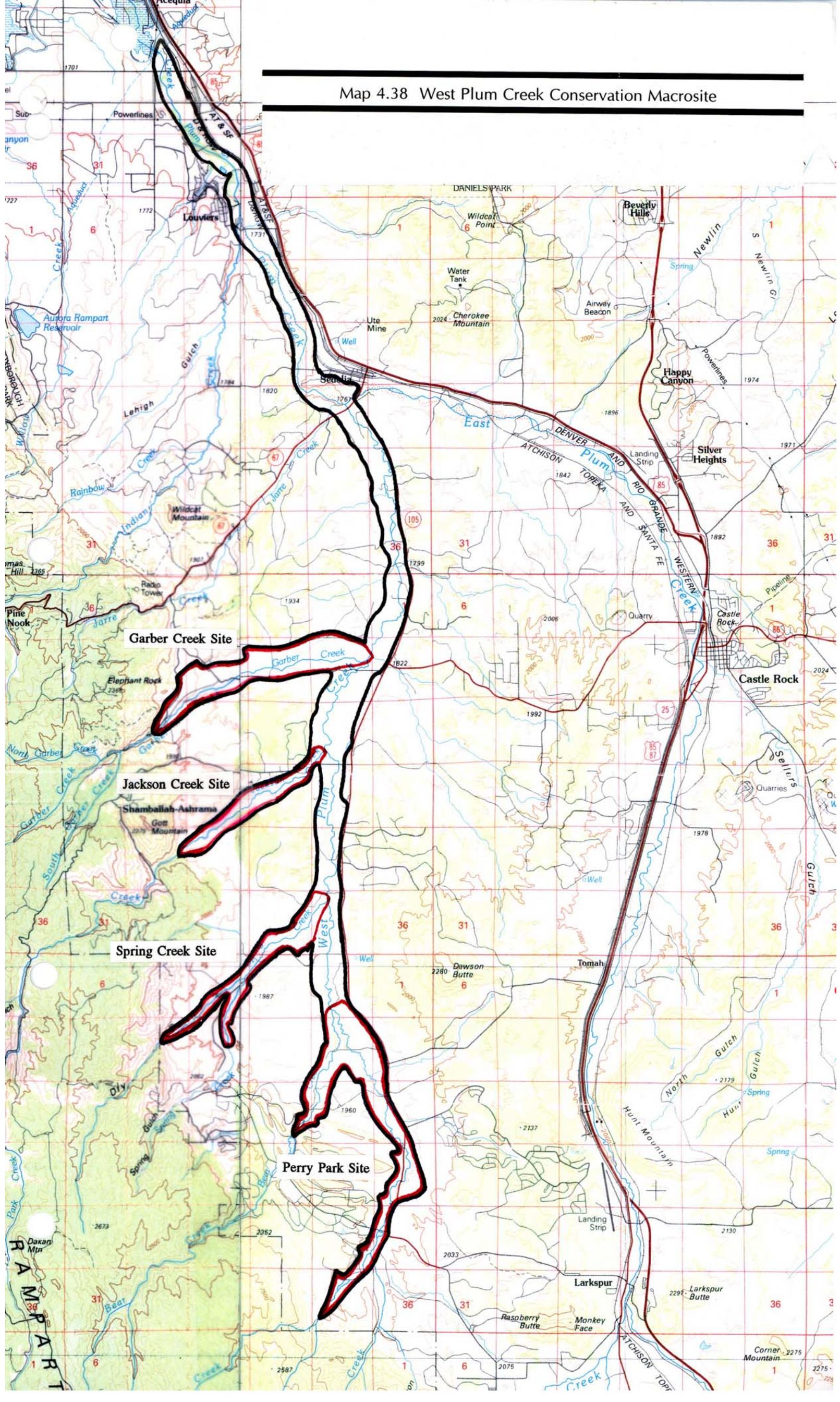
Since this site also supports a significant species that inhabits the floodplain and adjacent uplands, Preble's meadow jumping mouse, consideration must also be given to protection of the riparian and adjacent upland habitats within the site. Hydrological

issues mentioned above are important to maintaining these habitats as well. In addition, some considerations effect only the terrestrial components. As a small mammal and likely prey species, the Preble's meadow jumping mouse is likely vulnerable to increased predation by domestic pets such as cats, and perhaps dogs. The potential for such domestic predators to effect native wildlife is well established, and the rarity of this animal likely makes it especially vulnerable to excess predation. Therefore, residential development should either restrict such domestic pets, or be placed at a distance from the site that minimizes their effect. See **Section 2.4.4** regarding the threats posed by domestic predators.

