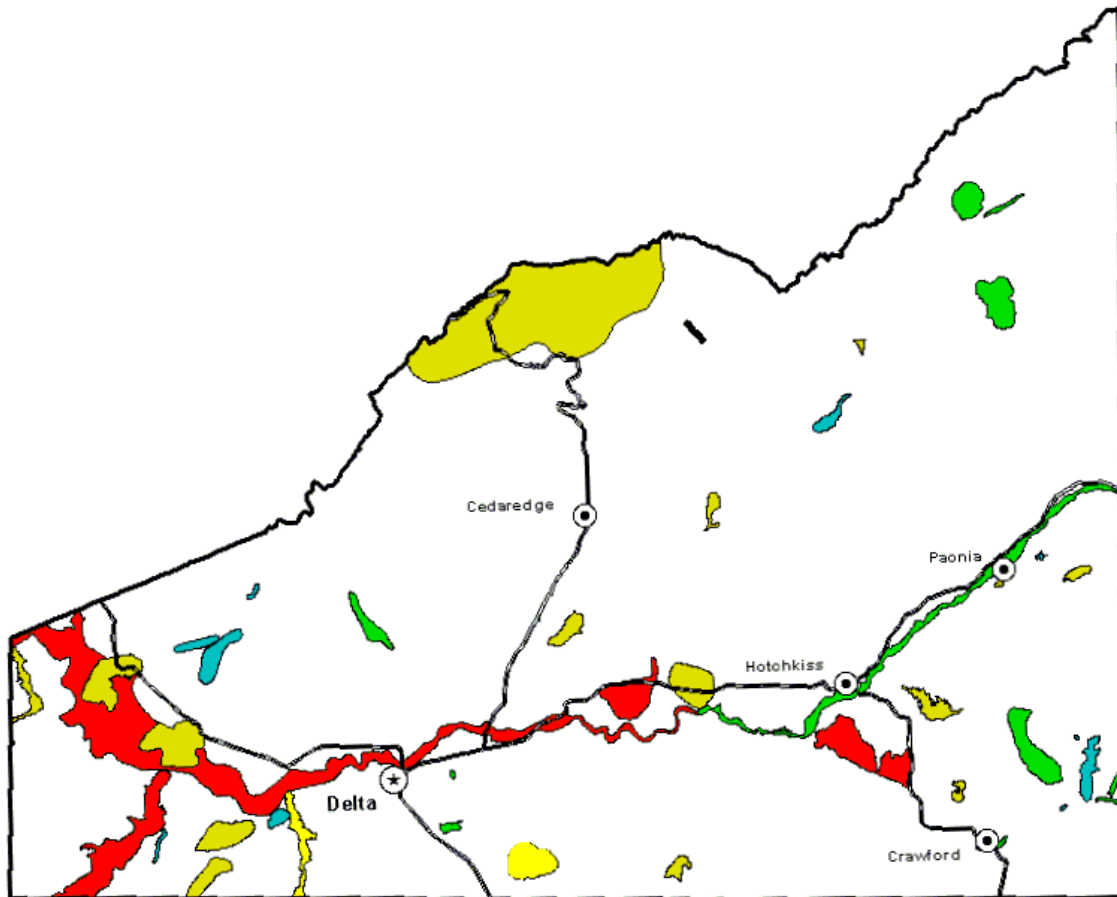


# Natural Heritage Biological Survey of Delta County, Colorado



Prepared for Delta County Commissioners  
February, 1998

by Peggy Lyon and Earl Williams  
Colorado Natural Heritage Program  
254 General Services Building  
Colorado State University  
Fort Collins, Colorado 80523

## Executive Summary

In January, 1996, the Delta County Commissioners adopted a master plan which includes the goal of preserving important agricultural and natural resource lands. The commissioners recognized that in order to prioritize areas for conservation, they needed good, up to date information on the locations of the most important natural resource and agricultural lands. The Nature Conservancy proposed to the Delta County Commissioners that a natural heritage survey for Delta County be conducted by the Colorado Natural Heritage Program (CNHP) to systematically identify the localities of rare, threatened, or endangered species and the locations of significant natural communities. This study was linked to a survey of important agricultural lands performed by Design Workshop of Aspen, Colorado. Funding for the joint project was awarded by Great Outdoors Colorado! (GOCO!).

Colorado Natural Heritage Program began its research by updating its Biological and Conservation Data System with existing information. This was drawn from previous studies by various individuals and organizations, the Colorado Division of Wildlife (CDOW) database, regional and local herbaria, local scientific experts, federal agencies and others. Based on these data, we identified over 150 targeted inventory areas (TIAs) for field research.

Field surveys began in April, 1997, and continued through November, 1997. At the beginning of the field season, the CNHP database contained 125 records for Delta County, all but 38 of which were over ten years old. Two hundred thirty-three new and updated records were entered in the database. Fourteen rare animals, five plants and sixteen natural communities were documented in our database for the first time for Delta County locations. One of the plants was documented for the first time in Colorado. Several plants and animals were found to be more common than had been thought.

Results of the survey confirm that Delta County contains a number of plant species endemic to Western Colorado which depend on the county for their existence. Due to unusual geological and soil substrates, the entire world's population of several species is restricted to a relatively small geographic area, comprising only two or three counties. Riparian zones and salt desert shrublands were found to be the most locally threatened common communities.

We have identified forty-four proposed conservation sites, containing one hundred eighty-one occurrences of rare or imperiled plants, animals, and natural communities. Results of the survey are included here, with descriptions and recommendations for each proposed conservation site.

The delineation of proposed conservation site boundaries in this report does not confer any regulatory protection on recommended areas. They are intended to be used to support wise planning and decision making for the conservation of these significant areas. Additional information may be requested from Colorado Natural Heritage Program, 254 General Services Building, Colorado State University, Fort Collins, CO 80523.

## **Acknowledgments**

Many people have helped with this project, donating their time, expertise, and energy. Thanks to the volunteers who helped us in the field, we were able to cover the territory more thoroughly, and more enjoyably. Gretchen VanReyper, Evelyn Horn, Skip Edwards, Doreen Dethmers, Bill Jacobs, Rick Lyon, and Cindy Carlson have our sincere gratitude.

Susan Hanson, Delta County Administrator, Kevin Lawton in the GIS Department, and the Delta County Commissioners have been great to work with, and a tremendous help throughout the project. Great Outdoors Colorado funded the project, and without their support, the project could not have been undertaken.

Biologists from several agencies gave freely of their expertise and experience. We want to especially thank Jim Ferguson, Amanda Clements, and Bob Welch at the Bureau of Land Management; Kathy Abramson at the Grand Mesa National Forest; Andrea Wang and Jim LeFevre at the Gunnison National Forest; Ed Nielsen at the Natural Resources Conservation Service; Steve McCall at the Bureau of Reclamation; Jim Garner and Sherm Hebein at the Colorado Division of Wildlife; Eric Rechel and Rick Ballard of Mesa State College.

Bill Ferguson and Marc Hitchcox of the Southwestern Colorado Data Center were patient teachers, and extremely helpful with GIS mapping.

Finally, the supporting staff at Colorado Natural Heritage Program deserves our gratitude. Jill Handwerk's hard work and patience getting all of our data into the Biodiversity and Conservation Data System is especially appreciated. She was supported by Doug Shinneman, Katie Pague, and the entire Heritage staff.

Finally, we'd like to thank the landowners of Delta County who invited us to explore their property. In many cases, they accompanied us in the field, and even drove us around. We are thankful that the land of Delta County is in the care of these people, who are genuinely interested in taking the best possible care of it.

## Table of Contents

Executive Summary	<i>i</i>
Acknowledgments	<i>ii</i>
I. The Project: A Natural Heritage Inventory of Delta County	1
Background	1
Methods	1
Results	3
Significant elements	3
Location of significant elements	5
Legal implications	5
Proposed conservation Sites	5
Recommendations	7
II. Delta County's Natural Heritage	9
Physical Characteristics (Physiography, Climate, Geology)	9
Biological Characteristics: Vegetation Zones and Plant Communities	11
Semi-desert Shrubland	12
Sagebrush Shrubland	14
Pinyon-Juniper Woodland	15
Gambel's Oak-Mountain Shrubland	16
Aspen Forest	17
Coniferous Forest	18
Riparian Vegetation	19
III. The Rare Plants of Delta County	20
Adobe beardtongue ( <i>Penstemon retrorsus</i> )	21
Arizona centaury ( <i>Centaureum arizonicum</i> )	21
Clay-loving wild buckwheat ( <i>Eriogonum pelinophilum</i> )	23
Colorado desert-parsley ( <i>Lomatium concinnum</i> )	23
Different leaved groundsel ( <i>Senecio dimorphophyllus</i> )	23
Eastwood's monkeyflower ( <i>Mimulus eastwoodiae</i> )	23
Giant helleborine ( <i>Epipactis gigantea</i> )	24
Grand Junction milkvetch ( <i>Astragalus linifolius</i> )	24
Grand Mesa penstemon ( <i>Penstemon mensarum</i> )	24
Large flowered breadroot ( <i>Pedimelum megalanthum</i> )	24
Long-flowered cat's eye ( <i>Cryptantha longiflora</i> )	25
Purple cinquefoil ( <i>Comarum palustre</i> )	25
Rocky Mountain thistle ( <i>Cirsium perplexans</i> )	25
Sierra corydalis ( <i>Corydalis caseana</i> )	25
Uinta Basin hookless cactus ( <i>Sclerocactus glaucus</i> )	25
Wetherill milkvetch ( <i>Astragalus wetherillii</i> )	26
IV. The Rare Animals of Delta County	27
<u>Amphibians</u>	
Boreal toad ( <i>Bufo boreas</i> )	28
Great Basin spadefoot toad ( <i>Spea intermontanus</i> )	28
Northern leopard frog ( <i>Rana pipiens</i> )	28

<u>Birds</u>	
Boreal owl ( <i>Aegolius funereus</i> )	30
Gray vireo ( <i>Vireo vicinior</i> )	30
Great Blue Heron ( <i>Ardea herodias</i> )	30
Greater sandhill crane ( <i>Grus canadensis tabida</i> )	30
Interior least tern ( <i>Sterna antillarum athalassos</i> )	31
Marsh wren ( <i>Cistothorus palustris</i> )	31
Northern goshawk ( <i>Accipiter gentilis</i> )	31
Northern harrier ( <i>Circus cyaneus</i> )	31
Willet ( <i>Catoptrophorus semipalmatus</i> )	31
Whooping crane ( <i>Grus americana</i> )	31
<u>Fish</u>	
Colorado cutthroat trout ( <i>Oncorhynchus clarki pleuriticus</i> )	32
Colorado squawfish ( <i>Ptychocheilus lucius</i> )	32
Flannelmouth sucker ( <i>Catostomus latipinnis</i> )	32
Razorback sucker ( <i>Xyrauchen texanus</i> )	32
Roundtail chub ( <i>Gila robusta</i> )	33
<u>Mammals</u>	
Ord's kangaroo rat ssp. ( <i>Dipodomys ordii sanrafaeli</i> )	33
White-tailed antelope squirrel ( <i>Ammospermophilus leucurus pennipes</i> )	33
<u>Reptiles</u>	
Western yellowbelly racer ( <i>Coluber constrictor mormon</i> )	34

## V. Proposed Conservation Sites

### B2 sites (Very High Significance)

B50 Road	36
Escalante Canyon	38
Gunnison River Macrosite	42
Hotchkiss Hills	46
Lawhead Gulch	50
Roubideau Creek	53

### B3 sites (High Significance)

Cedar Hill	56
Club Gulch South	58
Crawford Mesa	62
Dry Creek	64
Elk Wallows Reservoir	66
Grand Mesa Lakes Macrosite	68
Hart's Basin	72
Huff	76
Kelso Gulch	79
Little Coal Creek	81
Little Dominguez Creek	84
McDonald Mesa	88
Minnesota Creek	90
North Fork	92
Sulphur Mine	96
Ute Trail	99

Wells Gulch	101
<u>B4 sites (Moderate Significance)</u>	
Club Gulch North	104
Fish Hatchery	107
Land's End Peak	109
Lennox Mesa	111
Leroux Creek	113
Middle Point Creek	115
Needle Rock	117
North Delta	120
Second Creek	123
Surface Creek	125
Upper Point Creek	127
Wells Gulch East	129
<u>B5 sites (General Biodiversity Significance)</u>	
Beaver Creek	131
Dry Fork Escalante Creek	133
Graybeal Ranch	135
Little Alder Creek	137
Overland Reservoir	139
Saddle Mountain-Highline Ditch	141
Smith Fork at Crawford	143
Sweitzer Lake	145
Wiley Springs	147
Appendix I. The Natural Heritage Program and Biodiversity.	149
Colorado's Natural Heritage Program	151
The Natural Heritage Ranking System	151
Legal Designations	153
Element Occurrence Ranking	154
Proposed Conservation Sites	154
Proposed Conservation Sites Boundaries	155
Off-Site Considerations	155
Ranking of Proposed Conservation Sites	155
Protection Urgency Ranks	156
Management Urgency Ranks	156
Methods	157
Appendix II. Targeted Inventory Areas.	160
Appendix III. List of species mentioned in text (scientific names, alphabetized by common names).	162
References	170

### List of Tables

1. Plant Communities of Concern in Delta County	12
2. Rare Plants of Delta County	21
3. Rare and Imperiled Animals of Delta County	27
4. Definition of Colorado Natural Heritage Imperilment Ranks	152
5. Federal and State Agency Special Designations	153
6. Targeted Inventory Areas	160

### List of Maps

Proposed conservation sites map	35
Targeted Inventory Areas map	160

### List of Photographs

Adobe hills in the semi-desert shrubland zone	13
Sagebrush and pinyon-juniper at Dry Creek	15
Hanging garden community at Escalante Canyon	19
Rare Plants of Delta County	22
Northern leopard frog ( <i>Rana pipiens</i> )	29
Greater sandhill Cranes ( <i>Grus canadensis</i> )	29
Escalante Canyon Proposed Conservation Site	40
Hotchkiss Hills Proposed Conservation Site	49
Riparian forest at Gunnison River	49
Clay-loving wild buckwheat ( <i>Eriogonum pelinophilum</i> ) at Lawhead Gulch	52
Rocky Mountain thistle ( <i>Cirsium perplexans</i> )	61
Grand Mesa Lakes Proposed Conservation Site	61
Hart's Basin Proposed Conservation Site	75
North Fork Proposed Conservation Site	87
Little Dominguez Canyon Proposed Conservation Site	87

# **I. The Project: A Natural Heritage Inventory of Delta County**

## **Background Information**

In 1996, The Nature Conservancy proposed to the Delta County Commissioners that a biological survey be conducted to aid the county in meeting its goal of preserving important natural and agricultural resources by identifying and prioritizing areas for conservation. The Commissioners recognized the need of land use planners to have current, site-specific information on the ecological diversity of the county. They applied to Great Outdoors Colorado! for funding of a Natural Heritage Inventory and Conservation Plan for Delta County, to be performed by the Colorado Natural Heritage Program (CNHP). This would complement a survey of important agricultural lands to be performed by Design Workshop of Aspen, Colorado. This proposal was supported by many public and private partners in the county. The proposal was approved, and CNHP began work in early 1997. This document reports the results of that project.

## **Methods**

- 1. All available existing information on the significant flora and fauna of the county was compiled and entered in the Colorado Natural Heritage Program's Biological and Conservation Data System (BCD), and all occurrences were mapped.** This included previous research by CNHP staff, and records from the Colorado Division of Wildlife (CDOW), U. S. Bureau of Land Management (BLM), and National Forest (USFS). Herbaria were searched for collections of rare or imperiled plant species from Delta County.
2. Using the above data, in conjunction with aerial photographs, topographic maps, geology and soil maps, and available information on the habitat requirements of targeted species and natural plant communities, **we identified and mapped Targeted Inventory Areas (TIAs).** These included previously reported locations to be confirmed, and predicted new locations of the targeted elements. Local experts such as the CDOW, BLM staff, and local naturalists, were consulted for additional suggestions. Additional TIAs were added during the field season, as we learned more about the natural characteristics of the county.
3. When TIAs occurred on private land, ownership information was obtained from the County Assessor's office, and **owners were contacted for permission to inventory their land.** We found some people to be concerned that finding rare species on their land would affect their property rights. However, once they understood that this was highly unlikely, they were invariably interested to find out what species were on their property, and several landowners accompanied us on our field surveys. No one whom we contacted refused access.



**4. Field inventory work began in April, and continued through November, 1997.**

The inventory team consisted of a botanist/ecologist, and a wildlife biologist. A number of other CNHP scientists also spent time in the field. Several local residents volunteered their time, and BLM staff was particularly helpful. Throughout the project, we reported our findings to the county's local planning groups, and received valuable suggestions from them. Over 150 TIAs were visited and examined, usually requiring about a half day of hiking. Observations on vegetation, natural features, and condition of each site were recorded. When targeted plants, animals and natural communities were located, they were photographed, and element occurrence records were prepared.

5. Results were analyzed and entered in the BCD. **Proposed conservation sites for the protection of rare or imperiled species were delineated.** Descriptions of significant conservation sites and recommendations for conservation are presented in this document. Exact locations of rare species on private lands are not included.

## Results

### Significant Elements

Delta County has a rich flora and fauna, with several local or regional endemic species. CNHP tracks fifteen rare or imperiled plant species which have been found here (Table 2, page 22). Several of these are restricted to very narrow geographic areas and habitats. Nineteen natural communities of concern are recognized (Table 1, page 12). Twenty-one rare or imperiled animal species have been documented in the county during the last ten years. These include three amphibians, ten birds, five fish, two mammals, and one reptile. Animal species of the county tend to be more common globally, but are often rare in Colorado (Table 3, page 29). This frequently reflects the fact that they are at the edge of their range here. Twenty natural communities that are tracked by CNHP were documented in Delta County.

During this survey, 157 targeted inventory areas were visited (Appendix II). In addition, many informal “windshield surveys” were performed to locate additional areas of interest. Forty-four sites, ranging in size from seventeen to 55,859 acres, are recommended for conservation, based on the presence and quality of significant elements of natural diversity. CNHP ranks sites according to their biodiversity significance, B1 through B5, with B1 the most significant. Of the forty-four proposed conservation sites, 6 are ranked B2, 17 B3, 12 B4 and 9 B5. Each site is also given a rank for Protection Urgency (P1-P5) and Management Urgency (M1-M5), with comments when appropriate. More information on ranking and other CNHP methodology is given in Appendix I.

Two hundred twelve new or updated occurrences of significant elements of natural diversity (i.e., rare plants, animals, and natural communities) were documented from field work in 1997. One hundred seventy-four of these element occurrences are included in the forty-four proposed conservation sites. Individual sites have between one and thirty occurrences.

New records in the BCD for Delta County included four plants: purple cinquefoil (*Comarum palustre*), long-flowered cat’s-eye (*Cryptantha longiflora*), large-flowered breadroot (*Pediomelum megalanthum*), and Arizona centaury (*Centaurium arizonicum*). The Arizona centaury record was new, not only to Delta County, but to Colorado. New animal records for the county included the Great Basin spadefoot (*Spea intermontanus*), gray vireo (*Vireo vicinior*), great blue heron (*Ardea herodias*), greater sandhill crane (*Grus canadensis tabida*), Ord’s kangaroo rat (*Dipodomys ordii sanrafaeli*), willet (*Catoptrophorus semipalmatus*), northern harrier (*Circus cyaneus*) and marsh wren (*Cistothorus palustris*). These new records probably reflect the fact that Delta County’s natural heritage has been poorly documented, more than the rarity of the species.

In two instances, species were found to be more common than had been thought, and CNHP has removed them from their species of special concern list, or reduced their

ranks. The Sierra corydalis (*Corydalis caseana*) has been “watchlisted”, that is, although we no longer believe it to be rare, we will continue to monitor the plant. The rank of the large-flowered breadroot (*Pediomelum megalanthum*) will be reduced from G3S3 to G4S4, based on the number of occurrences found in 1997 in Delta and Mesa Counties.

In two other cases, we found that species were less common than we expected. We have changed the rank of the Rocky Mountain thistle (*Cirsium perplexans*) from G3S1 to G2S2. Both the thistle and the clay-loving wild buckwheat (*Eriogonum pelinophilum*) are being considered for a rank of G1S1, pending the outcome of additional field searches in Montrose County in 1998.

## Location of significant elements

Many of the sites identified fall partly or wholly on BLM or National Forest land. There are several reasons for this. First, about 55 percent of the county's land is publicly owned. Much of the private land is located in the valley bottoms, and has been developed as residential or irrigated agricultural land. A large part of the remaining private land is used for livestock grazing, and has been intensively used over the last century, resulting in significant changes from the native vegetation. This is especially evident in the reduction in native grasses and forbs, and an increase in exotic species. However, four of the most important sites are primarily on private land, and several others comprise a mixture of private and public lands.

## Legal implications

Federal and state legal status is given following the species name in each of the proposed conservation sites (Chapter V). Most of the rare or imperiled species in Delta County have no legal protection. Two of the rare fish of the Gunnison River (the Colorado squawfish, *Ptychocheilus lucius*, and the razorback sucker, *Xyrauchen texanus*), and one plant, the Clay-loving wild buckwheat (*Eriogonum pelinophilum*), are listed as endangered by the U. S. Fish and Wildlife Service, under the Endangered Species Act. One plant species, the Uinta Basin hookless cactus, is listed as threatened. All known locations of these species are included in proposed conservation sites listed here. Plants are not protected on private land, except in unusual situations (one cannot use federal funds to destroy them or sell them outside the state). The State of Colorado, Division of Wildlife, under Colorado Statutes 33-2-105 Article 2, lists the Colorado squawfish and razorback sucker as endangered. No rare plant species are protected by the state. Natural Heritage rarity ranks, and the proposed conservation sites in this document, **do not imply any legal designation.**

The lack of legal protection for most species in the county makes it imperative that the responsibility for their protection be undertaken voluntarily by managing agencies and the private sector. We cannot look to the federal or state governments to protect our biological diversity.

## Proposed Conservation Sites

Preliminary boundaries drawn for proposed conservation sites are based on the known locations of rare or imperiled species or communities, sometimes including a buffer zone, where required to protect them from potentially detrimental land uses, and additional area that protects the ecological processes necessary to perpetuate the elements. They may include several clustered occurrences, where the area between known occurrences may or may not be likely habitat. More exact information on the location of the elements within the site is available from CNHP as needed. However, the entire site should be considered as at least potentially significant. Additional inventory could result in modifications to site boundaries.

Proposed conservation sites recommended here are based on the presence of rare or imperiled plant and animal species, and rare, or especially good examples of more common, natural plant communities. This does not diminish the importance of areas that were not selected, when other values, such as recreation and open space, are considered.

Private lands which were found to be most significant for biodiversity were riparian areas and “adobes”--the unirrigated lands in the Gunnison River Valley and surrounding low hills with desert shrub vegetation. Several rare plant species depend on these badlands. This zone has been severely fragmented by development, so that the continued existence of the rare species may depend on conserving populations in small isolated sites. Threats to this zone include residential development, conversion to agricultural use, and disturbance from off road vehicles (ORV's).

The importance of the major river corridors to humans and wildlife cannot be overemphasized. Although the riparian zones along the Gunnison, the North Fork, and the Uncompahgre rivers have been severely impacted, there is potential for restoration to a more natural state. The river corridors should receive top priority among areas to be protected.

No regulatory protection is conferred by the delineation of proposed conservation sites in this report. They are intended as suggestions to support wise planning. CNHP is available for assistance to the county in ensuring protection of these areas on request.

## Recommendations

Specific protection and management needs are addressed under the descriptions of individual sites. However, some general recommendations for conservation of biodiversity in the county can be given here:

- **Develop and implement a plan for protecting the proposed conservation sites profiled in this report, with most attention directed toward sites with biodiversity rank (B-rank) B2 and B3.** The sites in this report provide Delta County with a basic framework for implementing a comprehensive conservation program. The B2 and B3 sites, because they have global significance, should receive priority attention. The sum of all the sites in this report represents the area CNHP recommends for protection to ensure that the County's natural heritage is not lost as the population and associated development increase.
- **Incorporate the information included in this report in the review of proposed activities in or near proposed conservation sites so that the activities do not adversely affect natural heritage elements.** All of the sites presented contain natural heritage elements of state or global significance. Development activities in or near a site may affect the element(s) present. Wetland and riparian sites are particularly susceptible to impacts from off-site activities if the activities affect water quality or hydrologic regimes. In addition, cumulative impacts from many small changes can have effects as profound and far-reaching as one large impact. As proposed activities within Delta County are considered, they should be compared to the site maps presented here. If a proposed project potentially would impact a site, planning personnel should contact persons, organizations, or agencies with expertise to get detailed comments. The Colorado Natural Heritage Program, Colorado Natural Areas Program, and Colorado Division of Wildlife routinely conduct environmental reviews statewide and should be considered valuable resources.
- Large natural areas should not be fragmented unnecessarily.
- Trails and roads should be located to minimize impacts on native plants and animals.
- Expand public and staff awareness of the county's natural heritage and its need for protection. Delta County can be a leader by providing community education, and forums where protection of our natural heritage is discussed.
- Consider purchasing development rights or outright purchase from willing owners of land for significant sites that are in need of protection.
- Inventory efforts should be continued, especially in areas where construction or habitat alteration is proposed. Even an extensive inventory such as this one cannot fully explore the biodiversity of the entire county. However, it is hoped that the information presented here will guide county planners by identifying resources that may be expected in areas similar to those described.
- Take a proactive approach to weed control in the county. Give additional support, in funding and manpower, to the Pest Inspector's office for weed control. Recognize that weeds affect natural communities as well as agriculture. See recommendation 32

of the Interregional Council on Smart Growth and Development for additional comments on weed management (Colorado Department of Local Affairs 1995). Pursue state funding to create a Weed Management District consisting of private, state and federal land managers.

- When disturbance of the land cannot be avoided, it may be necessary to prevent weed invasion by reseeding. In these cases, only native plants should be used. Ideally, seed should be locally harvested. This includes any seeding done on county road right-of ways.
- Encourage cluster developments that designate large common areas for preservation of natural communities, as an alternative to scattering residences over the landscape with a house on each 35 acres. Examples of ways to minimize the negative effects of inevitable development are addressed in detail in the Design Workshop report on important agricultural lands. Work with developers early in the planning process to educate them about the benefits of retaining natural areas.
- Support organizations, such as the local land conservancies, in acquiring conservation easements. Explore opportunities to form partnerships to access federal funding for conservation projects. For example, the 1996 Farm Bill provides moneys for easement acquisitions and other conservation projects, such as fencing of riparian areas.
- Continue to promote cooperation among local entities to preserve the county's biodiversity. Many cooperative undertakings are already underway in Delta County. Especially noteworthy are the efforts of the Three Rivers Land Conservancy, the Valley Land Conservancy, and the North Fork River Improvement Association.
- Consider the natural heritage values of each site for which land use decisions are made. Use this report as a guide for values to be considered. Also consider the impacts developments may have on adjacent natural areas.
- Provide the vision to protect Delta County's Natural Heritage for future generations.

## **II. Delta County's Natural Heritage**

Delta County has a highly significant natural heritage. With its wide range of elevation, and its variety of geology and soils, it is home to a combination of plants and animals found nowhere else on earth. The species found here evolved over millions of years, in response to a specific environment, and many are suited to thrive in areas where few other species can exist. Much of our natural heritage has been lost, an inevitable result of increased human population and development; however, much remains. The purpose of this report is to identify remaining natural areas that contain the special plants, animals and communities that are unique to our region, or otherwise imperiled, and to provide some direction for land use planning that will conserve them.

### **Physical characteristics**

Delta County is located in the Colorado Plateaus Province, Canyonlands section, of Bailey's Ecoregions, at the border with Southern Rocky Mountains Province (Bailey 1994). Elevations in the county range from about 4,740 feet on the Gunnison River at the Mesa County line, to 11,396 feet at the top of Mt. Lambourn.

Climate is continental, semi-arid, with an average annual rainfall of only 7.7 inches at Delta, although it is higher at upper elevations. It enjoys abundant sunshine, with an average of 205 sunny days, and a low relative humidity of 27%, resulting in high evaporation. Seasonal temperatures vary greatly from an average low temperature in winter of 22.2 degrees F., to an average high temperature of 94.5 degrees in summer. The growing season averages 143 days.

Delta County's 1, 157 square miles lie entirely within the watershed of the Gunnison River in west central Colorado. On the north, the county's boundary is defined by the top of the Grand Mesa, which supplies most of the irrigation water for agricultural lands in the valley. On the west, it includes the lower slopes of the Uncompahgre Plateau. The land gradually rises on the east toward the West Elk Mountains, and on the south, Black Ridge forms an upland through which the Gunnison River was forced to carve a deep canyon. Major tributaries of the Gunnison River--the North Fork, Smith Fork, and Uncompahgre River--extend the valley area, and have deposited the rich soils that make the valley an important agricultural area.

The geology of the county is varied. The most prominent feature is Grand Mesa, which rises 6,000 feet above the valley floor, to over 11,000 feet, and is visible from most of the county. The large flat-topped mountain was formed ten million years ago, when lava flows filled an ancient drainage system that ran across what is now the top of the mesa. As erosion wore away the layers of sedimentary rock on either side, the hard lava cap of Grand Mesa was left standing as an erosional remnant. Today, its many lakes and reservoirs serve to store water which is used to irrigate crops in the Gunnison and North Fork valleys.



The Uncompahgre Plateau, on the west side of the county, is the remnant of an ancient highland which was first uplifted 300 million years ago, along with the ancestral Rockies. It consists of colorful Cretaceous, Jurassic and Triassic sandstones overlying Precambrian rock which is exposed in the bottom of Escalante Canyon. Subsequent layers which can be seen in the canyon are the dark red Chinle Formation, the vertical cliffs of the Wingate, the smooth pink Entrada, and the multi-colored Morrison formations. The Plateau is capped by a resistant layer of Dakota sandstone.

Most of the Gunnison River Valley consists of Mancos shale of the Cretaceous Period, which was created from silt deposits from ancient inland seas that once covered much of the Intermountain West. Soils in the valley tend to be highly alkaline, with high levels of carbonate, gypsum, sodium, potassium, magnesium, and calcium, and very low levels of organic matter and plant nutrients. They range widely in age from recent alluvial deposits along stream flood plains to the well-weathered soils of higher terraces and benches. Flood plain soils are largely alkaline deposits over a relatively high ground water table. The alluvial deposits contain relatively coarse, unconsolidated and stratified soils of poorly graded, well sorted sands and gravels derived from igneous and sedimentary rock formations. More developed soils range in texture from silty clay loam to very fine sandy loam (USDA 1981). A special situation in the soils of the semi-desert is the presence of cryptobiotic crusts, most evident in undisturbed soils west of the Gunnison River. This living soil, containing mosses, lichens, algae and bacteria, is important for stabilizing the soil and adding to the long-term stability of desert grasslands (USDI 1989).

Delta County is, as yet, sparsely populated, with 25,502 residents as of July, 1996. However, its population is growing rapidly, having increased by 21% since 1990, according to the Colorado State Demographer's Office. The City of Delta is the county seat and primary retail and service center for the county. Other communities include Hotchkiss, Paonia, and Crawford to the east; and Cedaredge to the north. The county is primarily agricultural, with orchards, row crops and livestock enterprises. Coal mining is important in the eastern end of the county. A growing industry is recreation. Activities which can be pursued in the county include hunting, fishing, boating, water skiing, swimming, hiking, horseback riding, whitewater rafting, snowmobiling, and cross country skiing.

## **Biological characteristics: Vegetation Zones and Plant Communities**

Various combinations of the environmental factors discussed above are associated with characteristic plants, animals and natural communities (groups of species sharing the same habitat, that may interact with each other). In order to fully preserve the biological diversity of the county, representatives of each of these unique assemblages of living things should be protected. Often, rare species are indicators of very specific habitats. It is also important to conserve representatives of the more common plant communities.

The Colorado Natural Heritage Program keeps records of native plant communities which represent recurring patterns on the landscape, including those that are common, rare, or about which too little information is known to assess their rarity. These communities are often identified by two-part names, based on the dominant plant species in each of two layers, i.e., the tree, shrub or grass layer. An example is the shadscale/Salina wildrye plant association, which names the dominant shrub (shadscale) and dominant grass (Salina wild rye) of the community. (Common names of plants and animals will be used throughout the text of this report. A list of common names with their corresponding scientific names is given in Appendix III).

Classification of vegetation enables ecologists to communicate, and study the combination of environmental factors that are associated with a particular community. CNHP assigns a global and state rank to each community, based on its degree of imperilment (Appendix I). Inventories such as this one are useful in revising our assessment of the rarity of particular communities. In addition to recording the presence of communities, we evaluate each occurrence on a scale of A to D, based on its **quality** (abundance and health of the typical species), its **condition** (largely based on the presence or absence of alien species; its **viability**; and **defensibility** (see Appendix I for additional information on occurrence ranks).

In this study, we found that lower elevation riparian communities with good stands of cottonwoods, and an understory of native shrubs, grasses and forbs, are the most imperiled plant communities in Delta County. The second most imperiled community is the lower elevation semi-desert shrublands above the Gunnison and North Fork rivers between Delta and Hotchkiss, and south of Delta. These are largely private lands, and have been substantially reduced in area by cultivation and residential growth. Although they appear similar to large areas of BLM land north of Delta, rare plants that are found in the remnants of this community closer to the river are absent from the BLM lands.

**Table 1. Plant Communities of Concern in Delta County, alphabetized by scientific name.**

Scientific Name	Common Name	G-Rank	S-Rank
<i>Abies lasiocarpa-Picea engelmannii/Alnus incana</i>	Montane riparian forests	G3	S3
<i>Aquilegia micrantha-Mimulus eastwoodiae</i>	Hanging gardens	GU	SU
<i>Atriplex confertifolia/Hilaria jamesii</i>	Cold desert shrublands	G3	S2
<i>Atriplex confertifolia/Leymus salinus</i>	Cold desert shrublands	G3G5	S3
<i>Atriplex corrugata/shale barren</i>	Alkali mat saltbush shrublands	G5	S2?
<i>Krascheninnikovia lanata/Stipa comata</i>	Winterfat/needle and thread	G3	S3
<i>Distichlis spicata</i>	Salt meadows	G4	S3
<i>Juniperus osteosperma/Stipa comata</i>	Utah juniper-needle and thread	G2	S2
<i>Phragmites australis</i>	Marshes	G4	S3
<i>Pinus edulis/Cercocarpus montanus</i>	Mesic pinyon-juniper woodlands	G5	S4
<i>Populus angustifolia/Salix exigua</i>	Narrowleaf cottonwood riparian forests	G4	S4
<i>Populus deltoides/Rhus trilobata</i>	Fremont's cottonwood riparian forests	G2	S2
<i>Populus tremuloides/tall forbs</i>	Montane aspen forests	G5	S5
<i>Populus tremuloides/Pteridium aquilinum</i>	Aspen wetland forests	G2G3	S2S3
<i>Pseudotsuga menziesii/Cornus sericea</i>	Lower montane riparian forests	G3	S3
<i>Sarcobatus vermiculatus/Distichlis spicata</i>	Saline bottomland shrublands	G3	S1
<i>Sarcobatus vermiculatus/Suaeda torreyana</i>	Saline bottomland shrublands	GU	SU
<i>Spartina gracilis</i>	Salt meadows	G4	S3
<i>Typha latifolia</i>	Narrowleaf cattail marsh	G5	S3

Vegetation in Delta County can be classified into six broad types, each containing several plant associations. These types more or less correspond to elevation. From lowest to highest, they are: 1) semi-desert shrublands; 2) sagebrush; 3) pinyon pine-Utah juniper woodlands; 4) mountain shrublands; 5) aspen forests; and 6) coniferous forests. Within each of these zones, the addition of water (streams, rivers, or springs) creates additional vegetation types such as riparian zones, marshes and hanging gardens. The only major types of vegetation in Colorado that are not represented in Delta County are plains grasslands and alpine tundra. The boundary between these vegetation zones is usually not distinct, and species of each overlap, with large ecotonal areas.

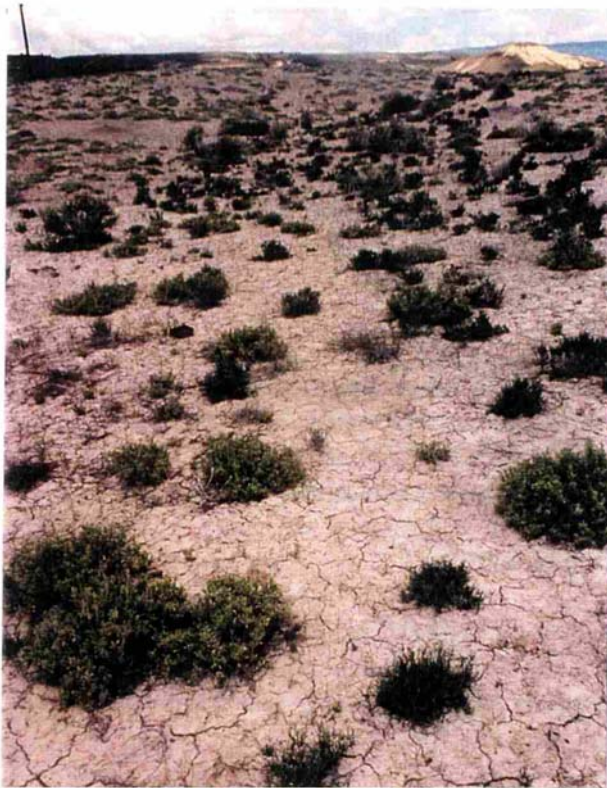
**Semi-desert shrublands** are found at the lowest elevations in the county, often on saline or alkaline soils derived from Mancos shale. This type includes the majority of private land in the county. It also represents over 30% of BLM lands. Shrubs of the goosefoot family (*Chenopodiaceae*) such as shadscale, mat saltbush, and greasewood, are the dominant life form. These plants are indicators of both climatically dry areas and physiologically dry soils. Within this zone are several characteristic, more or less distinct, plant associations, which can often be correlated with specific differences in soils, slope, aspect, and moisture (Singh and West 1971).

The most common plant association of this zone is shadscale/galleta (Cold Desert Shrublands), within which other less common associations occur. Although this community is widespread in Delta County, it is considered to be imperiled globally. We

have not attempted to map all occurrences of this locally common plant association, but describe them when they occur in proposed conservation sites. Typical associated species in this community include snakeweed, low rabbitbrush, pricklypear cactus, budsage, spiny horsebrush, and winterfat.

Within the matrix of shadscale/galleta, the most xeric sites are occupied by mat saltbushes with barren soil between the shrubs (mat saltbush/shale barrens). Steep north and east facing slopes often have the plant association shadscale/Salina wildrye. Low lying swales are characterized by greasewood/sea-blight, greasewood/saltgrass (saline bottomland shrublands) and salt meadows. With increasing elevation, Indian rice grass and needle and thread grass increase, and continue into the pinyon-juniper zone above. The natural riparian vegetation in this elevation zone consists of Fremont cottonwood with skunkbush or coyote willow. Wetlands are usually dominated by cattails, giant reeds, spike rushes and bulrushes.

The most imperiled plants of the county are found in this zone: the clay-loving wild buckwheat, Uinta Basin hookless cactus, Colorado desert-parsley, long-flowered cat's eye, and adobe beardtongue. Rare animals of the zone include Ord's kangaroo rat, white-tailed antelope squirrel, and a variety of birds, snakes and amphibians. These species are described in Chapters III and IV.



Adobe hills in the semi-desert shrubland zone.

**A major threat to the desert shrub ecosystem, and particularly the adobe hills at lower elevations, is fragmentation.** Much of this habitat has been converted to irrigated cropland and residential development. Some of the most threatened microhabitats, such as the toe slopes of the hills, are also the most desirable routes for irrigation ditches and canals. When the landscape is cut into small isolated patches, the necessary exchange of genetic material to maintain a healthy populations may not occur. In addition, the remaining patches are vulnerable to invasive weeds.

Even in the remaining patches, the condition of this vegetation type is often poor. This is most noticeable in the absence of native perennial grasses. Weedy species such as cheatgrass, halogeton, Russian knapweed, and annual mustards have invaded much of this land, especially along roads and on level bottomlands. Steeper hills tend to be in better condition. With good management, it is possible for recovery to occur. Chances are best when native species are least depleted; the poorer the condition, the slower the recovery (Blaisdell and Holmgren 1984). Whenever good native grass communities are encountered, they should be valued and protected. They can supply the seed source, and the nucleus for the improvement of adjacent areas.