As with all conservation sites in Douglas County, exotic plant invasion is a major concern. Unfortunately, many exotic species are already well established within the site. Therefore, primary efforts should be focused to contain these infestations and prevent more species of exotics from establishing here. Exotic grasses, mostly from hay, are ubiquitous here and may pose only a minimal threat. They have apparently reduced the diversity of plants in the riparian understory and reduces the overall quality of the plant communities, but still provide a semi-natural structure to the habitat that supports the significant species found here. Perhaps more threatening are invasive forbs such as knapweed (*Centaureus* spp.), leafy spurge (*Euphorbia esula*), and thistles (*Cirsium* and *Carduus* spp.) which tend to form monotypic stand that do not resemble the natural structure of the understory. Also, larger exotic plants such as Russian olive (*Elaeagus angustifolia*) have the potential to change the higher structure of the habitat by displacing native cottonwoods and willows. All of these invasive species are currently found within the site. Their control will be extremely difficult, especially since their proximity to water precludes most chemical treatments. Mechanical control may be effective in some cases. While tamarisk, or salt cedar (*Tamarix* sp.), was not detected anywhere within the county, this aggressive plant is present and expanding in waterways throughout Colorado including the South Platte watershed. This weedy shrub should be watched for and its establishment here prevented.

Exotic animals also pose a serious threat to this site. Introduced game fish such as various trout species (*Salmo* and *Salvelinus* spp.), and others, are already present in some parts of the West Plum Creek drainage. These exotic fish have the potential to directly effect the rare and imperilled native fish that this sites intends to protect. Further stocking of fish within this site should be prevented. Areas that are already stocked are mostly ponds and artificial impoundments. Bullfrogs (*Rana catesbiana*) are another exotic animal that is found within the lower reaches of the site. The effects of their presence is not known, but may especially be of concern in terms of the large northern leopard frog (*Rana pipiens*) population that is also found here.

Map 4.38 West Plum Creek Conservation Macro-site



SITE NAME: WILDCAT CANYON (W41)

SITE TYPE: Moderate Priority Wetland

SIZE: Approximately 80 acres

LOCATION: T8S R65W section 18

QUADRANGLE: Russellville Gulch (3910436)

GENERAL DESCRIPTION: The site contains an extensive wetland complex. The vegetation is dominated by dense willow (*Salix*) and emergent plant communities. The hydrology is somewhat altered by an impoundment and dike downstream. There has been moderate agricultural impact from plowing on adjacent lands.

CURRENT STATUS: Unprotected and privately owned.

PROTECTION AND MANAGEMENT CONSIDERATIONS: Protection of the hydrological processes, particularly the groundwater, is essential to the long term biological integrity of the site. Management should include the maintenance of a significant buffer around the wetland/riparian vegetation. A larger buffer between the agricultural land and the wetland is desirable.

5.0 TECHNICAL APPENDICES

5.1 NATURAL HERITAGE METHODOLOGY

To act as an effective tool for establishing conservation priorities for a global strategy, the Natural Heritage Network components must use a single methodology. The methods described below apply throughout the network.

5.1.1 Overview

The Heritage Methodology operates at several different levels. First, *elements of natural diversity* are ranked according to their rarity. These *elements* consist of species, subspecies and significant natural communities. The relative rarity of the various elements is based upon the scientific biological information and population locations known currently. As new information is acquired, element ranks can be modified.

The second level of the Heritage Methodology is the ranking of the populations or *occurrences* of a particular element. Since it is frequently impossible to protect all populations of a particular species, subspecies, or natural community, attempts are made to evaluate the relative quality of various occurrences of these elements so that conservation efforts can be focussed on the best representatives of the elements and the healthiest, most viable populations.

The third level of the Heritage Methodology is the delineation of potential conservation areas and the ranking of the land units according to the rarity and quality of the elements and their occurrences contained within the unit boundaries. This enables conservation efforts to focus on assemblages of rare elements as well as on the elements themselves. Taken together, these three levels at which the Heritage Methodology is applied provide a comprehensive, scientific approach to preserving species.

5.1.2 Element ranking

CNHP uses an element ranking system emphasizing the number of occurrences at distinct localities as an index of known biological rarity. The primary criterion for ranking elements is the number of occurrences because an element found in one place is more imperiled than an element found in twenty places. Also of importance is the size of the geographic range, the number of individuals, trends in both population and distribution, identifiable threats, and the number of already protected occurrences. Each element is assigned a rank that indicates its relative degree of imperilment on a five point scale:

- 1 = critically imperiled because of extreme rarity; five or fewer occurrences;
- 2 = imperiled because of rarity; 6 to 20 occurrences;
- 3 = vulnerable, very rare or found in a restricted range; 21-100 occurrences;
- 4 = apparently secure; and
- 5 = demonstrably secure.

Element rarity ranks are assigned in terms of imperilment within Colorado, the state

rank, and the element's imperilment over its entire range, its global rank. The global rank, or G-rank, set the highest priorities. The state rank, or S-rank, is used in discerning state and regional priorities. For example, an element with a rank of G3S2 will receive higher priority than an element with a rank of G5S1 due to its global rank. Together these two ranks provide an instant picture of an element's degree of imperilment. It should be noted that an element can never be more common within a state than it is globally. Therefore, the element's S-rank will always be as rare as the global ranking, ie. G3S2 not G2S3.

Elements that receive a rank of S1, S2 and S3 are used to set species protection priorities. Elements with a ranking of S3S4 are "watchlisted"; occurrence data is collected and periodically analyzed to determine if more active tracking is warranted. Any element more common than a "watchlisted" element, with an S-rank of S4 or S5, is not monitored. Accepted subspecies are also included on the CNHP list, but they receive less priority than an equivalently ranked or imperiled species.

This single ranking system identifies all imperiled elements except those that are migratory. When ranking migratory elements it is necessary to distinguish between breeding, non-breeding, and resident species. Ranking followed by a "B", e.g. S1B, indicates that the rank applies only to the status of breeding occurrences. Ranking followed by an "N", e.g. S1N, refer to nonbreeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state. A complete description of each of the Natural Heritage global and state ranks is provided in Tables 1 and 2, respectively.

5.1.2.1. Definition of Natural Heritage Global Imperilment Ranks.

Global Rank (G): Based on the range-wide status of a species.

- G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically imperiled throughout its range).
 - G2 Imperiled globally because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range. (Imperiled throughout its range).
 - G3 Vulnerable; very rare or local throughout its range or found locally in a restricted range (21 to 100 occurrences). (Vulnerable throughout its range).
 - G4 Apparently secure globally, though it might be quite rare in parts of its range, especially at the periphery.
 - G5 Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
 - GX Presumed extinct.
 - G#? Indicates uncertainty about an assigned global rank.
 - GU Unable to assign rank due to lack of available information.
 - GQ Indicates uncertainty about taxonomic status.
 - G#T# Trinomial rank (T) is used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.
-

5.1.2.2. Definition of Natural Heritage State Rarity Ranks.

State rank (S): Based on the status of a species in an individual state. S ranks may differ between states based on the relative abundance of a species in each state.

- S1 Critically imperiled in state because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extirpation from the state. (Critically endangered in state).
 - S2 Imperiled in state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extirpation from the state. (Endangered or threatened in state).
 - S3 Rare in state (21 to 100 occurrences).
 - S#B Refers to the breeding season imperilment of elements that are not permanent 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.
 - SH Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.
 - SX Presumed extirpated from state.
 - S#? Indicates uncertainty about an assigned state rank.
 - SU Unable to assign rarity rank, often because of low search effort or cryptic nature of the element.
 - 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.
-

5.1.2.3. Legal Designations

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

5.1.2.4. Federal and State Agency Special Designations.

Federal Status:

1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993)
 - LE Endangered; taxa formally listed as endangered.
 - LT Threatened; taxa formally listed as threatened.
 - P Proposed E or T; taxa formally proposed for listing as endangered or threatened.
 - C1 Notice of Review, Category 1: taxa for which substantial biological information exists on file to support proposing to list as endangered or threatened.
 - C2 Notice of Review, Category 2: taxa for which current information indicates that proposing to list as endangered or threatened is possible, but appropriate or substantial biological information is not on file to support an immediate rulemaking.
 - C2* Taxa believed to be possibly extirpated in the wild.
 - 3A Taxa for which the USFWS has persuasive evidence of extinction.
 - 3B Names that based on current taxonomic knowledge do not represent taxa meeting the Endangered Species Act's definition of a species.
 - 3C Notice of Review, Category 3C: taxa that have proven to be more abundant or widespread than was previously believed, and/or those that are not subject to any identifiable threat.
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:
 - a. Significant current or predicted downward trends in population numbers or density.
 - b. 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 C1 and C2 candidate species.

State Status:

1. Colorado Division of Wildlife

E	Endangered
T	Threatened
SC	Special Concern

5.1.3 Element Occurrence Ranking

Actual locations of elements, whether they be single organisms, populations, or 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 Heritage Methodology. In order to prioritize element occurrences for a given species, an element occurrence rank (EORANK) is assigned according to their ecological quality whenever sufficient information is available. This ranking system is designed to indicate which occurrences are the healthiest and ecologically the most viable, thus focussing conservation efforts where they will be most productive. The EORANK is based on 4 factors:

Quality – the representativeness of the occurrence as compared to element occurrence (EO) specifications including maturity, size, and numbers. The element occurrence specifications are set by a consensus of experts regarding the element in question;

Condition – how much has the site and EO been damaged or altered from its optimal condition and character;

Viability – the long term prospects for continued existence of this occurrence;

Defensibility – the extent to which the occurrence can be protected from extrinsic human factors that might otherwise degrade or destroy it.