Present uses, in addition to agriculture and grazing, include wildlife habitat and recreation. Although large, uninhabited landscapes can provide unique areas for camping and solitude, many people do not perceive this ecosystem to be as aesthetically pleasing as other parts of the county. It is more often used for target practice and off-road vehicle riding than for hiking or camping. Unfortunately, the wheels of off-road vehicles (ORVs) can destroy vegetation and damage the soil. This can cause accelerated wind and water erosion, and create favorable conditions for the invasion of exotic species. This ecosystem generally seems to suffer from a lack of respect and appreciation; many areas have been heavily altered or have served as trash dumps. **Public education about its unique natural values may be an important prerequisite for protecting this area.**

**Sagebrush** dominated lands occur throughout much of the Intermountain West, occupying the elevational zone above the semi-desert shrubland. We found areas dominated by sagebrush to be much less frequent in Delta County than in Mesa County. Here it rarely forms the large stands that are common in much of the west where soils are less alkaline. Instead, it is found more often as one element in a community dominated by other species.

Several shrubby species of sagebrush are found in Delta County, each with its own ecological requirements. Big sagebrush (*Artemisia tridentata* ssp. *tridentata*) occupies deep soils at lower elevations. It is a frequent component of a tall shrub community with greasewood, coyote willow, spearleaf and rubber rabbitbrushes, and fourwing saltbush. We found this association on deep alluvial soils along seasonally dry creeks and on riparian terraces of the Gunnison River.

Mountain big sage (*A. tridentata* ssp. *vaseyana*) tends to grow at slightly higher elevations with pinyon-juniper and mountain shrub communities. It is frequent on the slopes of Grand Mesa, associated with squaw apple, serviceberry, Gambel oak, bitterbrush, and mountain mahogany.



Sagebrush and pinyon-juniper at Dry Creek, east of Cedaredge.

Black sage (*A. nova*) and Bigelow's sage (*A. bigelovii*) are found on sandy soils at the ecotone between Utah juniper/needle and thread grass and semi-desert shrub communities on the slopes of the Uncompahgre Plateau; and bud sage (*A. spinescens*) is a frequent member of the semi-desert shrub community on alkaline soils.

The major area where we found sagebrush as the dominant species was on Fruitland Mesa, adjacent to pinyon-juniper woodlands. The areas we surveyed had been heavily grazed, and had a fifty to seventy-five percent cover of sagebrush with very little other vegetation. Associated species, when they occurred, included cheatgrass, rubber rabbitbrush, snakeweed, Russian knapweed, and several other invasive weeds. More mesic swales had some western wheatgrass. Undoubtedly, there are other more pristine sagebrush areas which we did not visit. One rare plant, the Rocky Mountain thistle, was found associated with sagebrush.

**Pinyon-juniper woodlands** are a major vegetation type in Delta County, occupying large areas on the west and south slopes of Grand Mesa, as well as the highlands in the southern and western parts of the county. The town of Cedaredge was named for the Utah juniper, which is sometimes called cedar. Pinyon-juniper woodlands are found from 4,600 to 8,900 feet, with their highest development between 5,000 and 7,000 feet. At higher elevations they occur on south and west facing slopes.

The trees in this zone are typically short and widely spaced, with an understory ranging from almost barren to a diverse mixture of shrubs, forbs and grass. Soils are usually coarse, sandy, and shallow, with low fertility. With increased moisture the canopy can become more dense, with a resulting decrease in understory vegetation. The pinyon-juniper type is widespread throughout the western United States, with different species of pinyon pine and juniper in different areas. The species found in Delta County are *Pinus edulis* and *Juniperus osteosperma*, with *Juniperus scopulorum* occurring mostly in mesic sites. In most of the region pinyon pine and juniper are co-dominant. However, of the two tree species, pinyon is more tolerant of cold, and juniper more tolerant of drought (Mutel and Emerick 1992). Juniper therefore occurs at lower elevations, where it is often mixed with sagebrush and desert shrubs, while pinyon is found at the higher elevations, where it gradually gives way to Gambel oak. Sites are usually warm and dry, with a mean annual temperature between 45<sup>0</sup> and 55<sup>0</sup> F., annual precipitation between 10 and 20 inches, and at least 80 frost free days (Mutel and Emerick 1992).

The shrub understory of the pinyon-juniper zone depends on site characteristics such as slope, aspect, and disturbance history. Shrubs may include saltbushes and other species discussed above under the semi-desert shrub vegetation type at the lower elevations; and mountain mahogany, Gambel oak, seviceberry, snowberry, and other shrubs discussed below under oak and mountain shrub vegetation types, at the higher elevations. The herbaceous understory is often sparse, especially where grazed by cattle. Typical native grasses are needle and thread, Indian rice grass, galleta, mutton grass and bottlebrush squirreltail. Cheatgrass is the most frequent non-native invader. Common forbs are hairy golden aster, twin bladderpod, roughseed cat's-eye, and scarlet globemallow.

Two plant associations in the pinyon-juniper zone which are tracked by Colorado Natural Heritage Program were documented in Delta County. A globally imperiled Utah juniper/needle and thread grass community on the flanks of the Uncompahgre Plateau was one of the best quality grasslands seen in the county. A more common community globally, but with its own local character, is pinyon pine/mountain mahogany. We documented a good example of this type at 7,400 feet, in the Needle Rock area east of Crawford. This community is located at the ecotone of the pinyon-juniper and mountain shrub zones, and contains a diverse assortment of shrubs. A rare plant, the adobe penstemon, was also found at that site. Other rare plant species found in the pinyon-juniper zone were the Grand Junction milkvetch, Wetherill's milkvetch, and large-flowered breadroot.

**Gambel oak and Mountain shrub** communities extend into the pinyon-juniper zone below and the aspen zone above. They occur on hillsides, upland benches, and well-drained lowlands, with fifteen to twenty-seven inches of precipitation per year (Johnston 1987). This type is most common between 7,000 and 9,000 feet elevation.

In Delta County lower elevations of this zone tend to contain a highly diverse mixture of shrubs, including mountain mahogany, Utah serviceberry, snowberry, sagebrush, rabbitbrush, squaw apple, chokecherry and Fremont barberry. Beneath the shrubs, common grasses (and grasslike plants) are western wheatgrass, Indian rice grass, squirreltail, elk sedge, and cheatgrass. Common herbaceous dicots (forbs) include hairy golden aster, Tracy's thistle, rock goldenrod, goldeneye daisy, and skyrocket gilia.

At upper elevations, Gambel oak is the dominant species. Oak is a clonal species, and may live to be very old. Stands in Utah exceed 4000 years of age (Mutel and Emerick 1992). Gambel oak is an important invader after fire, and can resprout quickly.

The Grand Mesa penstemon was found in communities dominated by Gambel oak, as well as at higher elevations with aspen and spruce.

**Aspen forests** are found primarily on the south slopes of Grand Mesa, mixed with Gambel oak at lower elevations, and becoming mixed with Engelmann spruce at upper elevations. They are also present in the small part of the West Elk Mountains that extends into eastern Delta County.

Aspen occurs in Delta County between elevations of 7,200 and 10,200 feet. At lower elevations, it occurs in relatively mesic sites, often in draws with cool air drainage, on north-facing slopes, in riparian zones, or in areas with snowdrifts or seeps. At upper elevations it may form stands alone, or mixed with Engelmann spruce and subalpine fir.

Aspen, like Gambel oak, is clonal. Although individual stems live for about 100 to 150 years, their root systems can live for 1000 or more years (Peet 1988). They are able to thrive in sunny places with poor soils. They are thus adapted for colonizing disturbed or burned sites. The other tree which is a major colonizer after fire in Colorado, lodgepole pine (*Pinus contorta*), is conspicuously absent from Delta County. Aspen is especially plentiful in sites once heavily disturbed by fire or logging. After disturbance, colonization can be completed within five to ten years. Maximum density is reached in 25 to 50 years.

Once established, aspen forests are the most species rich of all the vegetation types. This may be due to the increased fertility and moisture holding capacity of the soil with the addition of the deciduous leaf litter (Peet 1988). Aspen leaves decompose readily, since they are low in the tannins and resins which retard decomposition in conifer needles (Mutel and Emerick 1992).

Common species found in aspen forests of Grand Mesa include Canada wildrye, tall larkspur, aspen daisy, tall fleabane, cow parsnip, meadowrue, little sunflower, nettleleaf giant hyssop, chokecherry, serviceberry, snowberry, wild rose, Richardson's geranium, and tall ragwort. Sierra corydalis, previously thought to be rare, but now removed from CNHP's species of special concern list, was found in aspen as well as spruce-fir forests in



Delta County. However, in general, fewer rare plant species occur in aspen and spruce-fir forests than in the lower elevation zones.

Important animal species found in aspen forests include the northern goshawk and northern leopard frog.

**Coniferous forests** dominated by Engelmann spruce cover the upper elevations, above 8,000 feet, on Grand Mesa. They are most highly developed above 9,000 feet. The forest typically has a closed canopy, with a sparse understory of shade tolerant species. Interspersed with the forests, and becoming more common at higher elevations, are subalpine meadows or “parks.” Globally, the combination of various species of spruce and fir is common, and is characteristic of the taiga biome. It occurs in cold, wet areas with a short growing season. Annual precipitation is from 11.8 to 33.5 inches, with most of it falling as snow. This ecosystem is important in Colorado for snow collection and recreational values.

Soils in the spruce-fir zone are acidic, and often shallow and infertile, due to their recent origin, leaching and the acidic foliage. There is little bacterial activity at the low temperatures of this zone, and much of the carbon in the ecosystem is locked up in humus. Some compensation for this is achieved through mycorrhizal associations which increase nutrient uptake.

The shady understory of spruce-fir forests tends to contain few plant species. Typical understory species in the spruce-fir zone in Delta County are mountain lover, wild mountain parsley, osha, meadowrue, sweet cicely

Mesic forest openings and wet areas have a greater diversity of species, including tall larkspur, Richardson’s geranium, Colorado columbine, elderberry, cow parsnip, bluebells, bittercress, marsh marigold, planeleaf and barren-ground willows, and smallwing, water and Northwest Territory sedges. The different leaved groundsel was found in such a wet opening. A striking plant found along streams in this zone is the Sierra corydalis. This species was considered rare by CNHP until this year, when we documented enough populations, both in Delta County and in the San Juan National Forest, that we have removed it from our list of species of special concern.

Drier parks and clearings, including roadsides, host the Grand Mesa penstemon, as well as more common species such as skyrocket gilia, orange sneezeweed, little sunflower, and silvery lupine.

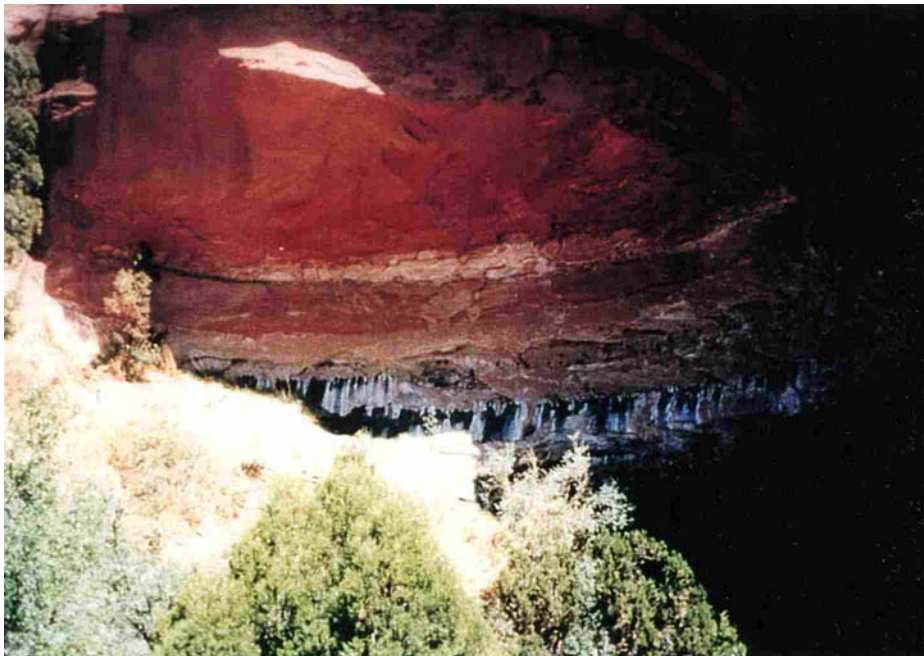
Peat bogs, which are uncommon in Colorado, are found in several places on Grand Mesa. It took thousands of years for these deep accumulations of plant material to form. One of the rare plants of the county, the purple cinquefoil, was found growing on floating mats of this peat.

Important animal species found in the spruce-fir zone include the boreal owl, goshawk, and boreal toad. Northern leopard frogs and Colorado cutthroat trout may also be found in this zone.

**Riparian zones and wetlands** comprise several distinct communities in Delta County. At low elevations, the riparian zone is dominated by narrowleaf or Fremont's cottonwood and coyote willow or skunkbrush. Wetlands with standing water or a high water table are characterized by cattails, giant reed, reed canary grass, bulrushes, and a variety of sedges and rushes. Important species on slightly drier ground are greasewood and saltgrass.

Riparian zones in the pinyon and juniper and mountain shrub zones are often dominated by narrowleaf cottonwood with an understory of Rocky Mountain and Drummond's willows, thinleaf alder, and red-osier dogwood. With increasing elevation, the cottonwoods are replaced by aspen or fir.

Occasional seeps in canyon walls support unique hanging garden communities, with species like Eastwood's monkeyflower and cliff Columbine that occur nowhere else in the county. The giant helleborine orchid is also associated with this community. A year-round supply of water and sandy soil that allows deep root penetration maintain this assemblage of rare plants (CONPS 1997). In Delta County, hanging gardens are found in Escalante Canyon, at the head of sandstone box canyons west of Escalante Creek.



Hanging garden community, Escalante Canyon

### III. The Rare Plants of Delta County

Delta County has fifteen known species of rare plants (Table 2). These are briefly described below. All of these species are included in one or more of the proposed conservation sites described in Chapter V.

As a result of this survey, CNHP has changed the ranks of two plant species. Since research showed that the Rocky Mountain thistle is known only from Colorado, its global and state ranks must agree. The fact that it is known only from three counties, and very few locations, prompted us to re-rank it from G3S1 to G2S2. This species will be further evaluated during CNHP's 1998 survey of eastern Montrose County. The Sierra corydalis was found to be more common than originally thought, with many occurrences on Grand Mesa, as well as new records from as far away as the San Juan National Forest. We therefore changed its rank from G5T3S3 to G5T3T4 S3S4, a rank that reflects a species that is "watchlisted." It is no longer considered to be of concern, but will be watched for a period of time before it is completely dropped from the list.

It is interesting to note the habitats of these fifteen species. Five species grow in the low elevation adobe hills, on highly alkaline soils derived from Mancos shale. These are: the adobe beardtongue, the clay-loving wild buckwheat, the Colorado desert-parsley, the long-flowered cat's eye, and the Uinta Basin hookless cactus. Two of the most imperiled (G2) plants of the county are in this group. The third G2 species, the Rocky Mountain thistle, appears to have a broader ecological amplitude, as it was found in sagebrush, pinyon-juniper, and mountain shrub communities. Three species, Wetherill's milkvetch, Grand Junction milkvetch and large-flowered breadroot are found most often in pinyon-juniper communities. Two species, the Grand Mesa penstemon and Sierra corydalis were found in the spruce-fir and aspen zones. Four species are restricted to very specific hydrological situations: Eastwood's monkeyflower and the giant helleborine orchid are confined to seeps, while the Arizona centaury occurs in sedge wetlands. The purple cinquefoil was found in peat bogs, on floating mats of vegetation.

As noted above, only two of these species, the Uinta Basin hookless cactus and the clay-loving wild buckwheat, are listed under the Endangered Species Act. Furthermore, state and federal regulations do not protect plants on private land, where the most imperiled species were found. Our conclusion is that we must protect good representations of natural communities in all vegetation zones of the county. Choosing sites which also contain our most threatened species will accomplish the goal of protecting our diversity at both the individual species and landscape scales.

**Table 2. Rare Plants of Delta County, alphabetized by common name. The most imperiled species are in bold type.**

Common Name	Scientific Name	Global rank	State rank	Preferred habitat
Adobe beardtongue	<i>Penstemon retrorsus</i>	G3	S3	adobe hills
Arizona centaury	<i>Centaurium arizonicum</i>	G4	S1	adobe hills
<b>Clay-loving wild buckwheat</b>	<b><i>Eriogonum pelinophilum</i></b>	<b>G2</b>	<b>S2</b>	<b>adobe hills</b>
<b>Colorado desert-parsley</b>	<b><i>Lomatium concinnum</i></b>	<b>G2</b>	<b>S2</b>	<b>adobe hills</b>
Eastwood's monkey-flower	<i>Mimulus eastwoodiae</i>	G3	S1S2	seeps
Giant helleborine orchid	<i>Epipactis gigantea</i>	G4	S2	seeps
Grand junction milkvetch	<i>Astragalus linifolius</i>	G3	S3	pinyon-juniper
Grand Mesa penstemon	<i>Penstemon mensarum</i>	G3	S3	spruce-fir, aspen
Large flowered breadroot	<i>Pediomelum megalanthum</i>	G3	S3	pinyon-juniper
Long-flowered cat's-eye	<i>Cryptantha longiflora</i>	G3	S3	adobe hills
Purple cinquefoil	<i>Comarum palustre</i>	G5	S1S2	peat bogs
<b>Rocky mountain thistle</b>	<b><i>Cirsium perplexans</i></b>	<b>G2</b>	<b>S2</b>	<b>pinyon-juniper, sagebrush, mountain shrub</b>
Sierra corydalis	<i>Corydalis caseana</i>	G5T3T4	S3S4	spruce-fir, aspen, riparian
Uinta Basin hookless cactus	<i>Sclerocactus glaucus</i>	G3	S3	adobe hills
Wetherill milkvetch	<i>Astragalus wetherillii</i>	G3	S3	pinyon-juniper

**Adobe beardtongue (*Penstemon retrorsus*) G3 S3**

The adobe beardtongue is a woody-based subshrub with erect flowering stems of small bluish-purple flowers. The hairs of the stems point backward (toward the base), giving it its scientific specific epithet of “retrorsus”. The plant is known from adobe hills in Montrose and Delta counties only, and is thus threatened by virtue of its limited distribution. Threats to the plant include land subdivision for residences, conversion to cropland, and recreational use by off-road vehicles. Sheep apparently do not eat the plants, and thus may positively enhance the population by removing competing vegetation. Adobe beardtongue is found in four proposed conservation sites: Crawford Mesa, McDonald Mesa, Needle Rock and Land’s End Peak. Of these, the population at Crawford Mesa is the most highly ranked, followed by the one at McDonald Mesa.

**Arizona centaury (*Centaurium arizonicum*) G4 S1**

Arizona centaury was documented for the first time in Colorado during this survey. This is a northward extension of its range from Arizona and New Mexico. It is a delicate, grass-like wetland plant with bright pink flowers. It was found growing in wet areas along the North Fork of the Gunnison, with spike rushes and sedges. The plant is closely related to two other species of *Centaurium*, *C. calycosum* and *C. exaltum*. Both Delta County populations of Arizona centaury are in the North Fork proposed conservation site. Both occurrences were small, but did not appear to be threatened. We expect that further searching will uncover additional populations.



## Rare Plants of Delta County, Colorado

**Clay-loving wild buckwheat (*Eriogonum pelinophilum*) G2 S2 LE**

The clay-loving wild buckwheat is a low, rounded subshrub, with woody stems at the base. It has short, linear leaves which are dark green above and densely woolly below, and small white flowers. It grows in semi-desert shrub communities on the toe slopes of rolling adobe hills. Soils where the plants are found are whitish clay derived from Mancos shale. Within this habitat, it occupies only very specific microhabitats with similar degrees of erosion and distance of transport of soil from receding residual shale hills (USFWS 1988). Associated species include shadscale, mat saltbush, budsage, poison aster, and spiny horsebrush.

The clay-loving wild buckwheat is found only in Delta and Montrose counties, on a total land area of about 500 acres. Much of the natural habitat for the plant has been fragmented by urban development and agricultural fields. The majority of individuals occur on only a few sites, with the remainder scattered in such small populations that their viability is questionable. The largest site in Delta County, which is also the type locality (the place it was first discovered and described) is the Lawhead Gulch proposed conservation site. Another moderate sized population occurs on the B50 Road site. Both of these sites should be protected. This is one of the two plant species in Delta County that are listed under the Endangered Species Act.

**Colorado desert-parsley (*Lomatium concinnum*) G2 S2**

The Colorado desert-parsley is a low-growing, yellow-flowered plant with shiny green leaves similar to the familiar edible parsley. It grows on adobe soils derived from Mancos shale. It flowers in April, and although it is perennial, the above ground parts virtually disappear later in the summer. In the Delta County site where it is most abundant, it preferred the lips of the badland hills, just above the steep barren clay slopes. In other sites, it was less abundant, and grew in more mesic, less harsh environments, often under shrubs. Its response to sheep grazing is not known, but it appears that grazing by sheep may favor the plant by removing competing vegetation. More observations during the early spring may clarify this. The Colorado desert-parsley is known only from Delta, Montrose and Ouray counties. The Hotchkiss Hills site is one of the best, and perhaps the very best, location for the plant in the world.

**Eastwood's monkeyflower (*Mimulus eastwoodiae*) G3 S1S2**

Eastwood's monkeyflower has a bright crimson flower and sharply toothed leaves. It grows in hanging gardens with a year round moisture supply. The plants put down new roots from points where their stems contact the sandy soil, and thus often are found growing in a line in horizontal cracks of sandstone canyon walls. The plants are frequently found growing with cliff columbine and the giant helleborine orchid. Its global range includes Utah, Arizona and four counties in southwest Colorado: Mesa, Montrose, San Miguel and Delta (Spackman *et al.* 1997). In Delta County, Eastwood's monkeyflower is known from only one population, with four sub-populations, in Escalante Canyon.

**Giant helleborine orchid** (*Epipactis gigantea*) **G4 S2**

The giant helleborine orchid, like Eastwood's monkeyflower above, is often associated with hanging gardens in sandstone canyons. Escalante Canyon had been known for some time as the only location of the plant in Delta County. We were surprised to find a large population of the plant on a seeping hillside overlooking the Gunnison River near Hotchkiss. Here, the substrate is adobe clay, rather than the sandy soils of Escalante Canyon. The greenish-purple flowers of the giant helleborine orchid have the familiar orchid shape, but are about an inch across and grow several to a stalk. Flowers appear in June and July, and fruit is produced in August and September. The plant has a wide geographic distribution in western North America, and is found occasionally from Mexico to Canada. There are twenty-six known locations in Colorado, distributed over eight counties (Spackman *et al.* 1997). Threats to the plants include diversion of the water feeding the seeps, and trampling. It is represented in the Escalante Canyon and Fish Hatchery proposed conservation sites.

**Grand Junction milkvetch** (*Astragalus linifolius*) **G3 S3**

The Grand Junction milkvetch is an attractive, bushy herbaceous perennial of the pea family. It produces pure white flowers which mature to upright red pods. It grows with pinyon and juniper, on dry clay slopes and gullies of the Morrison Formation, between 4,800 and 6,200 feet. Associated species include Indian rice grass, hairy golden aster, low rabbitbrush, and snakeweed. It is very closely related to *A. rafaensis*, which is found on the west side of the Uncompahgre Plateau, while *A. linifolius* is confined to the eastern side, in Mesa, Delta and Montrose counties. In Delta County, the Grand Junction milkvetch occurs in the Little Dominguez Creek and Escalante Canyon proposed conservation sites.

**Grand Mesa penstemon** (*Penstemon mensarum*) **G3 S3**

The Grand Mesa penstemon is a handsome, tall, blue-flowered plant. It is often found growing on roadsides in the aspen zone on Grand Mesa, extending upward to clearings and parks in the spruce-fir zone, and downward to the mountain shrub zone. At one time considered rare enough to be a candidate for federal listing, it has since been found to be more common than had been thought. However, its range is still restricted to Grand Mesa and a couple of locations in the western part of the West Elk Mountains, in Mesa, Gunnison, Delta and Montrose counties. Delta County has the majority of the populations known. It is represented in the Grand Mesa Lakes macrosite and the Elk Wallows and Leroux Creek proposed conservation sites.

**Large flowered breadroot** (*Pediomelum megalanthum*) **G3 S3**

The large-flowered breadroot is a member of the pea family, with five-parted leaves spreading out close to the ground, and clover-like heads of small white pea flowers. In Delta County, it was found in areas with scattered pinyon pine and Utah juniper, often in dry washes or on eroded hillsides. It is known from Utah and New Mexico, as well as Colorado (Welsh *et al.* 1993). It occurs in the Ute Trail and Wells Gulch proposed conservation sites.

**Long-flowered cat's eye** (*Cryptantha longiflora*) **G3 S3**

Long-flower cat's eye is a short-lived perennial with hairy leaves and long-tubular white flowers. It lives on sandy or clay soils in the desert shrub zone, often associated with the Uinta Basin hookless cactus. It is known from Colorado and Utah, in the Colorado and Gunnison River drainages. In Delta County, it was found in two of the proposed conservation sites, Club Gulch North and Roubideau Creek.

**Purple cinquefoil** (*Comarum palustre*) **G5 S1S2**

Purple cinquefoil is a species associated with high elevation peat bogs. A member of the rose family, it flowers in July and August. The species is circumboreal in distribution. It was previously known in Colorado from four counties: Mesa, Conejos, Gunnison and Larimer. We found the first Delta County record of purple cinquefoil in a reservoir on Grand Mesa. It was growing on a floating mat of vegetation with sedges in the middle of the reservoir, and on chunks of peat that had been cut from the island and hauled to shore. Continued removal of the peat will extirpate the only known site for this species in Delta County. This location is included in the Grand Mesa Lakes proposed conservation site.

**Rocky Mountain thistle** (*Cirsium perplexans*) **G2? S2?**

The Rocky Mountain thistle is known only from Colorado, in Mesa, Montrose and Delta counties. Its scientific name is apt, since it is a perplexing species about which little seems to be known. This information gap is reflected in the question marks in its global and state rarity ranks. Most of the occurrences of this plant that were previously known were small, usually with fewer than fifty individuals. In Delta County, we found one site at Dry Creek where the thistle dominated a dry sagebrush flat, and appeared to be colonizing disturbed areas. The species needs further study, and the Dry Creek site would be an ideal place to accomplish this. Smaller populations were found in the Cedar Hill and Little Coal Creek sites.

**Sierra corydalis** (*Corydalis caseana* ssp. *brandegei*) **G3G4 S3S4**

Sierra corydalis is known from Oregon to California, Utah and Colorado. It was a species that we targeted for this inventory, since it was considered vulnerable in the state. However, we found so much of it on Grand Mesa this year that we have removed it from our list of species of concern. We will continue to watch it, but no longer consider it to be rare. It is a striking, tall plant with flowers ranging from pure white to pink and lilac. It grows in wet areas, particularly in boulder filled stream beds. One good place to view this plant is at the Crag Crest trailhead by Eggleston Lake. It is represented in the Grand Mesa Lakes macrosite and Little Coal Creek proposed conservation sites.

**Uinta Basin hookless cactus** (*Sclerocactus glaucus*) **G3 S3**

The Uinta Basin hookless cactus is one of the two plants in Delta County to have federal protection under the Endangered Species Act. Because of this, it has been the subject of more inventory and study than other plant species, and this has resulted in many Delta County records of the species in CNHP's Biological and Conservation Data System. Because of its federal status, proposed conservation sites were identified for all known occurrences of the plant, although many are ranked B4, or of only moderate



significance. More taxonomic research is needed to clarify its relationship to other species in the genus. Research on the ecology of the plant, including identifying its pollinators, is being conducted by Dr. Eric Rechel and Dr. Rick Ballard of Mesa State College. They have learned that the major pollinators are ground-dwelling bees, which could make the plants vulnerable to trampling by livestock through loss of their pollinators as well as direct damage to the plants themselves. Plants are easily visible when flowering, during April and May. After blooming, the cactus may shrink to the soil surface, and its dull grayish green color makes it difficult to see. It is found on gravelly alluvial soils or in clay, between 4,500 and 6,000 feet. Associated vegetation includes shadscale, sagebrush, greasewood, galleta grass, black sage, Indian ricegrass, prickly pear cactus, saltbush, winterfat, yucca, low rabbitbrush and sand dropseed (Scheck 1994). It is known from Montrose, Delta, Gunnison, Garfield and Mesa counties in Colorado, and from Uinta and Grand counties in Utah. The Delta County populations are centered on the benches above the Gunnison River, with the largest single population occurring near the Escalante bridge. Although previously reported from the area between Delta and Hotchkiss, we were unable to locate any populations upstream of Roubideau Creek this year. The Uinta Basin hookless cactus occurs in the Gunnison River macrosite, and in the standard sites Escalante Canyon, Wells Gulch, Huff, Roubideau Creek, Little Dominguez Creek, and Kelso Gulch sites. We have also continued to list the plants in the Sulphur Mine and North Delta sites, although they were not confirmed this year. Further searches are needed in those areas.

**Wetherill milkvetch (*Astragalus wetherilli*) G3 S3**

Wetherill milkvetch has pinkish white pea flowers and rather large, inflated pods. The leaflets of its pinnately compound leaves are almost round. It grows on steep slopes, canyon benches, and talus under cliffs, in sandy clay soils derived from shale or sandstone (Barneby 1964). It is often the only plant growing in small dry washes on rocky clay hillsides, where its very light-weight seeds seem to be dispersed downhill by gravity and seasonal surface water. Associated plant species are pinyon pine, Utah juniper, mountain mahogany and sagebrush. Threats to the species include oil and gas development, overgrazing, road construction and other habitat modifications (O'Kane 1988). Its location in Delta County in a fairly inaccessible area west of the Black Canyon of the Gunnison River should be secure from these threats. Although we found the plant along the Ute Trail, it is expected both upstream and downstream of that site in similar habitats.

#### IV. The Rare and Imperiled Animals of Delta County.

Delta County has twenty-one species of animals that are tracked by Colorado Natural Heritage Program. Certain parts of the county stand out as the prime habitat for particular species. Grand Mesa's higher elevations are the home of boreal owls, goshawks and boreal toads. The semi-desert hills between the Gunnison River and Grand Mesa claim both of the rare mammals, the white-tailed antelope squirrel and Ord's kangaroo rat. Northern leopard frogs are found in the North Fork of the Gunnison and in small streams and wetlands throughout the eastern part of the county. The Gunnison River boasts four rare warm water fish species. The hottest spot for birds is Hart's Basin, east of Eckert. Brief descriptions of some of the species found in the county are given below. See Appendix I for explanations of ranks.

**Table 3. Rare and Imperiled Vertebrates of Delta County, alphabetized by common name within each taxonomic group. The most imperiled species are in bold type face.**

Common Name	Scientific Name	G-Rank	S-Rank
<b>AMPHIBIANS</b>			
Boreal toad	<i>Bufo boreas boreas</i>	G5T2Q	S1
Great basin spadefoot	<i>Spea intermontanus</i>	G5	S3
Northern leopard frog	<i>Rana pipiens</i>	G5	S3
<b>BIRDS</b>			
Boreal owl	<i>Aegolius funereus</i>	G5	S2
Gray vireo	<i>Vireo vicinior</i>	G5	S2B
Great blue heron	<i>Ardea herodias</i>	G5	S3B,SZN
Greater sandhill crane	<i>Grus canadensis tabida</i>	G5	S2B,S4N
Interior least tern	<i>Sterna antillarum athalassos</i>	G4T2Q	S1B
Marsh wren	<i>Cistothorus palustris</i>	G5	S3B,SZN
Northern goshawk	<i>Accipiter gentilis</i>	G5	S3B,S4N
Northern harrier	<i>Circus cyaneus</i>	G5	S4B,S4N
<b>Whooping crane</b>	<b><i>Grus americana</i></b>	<b>G1</b>	<b>S1</b>
Willet	<i>Catoptrophorus semipalmatus</i>	G5	S1B,SZN
<b>FISH</b>			
Colorado cutthroat trout	<i>Oncorhynchus clarki pleuriticus</i>	G5T3	S3
<b>Colorado squawfish</b>	<b><i>Ptychocheilus lucius</i></b>	<b>G1</b>	<b>S1</b>
Flannelmouth sucker	<i>Catostomus latipinnis</i>	G3G4	S3S4
<b>Razorback sucker</b>	<b><i>Xyrauchen texanus</i></b>	<b>G1</b>	<b>S1</b>
Roundtail chub	<i>Gila robusta</i>	G2G3	S2
<b>Mammals</b>			
Ord's kangaroo rat ssp.	<i>Dipodomys ordii sanrafaeli</i>	G5T?	S2
White-tailed antelope squirrel	<i>Ammospermophilus leucurus pennipes</i>	G5T?	S1S2
<b>REPTILES</b>			
Western yellowbelly racer	<i>Coluber constrictor mormon</i>	G5T5	S2

## Amphibians

### **Boreal Toad**                    (*Bufo boreas boreas*)                    **G4T1Q S1**

The boreal toad breeds in ponds and other quiet waters at high elevations, usually above 7,000 feet. Both large and small bodies of water which are shallow near the shore are suitable (Hammerson 1982). The toads migrate between their aquatic breeding habitats and terrestrial non-breeding habitat, so in addition to the ponds, lakes and reservoirs on Grand Mesa, the surrounding herbaceous wetlands are important for its survival. They sometimes seek shelter under fallen logs or in rodent holes. They feed on insects, including mosquitoes, which are abundant on Grand Mesa. Forest Service personnel report that the toads seem to be ephemeral; when investigators return to a site where they have been found as soon as three days later, they are often unable to relocate the toads. The subspecies has been proposed for federal listing as endangered. Although it was determined that listing is warranted, it has been precluded by other actions with higher priority (Federal Register, 23 March 1995). Our records from Grand Mesa are historic, over ten years old. No new populations were found during this survey.

### **Great Basin spadefoot toad** (*Spea intermontanus*) **G5 S2**

The Great Basin spadefoot toad is found in a wide variety of habitats, from low elevation shrublands to spruce-fir forests, and from British Columbia to Northwestern Arizona. In Colorado, it frequents pinyon-juniper woodlands, sagebrush and semi-desert shrublands, usually in or near dry rocky slopes or canyons (Hammerson 1982). It may dig a burrow in loose soil, or use ready-made burrows of small mammals. It breeds in temporary or permanent water, including rain pools and flooded areas along streams. Adult toads eat insects, and larvae probably eat algae, organic debris and plant tissue. We found the Great Basin spadefoot in wetlands along the North Fork of the Gunnison.

### **Northern leopard frog**                    (*Rana pipiens*)                    **G5 S3**

The northern leopard frog has seriously declined in some parts of Colorado. Part of the statewide decline seems to be due to predation by the increasingly abundant bullfrog (*Rana catesbiana*), which is native to the eastern U. S., but introduced in Colorado. We observed bullfrogs, but no leopard frogs in some sites at lower elevations in the Gunnison River. However, the leopard frog is also becoming uncommon in areas where bullfrogs are absent. The exact cause of the declines is unknown and needs further investigation (Hammerson 1982). The leopard frog inhabits springs, slow moving streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes, usually in permanent, clear water with rooted aquatic vegetation. In summer, the frog commonly occupies wet meadows and fields. The species appears to be faring better in Delta County than in other parts of the state. We found ten populations of northern leopard frogs in Delta County, in varied habitats, from wetlands along major rivers to the banks of small irrigation ditches. They are included in seven proposed conservation sites: Dry Creek, Graybeal Ranch, Lawhead Gulch, Little Coal Creek, North Fork, Roubideau Creek, and Sweitzer Lake.



Northern leopard frog (*Rana pipiens*).



Greater sandhill crane (*Grus canadensis tabida*). Photo by Mary Tremain for the Cornell University Laboratory of Ornithology.

## **Birds**

### **Boreal owl (*Aegolius funereus*) G5 S2 FS**

A small owl, with a large head and long wings, the boreal owl is a year round resident in the higher mountains throughout most of Colorado. The owls live in holes in standing snags in dense forests of spruce, fir and aspen. The nests are usually found near open meadows where the owls prey on small mammals, birds and insects. Grand Mesa, with its mature forests interspersed with grassy parks and meadows, provides ideal habitat. Many of our sites are in human-supplied nest boxes. As a dominant predator in the spruce-fir forests of the Rocky Mountains, the boreal owl may have a significant influence on the dynamics of forest small mammal populations, and indirectly on other ecological processes such as seed predation.

### **Gray vireo (*Vireo vicinior*) G5 S2B**

This small, gray-backed bird breeds in arid mountains from southern California to southwestern Colorado. It prefers dry, open pinyon-juniper woodlands at lower elevations (Andrews and Righter 1992). Gray vireos were recorded in Delta County in pinyon-juniper woodlands on the west and south slopes of Grand Mesa. Singing males during the breeding season were considered evidence of nesting in the area.

### **Great Blue Heron (*Ardea herodias*) G5 S3B,SZN**

The wide ranging great blue heron is found in colonies scattered throughout Colorado. Some winter here, while most others return from more southern habitats to our area in mid-February to March and leave again in October (Andrews and Righter 1992). They prefer freshwater and brackish marshes along lakes, rivers, fields and meadows. They nest high in trees, or less commonly in bushes, on the ground, rock ledges, or cliffs. The birds eat fish, crustaceans, amphibians and reptiles, mice and shrews, and other animals. Most foraging is done while standing in the water. In our area, undisturbed cottonwood stands are essential for nesting. Colonies are utilized year after year, as long as there is no disturbance; however, the supporting cottonwoods generally die after some years, causing the colonies to relocate. Our records from Delta County are from the Gunnison River, Smith Fork, and Hart's Basin.

### **Greater sandhill crane (*Grus canadensis tabida*) G5T4 S2B,S4N**

Greater sandhill cranes are migrants here, *en route* between their wintering grounds in New Mexico and breeding areas in Idaho and Montana. Enormous flocks of thousands of birds annually stop to rest at Fruitgrowers Reservoir in the Hart's Basin site. The long-legged, red-crowned sandhill cranes, with a wing span of six to seven feet, are an impressive sight, as they perform courtship rituals, jumping and flapping their wings, preening and dancing. They are a favorite of local residents, and a day spent watching them is a memorable experience.

**Interior least tern (*Sterna antillarum athalassos*) G4T2Q S1B,SZN**

The interior least tern, with its sharp yellow bill, narrow wings, forked tail, and black cap, breeds along the coasts of North America, and of the Caribbean Islands, as well as along scattered reaches of the major drainages of the Great Plains in North America (Thompson et al. 1997). Although it has been known to breed in eastern Colorado, a breeding pair in western Colorado is extremely unusual. One pair was recorded at Hart's Basin in 1980 (Chase 1980), but has not been documented since. However, it is a species to watch for.

**Marsh wren (*Cistothorus palustris*) G5 S3BSZN**

A small, brown wren with white line over its eye and white stripes on its back, the marsh wren is found throughout the western United States in cattail and bulrush marshes where it nests colonially. It was documented in the Hart's Basin proposed conservation site, where they can be both seen and heard from the road, as they fly from one section of marsh to another.

**Northern goshawk (*Accipiter gentilis*) G5 S2B**

A large, robust hawk with a long tail and rounded wings, the goshawk is found in aspen and spruce-fir forests in Colorado. Its nest is a platform of sticks in a tree. Females may have as many as nine nests, an active one and several alternates. Although it is a widespread species, nesting goshawks are uncommon in Colorado. Active nests were documented in 1994 at the Overland Reservoir and Little Alder Creek proposed conservation sites in the Gunnison National Forest.

**Northern harrier (*Circus cyaneus*) G5 S3BSZN**

The northern harrier, formerly known as the marsh hawk, is a large raptor recognizable by its white rump and low, wavering flight patterns. It builds its nest on the ground in sparsely shrubby open ground or marshes. CNHP's first records for Delta County for this species resulted from this survey. Marsh hawks were observed at the Hart's Basin and Middle Point Creek proposed conservation sites.