Each of these factors are rated on a scale of A through D, with A representing an excellent "grade" and D representing a "poor" grade. These "grades" are then averaged to determine an appropriate EORANK for the occurrence. Possible EORANKs and their appropriate definitions are as follows:

- A – Excellent
- B – Good
- C – Marginal
- D – Poor
- E – Verified extant but has not been given an EORANK
- O – Obscure, not found at the site reported from but not thoroughly searched for; more searching needed.
- X – Extirpated from the site, not located by repeated reasonably intensive field searches by qualified field people at the right time of year, or habitat is significantly altered and no longer suitable for maintenance of the element.
- H – Historical, no recent field information.

If insufficient information is available to rank an element occurrence, an EORANK is not assigned.

5.1.4 Conservation Sites

In order to successfully protect populations or occurrences, it is necessary to delineate **conservation sites**. These conservation sites focus on capturing the ecological processes that are necessary to support the continued existence of a particular element occurrence. Conservation sites may include a single occurrence of rare element or a suite of rare elements or significant features.

The goal of the process is to identify a land area that can provide the habitat and ecological processes upon which a particular element or suite of elements depends for their continued existence. The best available knowledge of each species' life history is used in conjunction with information about topographical, geomorphological, and hydrological features, vegetative cover, as well as current and potential land uses. The proposed boundary does not automatically exclude all activity. It is a hypothesis in that some activities will prove degrading to the rare or significant resource or the process on which they depend, while others will not. Consideration of specific activities or land use changes proposed within or adjacent to the preliminary conservation planning boundary should be carefully considered and evaluated for their consequences to the imperiled or significant resources on which the conservation unit is based.

5.1.5 Preliminary Conservation Planning Boundaries

Once the presence of rare or imperilled species or significant natural communities has been confirmed, the necessary first step towards its protection is the delineation of a **preliminary conservation planning boundary**. In developing such boundaries, CNHP staff considered a number of factors. In general, the preliminary conservation planning boundary is an estimate of the landscape that supports the rare elements as well as the ecological processes that allow them to persist. Such factors include, but are not limited to:

- the extent of current and potential habitat for the elements present, considering the ecological processes necessary to maintain or improve existing conditions;
- species movement and migration corridors;
- maintenance of surface water quality within the site and the surrounding watershed;
- maintenance of the hydrologic integrity of the groundwater, e.g. by protecting recharge zones;
- land intended to buffer the site against future changes in the use of surrounding lands;
- exclusion or control of invasive exotic species;
- land necessary for management or monitoring activities.

As the label "conservation planning" indicates, the boundaries presented here are for planning purposes. They delineate ecologically sensitive areas where land-use practices should be carefully planned and managed to ensure that they are compatible with protection goals for natural heritage resources and sensitive species. **All land within the conservation planning boundary should be considered an integral part of a complex economic, social, and ecological landscape that requires wise land-use planning at all levels.**

5.1.6 Off-site considerations.

Furthermore, it is often the case that all relevant ecological processes cannot be contained within a site of reasonable size. Taken to the extreme, the threat of ozone depletion could expand every site to include the whole globe. The boundaries illustrated in this report signify the immediate, and therefore most important, area in need of protection. Continued landscape level conservation efforts are needed. This will involve county-wide efforts as well as coordination with neighboring land planners and state and federal conservation planning.

The Colorado Natural Heritage Program was contracted by Douglas County Department of Planning and Community Development in 1993 to conduct a county-wide assessment of existing natural values and prioritize them on a global and state wide basis. The goal of the project was to assist Douglas County in achieving several objectives outlined in the Douglas County Master Plan, such as "to preserve critical ecosystem components, including wetlands, significant wildlife habitats, and migration corridors, (and) significant stands of trees and shrubs, large expanses of prairie grasses, and unique forms of vegetation" (Douglas County, 1992). The project was also to help fulfill the objectives discussed in the Open Space Master Plan, specifically to, "preserve, (and) maintain important natural features within the County for their environmental and aesthetic values" (Douglas County, 1990). Studies for this project did not include the Pike National Forest nor did it include the state parks of Roxborough, Chatfield, and Castlewood Canyon.

This report summarizes extensive research in area herbariums, museums, and libraries, discussions with appropriate resource management agencies (state and federal), scientific experts and local naturalists, and two field seasons of surveys. It compares the recorded ecological elements with other, similar occurrences from around the western hemisphere to give an overall assessment of the county's biological diversity. Other items contained in this report include a discussion of conservation issues (such as habitat destruction, degradation and fragmentation), recommendations for further management of selected biological elements, and maps indicating the location of selected element occurrences and conservation sites.

The Colorado Natural Heritage Program does not consider this project completed with the submission of this final report, however. The partnerships developed between CNHP, Douglas County, and private landowners during this project are valuable and strong. These should be nurtured further, promoting sound natural resource management and wise land-use planning as the county continues to experience growth pressures.

5.1.7 Ranking of conservation sites.

One of the strongest ways that the Colorado Natural Heritage Program uses these element and element occurrence ranks is to assess the overall significance of a site, which may include one or many element occurrences. Based on these ranks, each site is assigned a **biodiversity** (or B-) **rank**:

- B1 Outstanding Significance: only site known for an element or an excellent occurrence of a G1 species.
- B2 Very High Significance: one of the best examples of a community type, good occurrence of a G1 species, or excellent occurrence of a G2 or G3 species.
- B3 High Significance: excellent example of any community type, good occurrence of a G3 species, or a large concentration of good occurrences of state rare species.
- B4 Moderate Significance: good example of a community type, excellent or good occurrence of state-rare species.
- B5 General Biodiversity Significance: good or marginal occurrence of a community type, S1, or S2 species.

5.1.8 Protection Urgency Ranks and Management Urgency Ranks

The Protection Urgency Rank and the Management Urgency Rank are two mechanisms used to prioritize conservation action related to potential conservation areas. These two ranks summarize the urgency of the need for action and apply a timeline to focus action planning. Urgency ranks are based on current knowledge, but are not always known for a particular area. When this information is not available every effort is made to obtain it as soon as possible.

Protection Urgency Ranks. The urgency for protection rating reflects the need to take legal, political, or other administrative measures to alleviate threats that are related to land ownership or designation. The following codes are used to indicate the rating which best describes the urgency to **protect** the area:

- P1 - Immediately threatened by severely destructive forces, within 1 year of rank date; **protect now or never!**
- P2 - Threat expected within 5 years.
- P3 - Definable threat but not in the next 5 years.
- P4 - No threat known for foreseeable future.
- P5 - Land protection complete or adequate reasons exists not to protect the site; do not act on this site.

A protection action involves increasing the current level of legal protection accorded one or more tracts at 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, i.e. any action requiring stewardship intervention.

Threats that may require a protection action are as follows:

- 1) Anthropogenic forces that threaten the existence of one or more element occurrences at a site, e.g. (a) development that would destroy, degrade or seriously compromise the long-term viability of an element occurrence; and (b) timber, range, recreational, or hydrologic management that is incompatible with an element occurrence's existence;
- 2) The inability to undertake a management action in the absence of a protection action, e.g. obtaining a management agreement; and
- 3) In extraordinary circumstances, a prospective change in ownership management that will make future protection actions more difficult.

Management Urgency Rating. The urgency for management rating focuses on land use management or land stewardship action required to maintain element occurrences at the potential conservation area. The following codes are used to indicate the action needed to be taken at the area:

- M1 – (a) Management action required immediately or element occurrences could be lost or irretrievably degraded within one year.
- (b) Ongoing annual management action must continue or element occurrences could be lost or irretrievably degraded within one year.
- M2 – (a) New management action will be needed within 5 years to prevent the loss of element occurrences.
- (b) Ongoing, recurring management action must continue within 5 years to prevent loss of element occurrences.
- M3 – (a) New management action will be needed within 5 years to maintain current quality of element occurrences.
- (b) Ongoing, recurrent management action must continue within 5 years to maintain current quality of element occurrences.
- M4 – Although not currently threatened, management may be needed in the future to maintain the current quality of element occurrences.

M5 – No serious management needs known or anticipated at the site.

A management action may include biological management (prescribed burning, removal of exotics, mowing, etc.) or people and site management (building barriers, rerouting trails, patrolling for collectors, hunters, or trespassers, etc). Management action does not include legal, political, or administrative measures taken to protect a potential conservation area.

5.2 FIELD INVENTORY METHODS

The methods for assessing and prioritizing conservation needs over a large area are necessarily diverse. This study follows a general method that the Colorado Natural Heritage Program has and continues to develop specifically for this purpose.

The Natural Heritage Inventory was conducted in several steps:

5.2.1 Existing information collection.

CNHP databases were updated with information regarding the known locations of species and significant natural communities within Douglas County. Sources included museum collections, scientific literature, and local naturalists and biologist.

Other information was gathered to help locate additional occurrences of natural heritage resources. Such information covers basic species and community biology including range, habitat, phenology (timing), food sources, and substrates. This information was entered into CNHP databases and is included in this report in Appendices C through E.

5.2.2 Identify potential natural heritage resources.

Rare and imperilled species and significant natural communities potentially occurring in Douglas County were identified using known range and life history information, as well as known locations within Douglas County and the surrounding region. Over 70 rare species and natural communities were targeted in these surveys.

5.2.3 Identify survey sites.

Survey sites were chosen based on their likelihood of harboring rare species or significant natural communities. Known locations were targeted, and additional potential areas were chosen using a variety information sources.