**Willet (*Catoptrophorus semipalmatus*) G5 S1B, SZN**

A large shorebird with spectacular black and white wings when in flight, the willet is found from southern Canada to the Gulf of Mexico. It breeds from southeast Idaho to northern Utah, and only occasionally in Colorado. It inhabits marshes, meadows and beaches (Peterson 1961). In Delta County, willets were observed in the Hart's Basin proposed conservation site.

**Whooping crane (*Grus americana*) G1 SAN**

The whooping crane is the rarest bird in North America. Although it was not a viable population, the 1996 Hart's Basin visit of whooping cranes which had been raised by sandhill cranes was an exciting event for local birdwatchers. The whooping cranes were not present in the flocks of sandhills which passed through in 1997.

## **Fish**

### **Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) G5T3 S3 SC FS**

Western Colorado's native trout species is seldom found to be genetically pure, due to hybridization with introduced Rainbow trout (*Oncorhynchus mykiss*). Competition with introduced Brook trout (*Salmo fontinalis*) has been very detrimental and has led to local extinctions of native populations of cutthroat trout. Although the majority of cutthroat trout in western Colorado today have been stocked by the Colorado Division of Wildlife, Delta County has at least one native remnant population in the Second Creek proposed conservation site.

### **Colorado squawfish (*Ptychocheilus lucius*) G1S1 LE E**

The Colorado squawfish was once an important food and commercial fish, living throughout the Colorado River drainage in mainstream channels, including the Green, Yampa, White, Colorado, Gunnison, Dolores, and Animas rivers. Its current distribution is restricted to the lower reaches of these rivers, except the Dolores and Animas (Woodling 1985.) The decline of the fish is not fully understood. It is thought that dams have restricted spawning migrations, and that lowered water temperatures resulting from cold water releases prevent the development of fertilized eggs. Biotic interactions with other introduced fish species may also have impacted their decline (Woodling 1985). The young squawfish prefer small, quiet backwaters. Adults use various habitats, including deep, turbid, strongly flowing water, eddies, runs, flooded bottoms, or backwaters (especially during high flow). Lowlands inundated during spring high flow appear to be important habitats (Tyus and McAda 1984). Efforts for the recovery of the squawfish include reintroduction and the construction of fish ladders to facilitate their natural migration (Anderson, personal communication.) The Gunnison River proposed conservation site is the home of Delta County's squawfish.

### **Flannelmouth sucker (*Catostomus latipinnis*) G3G4 S3S4 SC**

The flannelmouth sucker is a large bottomfeeding fish, growing up to 22 inches and 3.5 pounds. It is known only from the larger streams and rivers in the middle and upper Colorado River Drainage, including parts of Wyoming, Colorado, New Mexico, Utah, Nevada, and Arizona. In Colorado, it is found only in the large rivers on the western slope (Woodling 1985). One of seven native fish that occur in the lower Gunnison River, the flannelmouth sucker was the second most numerous fish collected by electroshocking in the Gunnison River in 1992-3 (Burdick 1995). However, it has disappeared from the upper Gunnison River above Blue Mesa Reservoir. Although not federally listed, the flannelmouth sucker is listed by the State of Colorado as a species of special concern.

### **Razorback sucker (*Xyrauchen texanus*) G1S1 LE E**

The razorback sucker is extremely rare in Colorado. Fewer than seventy specimens have been collected since 1979, and these have all been adult fish, which may live for thirty years (Woodling 1985). This suggests that reproductive failure is the cause of their decline. Lack of recruitment of young into the population has been attributed to

predation by non-native species including catfish and carp. Dams may block access to spawning habitats, change suitable juvenile habitat, block upstream migration, and lower water temperatures. Habitats for the fish include backwaters, eddies, and impoundments. The fish are often associated with sand, mud and rock substrates in areas with sparse aquatic vegetation and moderate to warm temperatures (Sigler and Miller 1963). The razorback sucker is found in the Gunnison River proposed conservation site.

**Roundtail chub (*Gila robusta*) G3S2 SC**

The roundtail chub inhabits warm streams and large tributaries of the Colorado River Basin from Wyoming south to Mexico. Although the roundtail chub is abundant in most waters where it is found, it is declining in the Gunnison River, where it was abundant until the late 1970's (Woodling 1985). It is found in rocky runs, rapids, and pools of creeks and rivers, often in association with cover such as boulders or overhanging cliffs or vegetation. Groups of adults concentrate in quiet swirling water adjacent to fast moving water, while fish younger than one year old concentrate in river eddies and irrigation ditches (Woodling 1985). Their decline in the Gunnison River has been attributed to cold water releases downstream of Curecanti Dam (Woodling 1985).

**Mammals**

**Ord's kangaroo rat subsp. (*Dipodomys ordii sanrafaeli*) G5T?S2**

Ord's kangaroo rats are found in extreme western Colorado, in sagebrush, pinyon-juniper, or semi-desert shrub communities. They commonly dig burrows in light textured sandy soils. Food plants include cacti, Mormon tea, Russian thistle, pine nuts, and various seeds and branches of shrubs. The rat is able to eat plants high in oxalic acid, and derives water from its diet. The first Delta County records of the Ord's kangaroo rat resulted from this year's survey. All were found between the Gunnison River and Grand Mesa, in semi-desert shrubland. They are represented in the Wells Gulch, Huff and North Delta proposed conservation sites.

**White tailed antelope squirrel (*Ammospermophilus leucurus pennipes*) G5T?S1**

The white tailed antelope squirrel generally occurs below 5500 feet in river valleys, where the predominant vegetation is an association of saltbushes, sagebrush and greasewood, growing on heavy soils (Armstrong 1972). Rock outcrops and river-sorted boulder fields are its preferred habitat. The ecology of the subspecies is in need of study in Colorado, where its ecology is virtually unknown. Overgrazing, conversion of riparian habitats to more intensive irrigated agriculture, and similar practices may have negatively affected populations of the species (Fitzgerald, et al. 1982). Prior to this survey, the only record in the Colorado Natural Heritage Program database for this species in Delta County was a 1964 record mapped in downtown Delta. We found three new populations, with eight subpopulations in 1997. The species occurs in two of the proposed conservation sites recommended here, Huff and Middle Point Creek.



## **Reptiles**

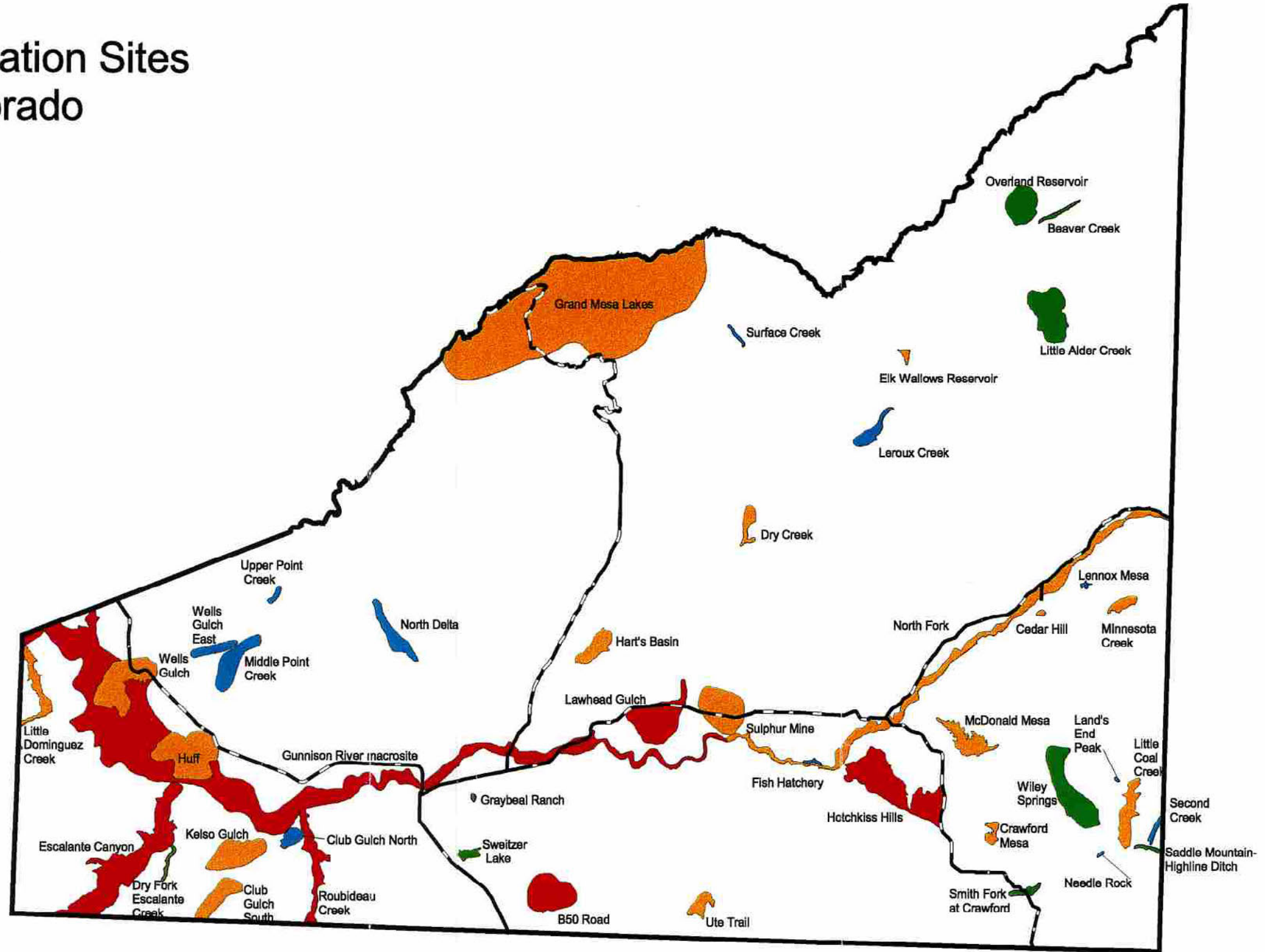
### **Western yellowbelly racer (*Coluber constrictor mormon*)      G5T5S2S3**

The western yellowbelly racer is found in a wide variety of habitats: meadows, prairies, open chaparral, pinyon-juniper woodlands, and riparian woodlands. In western Colorado, it occurs below about 5,500 feet, in agricultural areas, lowland riparian habitats, and occasionally in semi-desert shrublands. This slender-bodied snake, despite its name, does not constrict its prey, but swallows it whole, or crushes larger prey in its jaws. It feeds on insects, reptiles, frogs and small mammals. It was found at the Hart's Basin proposed conservation site.

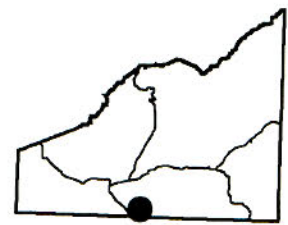
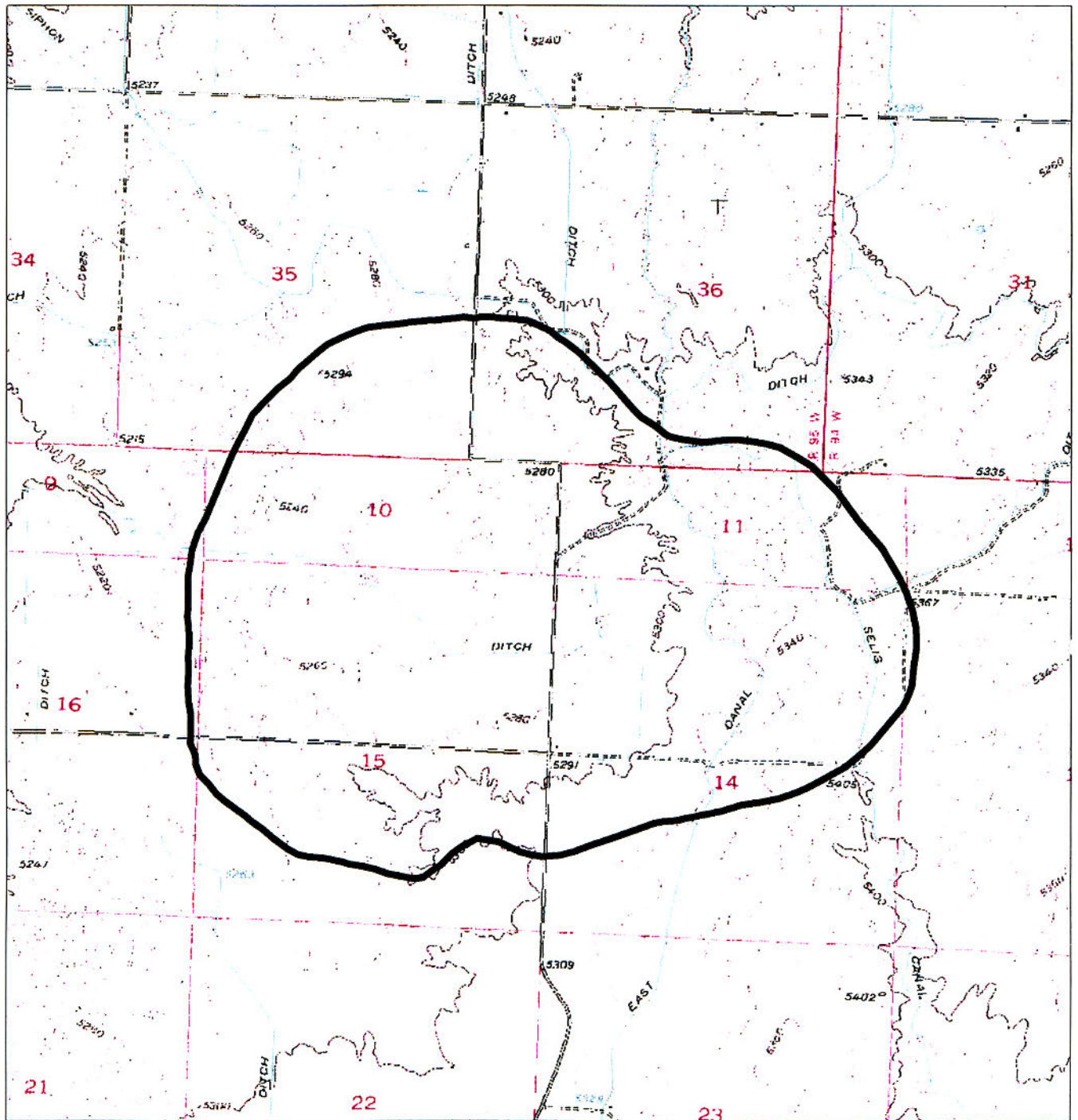
# Proposed Conservation Sites Delta County, Colorado



- Highway  
Conservation Sites
- B2 - Very High Significance
  - B3 - High Significance
  - B4 - Moderate Significance
  - B5 - General Significance



# B50 Road



## B50 Road

**Biodiversity Rank: B2** Very high significance.

The B50 Road site harbors the second largest known population of the clay-loving wild buckwheat (*Eriogonum pelinophilum*) in Delta County, and the ninth largest in the world.

**Protection Urgency Rank: P3**

The highest quality occurrence of the clay-loving buckwheat at this site is on private land on the south side of B50 Road. Although the absentee owner has no immediate plans to sell or develop the property, this is possible in the future. Efforts should be made to protect this occurrence with a conservation easement or other protection tool. The resident owner of one of the smaller populations is aware of the plant and plans to look for more of it during the flowering season in 1998.

**Management Urgency Rank: M5**

No serious management needs are known or anticipated on the private land at this site. The property is not grazed, and the areas where the clay-loving wild buckwheat is found are not used by humans. The BLM portion of the site is open to ORV use, which could impact the small clay-loving wild buckwheat population. Maintenance of the nearby irrigation ditch could also pose a threat to that population. However, the primary concern at this site should be the large population on the private land south of B50 Road.

**Location:** Approximately seven air miles southeast of Delta, on B50 Road.

U.S.G.S. 7.5 min. quadrangle: Olathe Northwest

Legal Description: T15S R95W S35, 36; T51N R10W S 9-11, 14-16.

**Elevation range:** 5,240 to 5,400 feet

**Size:** 1545 acres

**General Description:** This site in the southern part of the county is typical of the semi-desert shrublands in Delta County. It has low adobe hills derived from Mancos shale, sparsely vegetated with shadscale and mat saltbush. The clay-loving wild buckwheat was found almost exclusively on gentle east facing slopes, in several locations within this site. Although the buckwheat is not nearly as abundant here as at the Lawhead Gulch site, it is the second best site for the plant in Delta County, and contains the ninth largest of the twenty-two known populations in the entire world. In general, this part of the county has been highly fragmented by irrigated fields and residential housing.

**Biodiversity Rank Justification:** The B-50 Road proposed conservation site contains a high quality occurrence of a globally imperiled plant. The clay-loving wild buckwheat is known from only twenty-two populations, all in Delta and Montrose counties. This site includes three populations, one of which is the ninth largest known, with an estimated 2,000 individuals.

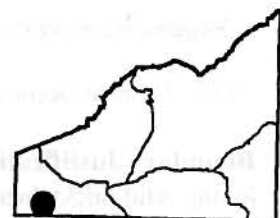
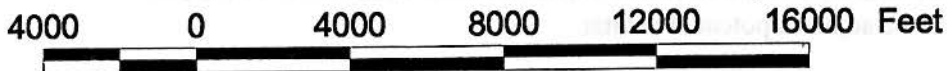
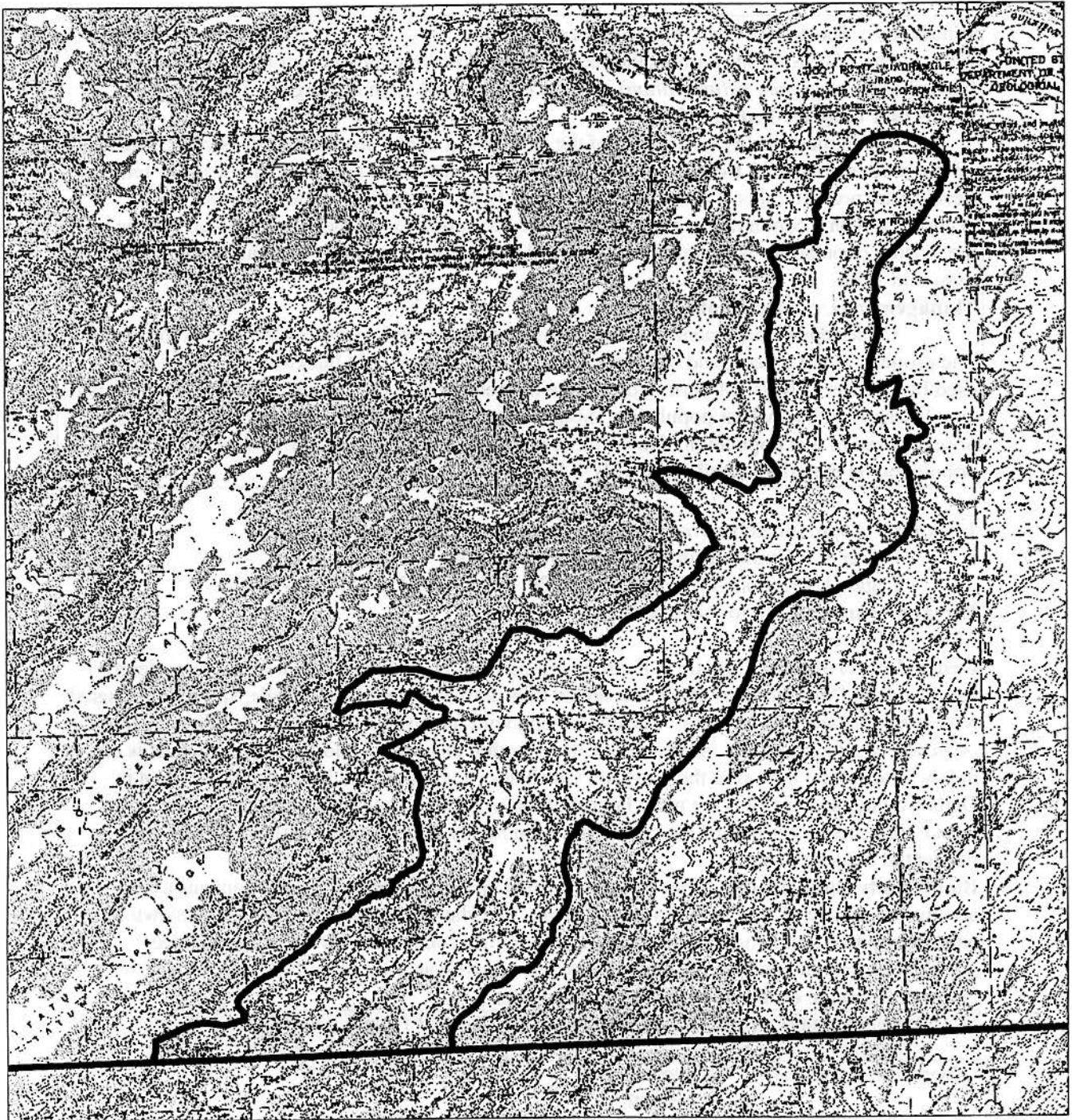
**Natural Heritage elements at the B-50 Road site.**

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Eriogonum pelinophilum</i>	Clay-loving wild buckwheat	G2	S2	LE	B
<i>Eriogonum pelinophilum</i>	Clay-loving wild buckwheat	G2	S2	LE	C
<i>Eriogonum pelinophilum</i>	Clay-loving wild buckwheat	G2	S2	LE	C

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to encompass the three occurrences of the clay-loving wild buckwheat and some adjacent potential habitat.

# Escalante Canyon



## Escalante Canyon

**Biodiversity Rank: B2.** Very high significance.

The Escalante Canyon site includes a concentration of several imperiled plants and an excellent example of a globally restricted plant community.

**Protection Urgency Rank: P2.**

The public land is adequately protected. The BLM portion of the site has been designated an Area of Critical Environmental Concern (ACEC), in recognition of its importance for rare plants and as a recreation area, especially at the potholes section of Escalante Creek. The southern end of this site has been designated a State Natural Area. Private land in the site may be threatened by residential development. Ranching has been historically important, and the irrigated pastures in the downstream part of the site seem to be compatible with the natural areas upstream. The continued agricultural use of the valley will probably have fewer negative effects on the natural areas than increased residential development.

**Management Urgency Rank: M3.**

Management action is needed to control weeds and maintain the quality of the riparian communities. Recommendations by the Colorado Natural Areas Program, including restricting vehicle use to the county road, and excluding grazing in the vicinity of the rare plant populations, have been acted on by BLM. Several roads have been closed, and a selected few improved. Vehicles are allowed only on designated roads and trails. No wood harvest is allowed. There is no grazing on the BLM land, although cattle do trail through Tatum Gulch. Monitoring studies for the Uinta Basin hookless cactus have been begun, but need to be redesigned and continued. Tamarisk control is recommended before the weed becomes unmanageable. Other weeds which are abundant on private and CDOW properties may spread upstream, and need to be watched.

**Location:** About ten air miles west southwest of Delta.

U.S.G.S. 7.5 min. quadrangle: Good Point

Legal Description: T51N R13W S9-11, 14-16, 20-22; T15S R98W S35, 36; T15S R97W S17-20, 29-32.

**Elevation range:** 4,920 to 8,000 feet.

**Size:** 6,248 acres.

**General Description:** Escalante Creek is one of the major drainages from the Uncompahgre Plateau to the Gunnison River. The canyon has scenic, geologic, historical, recreational, and agricultural values as well as being home to several rare plants and plant communities. The north flowing creek has carved a spectacular deep red-rock canyon down to Precambrian rock at its bottom. Above this, the dark red Chinle formation is topped by dramatic vertical Wingate sandstone cliffs. Small side drainages lead to box canyons with hanging gardens. Fans of the Jurassic Morrison formation running down from above have eroded, forming grotesque pillars called hoodoos.

The canyon has a long history, which can be glimpsed in the remains of old cabins that have been restored and are managed by the BLM. The area is popular with local residents who picnic, camp, and swim in the potholes of the creek near the Delta-Montrose County line. Private land in the canyon bottom with irrigated hay fields alternates with Colorado Division of Wildlife land. Portions of the site are grazed by livestock. The steep canyonsides and surrounding mesas, as well as the southernmost mile of canyon in Delta County are managed by the Bureau of Land Management. An unpaved county road runs along the canyon bottom. The site includes the Escalante Canyon state designated Natural Area.

Rare plants of the canyon include the Uinta Basin hookless cactus, the Grand Junction milkvetch, the giant helleborine orchid, and Eastwood's monkeyflower.

The Uinta Basin hookless cactus is found on dry, level to gently sloping ground, with shadscale (*Atriplex confertifolia*) and galleta (*Hilaria jamesii*). In undisturbed areas, the soil between plants is covered with a cryptobiotic crust. This living soil, containing mosses, lichens, algae and bacteria is important for stabilizing the sandy soils and adding to the long-term stability of desert grasslands. Other plants associated with the cactus are greasewood, hairy golden aster, broom snakeweed, prickly pear cactus, scarlet globemallow, spiny horsebrush, Fendler's desert-parsley, bulbous desert-parsley, and woolly milkvetch.



Escalante Canyon, with Utah juniper/needle and thread grass community in foreground.

The Grand Junction milkvetch usually grows on the Morrison formation, either on the sides of colluvial fans or in the small drainages where the Morrison has washed down over the older sandstones. Other plant species growing in the drainages with the milkvetch are Utah juniper, single leaf ash, serviceberry, cliff fendlerbush, Caineville thistle, rough brickellbush, hairy golden aster, greasewood, broom snakeweed, and needle and thread.

The most exceptional ecosystem in the canyon is the hanging garden (photo p.19). Four subpopulations of this plant community are found at the ends of box canyons off the main canyon. Precipitation falling on the mesa tops works its way through porous rock until it reaches an impermeable layer, and then moves laterally, to emerge as seeps in the alcoves at the heads of small side drainages. The wet, dripping walls support the rare Eastwood's monkeyflower, the yellow columbine, and the giant helleborine orchid, as well as several other more common plants such as smooth aster, basin wildrye, spikerush, and poison ivy. These areas are extremely unstable and fragile, and should not be climbed on. The giant helleborine orchid can also be found in wet areas downstream in these drainages, and sometimes along Escalante Creek itself. Here it grows with skunkbrush, sand bar willow, basin wildrye, and reed canary grass.

Several other natural communities are represented in the canyon. There are good examples of cottonwood/skunkbrush riparian communities, with both narrowleaf and plains cottonwoods, along Escalante Creek. Unfortunately, there are also stretches where this community is degraded, and introduced species such as tamarisk, sweet clover, cheatgrass, goosefoot, Japanese brome and bindweed dominate the understory.

An unusual stand of almost pure alkali cordgrass (*Spartina gracilis*) occurs near the Montrose-Delta county line. More common on the eastern plains, this species is rare on the Western Slope (Weber 1996). Soils in the stand are white with leached salts.

On the east side of Escalante Creek there are high quality occurrences of Utah juniper with needle and thread grass. This community is best developed on the tops and upper sides of ridges on colluvial fans of the Morrison formation. Associated species include pinyon pine, blue gramma, shadscale, Indian ricegrass, and clubflower. This excellent condition ungrazed site could serve as a baseline for range managers to use as a comparison with grazed areas.

**Biodiversity Rank Justification:** Escalante Canyon contains multiple excellent occurrences of globally vulnerable plants and imperiled natural communities.

Natural Heritage elements at the Escalante Canyon site.

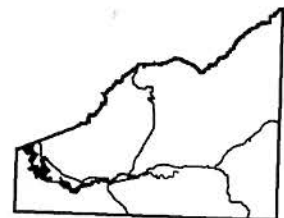
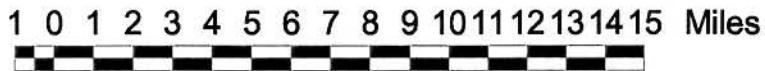
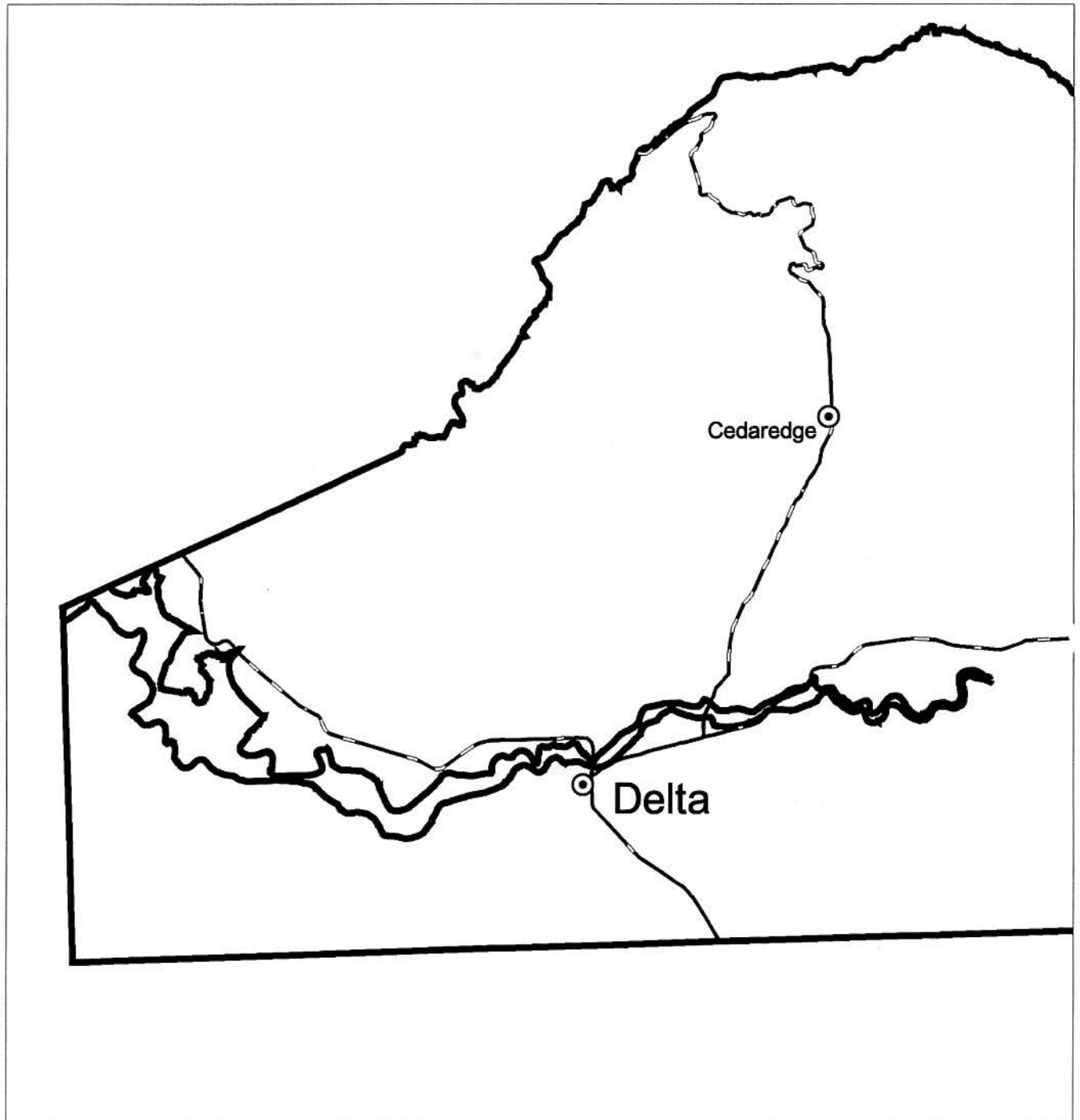
Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Aquiligia micrantha/Mimulus eastwoodiae</i>	Hanging gardens	GU	SU		A
<i>Astragalus linifolius</i>	Grand junction milkvetch	G3	S3		B
<i>Astragalus linifolius</i>	Grand junction milkvetch	G3	S3		B
<i>Astragalus linifolius</i>	Grand junction milkvetch	G3	S3		C
<i>Epipactis gigantea</i>	Giant helleborine orchid	G4	S2		B
<i>Epipactis gigantea</i>	Giant helleborine orchid	G4	S2		D
<i>Epipactis gigantea</i>	Giant helleborine orchid	G4	S2		B
<i>Juniperus osteosperma/Stipa comata</i>	Utah juniper-needle and thread	G2	S2?		B
<i>Mimulus eastwoodiae</i>	Eastwood monkey-flower	G3	S1S2		A
<i>Populus deltoides/Rhus trilobata</i>	Plains cottonwood-skunkbush riparian	G2	S2		C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	A
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C
<i>Spartina gracilis</i>	Salt meadows	G4	S3		B

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to include the entire canyon, to its rim. The north boundary is shared with the Gunnison River macrosite. The site extends into Montrose and Mesa Counties, although the description above applies only to the Delta County part of the site. The hydrological processes in the canyon are dependent on the condition of the entire watershed.



# Gunnison River Macrosite



## Gunnison River Macrosite

**Biodiversity Rank: B2.** Very high significance.

The Gunnison River Macrosite contains the globally imperiled fish, the Colorado squawfish and razorback sucker, as well as the major populations of the Uinta Basin hookless cactus that are known in Colorado. It also includes a good example of the globally imperiled plains cottonwood/skunkbrush plant community.

**Protection Urgency Rank: P4.**

The Colorado squawfish, razorback sucker and Uinta Basin hookless cactus are protected under the endangered species act. Much of the land along the Gunnison is privately owned. From the North Fork confluence to Roubideau Creek, the land is almost entirely private. At Roubideau Creek, the river passes through the Escalante State Wildlife Area. From there to the Mesa County line, private parcels are interspersed with BLM lands, which dominate the uplands. Possible tools for protection include purchase, conservation easements, purchase of development rights, and management agreements.

**Management Urgency Rank: M3**

Recovery of the endangered fish populations and restoration of riparian habitat will depend on implementing stream flows that will mimic the historical hydrology of the river (Burdick 1995). Although removal of exotic plant species and replacement with native cottonwoods and willows is desirable, the long-term success of such efforts will depend on restoration of the hydrological processes on which they depend. Great blue heron rookeries should be protected from human disturbance as much as possible. The Colorado Division of Wildlife defines critical habitat for the herons to include a buffer zone of 500 meters around the nesting trees at known active or inactive nest sites.

**Location:** Gunnison River and its flood plain downstream from the North Fork confluence.

U.S.G.S. 7.5 min. quadrangles: Dominguez|Good Point|Roubideau|Point  
Creek|Delta|North Delta|Orchard City|Lazear

Legal Description: T14S R98W S8, 9, 14-17, 20-23, 26, 27, 34, 35; T4S R3E S 7, 8, 17-20, 28-34; T15S R98W S 2, 11, 12, 13; T15S R97W S 7, 8, 17, 18 | T15S R97W S17, 18 | T15S R97W S14-16, 22-26; T15S R96W S 16-21, 30 | T4S R3E S26, 27, 34, 35; T15S R97W S 9, 10, 15, 16 | T15S R96W S15, 16 | T15S R96W S 10-16; T15S R95W S3-5, 7, 8, 18 | T15S R94W S1, 2, 11; T14S R94W S36.

**Elevation range:** 4,500 to 5,100 feet.

**Size:** 17,837 acres.

**General Description:** The Gunnison River drains all of Delta County, as well as a large part of Gunnison and Montrose Counties. In an arid land, the importance of this major river cannot be overemphasized. The site encompasses the riparian zone and benches above the river. Two standard sites, Huff and Wells Gulch, are included in the macrosite, but discussed separately.

The section of the river below the confluence with the Uncompahgre River at Delta has been designated as critical habitat for the Colorado squawfish and razorback sucker. Although this survey did not address the endangered fish, they have been much studied, and tremendous effort has been put into their recovery. A fish ladder was constructed at Redlands, near the confluence with the Colorado, to allow upstream migration of fish from the Colorado River, and genetic mixing with the Gunnison River population.

Four rare endemic native fishes occur in Delta County: the Colorado squawfish, razorback sucker, roundtail chub and flannelmouth sucker. Non-native fishes have increased

with lowered water levels, and threaten the survival of native fish. Of twenty-one species of fish collected in the warm water reaches of the Gunnison River, seven were native and fourteen were nonnative. However, the native fish comprised 79% of the total fish collected (Burdick 1995). In a two year study, densities of native fish were higher in a high-water year, while nonnatives were more dense in a low water year. Increasing spring flows in the river is essential to restore natural floodplain functions, provide habitat for native fish, and control exotic fish.

In addition to the fish, the native riparian plant community is considered to be globally imperiled. Natural riparian plant communities of the Gunnison are dominated by Fremont's cottonwood and sand bar willow (photo p.53). This community is dependent on spring flooding for regeneration. Other native species that are common along the river include skunkbush, big sagebrush, greasewood, rubber rabbitbrush, spearleaf rabbitbrush, bulrushes, cattails, spikerush, baltic rush, wild licorice, saltgrass, alkali sacaton and sand dropseed.

Much of the river has been highly altered, and cottonwood regeneration is not occurring as it should. Because of diversions for irrigation, much of the floodplain which once periodically flooded is no longer inundated during the spring runoff. Areas that were once covered with dense cottonwood forest have been invaded by exotic species such as tamarisk, Russian olive, Siberian elm, Russian knapweed, cheatgrass, and reed canary grass. When the water table is lowered, tamarisk and Russian olive gain an advantage over native species. Remaining cottonwood groves often have an understory of Russian knapweed and other exotic species.

However, there are still some areas which appear to have relatively intact hydrology and vegetation. Signs of health of the river include meanders which move over time, and recruitment and survival of new trees. One site we surveyed a couple miles downstream from Delta had a mature, open cottonwood forest, with concentric bands of younger trees and willows which were established as the river moved sideways and built up new gravel bars. Undisturbed cottonwood groves are essential for the nesting sites of the Great blue heron. Rookeries that we observed along the Gunnison were in mature cottonwoods at and just downstream of Confluence Park, and downstream 0.2 and 1.0 miles from Escalante Creek.

We have included in the macrosite the benches above the river which are home to the Uinta Basin hookless cactus. The macrosite includes the Huff standard site, which has the major concentration of the cactus. Other concentrations of the cactus are at McCarty Bench and Palmer Gulch. The elements listed below are in addition to those listed for the Huff and Wells Gulch sites. The macrosite also includes the section of the river in Mesa County, to the confluence with the Colorado River. However, elements listed below are those for Delta County only.

**Biodiversity Rank Justification:** The Gunnison River macrosite has unranked occurrences of critically imperiled fish, and the major concentration of the Uinta Basin hookless cactus.