Precisely known element locations were always included so that they could be verified and updated. Many locations were not precisely known due to ambiguities in the original data, i.e. "headwaters of Cherry Creek." In such cases, survey sites for that element were chosen in likely areas in the general vicinity. Areas with potentially high natural values were chosen using aerial photographs, geology maps, vegetation surveys, personal recommendations from knowledgeable locals, and numerous roadside surveys by our field scientists. Aerial photography is perhaps the most useful tool in this step of the process. High altitude infrared photographs at 1:24,000 scale (NHAP 85) were used for this project and are ideally suited for assessing vegetation types and to some extent natural conditions on the ground. Other aerial photography such as ortho photos, and large scale (1:6000) black and white photos (courtesy of Natural Resources Conservation Service) also proved useful.

Using the biological information stored in the CNHP databases, these information sources were analyzed for sites that have the highest potential for supporting specific elements. General habitat types can be discerned from the aerial photographs, and those chosen for survey sites were those that 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, quarries, etc.

Road side surveys were useful in further resolving the natural condition of these areas. The condition of grasslands is especially difficult to discern from aerial photographs, and a quick survey from the road can reveal such features as weed infestation or overgrazing. Similar information was attained by flying over the study area in a small aircraft.

5.2.4 Landowner contact.

Attaining permission to conduct surveys on private property was essential to this project. Once survey sites were chosen, land ownership of these areas was determined using records at the Douglas County assessor's office. First contact was attempted by a letter that briefly introduced our intent to document significant natural areas in Douglas County and requesting permission for our field scientist to visit the property. If a response was not received, a post card was sent as a reminder and requesting the owner to contact our offices by phone. If permission was granted, the owner was then contacted in person or by phone to arrange a convenient time for surveys to take place. See **Appendix A** for a copy of this letter.

On occasion, other methods were necessary to contact landowners. Some owners were contacted directly by telephone, others in person. All contacts were followed by written documentation in form of our standardized letter.

If landowners could not be contacted, or if permission to access the property was denied, this was recorded and the site was not visited. **Under no circumstances were properties surveyed without landowner permission.**

5.2.5 Field surveys.

Survey sites where access could be attained were visited at the appropriate time as dictated by the phenology of the individual elements. It is essential that surveys take place during a time when the targeted elements are detectable. For instance, breeding birds cannot be surveyed outside of the breeding season and plants are often not identifiable without flowers which are only present during certain seasons.

The methods used in the surveys necessarily vary according to the elements that were being targeted. In most cases, the appropriate habitats were visually searched in a systematic fashion that would attempt to cover the area as thoroughly as possible in the given time. Some types of organisms require special technique in order to capture and document their presence. These are summarized below:

Amphibians:	visual or with aquatic nets
Reptiles:	visual or with hook
Mammals:	small mammals only, Sherman live traps or gopher traps
Birds:	visual or by song/call, evidence of breeding sought
Fish:	aquatic nets
Insects:	aerial net
Plants:	visual
Natural communities:	visual, collect plot data including percent cover and composition

When necessary and permitted voucher specimens were collected and deposited in local university museums and herbaria.

When a rare species or significant natural community was discovered its precise location and known extent was recorded on 1:24,000 scale topographic maps. Other data recorded at each occurrence included 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 quality (size, vigor, etc.) of the population or community, the condition or naturalness of the habitat, the long-term viability of the population or community, and the defensibility (ease or difficulty of protecting) of the occurrence. These factors are combined into an element occurrence rank, useful in refining conservation priorities. See Section 4.3 for more information about element occurrence ranking.

5.2.6 Delineate preliminary conservation planning boundary.

Finally, since the objective for this inventory is to prioritize specific areas for conservation efforts, a preliminary conservation planning boundary was delineated. Such a boundary is an estimation of what area is to be considered in the persistence of the particular element occurrence. Primarily, in order to insure the preservation of an element occurrence, the ecological processes that support that occurrence must be preserved. The preliminary conservation planning boundary is meant to include features on the surrounding landscape that provide these functions. Data collected in the field are essential to delineating such a boundary, but other sources of information such as aerial photography are also used.

5.3 Detailed Findings

5.3.1 Information Collection Phase

Aerial photographs of the entire study area were reviewed in conjunction with 1:24,000 scale topographic maps. These photographs were from a variety of sources, the most useful being color infra-red imagery at 1:24,000 scale (NHAP 85, dated 1988). Black and white photographs of larger scale and later dates were also used.

A variety of information sources were searched for information pertaining to rare species and significant natural communities in Douglas County. The University of Colorado museums and herbarium were searched, as were plant and animal collections at Colorado State University, Western State, Rocky Mountain Herbarium, and local private collections. The Colorado Division of Wildlife provide extensive data on the fishes of Douglas County as well as information regarding the status of the Plains sharp-tailed grouse. The Breeding Bird Atlas was helpful in providing a list of all birds detected in the county through their work. Both general and specific literature sources were incorporated into CNHP databases as either locational information or as biological data pertaining to a species in general. This information was used to refine the potential element list and to refine our search areas. Over – occurrences of rare plants, animal, or significant natural communities were identified through this process.

5.3.2 Potential natural heritage resources.

Elements for which surveys were conducted were determined by using distributional information stored in CNHP databases. In general, species and natural communities that have been recorded from Douglas County, or from adjacent counties, are included in this list. Species or natural communities which prefer habitats that are not included in this study area were removed from the list. This primarily included those species that prefer higher elevations, such as those found in western Douglas County, but not within the privately owned study area.

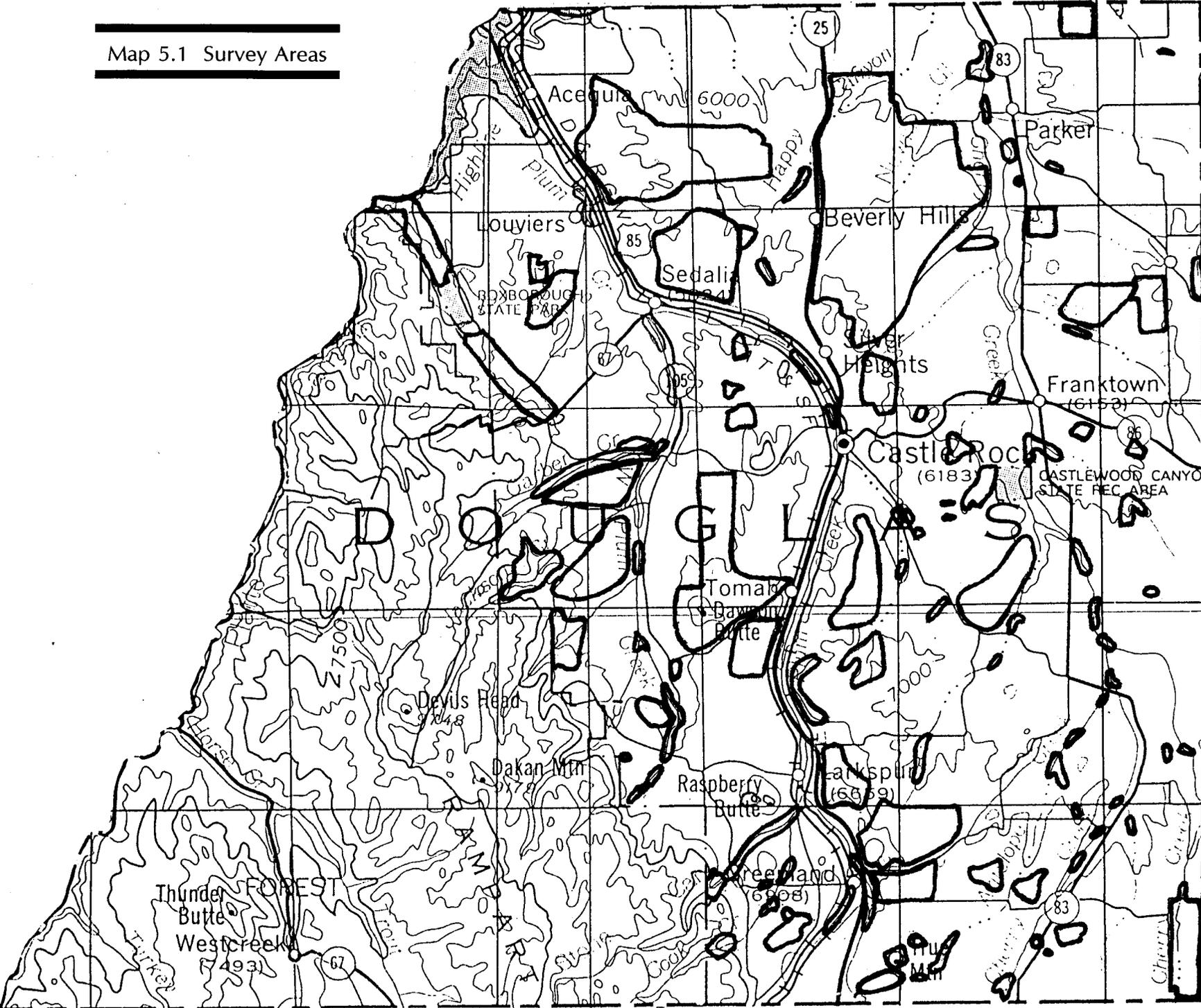
The amount of effort given to the inventory for each of these elements is prioritized according to the element's rank. Globally rare (G1 - G3) elements are given highest priority, state rare elements are second.

The following list of elements includes those elements currently monitored by CNHP that were found to potentially to occur in Douglas County, and were therefore targeted in CNHP field inventories.

5.3.3 Identification of survey areas.

The above information was used to delineate over 120 survey areas that were believed to have relatively high probability of harboring natural heritage resources. These areas are summarized on **Map 5.1**. These areas vary in size from less than 10 to several thousand acres and include all major habitat types in the study area.