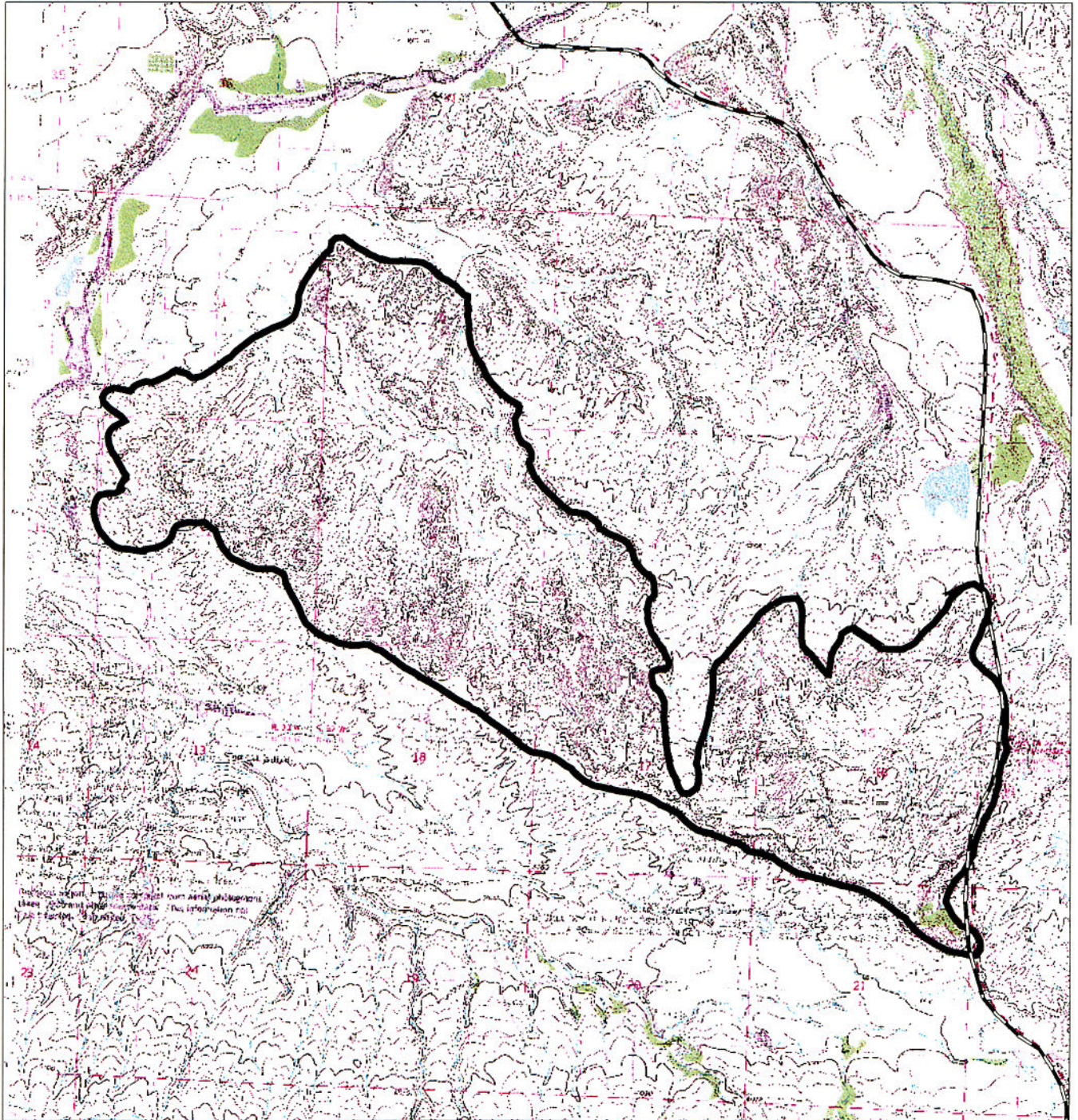
Natural Heritage elements at the Gunnison River macrosite.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Ardea herodias</i>	Great blue heron	G5	S3BSZN		B
<i>Ardea herodias</i>	Great blue heron	G5	S3BSZN		B
<i>Ardea herodias</i>	Great blue heron	G5	S3BSZN		D
<i>Catostomus latipinnis</i>	Flannelmouth sucker	G3G4	S3S4		
<i>Gila robusta</i>	Roundtail chub	G2G3	S2		
<i>Populus deltoides/Rhus trilobata</i>	Fremont's cottonwood riparian forests	G2	S2		B
<i>Ptychocheilus lucius</i>	Colorado squawfish	G1	S1	LE	
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	A
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	D
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	D
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	D
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	H
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	B
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	D
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	
<i>Xyrauchen texanus</i>	Razorback sucker	G1	S1	LE	

\*EO = Element Occurrence

**Boundary Justification:** The site includes the Gunnison River from the confluence of the North Fork to the Colorado River. We have drawn the boundaries to roughly approximate the one hundred year floodplain, with the addition of some benches above the river where the Uinta Basin hookless cactus occurs.

# Hotchkiss Hills



## Hotchkiss Hills

**Biodiversity Rank: B2.** Very high significance.

The Hotchkiss Hill site contains two excellent occurrences of the globally imperiled Colorado desert-parsley (*Lomatium concinnum*), a G2 species.

**Protection Urgency Rank: P3.**

The BLM portion of the site is protected from development. However, the greatest numbers of the desert-parsley occur on private land. Although there are presently no plans for development of this property, that is a possibility in the future.

**Management Urgency Rank: M4.**

The effects of sheep grazing on the Colorado desert-parsley are unknown. However, the present grazing system has been in effect for many years, and the plants seem to be thriving. The property owners report that the sheep do not eat the parsley. It seems that under this plan, the sheep may even be benefitting the plant, perhaps by removing competing vegetation. Further observations and study are needed. ORV use of the area is increasing, and poses a definite threat to the plants. Most of the disturbance from motorized vehicles is at the bottoms of the hills, but some riders enjoy the challenge of scaling the steep clay hills and disturb the tops as well. There are no fences or signs to mark the border between BLM and private land, so trespass on the private land is common.

BLM land at the site is part of Management Unit 5, which emphasizes management to reduce erosion of the highly saline soils, in order to reduce the salinity load in the Colorado River. The plan calls for no surface disturbance from March 1 to May 31, during the period when soils may be saturated and most erodable. ORV use is to be restricted to designated roads and trails. However, there are no informational signs specifying what roads and trails are designated, and this management prescription is not enforced. The plan also call for no grazing between March 20 to “range readiness”, but again, this provision does not appear to be enforced. Enforcement of existing management prescriptions would help protect the populations of the desert-parsley and possibly avoid more restrictive regulations should the species become listed under the Endangered Species Act.

**Location:** About a mile south of Hotchkiss.

U.S.G.S. 7.5 min. quadrangles: Hotchkiss | Grand View Mesa

Legal Description: T15S R93W S1, 12; T15S R92W S6-9, 15-18 | T15S R92W S15-18, 21.

**Elevation range:** 5,300 to 6,200 feet.

**Size:** 3,049 acres.

**General Description:** The Hotchkiss Hills site consists of a group of treeless, steep-sided adobe hills, rising from a relatively flat bottomland. The bottomlands are in poor condition, weedy with hornhead, annual grasses, and mustards, but the uplands have fewer weeds, and are home to one of our area’s most rare endemic plants. Although the sides of the hills have little vegetation, the tops have a sparse cover of shadscale, Gardner saltbush and perennial bunchgrasses, including galleta and Salina wild rye. Mat saltbush, budsage and spiny horsebrush are also common.

The Colorado desert-parsley is most abundant on the gently sloping or level tops of hills, especially on the south just above the steep slopes. The plants also sometimes grow along the sides of drainages near the top, and may extend down onto the steep south facing hillsides. The windswept edges of the highest hills, which have the most harsh growing conditions, are in some places covered with a solid carpet of the desert-parsley in April. The yellow flowers of the

parsley are often mixed with the purple flowers of a related species, *Cymopterus bulbosus*, or bulbous spring-parsley. Later in the summer, the plants' above-ground parts die and all but disappear.

The area is grazed by sheep early and late in the year. There is heavy recreational use at the bases of the hills, mainly for target practice and ORV use. Some ORVs climb up the steep sides of the hills to a road that runs along the top.

**Biodiversity Rank Justification:** The site has two excellent occurrences, with a total of eleven sub-populations, of the G2 ranked Colorado desert-parsley.

Natural Heritage elements at the Hotchkiss Hills site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Lomatium concinnum</i>	Colorado desert-parsley	G2	S2		A
<i>Lomatium concinnum</i>	Colorado desert-parsley	G2	S2		A

\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the tops and sides of the hills on which the Colorado desert-parsley occurs, both on BLM and private land. Surrounding bottomlands are not potential habitat for the plants. Protection of this site would physically protect the plant populations from direct disturbances; however, the ecological processes necessary for long term protection of the species are not known.



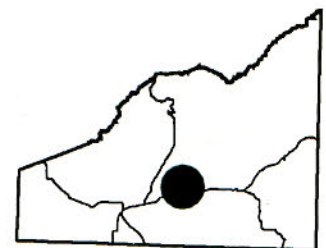
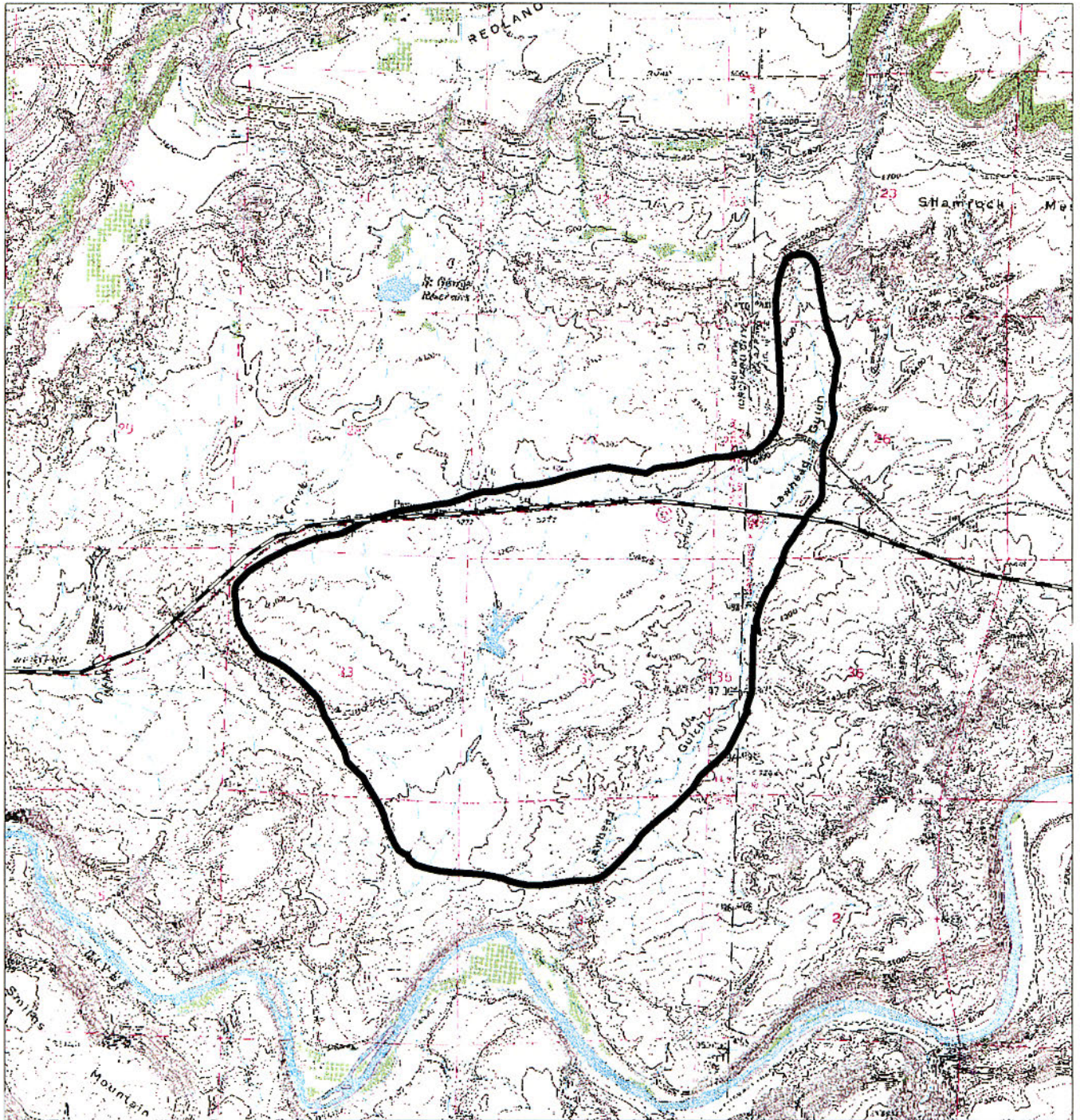
Hotchkiss Hills Proposed Conservation Site, with Colorado desert-parsley in foreground.



Riparian forests along the Gunnison River



# Lawhead Gulch



## Lawhead Gulch

**Biodiversity Rank: B2.** Very high significance.

The Lawhead Gulch site contains one of the largest known populations of the globally imperiled and federally listed clay-loving wild buckwheat (*Eriogonum pelinophilum*)

**Protection Urgency Rank: P1.**

Protection is urgently needed to prevent loss of this occurrence. Although the clay-loving wild buckwheat is listed as endangered under the Endangered Species Act, the plants are not protected on private land. This property is presently for sale, and if sold could be developed for residences, irrigated pasture, or grazing, possibly destroying the population of the clay-loving wild buckwheat. A conservation easement or other protection for the occurrences is needed. The entire property consists of approximately 2,236 deeded acres, with over two miles of frontage on Colorado State Highway 92 at its north side and more than one half mile of frontage on the Gunnison River at its south side. According to the realtor's description, there are 300 irrigable acres, which have produced crops in the past. The portion of the property where the clay-loving wild buckwheat occurs constitutes about four hundred acres, and is only marginally suitable for either livestock or development. This portion of the property could best be retained as open space and habitat for the clay-loving wild buckwheat.

**Management Urgency Rank: M4.**

Present management of the site is adequate. There is no grazing or any other use at this time. However, if the property is sold, trampling by livestock, conversion to cropland, or residential development could extirpate the clay-loving wild buckwheat population. If formal protection is not obtained, and the property is sold, a management agreement with the new owners could help to unofficially protect the occurrence.

**Location:** About three miles east of Austin, on Highway 92, commonly known as Payne Siding.

U.S.G.S. 7.5 min. quadrangles: Orchard City | Lazear

Legal Description: T14S R94W S26-28, 33-35; T15S R94W S3, 4 | T14S R94W S 23,26, 35.

**Elevation range:** 5,200 to 5,500 feet.

**Size:** 1,936 acres.

**General Description:** Lawhead Gulch is a broad swale, draining much of Redlands Mesa. The wetlands in the bottom are covered with greasewood and saltgrass. Just west of the gulch, the dry adobe hills with shadscale and mat saltbush are home to one of the world's two best populations of the clay-loving wild buckwheat. This is the site where the plant was first discovered, and is the type locality for the species. There are three minor sub-populations of the plant in the site, as well as the primary one which has thousands of individual plants. Associated species include budsage, winterfat, low rabbitbrush, and spiny horsebrush. Surrounding flat areas are very weedy, with Russian knapweed and halogeton. However, the weeds do not extend onto the more barren slopes where the buckwheat is found.

The buckwheat is restricted to the very light gray soils derived from Mancos shale, mapped as Chipeta silty clay loam, 3 to 30 percent slopes, by the Soil Conservation Service. This soil is described as being unsuitable for crops because of the slope, shallow soil depth, and low available water capacity. Planting grass by preparing the seedbed and drilling the seed produces only fair results, and would provide only very limited grazing for livestock. Limitations for urban

development include depth to bedrock, shrink-swell potential, slope, and corrosivity (USDA 1981).

The site includes the twenty acre Oasis Reservoir, which is important for waterfowl and migrating birds, and some extensive wetlands with cattail marshes, giant reeds, and saltgrass downstream. The northern leopard frog was found just below the reservoir.

There are two abandoned houses and some out-buildings on the site, and two roads pass through it. The site adjoins about 1400 acres of BLM land on the east, and one 80 acre isolated parcel which is privately owned.

**Biodiversity Rank Justification:** An excellent occurrence, perhaps the best known, of a globally imperiled plant. Also important as the type locality of the clay-loving wild buckwheat.

Natural Heritage elements at the Lawhead Gulch site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Eriogonum pelinophilum</i>	Clay-loving wild buckwheat	G2	S2	LE	A
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	C
<i>Sarcobatus vermiculatus</i> <i>/ Suaeda torreyana</i>	Greasewood-sea blight	GU	S?		B
<i>Typha latifolia</i>	Cattail marsh	G5	S3		C

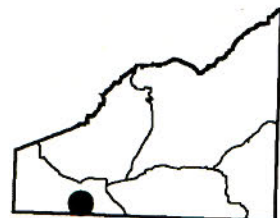
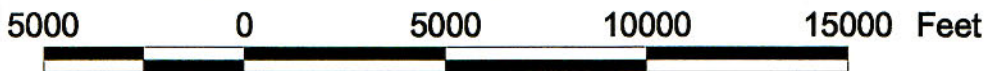
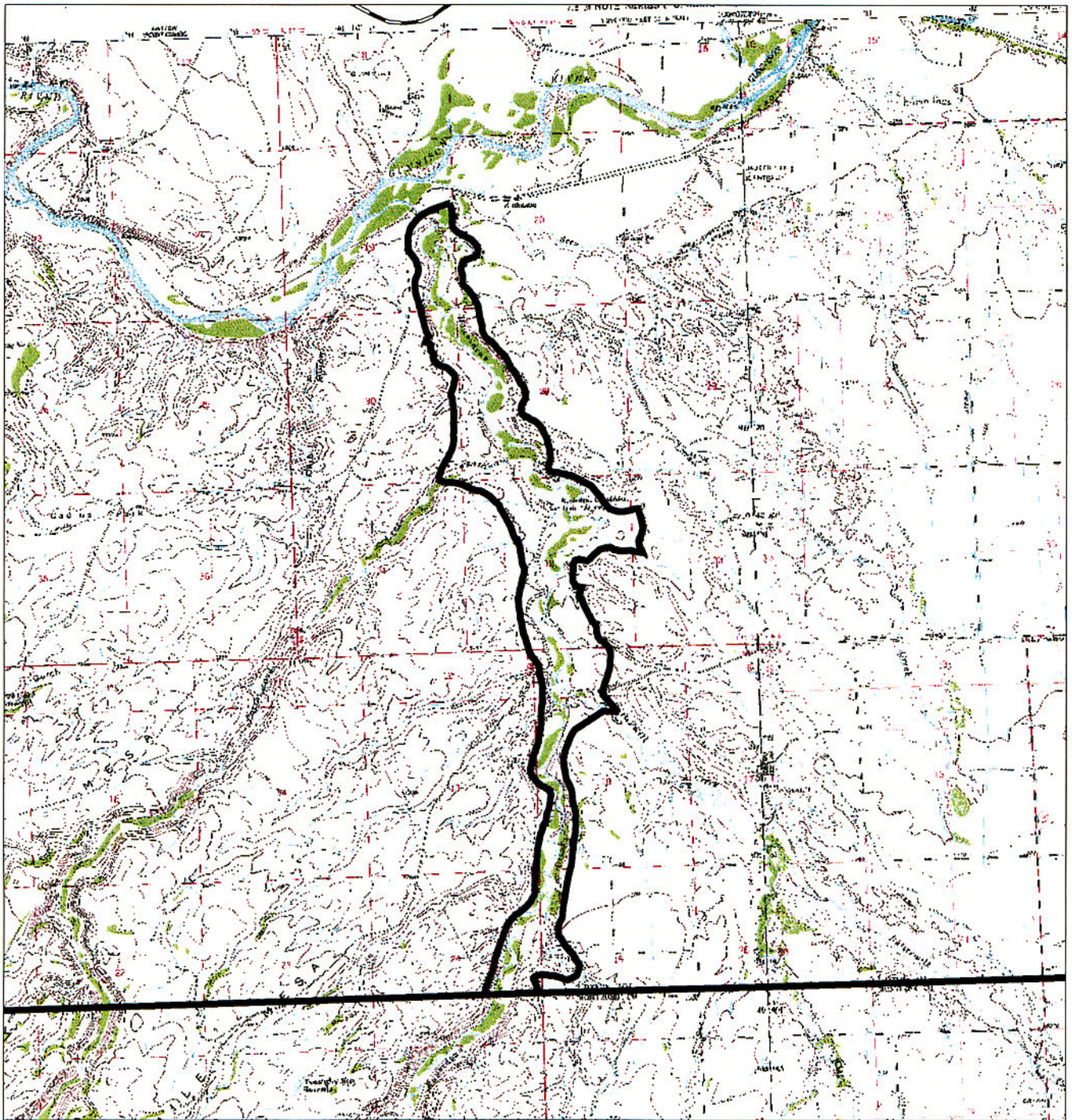
\*EO = Element Occurrence

**Boundary Justification:** The site includes four subpopulations of the clay-loving wild buckwheat, which occur on either side of the reservoir, and the adjacent gulch. A mosaic of common plant communities is represented. Protection of the land within these boundaries from direct and indirect disturbance is critical to the continued existence of the clay-loving buckwheat.



The clay-loving wild buckwheat at Lawhead Gulch.

# Roubideau Creek



## Roubideau Creek

**Biodiversity Rank: B2.** Very high biodiversity significance.

The high significance of the Roubideau Creek site is based on excellent occurrences of riparian plant communities upstream in Montrose County. Moderately good examples of riparian communities, rare plants, and amphibians can be found in the Delta County part of the site.

**Protection Urgency Rank: P4.**

Much of the Delta County part of the site is within the Escalante State Wildlife Area. South of the wildlife area, the creek passes through private lands with no special protection, and then onto BLM land.

**Management Urgency Rank: M2.**

Management of the Escalante State Wildlife Area is aimed toward enhancement of the riparian and wetland vegetation for wildlife. BLM lands in the site are also managed for riparian values. BLM lands along Roubideau Creek in Delta County were formerly grazed, but now only livestock trailing through the area takes place. Active management is needed for problem weeds, particularly tamarisk and Russian knapweed in the Escalante State Wildlife Area, and at the Correctional Center. Control of the knapweed near the Uinta Basin hookless cactus will have to be done cautiously to avoid harming the cactus.

**Location:** About five miles southwest of Delta.

U.S.G.S. 7.5 min. quadrangle: Roubideau

Legal Description (Delta County part only): T15S R96W S19, 20, 29, 30, 32, 33;

T51N R11W S7, 18, 19, 24.

**Elevation range:** 4,874 to 7800 feet.

**Size:** 3,427 acres.

**General Description:** One of the major drainages of the east side of the Uncompahgre Plateau, Roubideau Creek is a low gradient, meandering stream by the time it reaches Delta County. The lower half of the Delta County part of the creek flows through the Escalante State Wildlife Area, where it forms extensive wetlands which provide excellent breeding habitat for waterfowl. Much of rest of the Delta County area is privately owned along the valley bottom, with some BLM land along the southern end.

Riparian vegetation along the creek consists of Fremont cottonwood with several shrubs (sand bar willow, skunkbush, greasewood, spearleaf rabbitbrush), and grasses (saltgrass, Canada wildrye, giant reed, alkali sacaton and sand dropseed). Introduced species include tamarisk (*Tamarix ramosissima*), white top (*Cardaria* sp.) and reed canary grass (*Phalaris arundinacea*).

Dry benches above the river channel have desert shrub vegetation, and are home to some small, scattered populations of the Uinta Basin hookless cactus. Both the cactus and the long-flowered cat's-eye were found on the State Wildlife Area above the ponds at the north end of the site. A new population of the cactus was also found at the State Correctional Center. Native plants associated with the cactus were shadscale, galleta, broom snakeweed, paper flower, prickly pear cactus, sand aster, scorpionweed, and winterfat. There were also several introduced weeds, including Russian knapweed and cheatgrass.

The northern leopard frog was seen near the mouth of the creek.

**Biodiversity Rank Justification:** The rank is based on the excellent occurrences of riparian communities upstream. If only the Delta County portion were considered, the rank would be B4. Elements listed below are those in Delta County only.

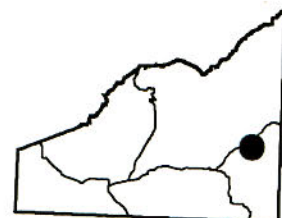
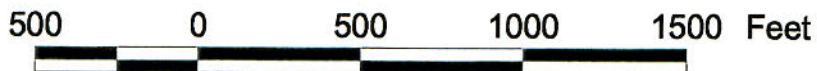
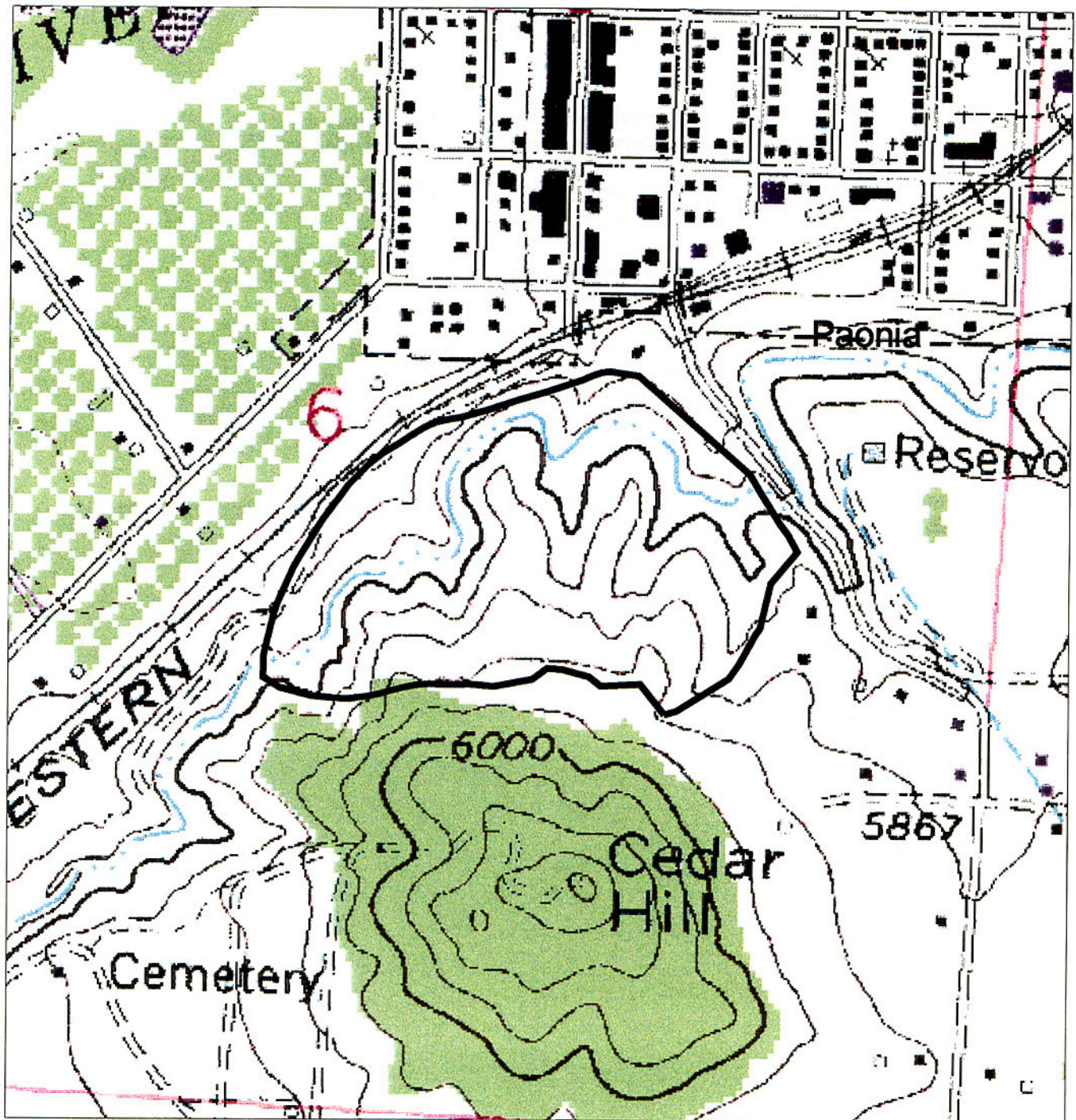
Natural Heritage elements at the Roubideau Creek site (Delta County only).

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Cryptantha longiflora</i>	Long-flowered cat's-eye	G3	S3?		C
<i>Populus deltoides/ Rhus trilobata</i>	Fremont's cottonwood riparian forests	G2	S2		C
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	D
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to include the creek, valley bottom, and benches with the Uinta Basin hookless cactus.

# Cedar Hill



## Cedar Hill

**Biodiversity Rank: B3.** High significance.

The Cedar Hill site contains small populations of two globally imperiled plant species.

**Protection Urgency Rank: P4.**

The site is owned by the town of Paonia. The primary threats to the site concern management rather than ownership.

**Management Urgency Rank: M4.**

Although not currently threatened, management maybe needed in the future to maintain the current quality of the element occurrences. Potential threats to the plants include trampling, disturbance from canal maintenance, and weed control actions. Users should be aware of the presence of the plants, and stay on roads or trails to avoid disturbing them. It may be necessary in the future to take steps to prohibit trespassers. The rare Rocky Mountain thistle superficially resembles the noxious alien weed, Canada thistle (*Cirsium arvense*). Caution should be taken before management actions are taken, so that the rare thistle is not harmed inadvertently.

**Location:** Cedar Hill is located at the southeastern edge of the town of Paonia.

U.S.G.S. 7.5 min. quadrangle: Paonia

Legal Description: T14S R91W S6

**Elevation range:** 5,760 to 5,960 feet

**Size:** 42 acres

**General Description:** This small, north-facing hillside, easily recognized by its wooden cross, is used by a local organization as the site for a nativity scene at Christmas. The railroad and a paved road run along the bottom of the hill, and an irrigation canal traverses the hillside about halfway up the site. The vegetation consists of a mixture of native shrubs, including Utah serviceberry, squaw apple, fourwing saltbush, and big sagebrush. The Colorado desert-parsley was found scattered throughout the site, often hidden under the dense shrubs. This hillside is wetter and more heavily vegetated than other sites where the desert-parsley was found. The Rocky Mountain thistle favored areas along the trail to the cross, which may indicate that it grows best in areas which have received some disturbance. It was also seen on the east facing slope above the canal. There is more potential habitat for these plants in surrounding areas which have not been searched, and have not been included in the site.

**Biodiversity Rank Justification:** The Cedar Hill site contains two fair occurrences of globally imperiled plants.

Natural Heritage elements at the Cedar Hill site.

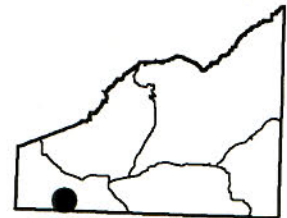
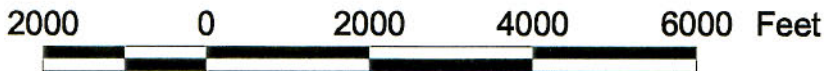
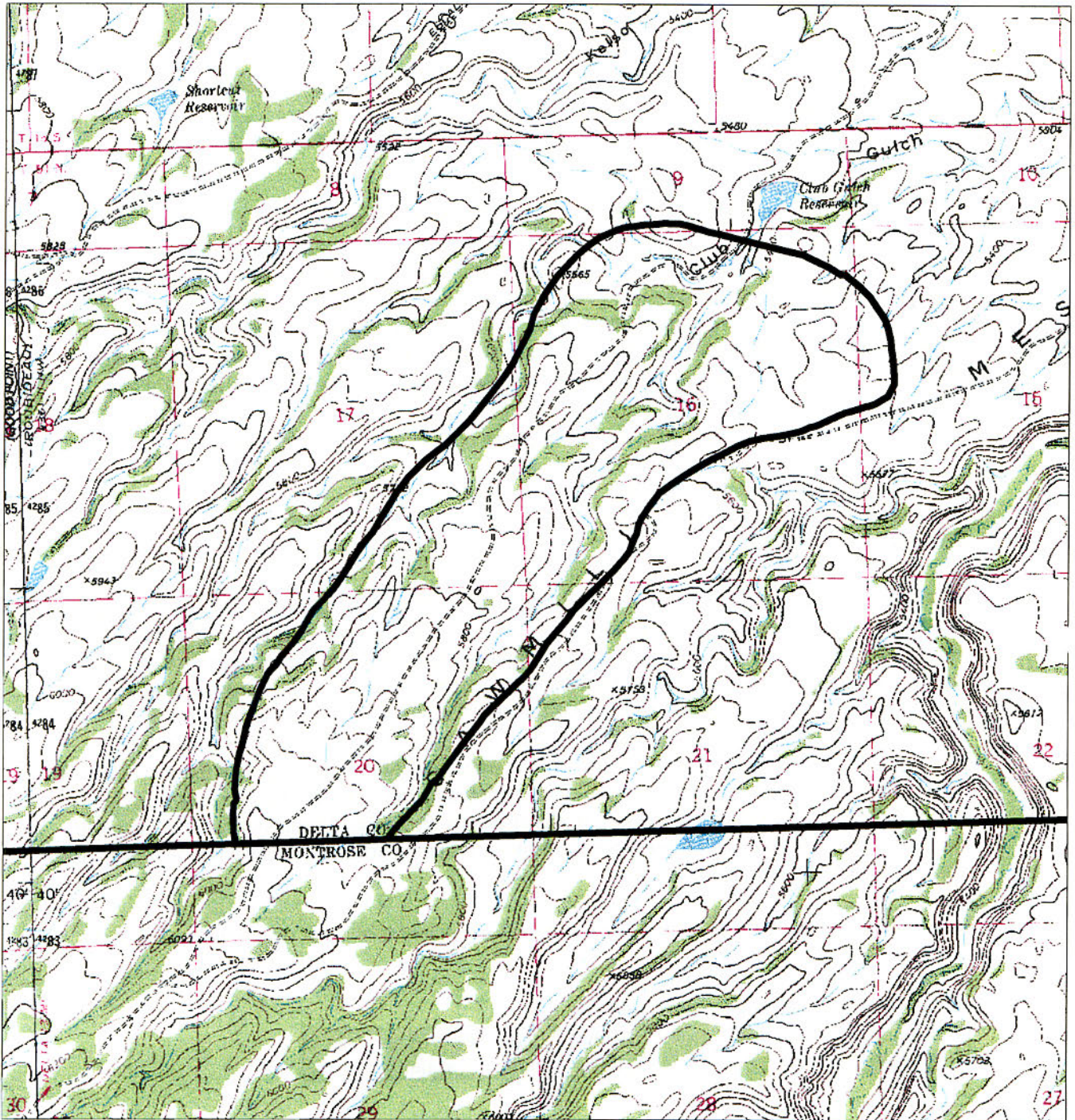
Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Cirsium perplexans</i>	Rocky Mountain thistle	G2	S2		C
<i>Lomatium concinnum</i>	Colorado desert-parsley	G2	S2		C

\*EO = Element Occurrence

**Boundary Justification:** The site includes the locations of both plants, bounded by the railroad, roads and the top of the hill.



# Club Gulch South



## Club Gulch South

**Biodiversity Rank: B3.** High significance.

The Club Gulch site contains one of the most extensive, unfragmented and healthy occurrences of the globally rare Utah juniper/needle and thread plant community known.

**Protection Urgency Rank: P4.**

The site is entirely on BLM land, and is adequately protected at present. However, special designation may be necessary to prevent future road development which would increase non-native plant invasion.

**Management Urgency Rank: M4.**

The site is in BLM's Management Unit 1, which emphasizes livestock use (USDI 1989b). Management is to be directed toward improving vegetation condition and forage for livestock. Presently, the north side of Sawmill Mesa Road is grazed by sheep, and the south side by cattle. In some areas, a distinct contrast in vegetative composition can be seen. The plant community is in excellent condition in this site. Present management appears to be successful, and perhaps could be applied to other areas which are in less good condition. Important ecological processes in the community probably include fire. There have been no prescribed burns in the area, and fires are extinguished when they occur. Further research is needed to determine the part that fire and grazing history have played in maintaining the savannah-like appearance of this site. BLM's management plan calls for intensive range monitoring studies. Of particular interest would be studies to determine whether the suppression of fire is leading to invasion of juniper into the grassland.

ORV use at the site is prohibited off designated roads only from December 1 to April 30. Although no negative impacts of ORV use were noted, this could become a problem as use increases.

**Location:** Southwestern part of Delta County, near the Montrose County line, along the Sawmill Mesa Rd.

U.S.G.S. 7.5 min. quadrangle: Roubideau

Legal Description: T51N R12W S15, 16, 17, 20, 21

**Elevation range:** 5,440 to 6,000 feet

**Size:** 920 acres

**General Description:** With a slight increase in elevation above the shadscale/galleta community which dominates the land to the north of this site, widely scattered Utah juniper appears, and needle and thread grass replaces galleta as the dominant native grass. This site has an excellent quality example of a plant community typical of much of the land on the lower flanks of the Uncompahgre Plateau between 5,600 and 6,500 feet. Savannah-like areas of almost pure needle and thread are broken by smaller patches dominated by winterfat, a shrub named for its importance as winter feed for sheep and deer. These form a mosaic with areas of black sagebrush. Cheatgrass, an invasive exotic weed, is much less common here than at lower elevations, and there are few non-native species. Some of the other common plants in the area are blue gramma, broom snakeweed, Indian rice grass, scarlet globemallow, actinea, and viscid rabbitbrush.

**Biodiversity Rank Justification:** An excellent occurrence of a globally imperiled community. The Utah juniper/needle and thread grass community is known only from the Four Corners region of the United States. Although small patches of this community are common on the Colorado Plateau, large intact systems are unusual. The Club Gulch site harbors a 920 acre occurrence, with more acreage of the community expected to the west of this site.

Natural Heritage elements at the Club Gulch South site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO rank
<i>Krascheninnikovia lanata/Stipa comata</i>	winterfat/needle and thread	G3	S3		B
<i>Juniperus osteosperma/Stipa comata</i>	Utah juniper/needle and thread	G2?	S2?		A

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to include several high quality patches of the Utah juniper/needle and thread community. Land to the west of this site which was not surveyed is expected to contain additional examples of this community.

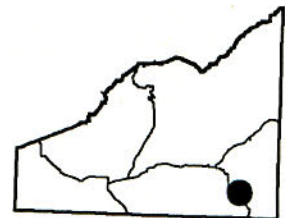
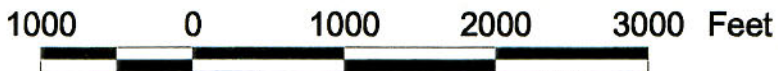
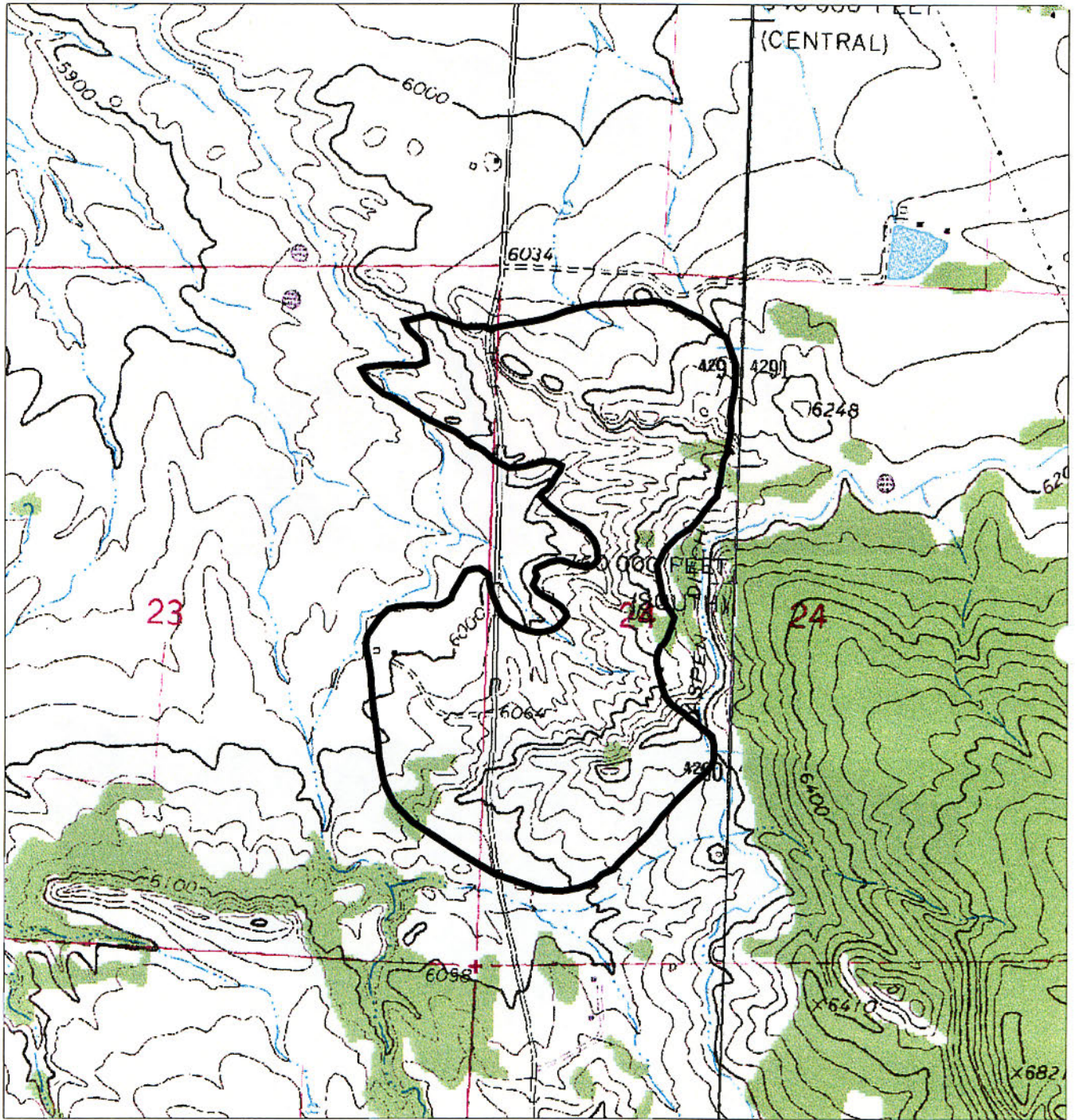


Rocky Mountain thistle (*Cirsium perplexans*)



Grand Mesa Lakes macrosite

# Crawford Mesa



## Crawford Mesa

**Biodiversity Rank: B3.** High significance.

The Crawford Mesa site contains an excellent population of the globally restricted adobe beardtongue (*Penstemon retrorsus*).

**Protection Urgency Rank: P3.**

This site is primarily on BLM land, and carries no special designation. The private land included in the site is not known to contain the adobe beardtongue, but is included because of its similar soil and topography.

**Management Urgency Rank: M3.**

There are several two-track roads through the site, and some evidence of off-road vehicle use in the area, which could impact the plants in the future. Management should be directed toward protecting the adobe beardtongue from disturbance by ORVs or further road development.

Sheep are grazed at this site during the dormant season. Their impacts on the adobe beardtongue are not known. Periodic monitoring of the plants to assess any changes in the quality or condition of the population is recommended.

**Location:** North of Crawford, along 3900 Road  
 U.S.G.S. 7.5 min. quadrangle: Grand View Mesa  
 Legal Description: T15S R92W S23, 24

**Elevation range:** 6,000 to 6,400 feet

**Size:** 214 acres

**General Description:** This area of low adobe hills has a high density, up to about 10% canopy cover, of the adobe penstemon. The soils are shallow, composed of a light gray, silty clay on the surface. The low available water capacity and shallow depth make these soils unsuitable for growing crops (USDA 1981). The beardtongue is found in barren areas on north facing slopes with sparse vegetation. Associated plants include shadscale and spiny horsebrush. The south facing slopes, with more grass and annual weeds, did not support the beardtongue. When the site was visited in early May, the plants were in bud, with very few flowers open.

**Biodiversity Rank Justification:** The Crawford Mesa cite contains an excellent occurrence of a vulnerable, locally restricted plant. The adobe beardtongue is known only from the adobe hills of Delta and Montrose counties. The Crawford Mesa site harbors one of the largest and healthiest occurrences known.

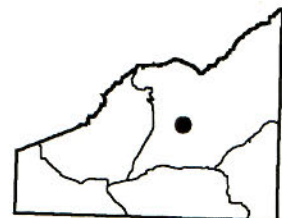
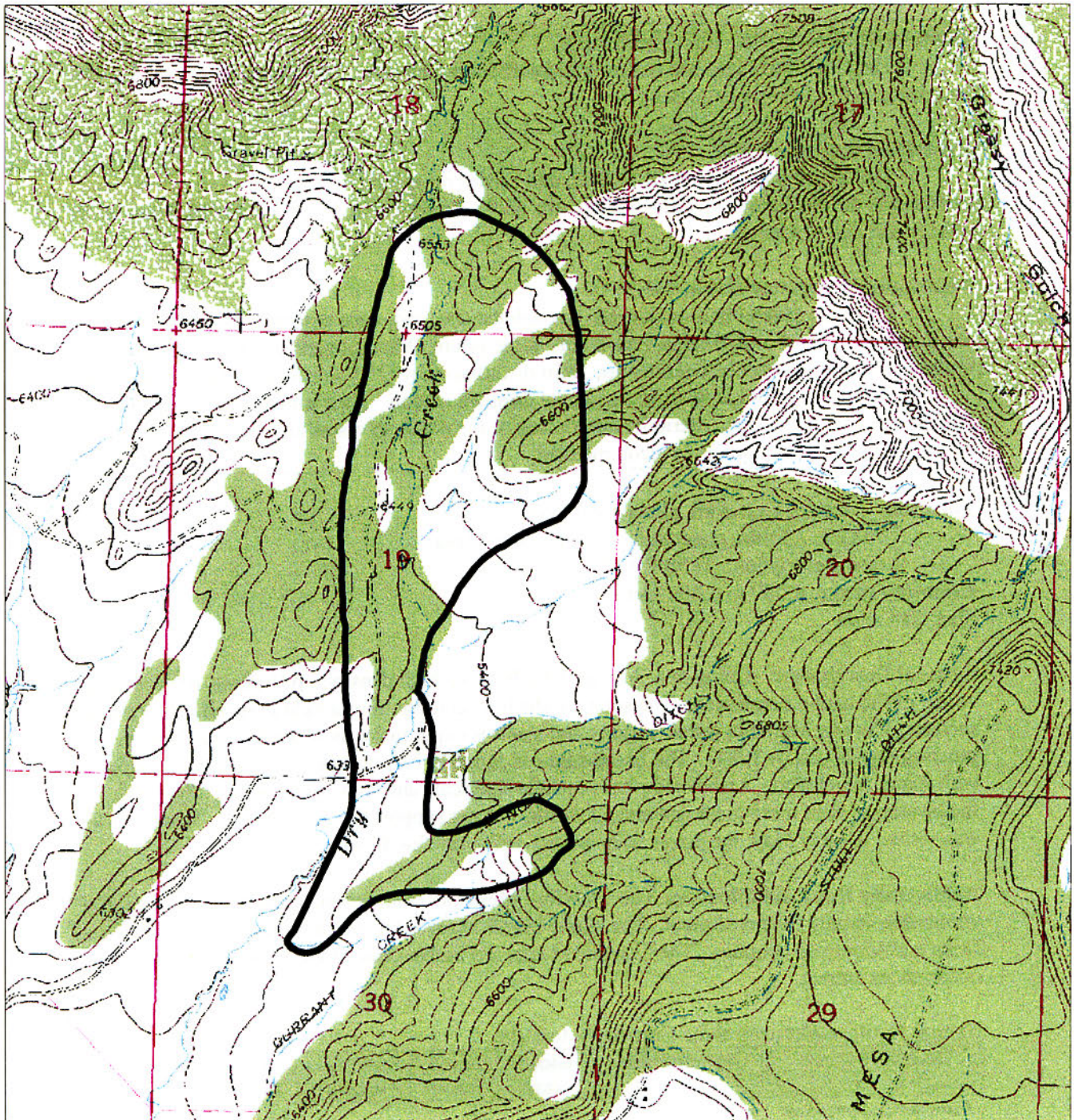
Natural Heritage elements at the Crawford Mesa site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Penstemon retrorsus</i>	adobe beardtongue	G3	S3		A

\*EO = Element Occurrence

**Boundary Justification:** The boundaries are drawn to encompass the population of adobe penstemon that was found on BLM lands, and the immediately adjacent areas with the same topography, vegetation and soil type. This includes some private land that was not searched.

# Dry Creek



## Dry Creek

**Biodiversity Rank: B3.** High significance.

The Dry Creek site contains the largest known population of the globally imperiled Rocky Mountain thistle (*Cirsium perplexans*).

**Protection Urgency Rank: P3.**

This site is located on a private ranch. The owner is aware of the the thistle, and plans no activity that will harm it. For long-range protection, a conservation easement or other voluntary formal protection is desirable.

**Management Urgency Rank: M2.**

Monitoring and study of the ecology of the Rocky Mountain thistle at this site would be extremely beneficial to our understanding of this perplexing species. Since the thistle appears to be successful under present management, no change in land use is advocated at this time.

**Location:** About 6 air miles east of Cedaredge

U.S.G.S. 7.5 min. quadrangle: Dry Creek

Legal Description: T13S R93W S18, 19, 300

**Elevation range:** 6,280 to 6,680 feet.

**Size:** 351 acres.

**General Description:** This private ranch is the site of the world's largest known population of the Rocky Mountain thistle. The thistle was first noticed a year ago by the owner, growing in a dry, formerly grazed field with sagebrush. Little is known about the ecology of this thistle. At this site, it appeared to be a colonizer of a disturbed area. Nearby, in a wetland fed by a small intermittent stream, we found northern leopard frogs. The populations of these frogs are known to be cyclical, and they seemed to be more abundant than usual this year. Gray vireos were also seen at this site, but since their nesting was not confirmed, they do not appear in the list of elements.

**Biodiversity Rank Justification:** A good (B ranked) occurrence of a globally imperiled plant. Further research on the ecology and taxonomy of the Rocky Mountain thistle is needed, and could influence this site rank. If, after further research in Montrose County in 1998, the Rocky Mountain thistle is determined to be an unquestionable G2 S2, this site rank will be ranked B2.

Natural Heritage elements at the Dry Creek site.

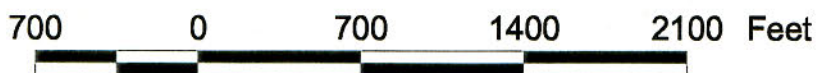
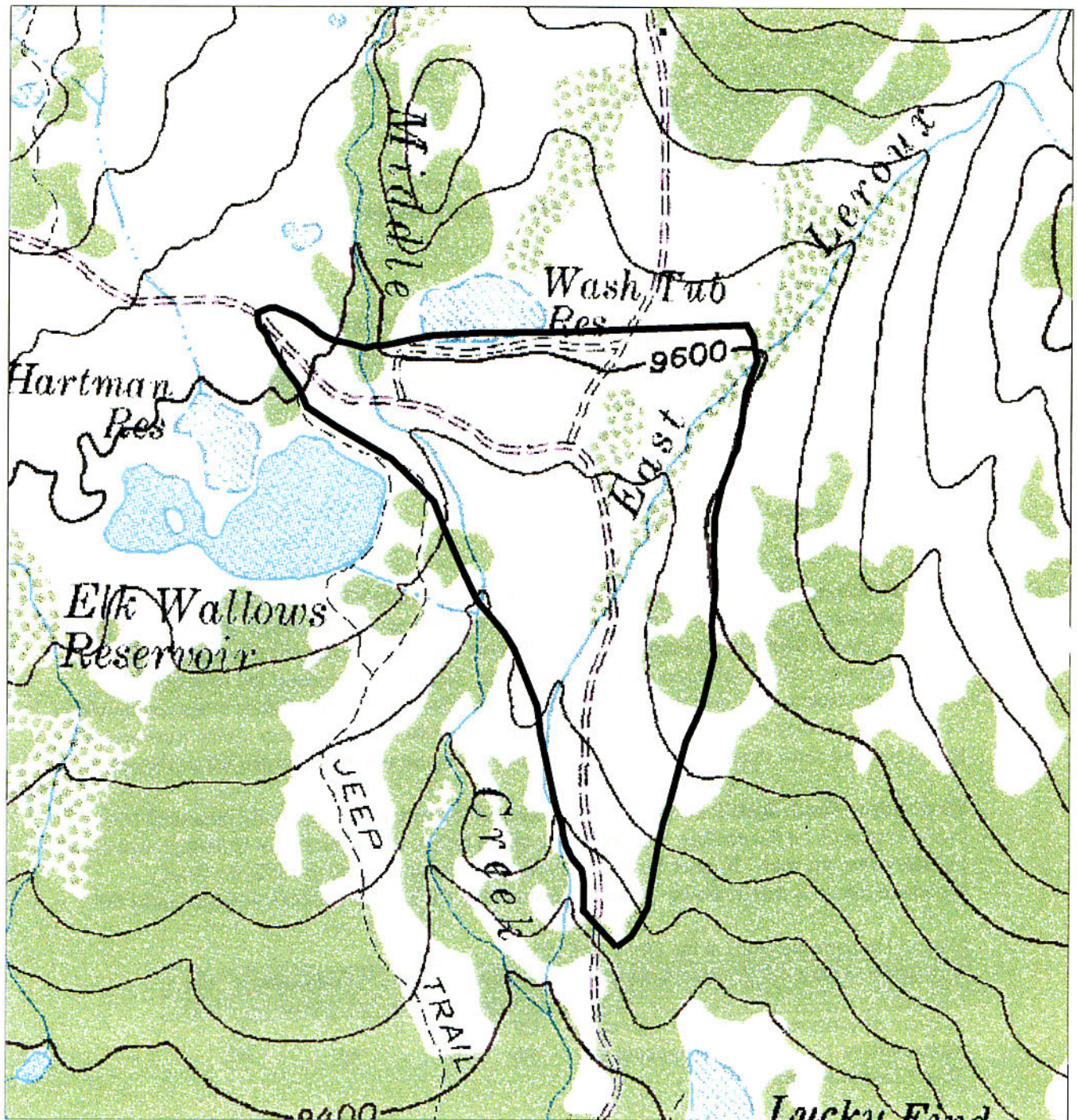
Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Cirsium perplexans</i>	Rocky mountain thistle	G2?	S2?		B
<i>Rana pipiens</i>	northern leopard frog	G5	S3	NF	C

\*EO = Element Occurrence

**Boundary Justification:** The site includes the mosaic of plant communities on the ranch, from dry open sagebrush areas with adjacent pinyon and juniper to the wetland habitat of the northern leopard frog.



# Elk Wallows Reservoir



## Elk Wallows Reservoir

**Biodiversity Rank: B3.** High significance.

The Elk Wallows Reservoir site contains a good occurrence of the globally restricted Grand Mesa penstemon.

**Protection Urgency Rank: P4.**

This site is within the Grand Mesa National Forest. Issuance of special use permits for timber harvest, firewood cutting, and grazing, may pose threats to the Grand Mesa penstemon.

**Management Urgency Rank: M3.**

Ongoing management is needed to prevent the loss of the plant along the roadside. Road maintenance actions, particularly spraying, could damage the Grand Mesa penstemon. In addition, there is a possibility of excavation of soil from the site for road fill or dam material. The location of the plants along the roadside may also make them vulnerable to collecting, although there is no evidence that this has occurred yet.

**Location:** Grand Mesa National Forest, fifteen miles north of Hotchkiss, via 3100 Rd.

U.S.G.S. 7.5 min. quadrangle: Chalk Mountain

Legal Description: T12S R92W S25, 26

**Elevation range:** 9,440 to 9,600 feet.

**Size:** 92 acres.

**General Description:** A small site of about 100 acres, this is the location of a thriving population of Grand Mesa penstemon. The attractive blue-flowered plants are most abundant along the roadside, and seem to prefer open areas with some degree of disturbance. The surrounding area is a mosaic of Engelmann spruce forest and open parks.

**Biodiversity Rank Justification:** A good quality occurrence of a plant with very restricted range.

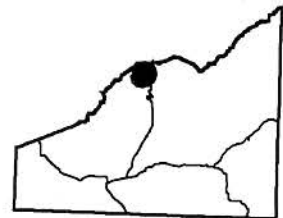
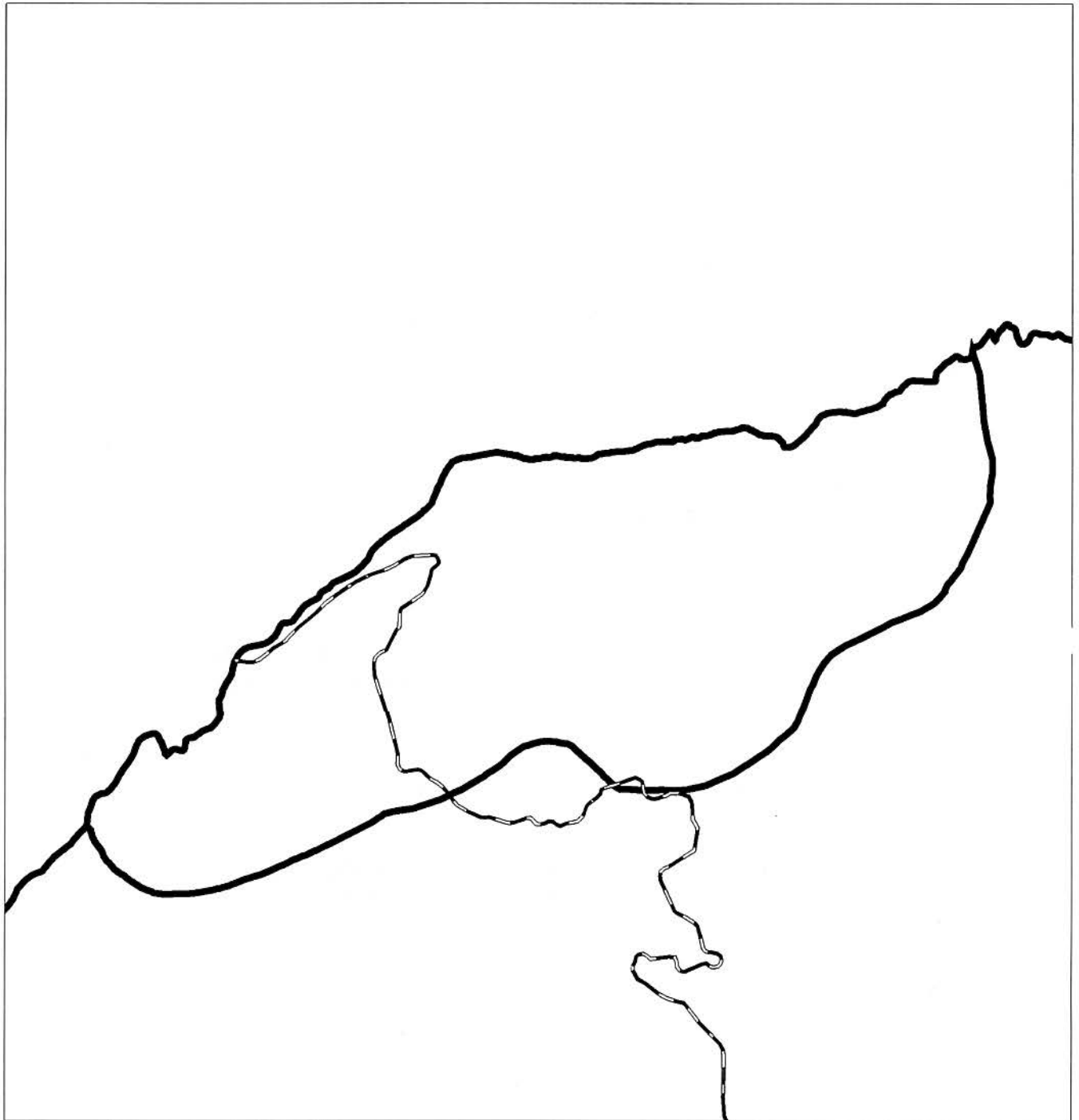
Natural Heritage elements at the Elk Wallows site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Penstemon mensarum</i>	Grand mesa penstemon	G3	S3		B

\*EO = Element Occurrence

**Boundary Justification:** The site includes the Grand Mesa penstemon population along the roadside and in adjacent clearings. The area was searched along the road in both directions from the site, but no more plants were found. The boundary should include sufficient suitable habitat for the penstemon population to expand into new clearings.

# Grand Mesa Lakes



## Grand Mesa Lakes Macrosite

**Biodiversity Rank: B3.** High significance.

The Grand Mesa Lakes Macrosite contains excellent and good occurrences of globally and state imperiled plants, as well as multiple occurrences of state rare birds and amphibians.

**Protection Urgency Rank: P2.**

The site is entirely within the Grand Mesa National Forest. However, the species listed below are vulnerable on many fronts. Actions related to maintenance of reservoirs by parties holding water rights directly threaten the survival of the purple cinquefoil by removal of the peat it grows on. The boreal owls and boreal toads are negatively impacted by timber harvest, road building, and vehicular traffic. Grazing on the forest may endanger the Grand Mesa penstemon, different leaved groundsel, and riparian plant communities. Special designation of sensitive areas by the forest service may be needed to protect these elements in the future.

**Management Urgency Rank: M1.**

The most urgent management need is to protect the extremely restricted population of the purple cinquefoil, which is in danger of extirpation by removal of the peat on which it grows. Beyond this, travel management decisions will affect all species. The forest plan was last amended in 1971, and is not scheduled for revision at this time. It will therefore be necessary for managers to be aware of the impacts of day to day decisions, such as the issuance of special use permits, on the significant species of this site, and take the responsibility for protecting them. Public education will play a large role in providing the support for forest managers to make good decisions

**Location:** Grand Mesa.

U.S.G.S. 7.5 min. quadrangles: Mesa Lakes|Grand Mesa|Hell's Kitchen

Legal description (Delta county part only): T12S R95W S1-4, 8-12, 14-22; T12S R96W S24; T11S R95W S34-36; T12S R94W S3-6, 7-10, 15-18; T11S R94W S31-34, 27-29

**Elevation range:** 8,600 to 11,189 feet.

**Size:** 55,859 acres.

**General Description:** Grand Mesa, one of the major landmarks of Delta County, is a large flat-topped mountain topped with Tertiary volcanic rock. Hundreds of natural and man-made lakes are scattered over the area. Vegetation ranges from Gambel's oak woodland to aspen and spruce-fir forest at the highest elevations.

At the lower elevations of the site, oak woodland forms a mosaic with aspen forests. Common understory species occurring with the oak include chokecherry, snowberry, aspen daisy, serviceberry, mountain thistle, and osha.

Aspen forests on the mesa tend to occupy mesic sites, and have a tall understory of herbaceous plants. These include nettleleaf giant hyssop, tall larkspur, cow parsnip, snowberry, false hellebore, aspen daisy, Canada wildrye, towering Jacob's ladder, little sunflower, mountain thistle, wild geranium, tall ragwort, coneflower, tall fleabane, and Fendler's waterleaf.

With increasing elevation, spruce becomes mixed with the aspen, and finally dominates the canopy. Forests of Engelmann spruce and subalpine fir have a variety of understory species, including heartleaf arnica, parrotsbeak, Wolf currant, Jacob's ladder, sweet cicely, elk sedge, whortleberry, and meadowrue. Forested areas are interspersed with open grassy parks and wetlands. Drier areas have a variety of grasses and forbs such as orange sneezeweed, mountain thistle, skyrocket gilia, blue columbine, little sunflower, aspen daisy, lupine, wild geranium, and

white peavine. Common species in wetlands are Rocky Mountain willows, a variety of sedges and rushes, alpine bistort, elephantella, willow herb, veronica, Indian paintbrush, edible valerian, Whipple penstemon, marsh marigold, bittercress, hairy arnica, to name only a few.

The highest areas in the site, such as Crag Crest have some species that occur in alpine tundra, but cannot be considered truly alpine. Abundant along the crest are rockslide fleabane, blue columbine, matted saxifrage, false strawberry, and graylocks hymenoxys (old man of the mountain).

This macrosite encompasses a large number of occurrences of both plants and animals. Much of the data on animal species has come from National Forest research. The thirteen boreal owl nesting sites listed below were documented in this site in 1993 during forest biodiversity studies (Gray 1994). The owls inhabit both aspen and spruce-fir forests, nesting in cavities or woodpecker holes. They prefer trees on the edges of meadows, near water. The owls have no formal protection, and are therefore vulnerable to activities such as timber harvest, road building, and other disturbance.

The boreal toad observations were made in 1932 and 1954, and were reported in a 1994 publication of the Colorado Division of Wildlife (CDOW 1994). More recent sightings in 1993 could not be substantiated when researchers returned to the site the following day. The toads are ephemeral, and therefore difficult to locate, so although they have not been recently documented, they are probably still extant on the mesa. There is abundant potential habitat for them, as they breed in subalpine lakes, reservoirs, ponds and creek pools, culverts, and even small, isolated puddles in the forest. They eat a variety of invertebrates, including mosquitoes, which are plentiful on the mesa. These toads are most common between 8,500 and 11,000 feet (Hammerson 1986). They migrate between aquatic breeding and terrestrial nonbreeding habitats (CNHP 1997).

The Grand Mesa penstemon was found in several locations, usually along roads in sunny, disturbed areas. Surrounding vegetation may be dominated by oak, aspen, or spruce. The penstemon appears to be a poor competitor for sunlight, and is not found in places with much competing vegetation.

The purple cinquefoil was found growing on floating mats of peat at Kennicott Slough with Northwest Territory sedge. This is the first known occurrence of this species in Delta County. A previously discovered location is in a similar floating peat bog near the headwaters of Kannah Creek in Mesa County. This ecosystem is rare in Western Colorado, and the plant indicates that some very specific environmental characteristics are present. The Kennicott Slough population is immediately threatened by the intentional cutting and removal of the floating island in the middle of the reservoir. Cinquefoil was found on chunks of peat left to dry on the shore of the reservoir, as well as on the floating island.

The Sierra corydalis, previously considered to be rare, was found to be more common than we had thought. This seemed to be a good year for the plant, perhaps due to high spring precipitation, and it was flourishing in many rocky creek drainages. CNHP has therefore changed its rank from G5S3 to G5S3S4, which means that we will no longer track the species, but keep it on a "watchlist". One good place to see this attractive plant is at the Crag Crest trailhead. Here it grows in wet areas with willows, elderberry, chiming bells, osha, tall larkspur, wild geranium, cow parsnip and nettles.

The different leaved groundsel was found in a wet meadows adjacent to a reservoir. Associated species were Rocky Mountain and Drummond's willow, chiming bells, arrowleaf groundsel, tufted hairgrass, and smallwing sedge.

The site includes many roads, including a scenic byway. The area is a popular recreation destination for camping and fishing. Most of the site is within the Grand Mesa National Forest, but there are some private inholdings with vacation homes around Ward, Baron, Alexander, Hotel, and Eggleston Lakes.

**Biodiversity Rank Justification:** A good occurrence of a plant which is globally vulnerable due to its restricted range. Many occurrences of state rare animals.

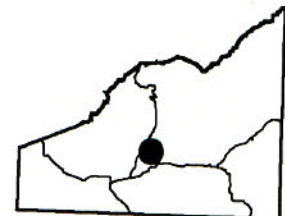
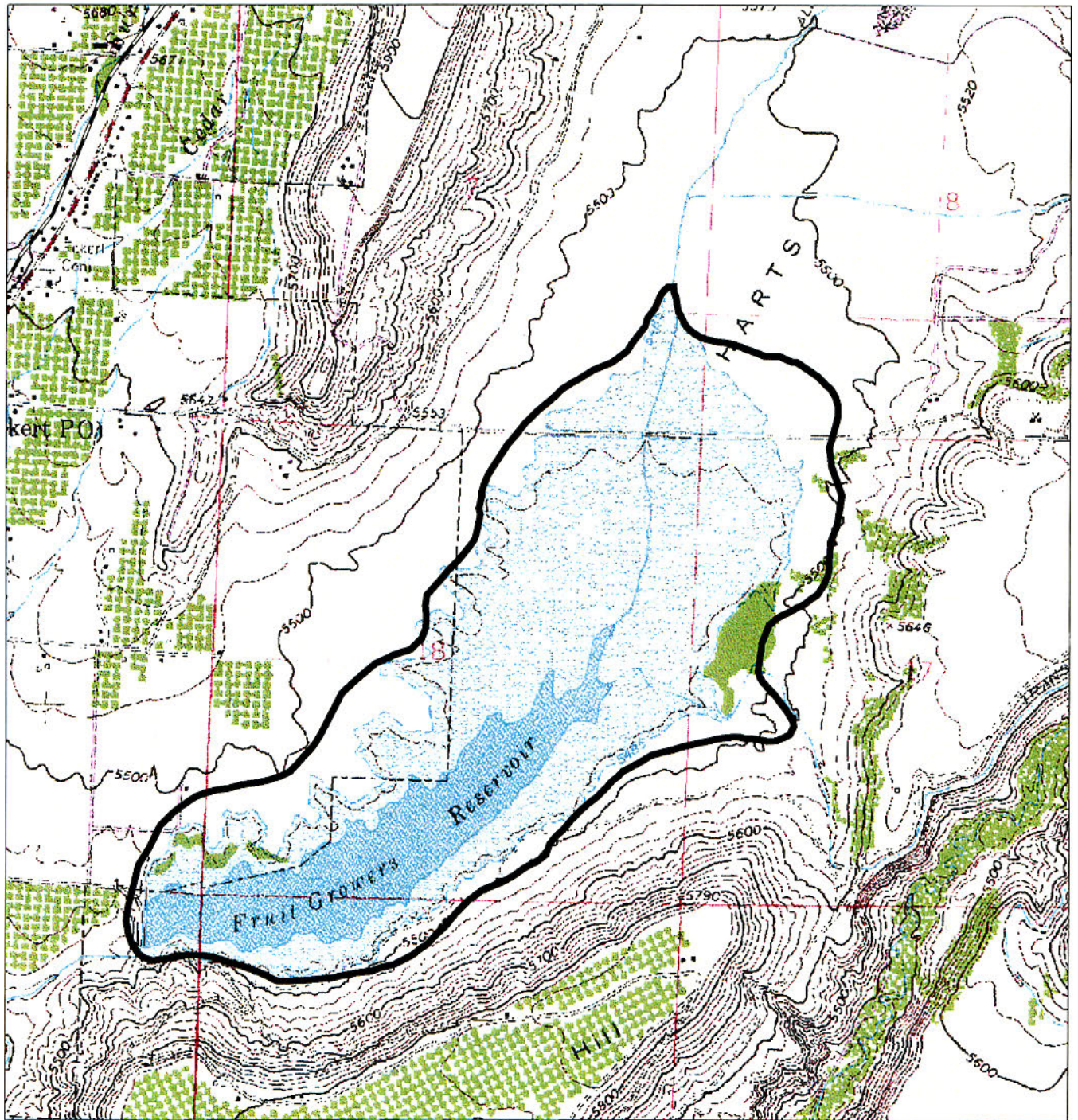
Natural Heritage elements at the Grand Mesa Lakes macrosite.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO rank
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	boreal owl	G5	S2	FS	
<i>Aegolius funereus</i>	Boreal owl	G5	S2	FS	
<i>Bufo boreas pop 1</i>	boreal toad (Southern Rocky Mountain)	G5T2Q	S1	E	H
<i>Bufo boreas pop 1</i>	boreal toad (Southern Rocky Mountain)	G5T2Q	S1	E	H
<i>Comarum palustre</i>	Purple cinquefoil	G5	S1S2		B
<i>Corydalis caseana</i>	Sierra corydalis	G5	S3		C
<i>Corydalis caseana</i>	Sierra corydalis	G5	S3		A
<i>Corydalis caseana</i>	Sierra corydalis	G5	S3		B
<i>Corydalis caseana</i>	Sierra corydalis	G5	S3		B
<i>Corydalis caseana</i>	Sierra corydalis	G5	S3		B
<i>Corydalis caseana</i>	Sierra corydalis	G5	S3		C
<i>Corydalis caseana</i>	Sierra corydalis	G5	S3		C
<i>Corydalis caseana</i>	Sierra corydalis	G5	S3		H
<i>Penstemon mensarum</i>	Grand mesa penstemon	G3	S3		B
<i>Penstemon mensarum</i>	Grand mesa penstemon	G3	S3		D
<i>Penstemon mensarum</i>	Grand mesa penstemon	G3	S3		C
<i>Populus tremuloides/tall forbs</i>	Aspen-tall forbs	G5	S5		A
<i>Senecio dimorphophyllus</i>	Different leaved groundsel	G4T2	S1		A

\*EO = Element Occurrence

**Boundary Justification:** The site includes the lakes area of Grand Mesa, including parts in Mesa County which have additional occurrences of the same species listed above. The estimated foraging range of the boreal owls was included.

# Hart's Basin



## Hart's Basin

**Biodiversity Rank: B3.** High significance

This site is important as a migratory bird stopover, and for its concentration of waterfowl and shorebirds.

**Protection Urgency Rank: P2.**

Most of the land surrounding Fruitgrowers Reservoir is privately owned, and as yet undeveloped. Development for residences would potentially increase human disturbance that would be detrimental to the birds. At least one parcel of private land is presently for sale. It adjoins the marsh at the end of the reservoir, close to the sandhill crane staging area and the Western Grebe area. Purchase of the property or its development rights would greatly benefit the future of the reservoir as an important bird refuge.

**Management Urgency Rank: M1.**

At present, the area is a wildlife sanctuary by default, as pollution of the reservoir has caused recreational use such as swimming, motorboating and water skiing to be prohibited. A local task force is working to get the site cleaned up. The Health Department has recently classified the reservoir as a recreational site in order to boost requirements for the quality of effluents from the upstream sewage treatment plant (Schroeder, personal communication). Members of the community are divided between wanting to use it for recreation, or maintaining it as a wildlife area. Any heavy recreational use, especially motorized boats, would be extremely detrimental to the area as a wildlife refuge. A decision will need to be made in the near future. Whatever the outcome, the Bureau of Reclamation will require that there be a managing entity that controls the use of the area, whether for wildlife or recreation. Managers will have to contribute at least 50% of funds to pay for management, including providing and maintaining restrooms, law enforcement, etc. At present, there is very limited parking, and no restroom facilities. Management will involve an ongoing expense, and the financial ability to fund this may determine the future of the area. The Black Canyon Audubon Society has already taken some management responsibility, and has built a hiking trail along the southeast edge of the reservoir. The area has been publicized to birders, and visitation has increased. Hunting is currently allowed at the reservoir. The effects of this should be reviewed. There is no grazing at the site.

**Location:** Two miles east of Eckert, about ten miles northeast of Delta.

U.S.G.S. 7.5 min. quadrangle: Orchard City

Legal Description: T14S R94W S7, 8, 17-19; T14S R95W S13, 24.

**Elevation:** 5,500 feet.

**Size:** 643 acres.

**General Description:** Hart's Basin is the area surrounding Fruitgrowers Reservoir, which provides irrigation water to about 2700 acres of orchards and croplands in Delta County. Its shallow open water, mudflats and marshlands attract an enormous number of migratory waterfowl and shorebirds as well as a large variety of nesting birds. The most dramatic event annually is the arrival of the Sandhill cranes on their migration between central New Mexico and their breeding grounds in the Greater Yellowstone area. This is the major resting spot for this population between the San Luis Valley and their breeding grounds in the greater Yellowstone area. The whooping cranes that were raised by sandhills were part of the flock that stopped here in 1996. At the end of March in 1997, over 10,000 sandhills used the reservoir as their overnight



stop, fascinating local bird enthusiasts with their courtship and dominance displays (Horn, personal communication).

Local birders Steve McCall of the Bureau of Reclamation and Ron Lambeth of the Bureau of Land Management have proposed the site to the American Bird Conservancy as a “United States Important Bird Area”. In their nomination criteria they cite: seven endangered, threatened, or vulnerable species which use the area (although CNHP does not track them unless they are known to be nesting); representative communities of waterbirds, shorebirds and wading birds; use by 1% or more of a species population (sandhill cranes, with 20,000 birds stopping during the spring migration); and use by over 2,500 wading birds, including sandhills, white-faced ibis, great blue herons, black-crowned night herons, snowy, cattle, and great egrets, and rails.

The southwestern willow fly-catcher has been observed at the reservoir, with its presence during June and July strongly suggesting that it is nesting there, although no nests have been confirmed. The only record of the interior least tern dates from 1980 (Chase 1980), and the species probably is no longer present. We show it as an historic record to document the fact that it was seen, and should be watched for in the future. It further emphasizes the singularity of Hart’s Basin as an important bird site.

Most of the land in the site is privately owned. The reservoir and a very small amount of surrounding land are owned by the Bureau of Reclamation and managed by the Bureau of Land Management. The dam is operated by the Orchard City Irrigation District, and the Black Canyon Audubon Society cooperates in management of the reservoir area.

Water in the reservoir has been contaminated, testing high in fecal matter, from upstream sources. The lake may be in the process of eutrophication, i.e. overloading of organic materials, which depletes oxygen when they decompose (Schroeder, personal communication).

**Biodiversity Rank Justification:** This site is of major importance as a migratory stopover for waterfowl and shorebirds. The whooping crane occurrence is not considered viable, and does not influence the site’s rank.

Scientific name	Common name	Global rank	State rank	Fed/State status	State status	Fed sensitive	*EO Rank
<i>Ardea herodias</i>	Great blue heron	G5	S3BSZN				D
<i>Grus americana</i>	Whooping crane	G1	S1				D
<i>Shorebird concentration</i>	Shorebird concentration	not ranked	not ranked				
<i>Sarcobatus vermiculatus/ Distichlis spicata</i>	Saline bottomland shrublands	G3	S1				D
<i>Catoptrophorus semipalmatus</i>	Willet	G5	S1BSZN				B
<i>Circus cyaneus</i>	Northern harrier	G5	S4BS4N				B
<i>Cistothorus palustris</i>	Marsh wren	G5	S3BSZN				B
<i>Coluber constrictor mormon</i>	Western yellowbelly racer	G5	S2S3				B
<i>Coluber constrictor mormon</i>	Western yellowbelly racer	G5	S2S3				B
<i>Egretta thula</i>	Snowy egret	G5	S2BSZN				B
<i>Sterna antillarum athalassos</i>	Interior least tern	G4T2Q	S1BSZN				H

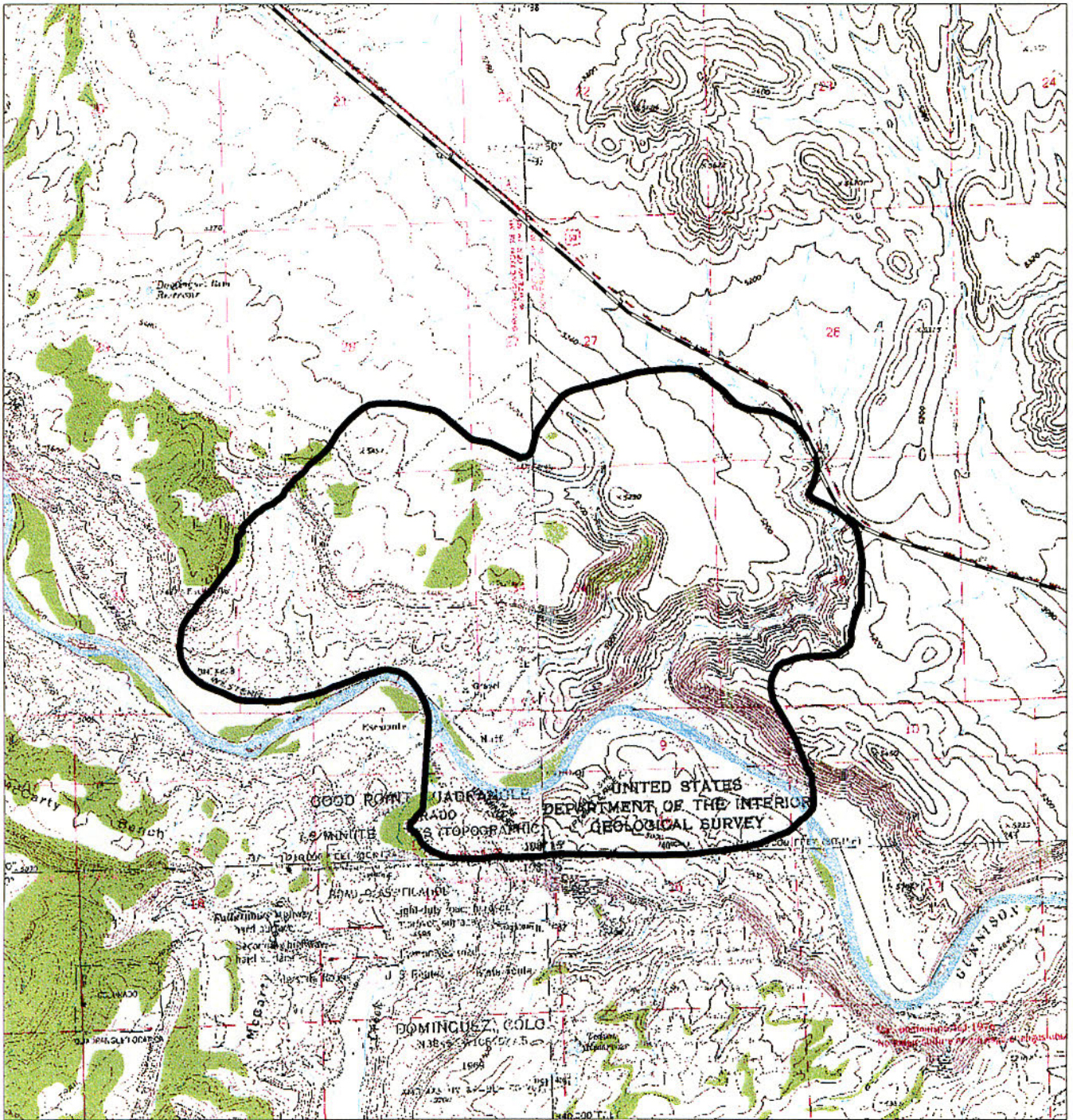
\*EO = Element Occurrence

**Boundary Justification:** The site includes the reservoir to the high water mark, including the cottonwood stands and wetland vegetation, as well as adjacent arid land which is important as a buffer to reduce human disturbance to the birds.