Map 5.1 Survey Areas



5.3.4 Landowner contact.

Response to our letter was lower than expected, and many unresponsive owners were recontacted with another letter or postcard which requested the courtesy of a reply. Overall, 88 landowners were contacted, 30 of which responded favorably. The remainder either did not respond, or responded with a denial.

A major difficulty in contacting Douglas County land owners is the fact that a large percentage of the land is held by investment partnerships, family trusts, and large corporations. Often a contact person for such properties was difficult to find. Additionally, many land owners are absentee and equally difficult to contact. Local land managers can usually be contacted, but rarely have authority to allow surveys.

A further difficulty in attaining access was concern about government sponsored projects, especially those concerning "endangered" species. In general, local land owners, especially long-term residents, were most likely to grant permission, while investors and developers topped the list of denials. Lack of land access was a major constraint on the amount of area that could be surveyed.

5.3.5 Field survey phase.

Field surveys by CNHP scientists and technicians took place from August 1993 through August 1995. Substantial information was gained regarding the natural significance of the study area. Not only were several historical records updated, but much information was added to recent records and a number of new records were also discovered. Additionally, enough information was gathered in certain instances to say with confidence that the element previously reported in an area has been extirpated.

Forty-eight monitored elements of biodiversity have been recorded in CNHP databases during the course of this study.

Additional information was gathered from the field regarding natural condition of the habitats, land status, apparent threats, and recommended placement of conservation planning boundaries. Similar information was gathered at sites that did not reveal the presence of significant elements a well.

5.4 Description of a Conservation Site Profile

The conservation site is described in a standard site report which reflects data fields in CNHP databases. The sections of this report and the contents are outlined and explained below.

SITE NAME: A name is given to each site to facilitate communication. For Natural Heritage Sites, the name is an official place holder in the Biological Conservation Data System of the Colorado Natural Heritage Program.

SITE TYPE: For the Douglas County report sites are assigned to four categories: Natural Heritage Sites, High Priority Wetland, Medium Priority Wetland, and Habitat Conservation Area.

SIZE: The approximate acreage included within the conservation planning boundary for the conservation site.

BIODIVERSITY RANK: The overall significance of the conservation site in terms of rarity of the natural heritage resources and the quality (health, abundance, etc.) of their occurrences. As discussed in Section 4.4.1, these ranks range from B1 (Outstanding Significance) to B5 (General Biodiversity Significance). This field is only applicable to Natural Heritage Sites.

PROTECTION URGENCY RANK: The time frame in which conservation protection must occur. In most cases, this rank refers to the need for a major change of protective status (e.g. agency special area designations or ownership). The ranks range from P1 (immediate urgency; within a one year time frame) to P5 (no known urgency). See section 4.4.2. This field is applicable only to Natural Heritage Sites.

MANAGEMENT URGENCY RANK: The time frame in which a change in management of the element or site must occur. Using best scientific estimates, this rank refers to the need for management in contrast to protection (e.g. increased fire frequency, decreased herbivory, weed control, etc.). The ranks range from M1 (immediate urgency, within one year) to M5 (no known urgency). See section 4.4.2. This field is applicable only to Natural Heritage Sites.

LOCATION: The townships, ranges, and sections which are included in a site; also the USGS 7.5' quadrangles that include the Conservation Site.

GENERAL DESCRIPTION: A brief narrative picture of the topography, vegetation, and current use of the conservation site. Common names are used along with the scientific names.

NATURAL HERITAGE RESOURCE SIGNIFICANCE: A synopsis of the rare species and significant natural communities that occur on the conservation site. See Sections 4.2 and 4.3 for explanations of ranks. This field is applicable only to Natural Heritage Sites.

CURRENT STATUS: A summary of the ownership, degree of protection currently afforded the conservation site, and threats to the site or natural heritage resources as determined to date.

BOUNDARY JUSTIFICATION: The preliminary conservation planning boundary delineated in this report includes all known occurrences of natural heritage resources and the adjacent lands required for their protection. A discussion of the major factors that were considered is in Section 6.6.1. This field is applicable only to Natural Heritage Sites.

PROTECTION AND MANAGEMENT CONSIDERATIONS: A summary of the major issues and factors that are known or likely to affect the protection and management of the conservation site.

5.5 Relating this Report to Managing Biological Diversity at the Landscape Level

The management of Biological Diversity must consider more than species specific management criteria and consider the elements of human-use in the area. The conservation sites typically identified in this type of study may be considered as core areas for the protection of the full range of biological diversity. Some of these areas are best considered as candidates for special area designations, others as sites within a landscape that should be managed to include the maintenance of the site's integrity.

A basic premise in the landscape management approach starts with the delineation of core protected areas that can be represented by special designations. Where possible, these should be connected through corridors and appropriately buffered. Buffer areas should include the ecological processes supporting the diversity of the core area. Such is the basis of the development of preliminary conservation planning boundaries.

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