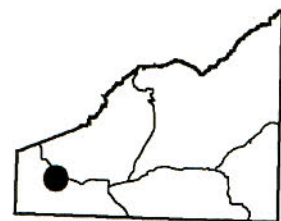


Local bird enthusiasts at Hart's Basin.

# Huff



3000 0 3000 6000 9000 Feet



# Huff

**Biodiversity Rank: B3.** High significance.

The Huff site contains the largest known population of the Uinta Basin hookless cactus (*Sclerocactus glaucus*) a plant which is listed as threatened under the Endangered Species Act.

**Protection Urgency Rank: P3.**

Although the Uinta Basin hookless cactus is federally protected, the threat of collection for commercial use is real. Cacti which were marked in a study plot on BLM land were dug up and removed in 1996. The major concentration of the Uinta Basin hookless cactus is adjacent to a county gravel pit; however, the part of it that is active has been surveyed and released for excavation by the U.S. Fish and Wildlife Service and BLM. Future excavation areas, which will probably not be needed for ten to fifteen years, will also be surveyed before being released, if the cactus is still listed at that time. A potential threat in the future is development of dams downstream which could flood the area.

**Management Urgency Rank: M3.**

Continued observation and monitoring of this major population of the Uinta Basin hookless cactus is warranted. There is some evidence of herbivory by an unidentified animal, perhaps a packrat, which needs further investigation. The BLM land is managed under Management Unit 1, which emphasizes livestock values. The management plan calls for intensive monitoring of range condition. Sheep grazing during the winter may cause trampling of some populations. The area is open to ORV use. The cactus may be indirectly affected by disturbance to the ground-dwelling bees that are its major pollinators.

**Location:** Benches above the Gunnison River in the vicinity of the Escalante Bridge.

U.S.G.S. 7.5 min. quadrangles: Dominguez | Point Creek

Legal Description: T4S R3E S27, 28, 32-34; T15S R97W S8, 17 | T4S R3E S 26, 27, 34, 35; T15S R97W S 9, 10, 15, 16.

**Elevation range:** 4,800 to 5,480 feet.

**Size:** 2,413 acres.

## **General Description:**

This site is of prime importance as the foremost location in Colorado of the Uinta Basin hookless cactus. Populations here have up to two thousand individuals, in contrast to the much smaller clusters of the cactus scattered elsewhere along the river, where average sized occurrences are less than 50 plants. This may be the major center of distribution for the species in Colorado. This location is used as a study site by researchers associated with Mesa State College.

Typical habitat for the cactus is on clay soils derived from Mancos shale, with rounded cobbles of basalt scattered over the surface. Plants are often concentrated on the lips of the benches (Pleistocene pediments). They may be under shrubs, or in the open. They are rarely on steep hills or in the greasewood flats along the river. Frequently associated species are shadscale, galleta, broom snakeweed, prickly pear cactus, cheatgrass, and globemallow.

In addition to the cactus, this site has excellent examples of common semi-desert shrub plant communities, and the greatest concentration that we have seen of the white tailed antelope squirrel. The shadscale/galleta community forms a mosaic with black sage/Salina wildrye. There are very few weedy species. Associated native species include snakeweed, hedgehog cactus, Mormon tea, Indian paintbrush, Indian ricegrass, and low rabbitbrush. Along the river, the flat

bottomlands have a dense stand of greasewood. The antelope squirrels were found here and in the rocky draw along Road 730. Altogether, we found nine sub-populations, which comprise three populations. This species had previously been documented only once in Delta County, an historic record mapped in what is now downtown Delta.

**Biodiversity Rank Justification:** This site contains an excellent occurrence, and the largest known occurrence, of the globally vulnerable Uinta Basin hookless cactus.

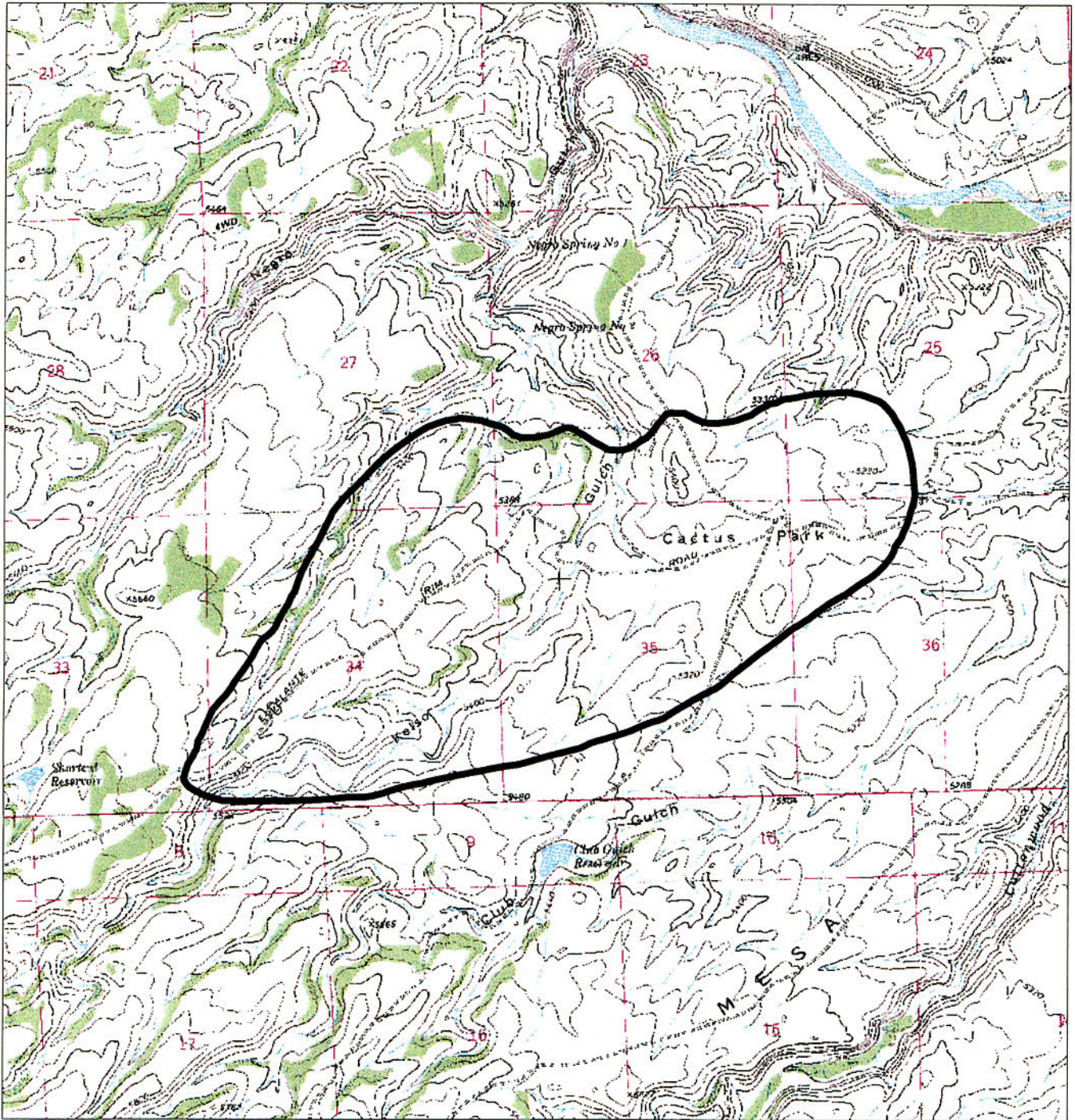
Natural Heritage elements at the Huff site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Ammospermophilus leucurus</i>	White-tailed antelope squirrel	G5T?	S1S2		B
<i>Ammospermophilus leucurus</i>	White-tailed antelope squirrel	G5T?	S1S2		B
<i>Ammospermophilus leucurus</i>	White-tailed antelope squirrel	G5T?	S1S2		B
<i>Atriplex confertifolia/Hilaria jamesii</i>	Cold desert shrublands	G3	S2		A
<i>Atriplex confertifolia/Leymus salina</i>	Cold desert shrublands	G3G5	S3		B
<i>Dipodomys ordii</i> ssp. <i>sanrafaeli</i>	Ord's kangaroo rat ssp.	G5	S2		B
<i>Sarcobatus vermiculatus/Suaeda torreyana</i>	Saline bottomland shrublands	GU	SU		C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	A
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	B
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C

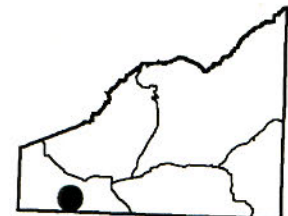
\*EO = Element Occurrence

**Boundary Justification:** This site includes the large Uinta Basin hookless cactus population, on both sides of the Gunnison River. Pollination studies have shown that the major pollinator, a small green bee, is capable of crossing the river, so the occurrences on either side may be genetically connected. Also included is surrounding territory with good examples of common plant communities and the occurrences of two small mammals. This site is included within the Gunnison River macrosite.

# Kelso Gulch



2000 0 2000 4000 6000 Feet



## Kelso Gulch

**Biodiversity Rank: B3.** High significance.

The Kelso Gulch site supports a good population of the Uinta Basin hookless cactus (*Sclerocactus glaucus*).

**Protection Urgency Rank: P4**

The area does not receive much human use, although there are several dirt roads through the site, including the Escalante Rim Road.

**Management Urgency Rank: M3**

Present management plans appear to be appropriate for the general plant community. The BLM land is in Management Unit 1, which emphasizes livestock grazing and improving range condition. The general area is grazed by sheep and antelope. Management should address controlling the spread of noxious weeds such as halogeton. Our failure to relocate the cactus in 1997 is of concern, and further search is warranted. If the plants are relocated, it would be useful to establish some permanent plots so that the cactus can be monitored over a long period of time to ascertain trends in the population. According to BLM personnel, ORV use in the area is increasing, and poses a threat to the cactus as well as the plant community in general.

**Location:** South of the Gunnison River, 2 miles east of Roubideau Creek

U.S.G.S. 7.5 min. quadrangle: Roubideau

Legal Description: T15S R97W S25-27, 34-36

**Elevation range:** 5,240 to 5,600 feet

**Size:** 1,359 acres

**General Description:** This site is based on a Uinta Basin hookless cactus population documented by a BLM survey in 1993. The plants were not relocated in 1997. The vegetation of the site is dominated by shadscale with galleta and broom snakeweed. Condition of the plant community is varied, with patches of abundant grass interspersed with patches having less grass and more snakeweed. Some of the most weedy areas may represent old sheep bedding grounds, where soils have been compacted. There is some invasion by halogeton along the roads.

**Biodiversity Rank Justification.** The site is reported to contain a good quality occurrence of the imperiled Uinta Basin hookless cactus. However, if the occurrence cannot be relocated with further searching, this rank should be reevaluated.

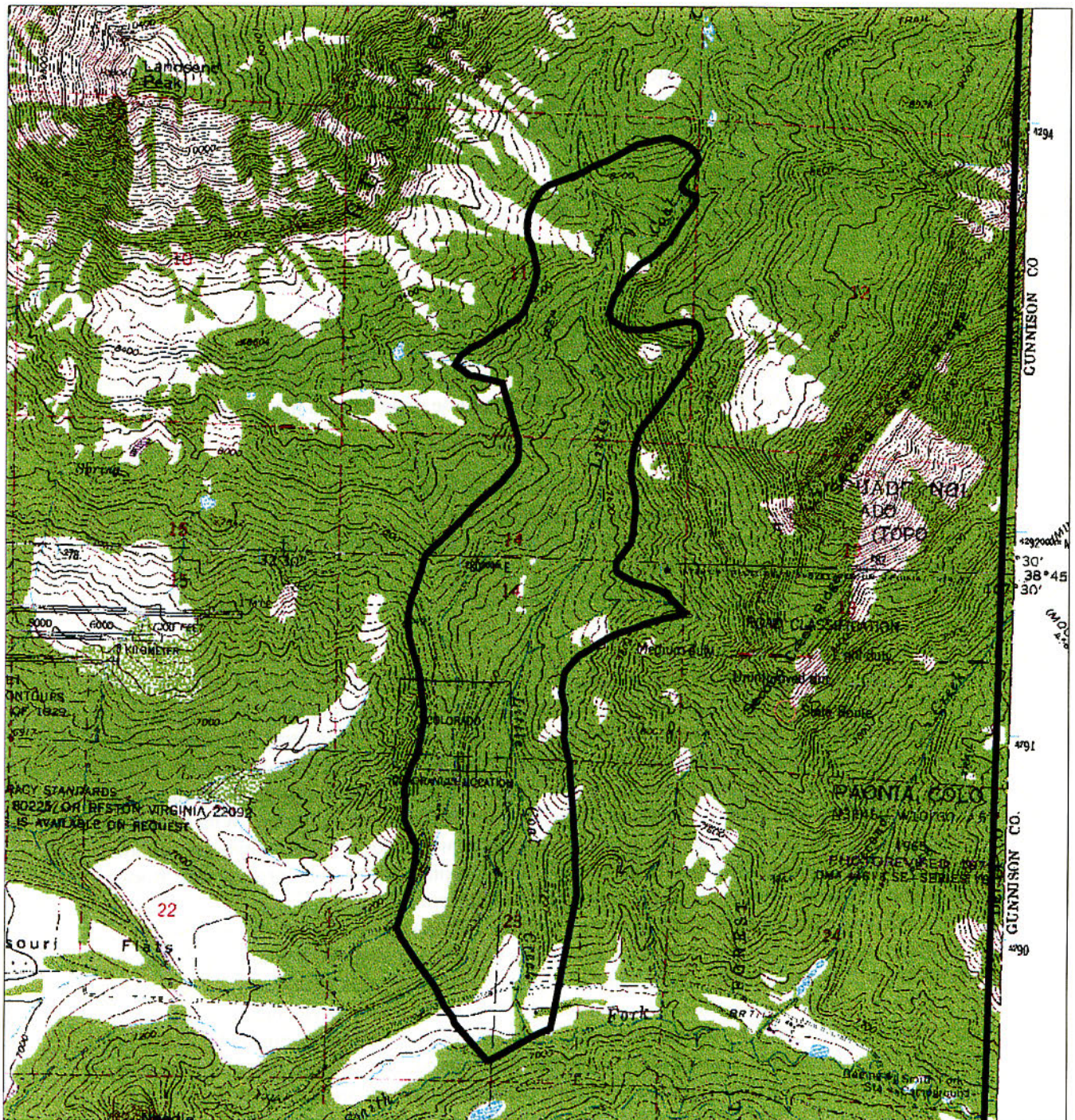
Natural Heritage elements at the Kelso Gulch site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	B

\*EO = Element Occurrence

**Boundary Justification:** The site is drawn to include a cluster of ten sub-populations of the Uinta Basin hookless cactus, as mapped by BLM researchers.

# Little Coal Creek





## Little Coal Creek

**Biodiversity Rank: B3.** High significance.

The Little Coal Creek site harbors good quality examples of two plant communities, small occurrences of the northern leopard frog (*Rana pipiens*), a state rare amphibian, and Rocky Mountain thistle (*Cirsium perplexans*), a globally imperiled plant.

**Protection Urgency Rank: P5.**

All but the lowest one mile of the site is on National Forest land. No further protection is needed.

**Management Urgency Rank: M4.**

The area is grazed, and exotic weedy species are common along the road. However, any weed control actions should avoid the Rocky Mountain thistle population. The area has had a prescribed burn to regenerate forage for livestock and wildlife. The profuse growth of bracken fern was an unexpected result. The burned area should be revisited and the success of the treatment determined.

**Location:** Approximately six air miles northeast of Crawford

U.S.G.S. 7.5 min. quadrangles: Crawford | Paonia

Legal Description: T15S R91W S14, 21 | T15S R91W S11, 12, 14.

**Elevation range:** 6,960 to 8,400 feet

**Size:** 837 acres

### General Description:

This site includes the riparian zone and adjacent uplands of Little Coal Creek from its mouth at the Smith Fork to a point opposite Land's End Peak. Access to the site is by an unimproved road (F Road) northeast of Crawford. Although the lower part of the creek was not visited, it appears from a distance to have a good growth of cottonwoods and willows. The non-riparian hills in the lower elevations of the site have a diverse mixture of juniper and mountain shrubs, including serviceberry, Fremont barberry, wild rose, and squaw apple. With increasing elevation, Gambel oak replaces the barberry, and mountain mahogany and snowberry become more common. Understory species include elk sedge, lupine, and smooth brome. The Rocky Mountain thistle was found along the roadside in this community.

The upstream reaches that we surveyed were dominated by Douglas fir, narrowleaf cottonwood, and thinleaf alder, with an understory of red-osier dogwood, wild rose, Rocky Mountain willow and Drummond's willow. Uplands were vegetated with Gambel oak and aspen. Part of the Gambel oak woodland was burned in 1996 by the forest service, in an effort to improve wildlife habitat by regenerating oak, serviceberry and the herbaceous understory. In the burned area, we found that about 60% of the oak was burned, and bracken fern had increased, forming a dense cover. Our largest native fern, bracken is a clonal species, spreading by long hairy rhizomes and often forming large colonies. Other species present were nettle-leaf giant hyssop, stinging nettles, and chokecherry. Bracken fern also occurred in the adjacent aspen forest, forming a plant association that is of global interest, although it was much more dense in the burned oak. Associated species in the wet aspen forest were Richardson's Geranium, black-eyed susan, and fragrant bedstraw.

The northern leopard frogs were found in late August in a tributary of Little Coal Creek and next to a small irrigation ditch some distance from the creek. This species breeds in open water, but may then move into adjacent wetlands or grasslands well away from the water in its

adult stage. Both habitats and connections between them must be protected to ensure survival of the population.

The Sierra corydalis was a small patch, in a typical site for the species, a small rocky stream bank. This species has since been removed from CNHP’s list of species of special concern, as it was found in abundance on Grand Mesa.

**Biodiversity Rank Justification:** The site contains good quality examples of two globally restricted plant communities, as well as small populations of an imperiled plant and a state rare amphibian.

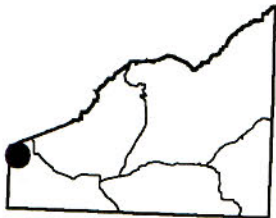
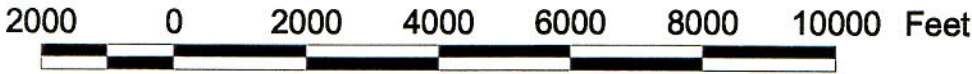
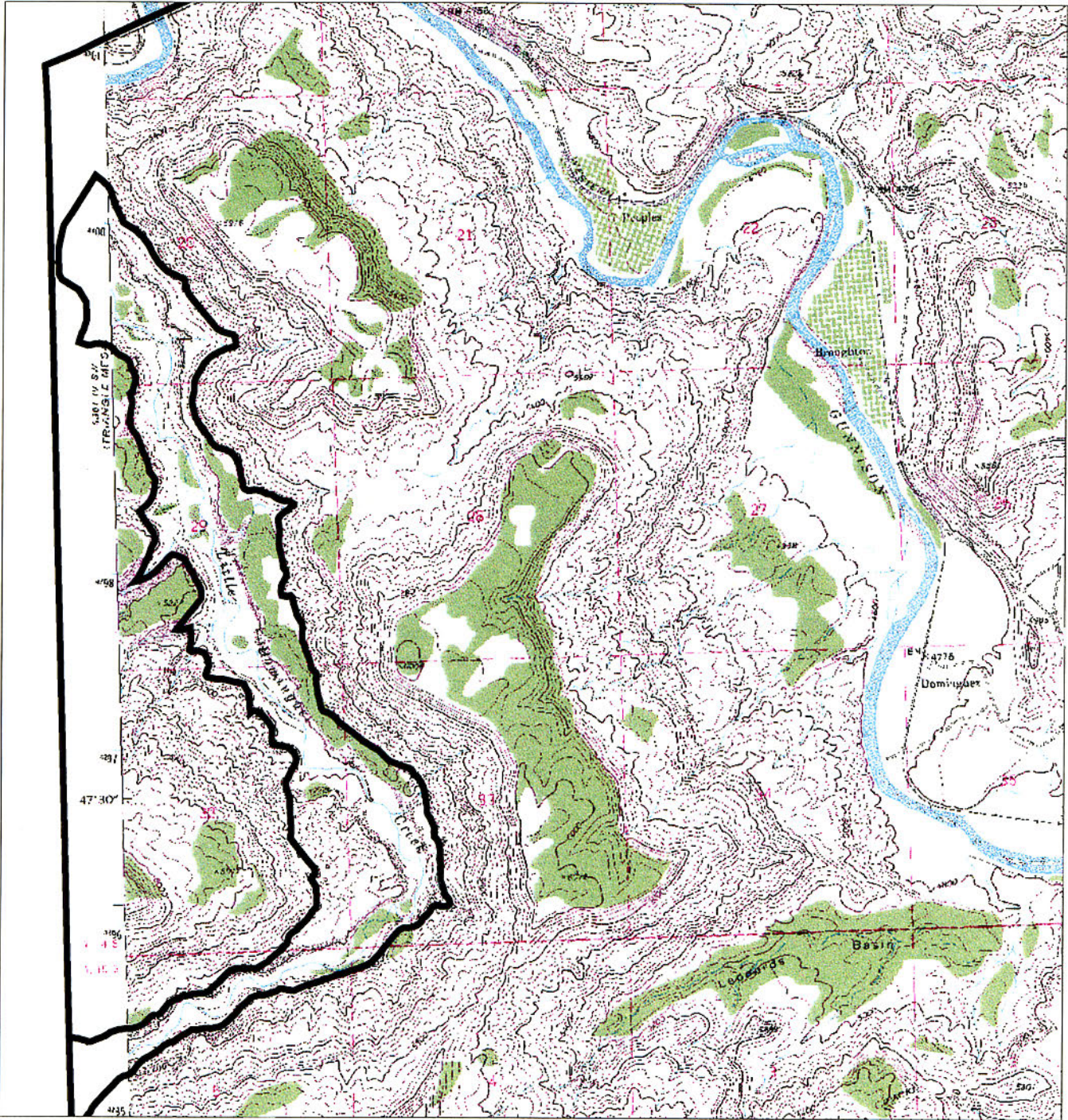
Natural Heritage elements at the Little Coal Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Cirsium perplexans</i>	Rocky mountain thistle	G2	S2		D
<i>Corydalis caseana</i> ssp. <i>brandegii</i>	Sierra corydalis	G5T3T4	S3S4		D
<i>Populus tremuloides</i> / <i>Pteridium aquilinum</i>	Aspen wetland forests	G2G3	S2S3		B
<i>Pseudotsuga menziesii</i> / <i>Cornus sericea</i>	Lower montane riparian forests	G3	S3		B
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	

\*EO = Element Occurrence

**Boundary Justification:** The boundary was drawn to include the occurrences of the northern leopard frog and Rocky Mountain thistle, with the adjacent aspen and Douglas fir riparian communities.

# Little Dominguez Creek



## Little Dominguez Creek

**Biodiversity Rank: B3.** High significance.

Small occurrences of three globally vulnerable rare plants are found in the Little Dominguez Creek site. It also contains a good example of the cold desert shrubland plant community.

**Protection Urgency Rank: P5.** The site is on BLM land, and is managed by the Grand Junction District. Parts that are mapped as private land were purchased by BLM, with the provision that the former owner may continue to live on the property. The site is designated as a Wilderness Study Area.

**Management Urgency Rank: M4.** Little Dominguez Creek falls in BLM's Management Unit 1, which emphasizes livestock grazing values. The site is grazed by cattle during the fall and winter. Land health standards have been incorporated in the Resource Management Plan for the area between Big Dominguez Creek and 25 Mesa Road, which includes the Little Dominguez site. BLM will be conducting range and riparian studies during the summer of 1998 to assess the health of this site. Disturbance by recreationists is minimized by the relative inaccessibility of the area. Future management should address the invasion of weeds, including tamarisk, Russian thistle and cheatgrass.

**Location:** Approximately seventeen miles west northwest of Delta.

U.S.G.S. 7.5 min. quadrangles: Dominguez | Triangle Mesa

Legal Description: T14S R98W S 20, 29, 32, 33 | T15S R98W S5

**Elevation range:** 4,800 to 5,800 feet.

**Size:** 1,012 acres.

**General Description:** Little Dominguez Creek flows north from the Uncompahgre Plateau to join Big Dominguez Creek just above its confluence with the Gunnison River at the Delta-Mesa County line. The major upland vegetation in the valley is the common desert shrub community of shadscale with galleta. Associated species found in this community were Indian rice grass, needle and thread, broom snakeweed, hairy golden aster, cheatgrass, Russian thistle, four-wing saltbush, and prickly-pear cactus.

The Grand Junction milkvetch was found on the Morrison formation, on toe slopes with Rocky Mountain juniper, on the creek bank, and in small seasonal drainages. The Uinta Basin hookless cactus was on rocky toe slopes lower in the canyon, near the confluence with Big Dominguez Creek.

The riparian zone along the creek has patches of Fremont cottonwood. These appear to be regenerating successfully, and all age classes are represented. There is significant invasion by tamarisk. Other common species along the creek are coyote willow, rubber rabbitbrush, big sagebrush, greasewood, spearleaf rabbitbrush, western goldentop, scouring rush, reed canary grass, threesquare and softstem bulrushes, inland saltgrass, alkali muhly, alkali sacaton, cluster aster, and yellow sweetclover. The creek is subject to flash floods, one of which we witnessed. There was some evidence of recent beaver activity.

**Biodiversity Rank Justification:** The presence of three rare plants, in close proximity in one site, but occupying distinctly different habitats, gives this site importance, although all of the occurrences are small. The canyon, although not entirely pristine, is generally in good condition.

Natural Heritage elements at the Little Dominguez Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Astragalus linifolius</i>	Grand junction milkvetch	G3	S3		D
<i>Astragalus linifolius</i>	Grand junction milkvetch	G3	S3		C
<i>Atriplex confertifolia/Hilaria jamesii</i>	Cold desert shrublands	G3	S2		B
<i>Epipactis gigantea</i>	Giant helleborine orchid	G4	S2		C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C

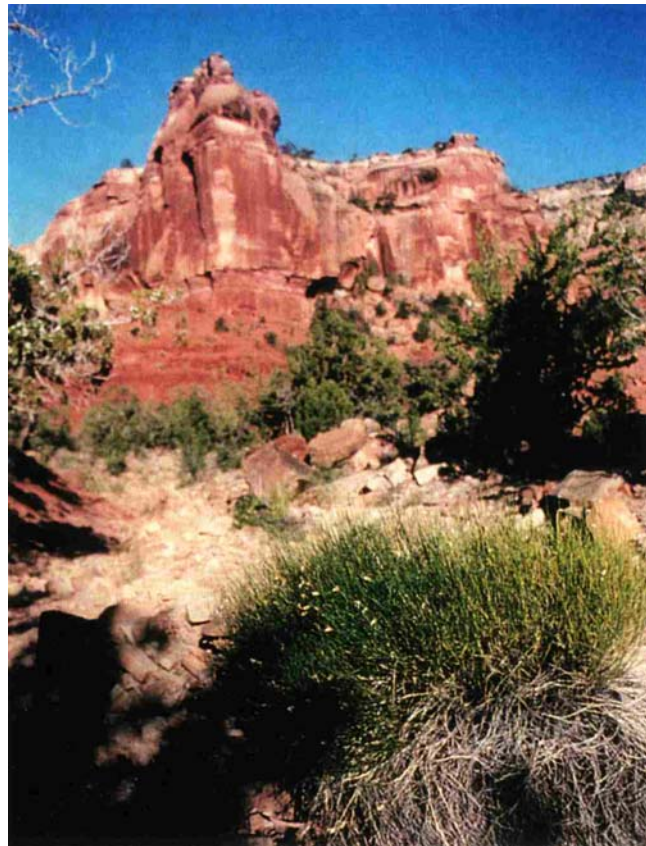
\*EO = Element Occurrence

**Boundary Justification:**

The site includes the riparian zone along Little Dominguez Creek, which is the habitat for the giant helleborine orchid, and the gentle side slopes where the Uinta Basin hookless cactus and Grand Junction milkvetch are found. The entire site includes the upstream area in Mesa County which was surveyed earlier, although the elements listed here are those found in Delta County only. The entire watershed is important for proper ecosystem functioning.

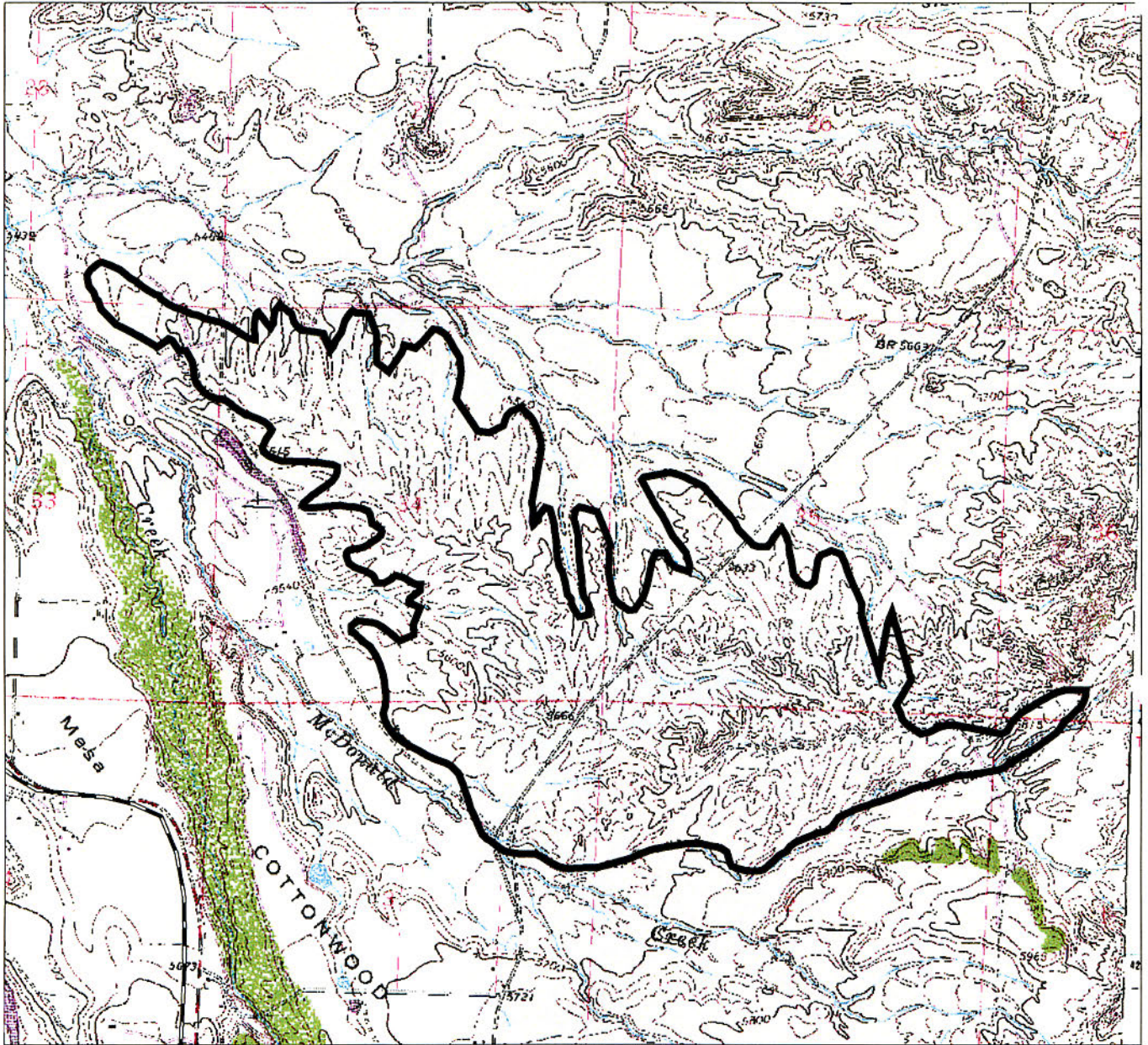


North Fork of the Gunnison River

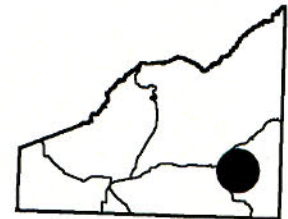


Little Dominguez Canyon, with the  
Grand Junction milkvetch in the foreground.

# McDonald Mesa



2000 0 2000 4000 6000 Feet



## McDonald Mesa

**Biodiversity Rank: B3.** High significance.

The McDonald Mesa site contains good occurrences of the adobe beardtongue (*Penstemon retrorsus*), a globally vulnerable plant.

**Protection Urgency Rank: P5.**

The site is almost entirely on BLM land. There is no special designation. Special status is probably not necessary if management concerns are met.

**Management Urgency Rank: M3.**

Management action is needed to protect the occurrence from ORVs, which use the area heavily. The area is in BLM's Management Unit 2, which emphasizes winter range for wildlife. Sheep graze the area in the spring. Monitoring of the rare plant population is recommended to assess trends over time, particularly the impacts of sheep and ORVs.

**Location:** About 3 miles east southeast of Hotchkiss.

U.S.G.S. 7.5 min. quadrangle: Hotchkiss

Legal Description: T14S R92W S28, 33-36; T15S R92W S 1, 2, 3

**Elevation range:** 5,500 to 5,800 feet

**Size:** 859 acres

**General Description:** This site consists of low adobe foothills east of McDonald Creek. Much of the area has been disturbed, with several roads and a major power line, and is quite weedy. Prairie dog holes are abundant. The hills are sparsely vegetated with shadscale, broom snakeweed, winterfat, bulbous spring parsley, and scorpionweed. Two plant species found here, poison aster and princes plume, are indicators of selenium in the soil. We found the adobe beardtongue to be abundant in areas with shadscale and snakeweed where much barren clay soil was exposed between the shrubs. These sites occurred primarily on north-facing slopes and ridgetops. The species was conspicuously absent from south-facing slopes and flat bottomlands with sagebrush and grass. The plants were in full bloom on May 10.

The Colorado desert-parsley occurred in one small area along with the adobe beardtongue. However, this was a small population, probably peripheral to the main population center to the west (see Hotchkiss Hills site).

Soils in this site are mapped as Chipeta silty clay, 3 to 30 percent slopes (USDA 1981). These are shallow, well drained soils that overly and were derived from Mancos shale.

**Biodiversity Rank Justification:** The McDonald Mesa site contains good occurrences of a globally vulnerable plant.

Natural Heritage elements at the McDonald Mesa site.

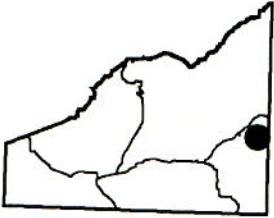
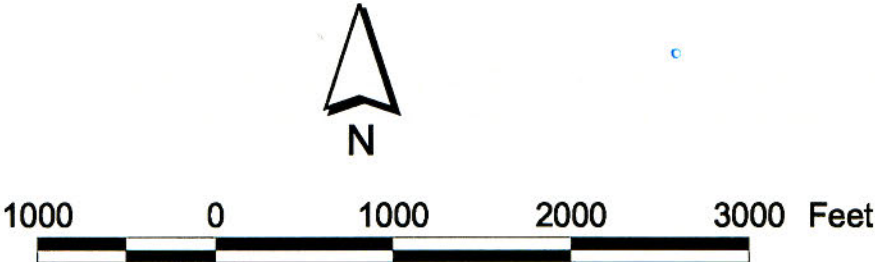
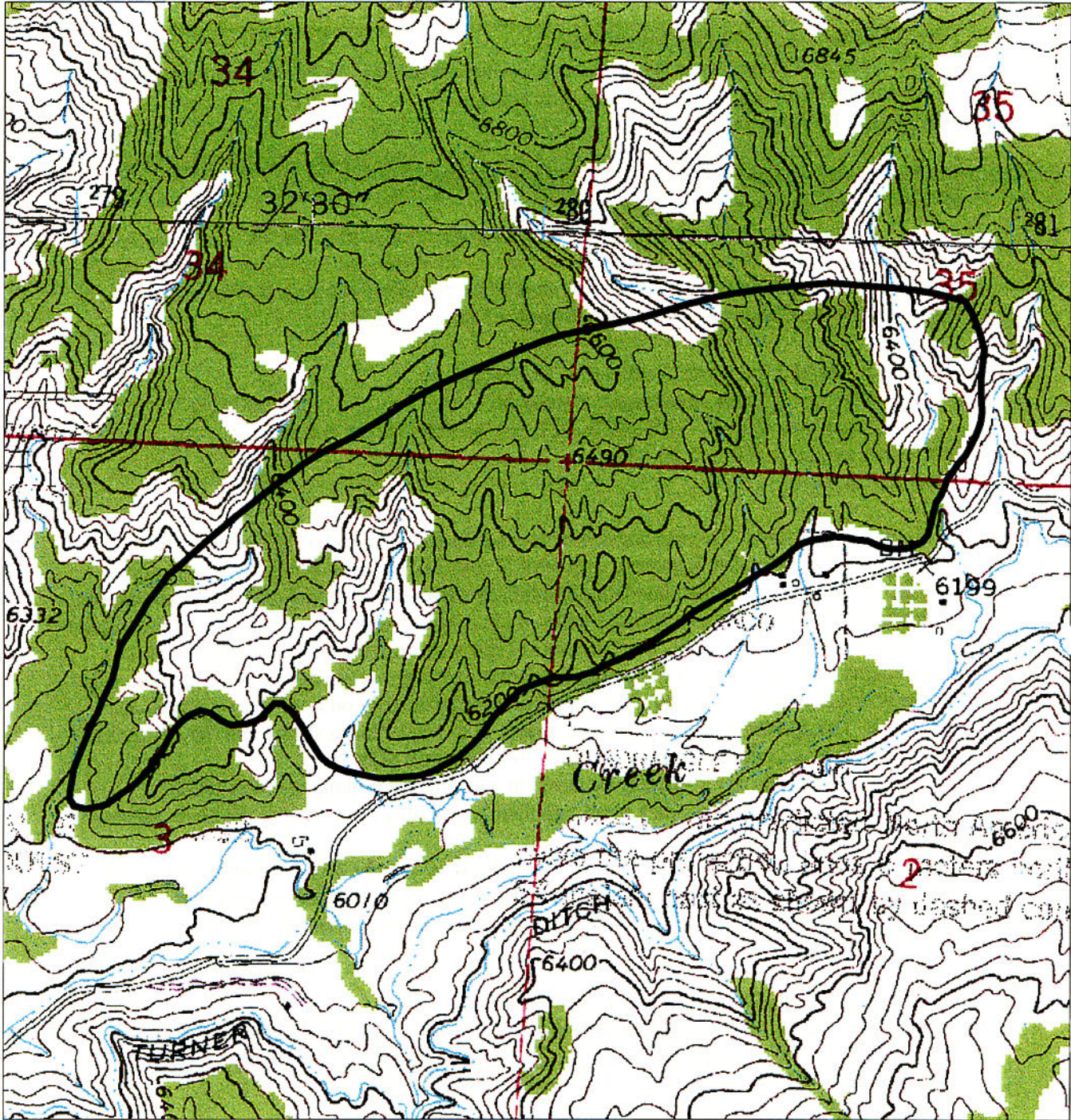
Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Lomatium concinnum</i>	Colorado desert-parsley	G2	S2		C
<i>Penstemon retrorsus</i>	Adobe beardtongue	G3	S3		B
<i>Penstemon retrorsus</i>	Adobe beardtongue	G3	S3		B

\*EO = Element Occurrence

**Boundary Justification:** The boundary was drawn to include the area surveyed, and surrounding area with the same soil type and similar vegetation, which is potential habitat for the adobe beardtongue.



# Minnesota Creek



## Minnesota Creek

**Biodiversity Rank: B3.** High significance.

The Minnesota Creek site has two separate populations of the Colorado desert-parsley (*Lomatium concinnum*).

**Protection Urgency Rank: P5.**

The site is on BLM land with no special designation. It appears to be little used, and should not require further protection.

**Management Urgency Rank: M3.**

Leafy spurge, an extremely aggressive invasive weed, has been found in the area, and needs to be controlled before it spreads further. BLM is actively trying to control it with herbicides, and may use fire as a control in the future. The area is managed under BLM's Management Unit 2, which emphasizes big game habitat. Although nearby areas have suffered some abuse attributed to hunters, this site is not heavily used due to the difficulty of access from the road.

**Location:** Approximately three miles east of Paonia.

U.S.G.S. 7.5 min. quadrangle: Paonia

Legal Description: T14S R91W S2, 3; T13S R91W S34, 35.

**Elevation range:** 6,200 to 6,600 feet.

**Size:** 275 acres.

**General Description:** This site on the south facing slopes of Jumbo Mountain, north of Minnesota Creek, has scattered patches of the Colorado desert-parsley. The area is a mosaic of mountain shrub communities with Utah juniper, squaw apple, serviceberry and mountain mahogany, and badlands areas with mostly barren soils and some shadscale and spiny horsebrush. We found the parsley in both communities, but most often associated with shadscale. The plants are much less dense here than in the Hotchkiss Hills site. Two other closely related members of the parsley family occur in the same site. Widewing spring-parsley (*Cymopterus purpurascens*) is more abundant on upper slopes and ridgetops, while Rocky Mountain spring-parsley (*C. planosus*) is found mostly on lower slopes. The Colorado desert-parsley is found primarily on mid-slopes. However, all three may be found together in some places.

Soils at this site are mapped as Torriorthents-Rock outcrop, shale complex. These are moderately steep to very steep soils and rock outcrops with silty clay or silty clay loam on the surface. They have slow permeability, high erosion hazard, and limited value for grazing. They are unsuited to farming. A previously located population farther west in this site was growing on soils mapped as badlands, which are described as nearly impermeable and unsuitable for grazing (USDA 1981).

**Biodiversity Rank Justification:** A moderately good occurrence of a globally imperiled plant.

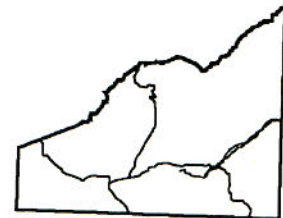
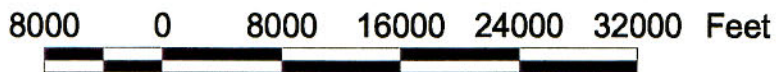
Natural Heritage elements at the Minnesota Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Lomatium concinnum</i>	Colorado desert-parsley	G2	S2		C

\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses two known locations of *Lomatium concinnum*, at the east and west ends of the site, as well as similar habitat between the two. There is more potential habitat to the west which has not been surveyed.

# North Fork



## North Fork

**Biodiversity Rank: B3.** High significance.

The North Fork site contains good to moderate quality examples of common riparian plant communities, a state rare plant, and two amphibians.

**Protection Urgency Rank: P3.**

The majority of land along the North Fork is privately owned. Opportunities for restoration may depend on acquisition or other protection tools. Public education and cooperation will be crucial to the future of the North Fork ecosystem.

**Management Urgency Rank: M3.**

Many changes in the way the river and its floodplain have been managed are needed to restore the health of the North Fork. Local efforts are underway to improve the river's hydrology and morphology, and to restore native riparian vegetation. Existing native vegetation should be protected and enhanced, and new plantings of native species made where feasible.

**Location:** From the Gunnison County line northeast of Paonia to the Gunnison River confluence.

U.S.G.S. 7.5 min. quadrangles: Lazear | Hotchkiss | Paonia

Legal Description: T14S R93W S31; T15S R93W S 2-6, 9-11 | T15S R93W S 35, 36;

T14S R92W S 10-12,14-16, 20, 21, 29-31.

**Elevation range:** 5,100 to 6,000 feet.

**Size:** 3,855 acres.

### General Description:

The North Fork of the Gunnison River is a major landscape feature of Delta County. Formed by the confluence of Muddy and Anthracite Creeks near Paonia, the stream flows southwesterly for thirty miles. At Hotchkiss, the North Fork drains 940 square miles (U.S. Army Corps 1980).

The floodplain of the North Fork contains many examples of the globally imperiled riparian forests of cottonwoods with skunkbush or coyote willow understory. However, under natural circumstances, this community would be much more abundant and in better condition than it is. Along much of the river, rather than occupying a broad flood plain, cottonwoods are confined to a narrow band under fifty feet wide. There are occasional larger groves, which often have more exotic than native vegetation in the understory.

The native community is dependent on periodic flooding for regeneration. Sites where this association occurs vary from point bars and other depositional features (early seral stands) to alluvial terraces (mature stands) that may be many meters away from the main channel, and several meters above the high water mark. Since mature cottonwoods are able to tap deeper water tables than seedlings, mature stands are often reproducing only by suckering, and their long term survival is questionable. Seedlings tend to be numerous along the shoreline, but often do not survive to maturity. The condition of the riparian vegetation is highly variable, with many areas invaded by tamarisk, Russian olive, Siberian elm, Russian knapweed, and other non-native plants.

At the upper end of the site near Paonia, the cottonwoods are primarily the narrowleaf species, while at the lower end, near Hotchkiss, Fremont cottonwood is more common. The hybrid of the two species, *Populus x acuminata*, is found throughout the site. Box elder and hawthorns are occasional. Typical native species in the understory are coyote willow, skunkbush, wild licorice, horsetails, and wheatgrasses. Occasionally, in mesic mature stands there is a thick vegetation layer including silver buffaloberry, wild rose, poison ivy, and western white clematis.

Native species that occur in saturated wetlands along the North Fork include cattails, giant reed, softstem and three-square bulrushes, spike rush, Northwest Territory sedge, horsetails and Baltic rush. Gravel bars often have Canadian horseweed and woolly mullein, in addition to coyote willow and cottonwood seedlings.

Common weedy species in wet areas are tamarisk, Russian olive, Siberian elm, red top, rabbitfoot grass, Kentucky bluegrass, reed canary grass, and sweet clover. In dry areas, common weeds are cheatgrass, orchard grass, smooth brome, alfalfa, Canada thistle, and Russian thistle.

Uplands which have not been irrigated are mostly shrub-grasslands, usually dominated by big sagebrush, rabbitbrush, and four-wing saltbush with galleta, sand dropseed or Western wheatgrass. Lower lying, seasonally wet areas often have greasewood and saltgrass. There is a great diversity of forbs, many of which are non-native species.

In addition to the plant community, we found occurrences of two state rare amphibians and a state rare plant. The Great Basin spadefoot, a new record for Delta County, was found in natural wetlands with willows, about two miles upstream from Hotchkiss. The species appeared to be abundant here. The northern leopard frogs were found close by, in a man-made wetland with cattails and pasture grasses, supplied by irrigation water. Arizona centauray was documented for the first time in Colorado, growing in wetlands with spike rush and sedges, in two locations near Hotchkiss.

The physical characteristics of the North Fork were studied in 1997, commissioned by the North Fork River Improvement Association (NFRIA), a group of local landowners, water users and concerned citizens. The study was prompted by the recognition that the river has been degraded by extensive streambank erosion (Crane 1997). Results of this degradation noted in the study include:

- Reduced riparian and wetland ecosystem function
- Loss of wildlife habitat
- Property loss
- Destruction of the fisheries
- Relocation of existing irrigation diversions
- Bridge scour
- Reduction of bedload transport
- Decreased late season flows
- Increase in flood damage
- Reduced water quality

The study recounted historical changes in the river since white settlement. According to an early settler, Esra Wade, in 1882 most of the valley near Paonia was covered with cottonwood, skunkbush, willow, and buffaloberry. He wrote that the river “was very crooked, which lessened its fall, therefore did not cut its banks, but spread over a large portion of the valley during high water time, and deposited sand and rich soil from the high country, making the valley soil, in places, very rich. Later on the ranchers began cutting these curves in the river and then the trouble began...” (Crane 1997)

Many different types of disturbance resulting from development in the valley have led to the existing condition of the North Fork. Efforts to control flooding and bank erosion, removal of riparian vegetation, irrigation diversions, gravel mining, upstream dams, cultivation and grazing have all contributed to channelization and entrenchment of the river, decrease of sinuosity, high width/depth ratio, and inability to carry its bedload. The challenge now is to meet current needs and future demands for traditional uses while restoring the health of the river and the entire ecosystem (Crane 1997).

Some excellent recommendations for flood management and floodplain restoration are included in the morphological report. These include removing existing levees and dikes farther away from the active channel, and increasing wetland and riparian forest habitat within the

widened floodplain. Further development on the floodplains of the river and its tributaries, and in wetlands should be discouraged. Crane concludes: “The way to reduce flooding in one area is to promote flooding in others...Store floods on their floodplains”(Crane 1997). By encouraging flooding in some areas, the natural ecosystem processes necessary to maintain the cottonwood-willow community can be restored, while other areas are protected from flooding.

In addition to the NFRIA, other local groups have taken an interest in restoration of specific sites on the North Fork. One project begun last year by the BLM at the confluence with the main stem of the Gunnison River included weed control and replanting a riparian area with skunkbrush, wild rose, alkali sacaton and other native plants. This is an encouraging development. It is important that the morphological and hydrological characteristics of each site be taken into account so that restoration efforts will be lasting. The 1997 study will be extremely valuable for evaluating the potential for restoration.

Revegetation of the floodplain should be accomplished using native plant species such as those mentioned above. Existing cottonwood and willow communities should be preserved and enhanced, while non-native species can gradually be eliminated. This will be a long-term commitment, but the motivation exists in Delta County for beginning restoration now.

**Biodiversity Rank Justification:** The site contains a fair occurrence of an imperiled plant community, and good occurrences of a state rare plant and two amphibians.

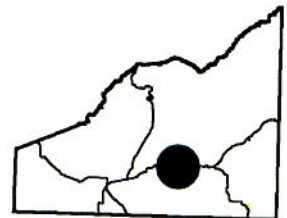
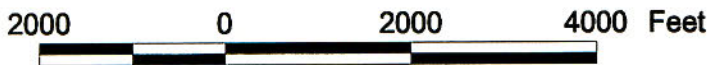
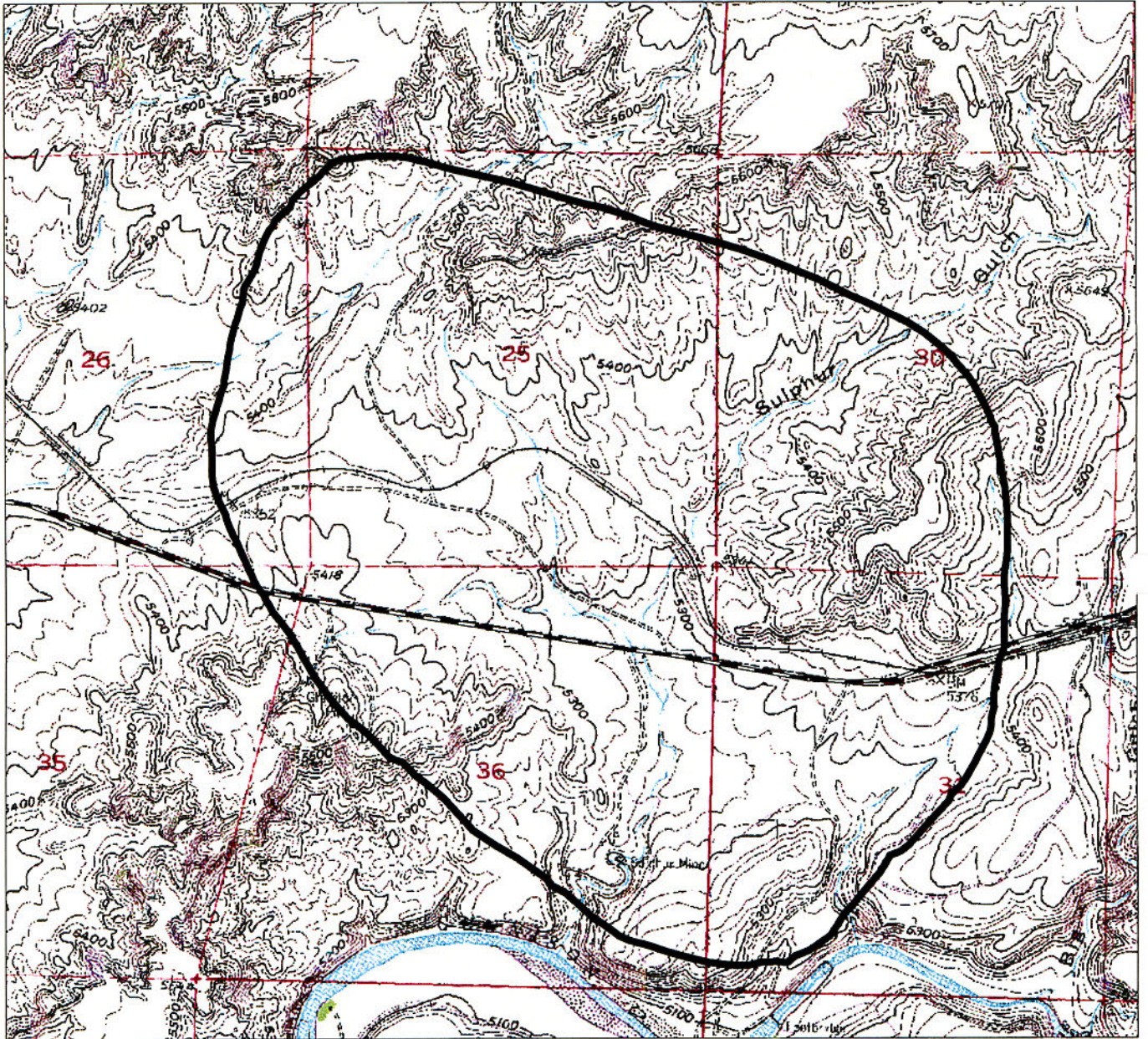
Natural Heritage elements at the North Fork site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Centaurium arizonicum</i>	Arizona centaury	G5	S1		B
<i>Centaurium arizonicum</i>	Arizona centaury	G5	S1		D
<i>Populus angustifolia/ Rhus trilobata</i>	Narrowleaf cottonwood/skunkbrush	G3	S2S3		C
<i>Populus deltoides/ Rhus trilobata</i>	Fremont's cottonwood riparian forests	G2	S2		D
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	B
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC,FS	
<i>Spea intermontana</i>	Great Basin spadefoot	G5	S3		B
<i>Spea intermontana</i>	Great Basin spadefoot	G5	S3		B

\*EO = Element Occurrence

**Boundary Justification:** The boundary was drawn to approximate the one hundred year flood plain, and the extent of the potential riparian vegetation. In some areas the natural flood plain has been altered by roads and railroads which act as dikes, and the boundary has been drawn reflecting the present flooding limits. Although the site was delineated for the river and floodplain only, the importance of the entire watershed to the health of the river should be considered.

# Sulphur Mine



## Sulphur Mine

**Biodiversity Rank: B3.** High significance

The Sulphur Mine site contains small populations of two globally imperiled plants, the Colorado desert-parsley (*Lomatium concinnum*) and the Uinta Basin hookless cactus (*Sclerocactus glaucus*).

**Protection Urgency Rank: P4**

Ownership of the site is a mix of private and BLM land. Part of the BLM land has been identified for disposal, and should be thoroughly surveyed for the Uinta Basin hookless cactus before being sold.

**Management Urgency Rank: M3.**

The BLM land is managed in accordance with the guidelines for management units 4 and 16. Unit 4 includes areas surrounding the Gunnison Gorge, designated as the Gunnison Gorge Special Recreation Management Area. Management problems that have troubled BLM include illegal dumping and invasion of Russian knapweed. ORV use has increased, and a proliferation of new trails is becoming visible. There is some sheep grazing at this site. In 1997, the site appeared to be quite degraded. The ground was very dry, and all herbaceous plants were stunted, compared with those in nearby areas with the same soil type and topography. Further study is needed to understand why the Colorado desert-parsley here appears to be in such poor condition compared with that at other sites, and whether the Uinta Basin hookless cactus has actually been extirpated.

**Location:** Both sides of Highway 92, east of Austin.

U.S.G.S. 7.5 min. quadrangle: Lazear

Legal Description: T14S R94W S25, 26, 35, 36; T14S R93W S 30, 31.

**Elevation range:** 5,200 to 5,600 feet.

**Size:** 1,732 acres.

**General Description:** On a bluff above the Gunnison River, this site consists of rolling adobe hills with sparse vegetation. Although there were several historic records dating from 1978 through 1983 of small populations of the Uinta Basin hookless cactus at this site, we were unable to locate any in 1997. However, due to the elusive nature of the cactus, we can't rule out the possibility that they are still there. If they are, this represents the eastern extent of their known range in Delta County.

The Colorado desert-parsley at this site was much smaller and appeared less healthy than the populations at Hotchkiss Hills and Cedar Hill. In general, the area appeared quite degraded.

**Biodiversity Rank Justification:** Several poor quality occurrences of globally imperiled plants.



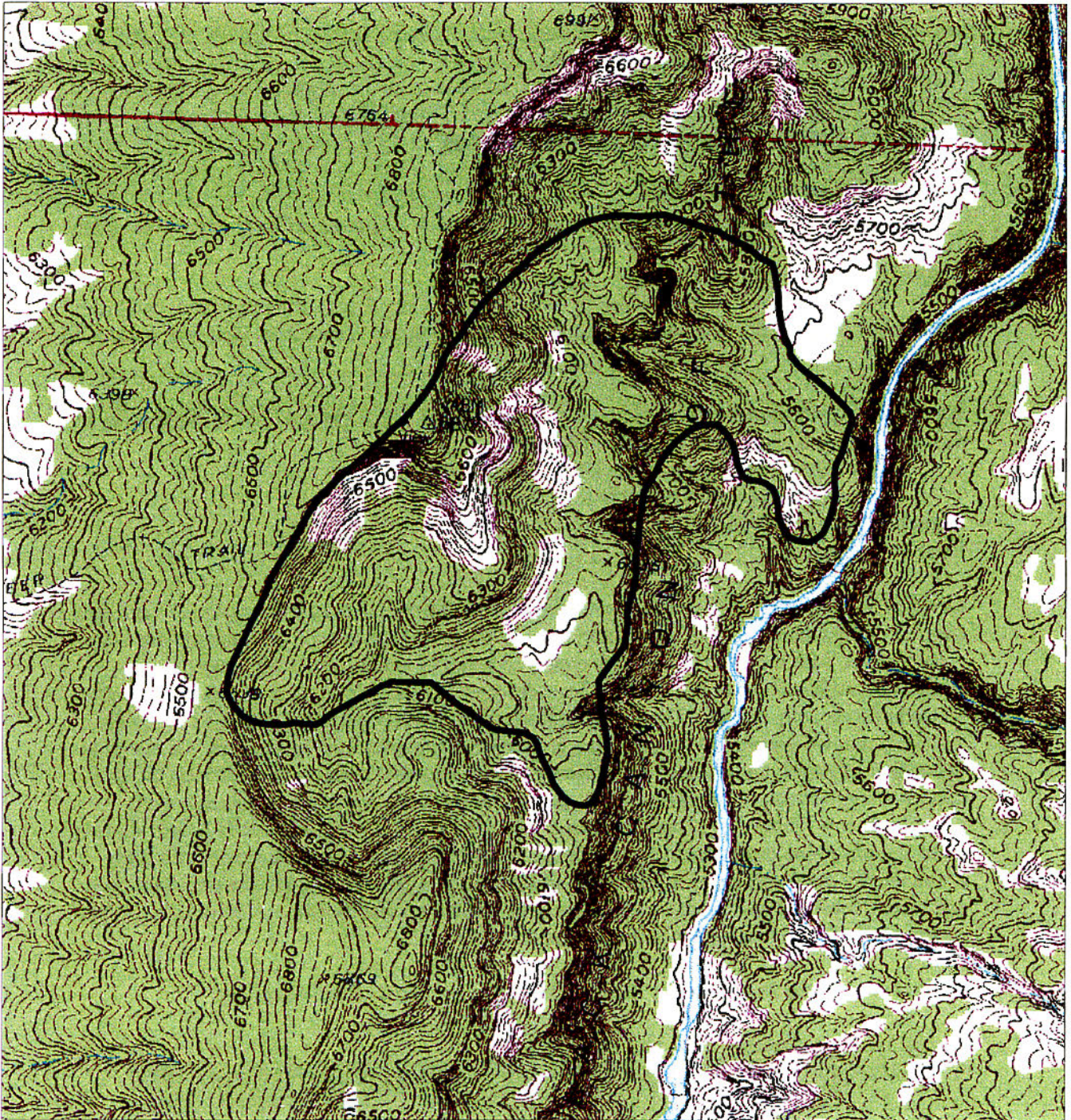
Natural Heritage elements at the Sulphur Mine site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Lomatium concinnum</i>	Colorado desert-parsley	G2	S2		D
<i>Lomatium concinnum</i>	Colorado desert-parsley	G2	S2		D
<i>Lomatium concinnum</i>	Colorado desert-parsley	G2	S2		H
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3		
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3		H
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3		H
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3		H

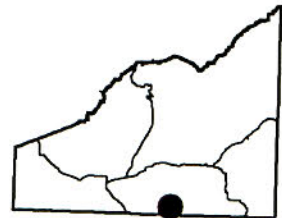
\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the occurrences of the Colorado desert-parsley that were confirmed in 1997 and historic occurrences that were not verified. Since populations of these plants can be variable, and the areas we saw appeared to be suffering from drought and/or grazing pressure, it would be advisable to recheck this area in another year.

# Ute Trail



1000 0 1000 2000 3000 Feet



## Ute Trail

**Biodiversity Rank: B3.** High significance.

The Ute Trail site has a good quality (B-ranked) occurrence of the large-flowered breadroot (*Pediomelum megalanthum*), and a fair occurrence of Wetherill's milkvetch (*Astragalus wetherillii*), plants which are rare throughout their range.

**Protection Urgency Rank: P5.**

The site is adequately protected as part of the BLM's Gunnison Gorge Wilderness Study Area.

**Management Urgency Rank: M5.**

No management needs are known or anticipated. Only foot traffic is allowed, and hikers tend to stay on the trails in the areas where the rare plants occur. There is no livestock grazing on the site.

**Location:** Approximately twelve miles east-southeast of Delta. The trailhead is reached via a signed BLM road which goes east from 2450 Dr.

U.S.G.S. 7.5 min. quadrangle: Black Ridge

Legal Description: T51N R9W S 10, 11, 14, 15.

**Elevation range:** 5,500 to 6,500 feet.

**Size:** 378 acres.

**General Description:** The Ute Trail site is located on the steep western slopes above the Black Canyon of the Gunnison. The east-facing hillside has good examples of common pinyon-juniper communities, with some small, but high quality, patches of needle and thread grass. Both Wetherill's milkvetch and large-flowered breadroot were found along the trail and in dry washes which are seasonally eroded. The habitat requirements of the two species appear to be similar, and the same two species have been found growing close together in Mesa County, on the same geological substrate, the Wasatch Formation. Some of the other plants associated with the rare species were Eastwood's lomatium, Utah juniper, Mormon tea, mountain mahogany, spiny greasbrush, low rabbitbrush, bahia, and sand aster. We found the large-flowered breadroot to be more abundant than the Wetherill's milkvetch. Small sub-populations of the milkvetch were found in only three washes, although much of the nearby adjacent area with similar habitat was searched. Nevertheless, the plants are likely to be present in other washes on the pinyon-juniper covered hillsides both upstream and downstream of the trail.

**Biodiversity Rank Justification:** B and C ranked occurrences of two G3 plants.

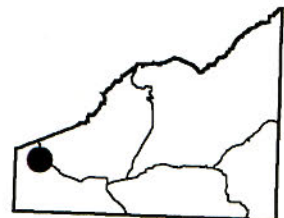
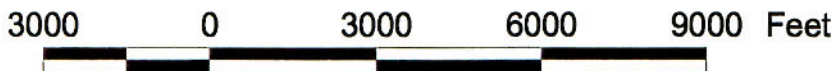
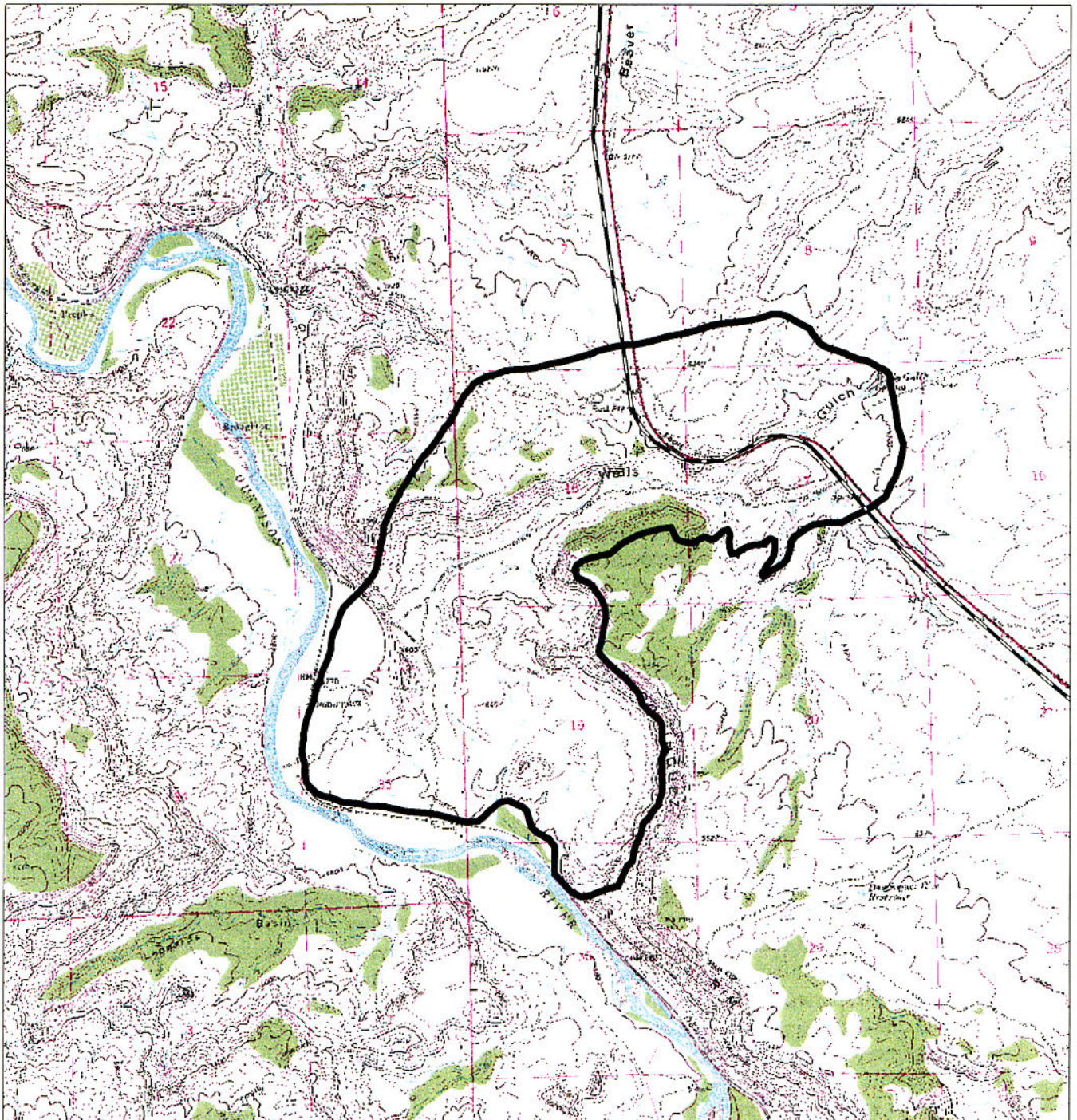
Natural Heritage elements at the Ute Trail site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Astragalus wetherillii</i>	Wetherill milkvetch	G3	S3		C
<i>Pediomelum megalanthum</i>	Large-flowered breadroot	G3	S3		B

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to include the known locations of the rare plants, and the area between them on the same soil type. Not included in the site is a large area of potential habitat, both north and south of this site, which has not been searched.

# Wells Gulch



## Wells Gulch

**Biodiversity Rank: B3.** High significance.

The Wells Gulch site contains good and fair occurrences of two globally restricted plants, the Uinta Basin hookless cactus and the large-flowered breadroot, and high quality examples of cold desert shrublands communities.

**Protection Urgency Rank: P3.**

The majority of the area in the site is BLM land. A potential threat to the rare plants at the site is the planned relocation of Highway 50, in order to straighten a dangerous curve. In addition, a realignment of the Trans-Colorado pipeline is planned, which will cause considerable surface disturbance. Clearances for the Uinta Basin hookless cactus, which is federally listed as threatened, will be required for both projects. However, impacts to the large-flowered breadroot, which has no legal protection, and the cold desert shrublands plant communities are likely to be severe.

**Management Urgency Rank: M3.**

The BLM management plan for this site calls for emphasis on livestock values. Sheep graze the area during the dormant season. ORV use is not restricted in this area. The fact that we were unable to find any Uinta Basin hookless cactus in a location that had previously been reported as a high quality site with abundant cactus is cause for some concern. Further searches during flowering season are warranted, and grazing impacts should be assessed. Once a good population of the cactus is relocated, permanent monitoring plots should be established to provide information on changes in population size and condition over time.

**Location:** Approximately thirteen air miles west-northwest of Delta.

U.S.G.S. 7.5 min. quadrangle: Dominguez

Legal Description: T4S R3E S 7, 8, 17-19, 30; T14S R98W S 26, 35.

**Elevation range:** 4,800 to 5,400 feet.

**Size:** 2,021 acres.

**General Description:** This broad, gently sloping shrub/grassland covers a large area east of the Gunnison River in western Delta County. Vegetation is characterized by shadscale with galleta grass, except on north facing slopes where the dominant grass is Salina wildrye. The hills are quite free of weeds, except for some cheatgrass. Low lying swales are dominated by greasewood, with seablight and winterfat. Low areas tend to be more weedy, with cheatgrass and halogeton.

In spite of intensive searching, very few of the Uinta Basin hookless cacti which had been previously reported from this site were relocated in 1997. The original 1983 report for the cactus noted that the area was highly impacted by grazing. When we did find a few cacti, the associated vegetation was typical of other cactus sites, with shadscale, snakeweed, budsage, galleta, prickly-pear cactus, low rabbitbrush, globemallow, and Fendler's spring-parsley among the plants present. The clay soils derived from Mancos shale, with scattered basalt pebbles and cobbles on the surface, were also typical of other sites.

The large-flowered breadroot was a new record for Delta County. We found it to be frequent over a large area, usually on the edges of dry washes, but never very abundant in any one place. Associated species included spiny greasebush, low rabbitbrush, snakeweed, princes plume, Mormon tea, twin bladderpod, Easter daisy, Indian paintbrush, thrift mock goldenweed, and hairy golden aster.

**Biodiversity Rank Justification:** A good (B-ranked) occurrence of the large-flowered breadroot (G3).

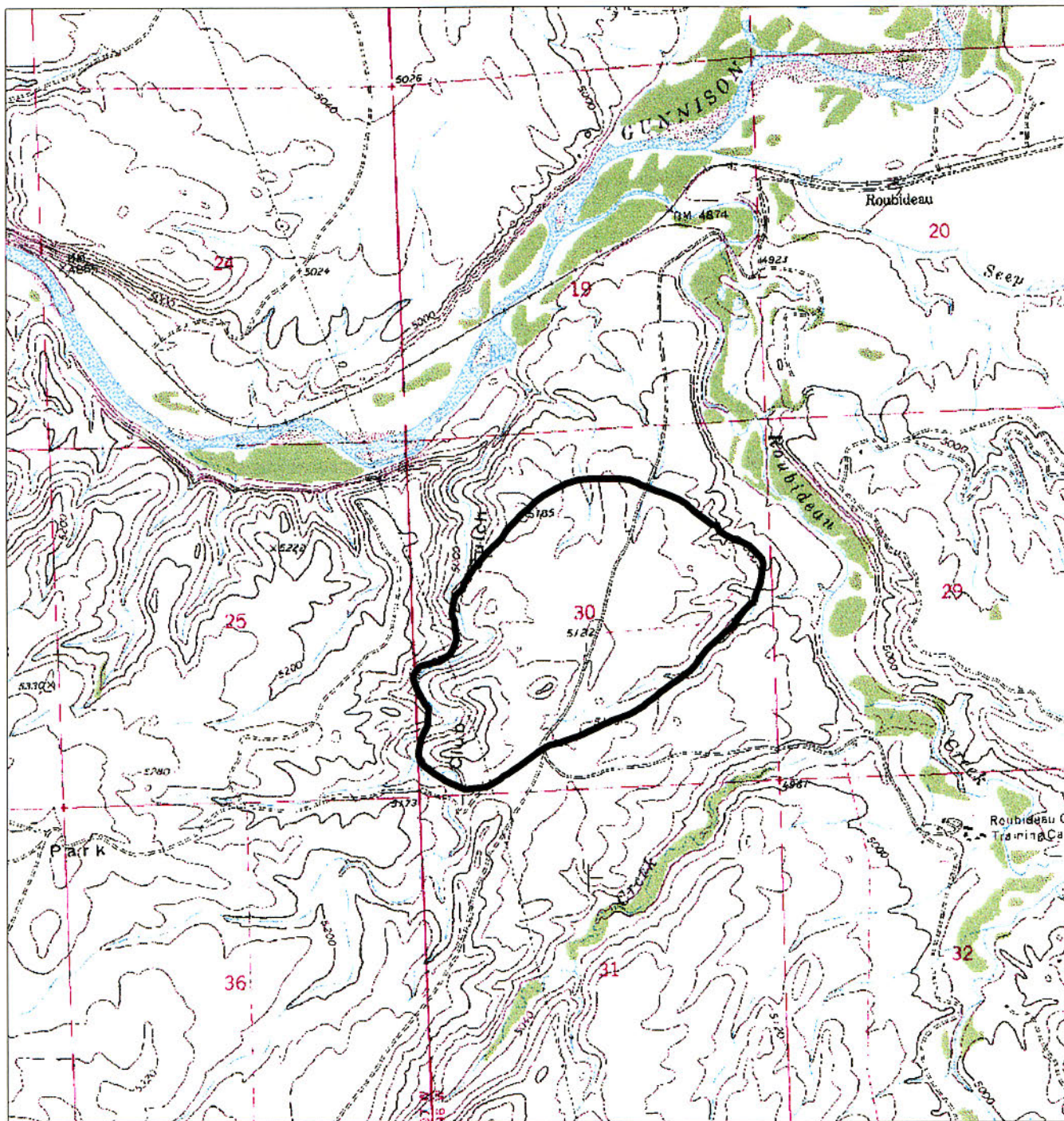
Natural Heritage elements at the Wells Gulch site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Atriplex confertifolia/Hilaria jamesii</i>	Cold desert shrublands	G3	S2		B
<i>Atriplex confertifolia/Leymus salinus</i>	Cold desert shrublands	G3G5	S3		B
<i>Pediomelum megalanthum</i>	Large-flowered breadroot	G3	S3		B
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	D

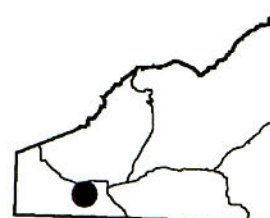
\*EO = Element Occurrence

**Boundary Justification:** The boundary was drawn to include the occurrences of the large-flowered breadroot and both historic and new populations of the Uinta Basin hookless cactus. The semi-desert shrub plant communities occur within the site, and also extend beyond the site boundary.

# Club Gulch North



2000 0 2000 4000 6000 Feet



## Club Gulch North

**Biodiversity Rank: B4.** Moderate significance.

The Club Gulch North site has fair occurrences of a the large-flowered breadroot, a locally restricted plant, and a cold desert shrublands community.

**Protection Urgency Rank: P4.**

The site is located in the Escalante State Wildlife Area and on BLM property. No additional protection for the state property is needed. The 80 acre BLM parcel has been identified for disposal, due to its isolation. If this property is sold, it should be acquired by the state as part of the wildlife area to protect these resources.

**Management Urgency Rank: M4.**

No serious management needs are known or anticipated at this site. Although there is a powerline and service road adjacent to the long-flowered cat's-eye population, the plants do not appear to be impacted negatively under present management. There is no authorized grazing on the BLM portion of the site. Management should be directed toward improving the quality of the plant community by encouraging better coverage of native grasses and reduction of cheatgrass and halogeton.

**Location:** About seven air miles west of Delta, south of the Gunnison River.

U.S.G.S. 7.5 min. quadrangle: Roubideau

Legal Description: T15S R96W S30

**Elevation range:** 5,000 to 5,200 feet.

**Size:** 325 acres.

**General Description:** This site of about 500 acres is on a fairly level mesa top between Club Gulch and Roubideau Creek, about a quarter mile south of the Gunnison river. It is within the Colorado Division of Wildlife's Escalante State Wildlife Area, and includes part of an eighty acre BLM parcel which is surrounded by the wildlife area. The site is bisected by Sawmill Mesa Road. The shrub and grassland is typical of much of the lower elevations (5,000 to 5,600 feet) between the Gunnison River and the Uncompahgre Plateau. The dominant shrub is shadscale (*Atriplex confertifolia*), and the dominant native grass is galleta (*Hilaria jamesii*). The relative abundance of the galleta is patchy. In some places there is more cheatgrass (*Bromus tectorum*) and broom snakeweed (*Gutierrezia sarothrae*), which lower the quality and condition of the plant community (Belcher and Wilson 1989, Melgoza et al 1989). Other common plants in the area are Fendler's spring-parsley, scarlet globemallow, scorpionweed, prickly pear cactus, budsage, sand aster, sand verbena, tansy mustard and Indian rice grass. Disturbed areas, particularly along roads, are frequently invaded by halogeton. Although the area is similar to other areas where the Uinta Basin hookless cactus grows, none were found here during searches in 1997. The long-flowered cats-eye was found at the top of a small hill, below a power-line.

**Biodiversity Rank Justification:** The site contains C ranked occurrences of a locally restricted (G3) plant and natural community.



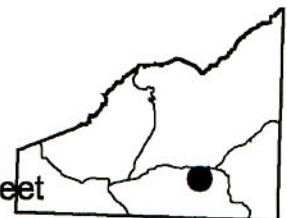
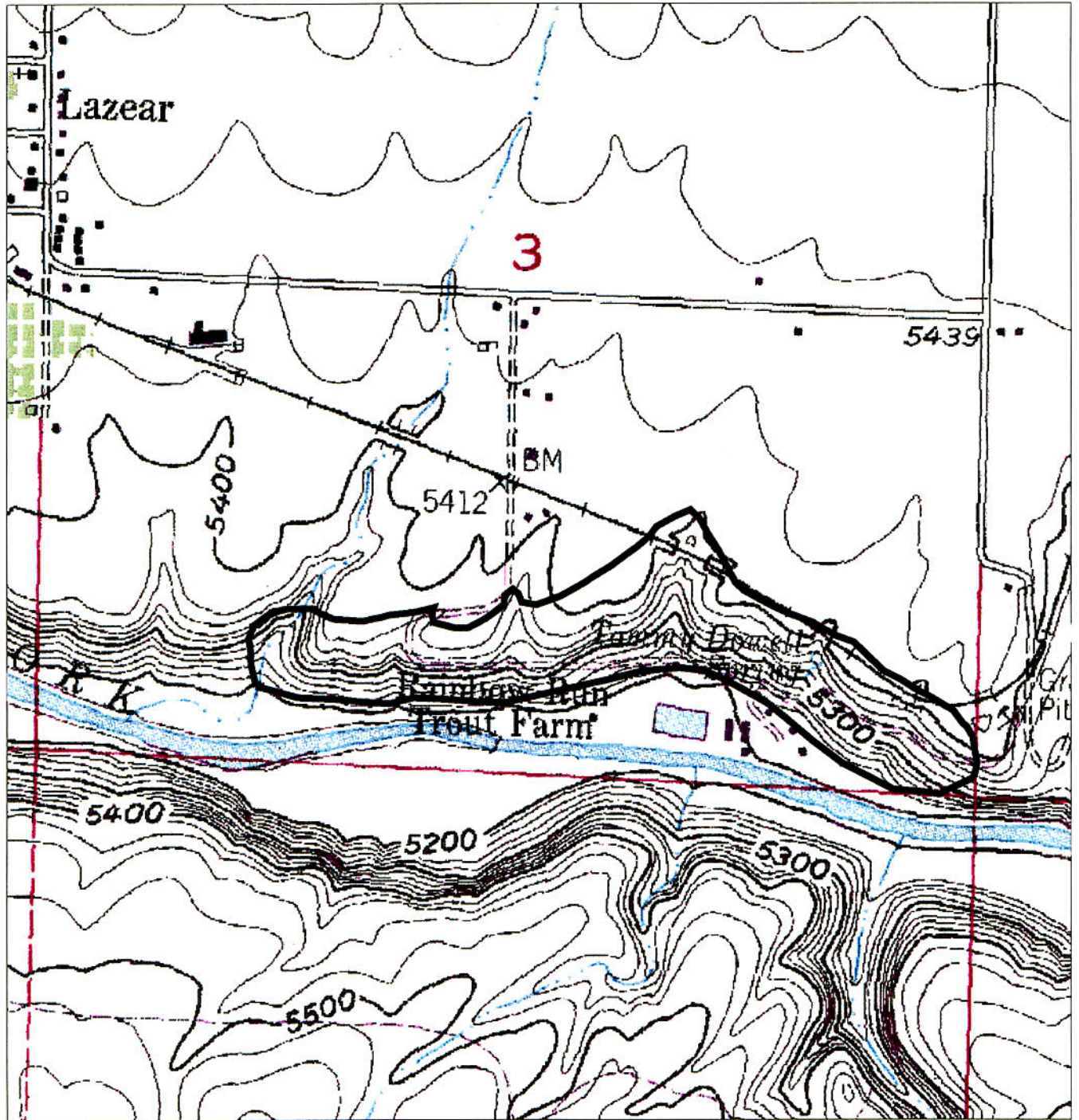
Natural Heritage elements at the Club Gulch North site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Atriplex confertifolia/Hilaria jamesii</i>	cold desert shrublands	G3	S2		C
<i>Cryptantha longiflora</i>	long-flowered cat's-eye	G3	S3?		C

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to encompass the population of the long-flowered cat's-eye and the adjacent shrub-grassland typical of the area on both sides of Sawmill Mesa Road.

# Fish Hatchery



## Fish Hatchery

**Biodiversity Rank: B4.** Moderate significance.

The fish hatchery site contains a good quality occurrence of the state rare giant helleborine orchid (*Epipactis gigantea*).

**Protection Urgency Rank: P4.**

The site is owned by the U. S. Fish and Wildlife Service. Protection of the hydrological processes necessary for the continuance of the orchid population should complement other fish hatchery objectives.

**Management Urgency Rank: M3.**

Although the site is not currently threatened, management may be needed in the future to maintain the current quality of the element occurrence. Survival of this population of the orchid depends upon the continued flow of water from the springs. There are many exotic species on the property, some of which could invade the orchid population. A monitoring program should be established to further elucidate the threat of weed invasions.

**Location:** Southeast of Lazear, above Hotchkiss National Fish Hatchery.

U.S.G.S. 7.5 min. quadrangle: Lazear

Legal Description: T15S R93W S3

**Elevation range:** 5,200 to 5,400 feet.

**Size:** 53 acres.

**General Description:** This site, on the hillside above the Hotchkiss National Fish Hatchery, is a spring-fed wetland with a large population of the giant helleborine orchid. The springs are the source of the water for the fish hatchery. They are believed to be natural, although runoff from irrigated fields above may contribute to the flow. Other wetland vegetation on the hills includes water parsnip, cattails, reed canary grass, bulrushes and sedges.

**Biodiversity Rank Justification:** A good occurrence of a state imperiled plant.

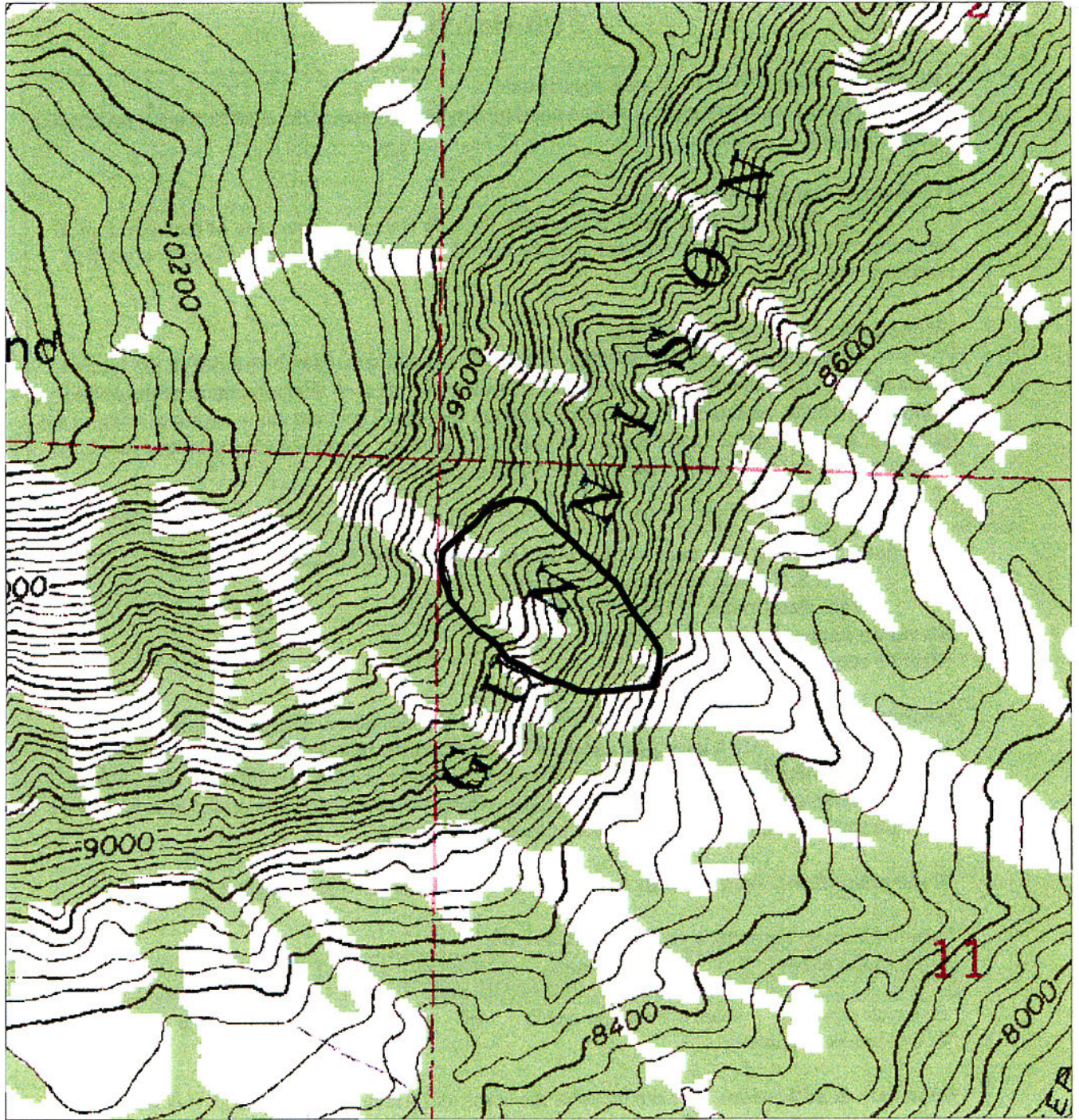
Natural Heritage elements at the Fish Hatchery site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Epipactis gigantea</i>	Giant helleborine orchid	G4	S2		B

\*EO = Element Occurrence

**Boundary Justification:** The site includes the seeps and wet hillside. Although it is not included in the site, the recharge area for the springs is crucial to the continued existence of the orchid population. The hydrology of the springs is unknown at this time.

# Land's End Peak



## Land's End Peak

**Biodiversity Rank: B4.** Moderate significance.

The Land's End site has a small occurrence of the adobe beardtongue (*Penstemon retrorsus*), a plant which is globally vulnerable due to its very restricted range.

**Protection Urgency Rank: P5.**

This site is within the Gunnison National Forest, on the side of Land's End Peak, away from trails. We saw no evidence of human or livestock use, and see no need for additional protection.

**Management Urgency Rank: M5.**

No special management is needed. Any disturbance to the area is likely to be from natural landslides.

**Location:** Approximately six air miles northeast of Crawford.

U.S.G.S. 7.5 min. quadrangle: Paonia

Legal Description: T15S R91W S11

**Elevation range:** 8,600 to 9,400 feet.

**Size:** 17 acres.

**General Description:** Land's End Peak is the farthest west peak of the West Elk Mountains. We found a small population of the adobe penstemon in a steep draw on its eastern flank, above a wide boulder field. Vegetated areas of the mountainside have a dense growth of aspen with a variety of shrubs and forbs in the understory. Douglas fir and Rocky Mountain maple grow in narrow drainages.

**Biodiversity Rank Justification:** The site has a small, C ranked occurrence of a globally vulnerable (G3) species.

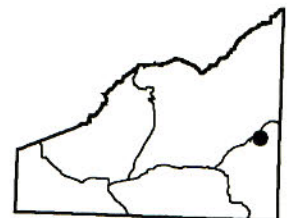
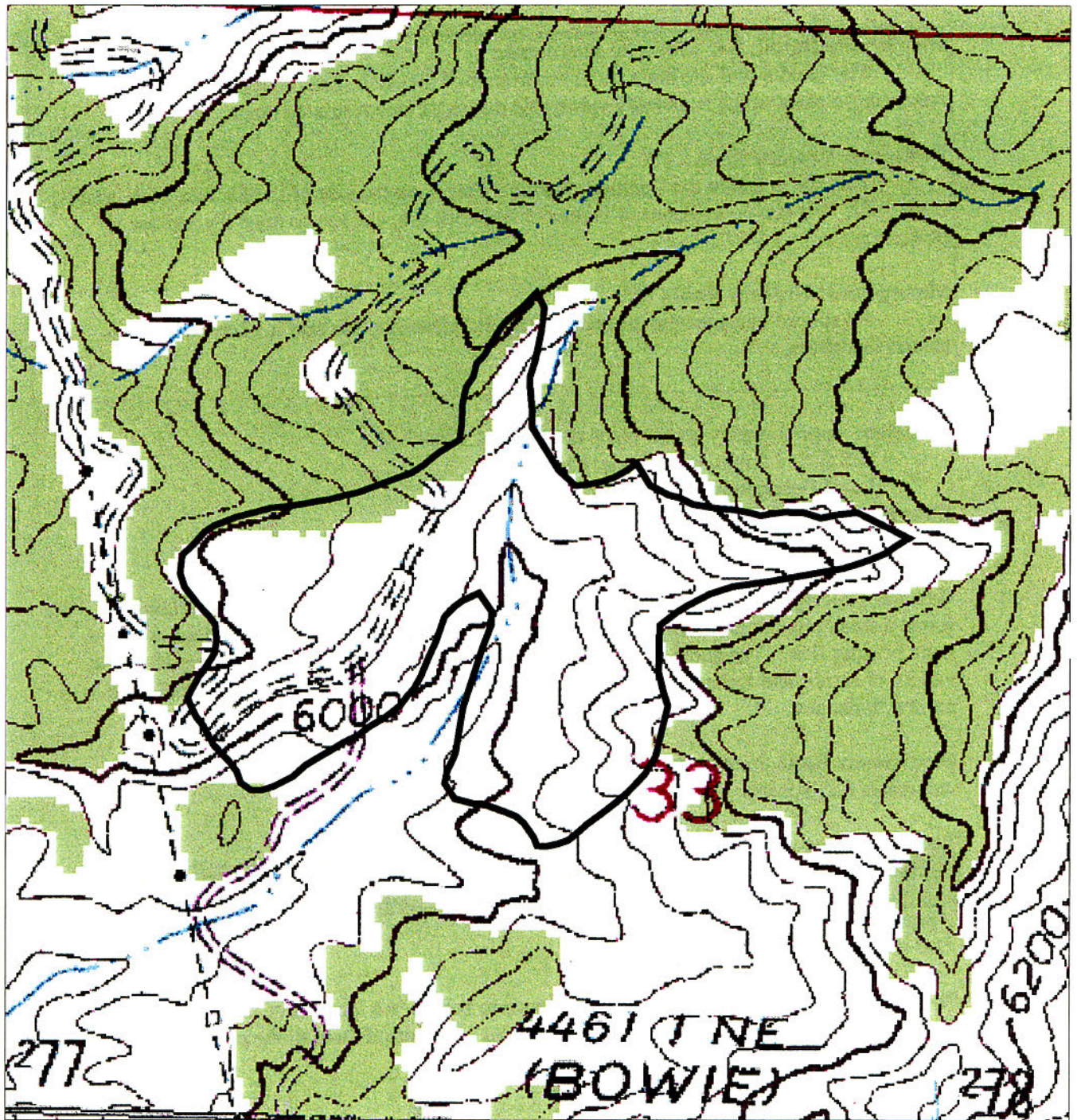
Natural Heritage elements at the Land's End site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Penstemon retrorsus</i>	Adobe beardtongue	G3	S3		C

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to include the location of the adobe beardtongue. Further surveys may increase the size of the site if more of the plants are found.

# Lennox Mesa



## Lennox Mesa

**Biodiversity Rank: B4.** Moderate significance.  
 The Lennox Mesa site contains an occurrence of the adobe beardtongue (*Penstemon retrorsus*), a G3 plant.

**Protection Urgency Rank: P3.**  
 The site is on BLM land, with no special protection. The area is open to coal leasing, which could potentially threaten the plant population in the future.

**Management Urgency Rank: M3.**  
 The Lennox Mesa site falls within BLM's Management Units 2 and 16. Unit 2 is identified as critical deer and elk winter habitat. The area is open to ORV use except during the winter months, when their use is restricted to designated roads and trails to avoid disturbance of the wildlife. BLM range managers have noted a significant increase in ORV use in the area, with 4-wheelers driving on the hillsides. Revised management plans should restrict ORV use to existing roads and trails year-round. Cattle grazing takes place during spring and fall. This location should be revisited to confirm the presence of the adobe penstemon and evaluate the quality and condition of the site.

**Location:** Approximately one mile northeast of Paonia.

U.S.G.S. 7.5 min. quadrangle: Bowie

Legal Description: T13S R91W S33

**Elevation range:** 6,000 to 6,200 feet.

**Size:** 42 acres.

**General Description:** Lennox Mesa is located on the western flank of Jumbo Mountain, northeast of Paonia. The adobe penstemon was located there by a BLM survey crew in 1984. Our attempt to visit this site in 1997 was aborted; however, we have no reason to believe that there has been any change. This location should be visited in the future to confirm and evaluate the occurrence.

**Biodiversity Rank Justification:** The site has an unranked occurrence of a globally vulnerable (G3) plant.

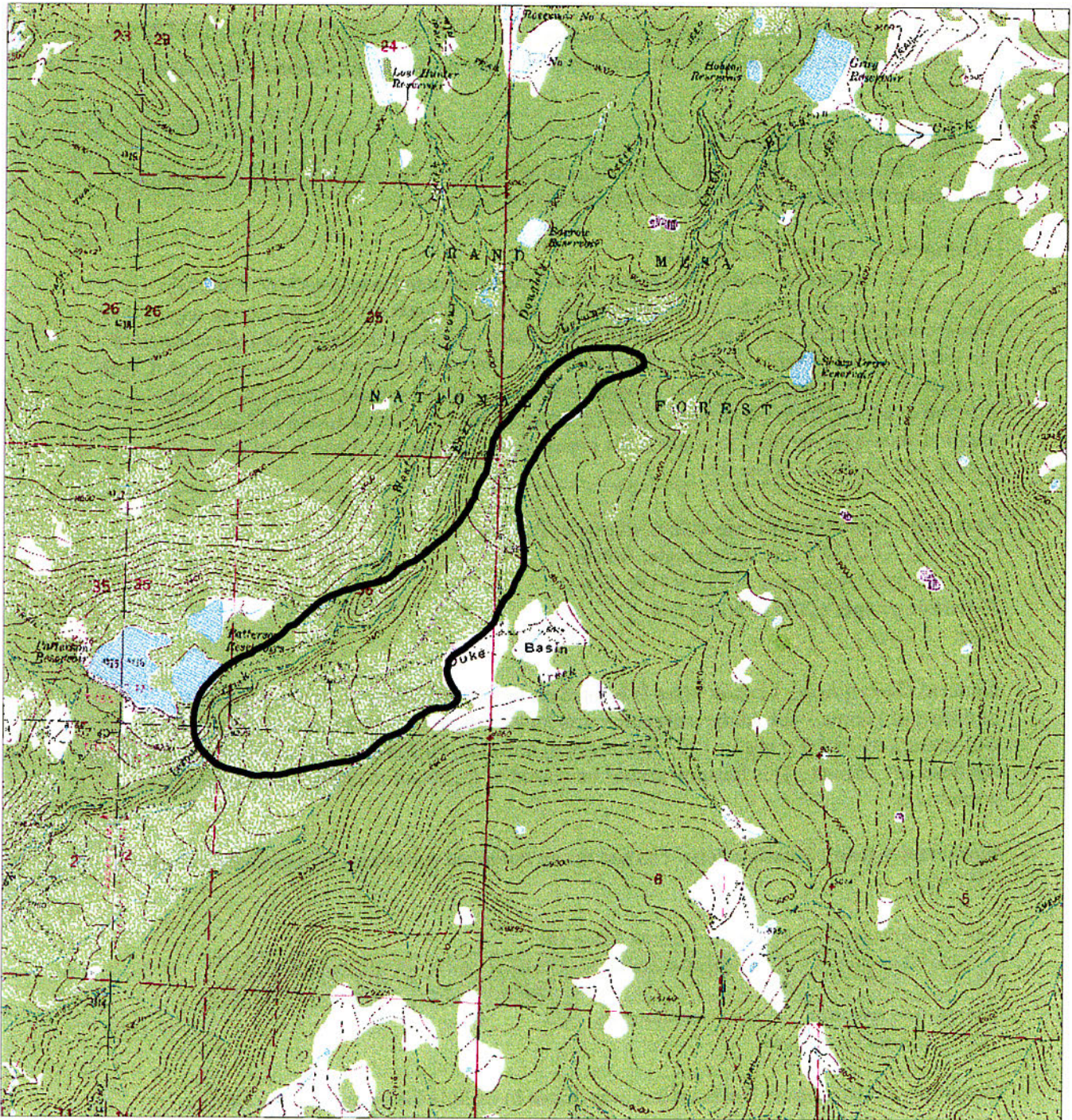
Natural Heritage elements at the Lennox Mesa site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Penstemon retrorsus</i>	Adobe beardtongue	G3	S3		

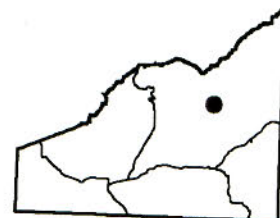
\*EO = Element Occurrence

**Boundary Justification:** The boundary was drawn to include the location of the adobe penstemon as mapped by BLM and surrounding non-forested land which was mapped as the same soil type (Torriorthents-rock outcrop) by the NRCS (USDA 1981).

# Leroux Creek



2000 0 2000 4000 6000 8000 Feet





## Leroux Creek

**Biodiversity Rank: B4.** Moderate significance.

The Leroux Creek site contains a moderately good occurrence of Grand Mesa penstemon (*Penstemon mensarum*), a globally vulnerable plant.

**Protection Urgency Rank: P4.**

The site is within the Grand Mesa National Forest. There is no special protection for the Grand Mesa penstemon, and is probably not necessary.

**Management Urgency Rank: M4.**

Although the Grand Mesa penstemon seems to prefer sites which have some level of disturbance, its location at the roadside makes it vulnerable to road maintenance activity. Road crews should be made aware of the plant. Timing of maintenance actions can be adjusted to ensure the least impact to the plant.

**Location:** Grand Mesa National Forest, at the forest boundary, along Leroux Creek Road (3100 Road) north of Hotchkiss.

U.S.G.S. 7.5 min. quadrangle: Gray Reservoir

Legal Description: T12S R93W S36; T12S R92W S30,31; T13S R93W S1.

**Elevation range:** 8,200 to 9,000 feet.

**Size:** 468 acres.

**General Description:** The Leroux Creek site consists primarily of Gambel oak woodland, with patches of aspen. Other associated plant species include lupine, wild rose, aspen daisy, chokecherry, snowberry, serviceberry, osha, little sunflower, and yarrow. The soil just outside the forest boundary was mapped as Delson loam, deep and well-drained. The Grand Mesa penstemon was found in scattered patches in sunny, disturbed areas, along the roadside and in cleared campsites. Cutthroat trout in the stream have been stocked, and are therefore not listed below.

**Biodiversity Rank Justification:** A moderately good (C ranked) occurrence of a globally vulnerable (G3) plant species.

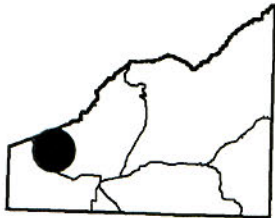
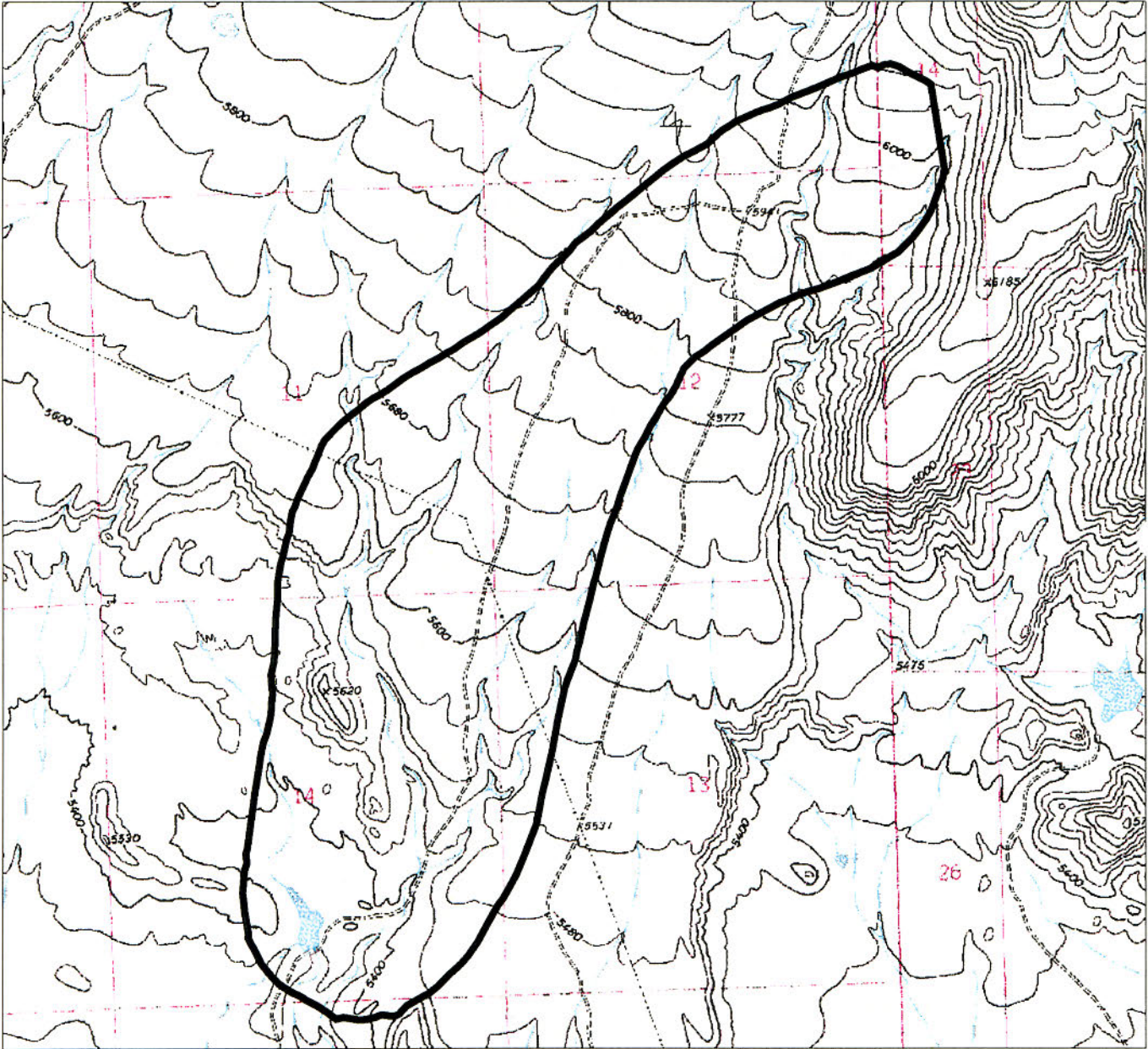
Natural Heritage elements at the Leroux Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Penstemon mensarum</i>	Grand Mesa penstemon	G3	S3		C

\*EO = Element Occurrence

**Boundary Justification:** The site boundary is drawn to include several occurrences of the Grand Mesa penstemon, with similar habitat between the locations.

# Middle Point Creek



## Middle Point Creek

**Biodiversity Rank: B4.** Moderate significance.

The Middle Point Creek site contains a good occurrence of a state rare mammal, the white-tailed antelope squirrel (*Ammospermophilus leucurus pennipes*).

**Protection Urgency Rank: P5.**

The site is on BLM land with no special designation. There is no need for further protection at this time.

**Management Urgency Rank: M4.**

Although not currently threatened, management may be needed in the future to maintain the population of white-tailed antelope squirrel. It is thought that reduction of the native grass cover through overgrazing may have reduced numbers of the white-tailed antelope squirrel. Grazing management should take this species into account. The present practice of grazing by sheep during the dormant season is believed to have little impact on the grass. The area is managed under Management Unit 5, which emphasizes salinity control. Disturbances to the alkaline soil can cause erosion, and increased salinity of the Gunnison River. ORV use is restricted to existing roads and trails, although this is difficult to enforce.

**Location:** Approximately eleven air miles northwest of Delta.

U.S.G.S. 7.5 min. quadrangle: Point Creek

Legal Description: T4S R3E S1, 11-14, 23; T14S R97W S14.

**Elevation range:** 5,360 to 6,080 feet.

**Size:** 1,044 acres.

**General Description:** The site is on the long, gentle slopes at the base of Grand Mesa, with several parallel rocky draws leading south to the Gunnison River. The white-tailed antelope squirrels were found in these draws. This is the first precisely mapped record of the white-tailed antelope squirrel in Delta County. The site includes a small reservoir which dry when we visited it. Although weedy, it seems to attract some wildlife, and was the location of the northern harrier sighting. Vegetation of the area is desert shrubland with shadscale and galleta.

**Biodiversity Rank Justification:** A good occurrence of a state rare animal.

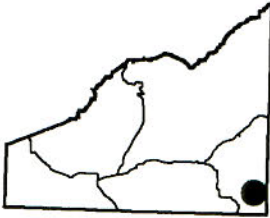
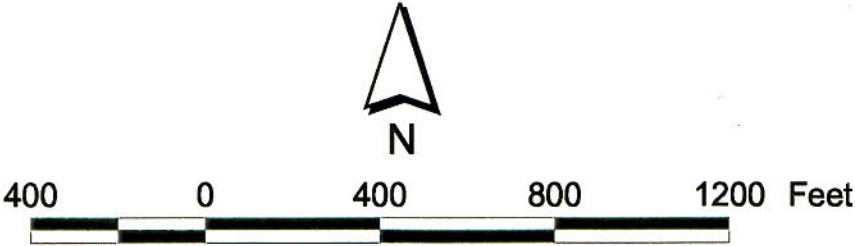
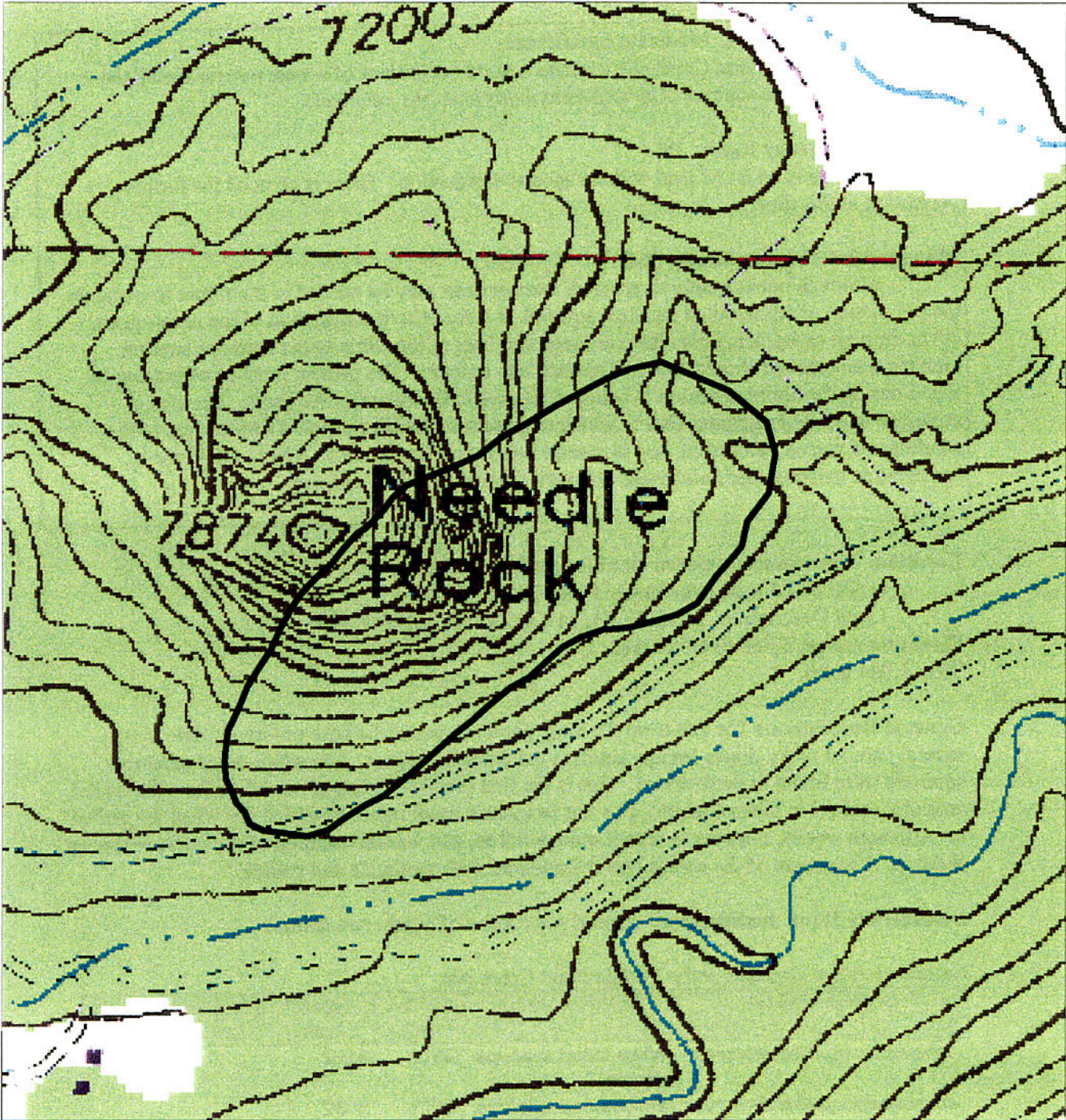
Natural Heritage elements at the Middle Point Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Ammospermophilus leucurus</i>	White-tailed antelope squirrel	G5T?	S1S2		B
<i>Ammospermophilus leucurus</i>	White-tailed antelope squirrel	G5T?	S1S2		
<i>Circus cyaneus</i>	Northern harrier	G5	S4BS4N		C

\*EO = Element Occurrence

**Boundary Justification:** The site includes two occurrences of the white-tailed antelope squirrel, and similar habitat between them.

# Needle Rock



## Needle Rock

**Biodiversity Rank: B4.** Moderate significance

The Needle Rock site contains a scattered population of adobe beardtonge (*Penstemon retrorsus*) in a highly diverse shrub community.

**Protection Urgency Rank: P5.**

The site is on BLM land, and has been designated as an an Outstanding Natural Area and an Area of Critical Environmental Concern (ACEC) by BLM, and as a designated State Natural Area by the Colorado Natural Areas Program. No surface disturbance activity is allowed, ORV use is prohibited, and no grazing takes place at the site. Further protection should not be necessary.

**Management Urgency Rank: M4.**

Present management appears adequate. It may be necessary in the future to improve the marking of foot trails to prevent the proliferation of new trails which could impact the plant community.

**Location:** Approximately four air miles northeast of Crawford.

U.S.G.S. 7.5 min. quadrangle: Crawford

Legal Description: T15S R91W S27

**Elevation range:** 7,000 to 7,800 feet.

**Size:** 24 acres.

**General Description:** Needle Rock is a neck of volcanic rock which towers 800 feet over the surrounding valley floor. The site is owned by BLM, and is a designated State Natural Area. BLM has provided interpretive signs and a nature trail which receives about 375 visitors each year (CNAP 1997).

The south-facing hillsides have a plant community which has a high diversity of shrubs. While the dominant species of the plant association are common, this area has a combination of species which seems to be peculiar to the Crawford area. Shrubs include mountain mahogany, squaw apple, serviceberry, cliff fendlerbush, littleleaf mock orange, adobe beardtongue, and snowberry. With increasing elevation, there is more Gambel oak, with rock spirea on rock outcrops. The community is in good condition, with very few weeds.

Although the adobe beardtongue is more abundant elsewhere, its presence in this protected site is notable.

**Biodiversity Rank Justification:** A small (C ranked) occurrence of a globally vulnerable (G3) plant.

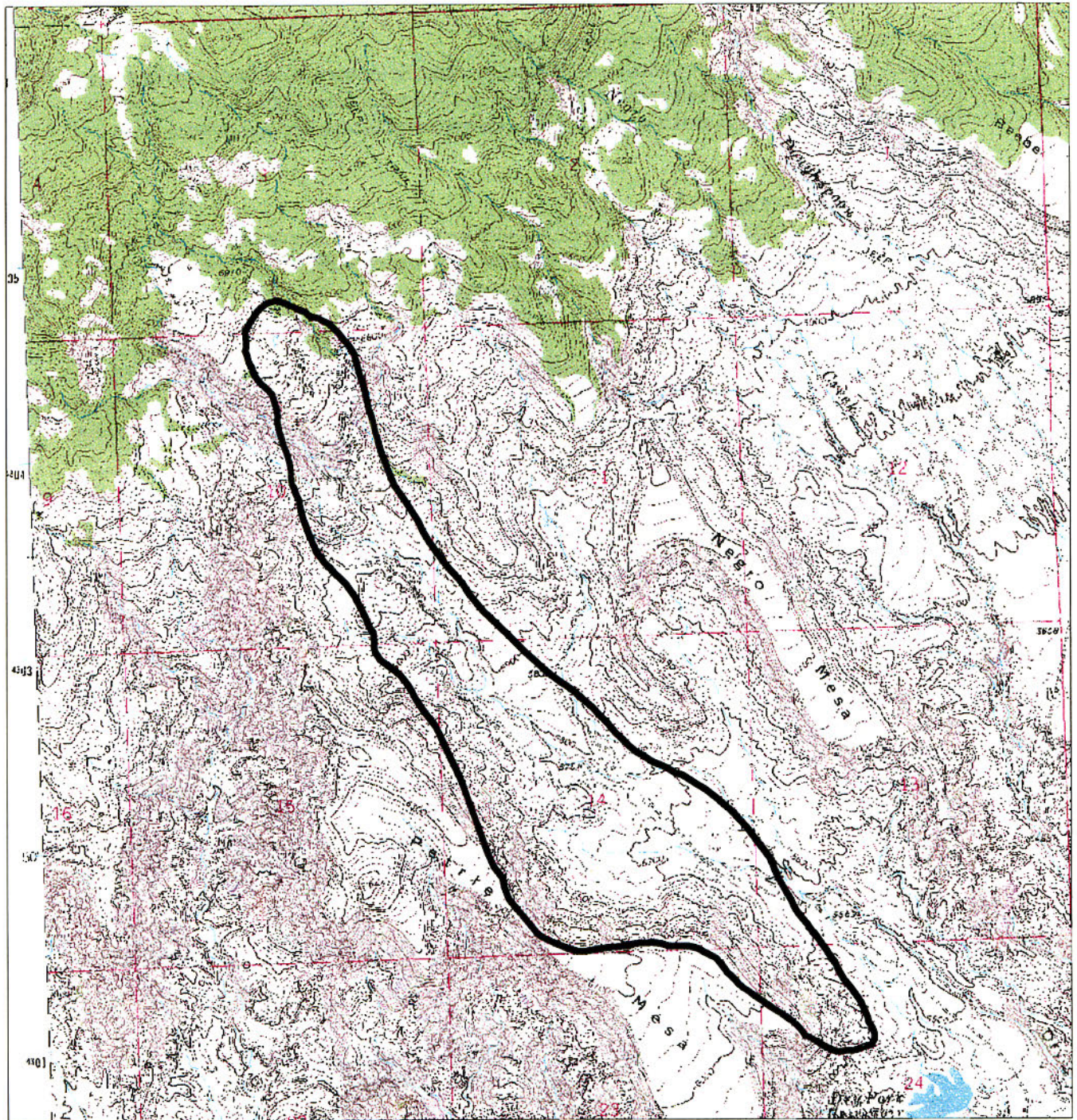
Natural Heritage elements at the Needle Rock site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Penstemon retrorsus</i>	Adobe beardtongue	G3	S3		C
<i>Pinus edulis/Cercocarpus montanus</i>	Mesic pinyon-juniper woodland	G5	S4		B

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to include the adobe beardtongue occurrence as well as the high quality plant community, which provides additional suitable habitat for the plant. This should protect the occurrence from unnatural disturbances such as weed invasions.

# North Delta



## North Delta

**Biodiversity Rank: B4.** Moderate significance.

The North Delta site contains a high quality example of the cold desert shrublands natural community, as well as a small population of the Uinta Basin hookless cactus (*Sclerocactus glaucus*) and an occurrence of a state rare Ord's kangaroo rat subspecies (*Dipodomys ordii sanrafaeli*).

**Protection Urgency Rank: P4.**

This site is located primarily on BLM land. Part of the area is included in BLM's Adobe Badlands Wilderness Study Area. No threats to the community or the kangaroo rat are known. The area has little traffic, except during hunting season.

**Management Urgency Rank: M4.**

The site is managed as a Wilderness Study Area, and as part of Management Unit 5, which emphasizes erosion control to reduce salinity of the Colorado River. Sheep and cattle graze and trail through the area. The occurrence of the cold desert shrublands community is on steep hillsides which are probably avoided by cattle.

**Location:** 1560 Dr., north of Dry Fork Reservoir

U.S.G.S. 7.5 min. quadrangle: North Delta

Legal Description: T14S R96W S , 10, 11, 13-15, 23, 24

**Elevation range:** 5,600 to 6,800 feet.

**Size:** 742 acres.

**General Description:** The upper north and east facing slopes below Petrie Mesa have a good example of Salt desert shrublands with shadscale and Salina wild rye, which are typical of large sections of Delta County. In more level areas, the dominant grass is galleta. Although there is some cheatgrass, the shrublands are generally of high quality, in contrast with areas south of Dry Fork Reservoir, which are in poor condition. This is the site of our first Delta County records for Ord's kangaroo rat. Two individuals were documented on the road at night near the north end of the site, as the road begins to climb up toward pinyon-juniper woodlands on the slopes of Grand Mesa. Although there was a report of the Uinta Basin hookless cactus at this location, we were unable to locate it in 1997.

**Biodiversity Rank Justification:** A high quality occurrence of a globally vulnerable natural community and a state rare animal.

Natural Heritage elements at the North Delta site.

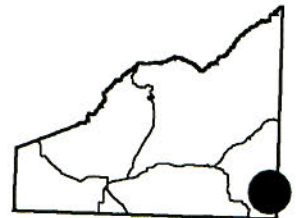
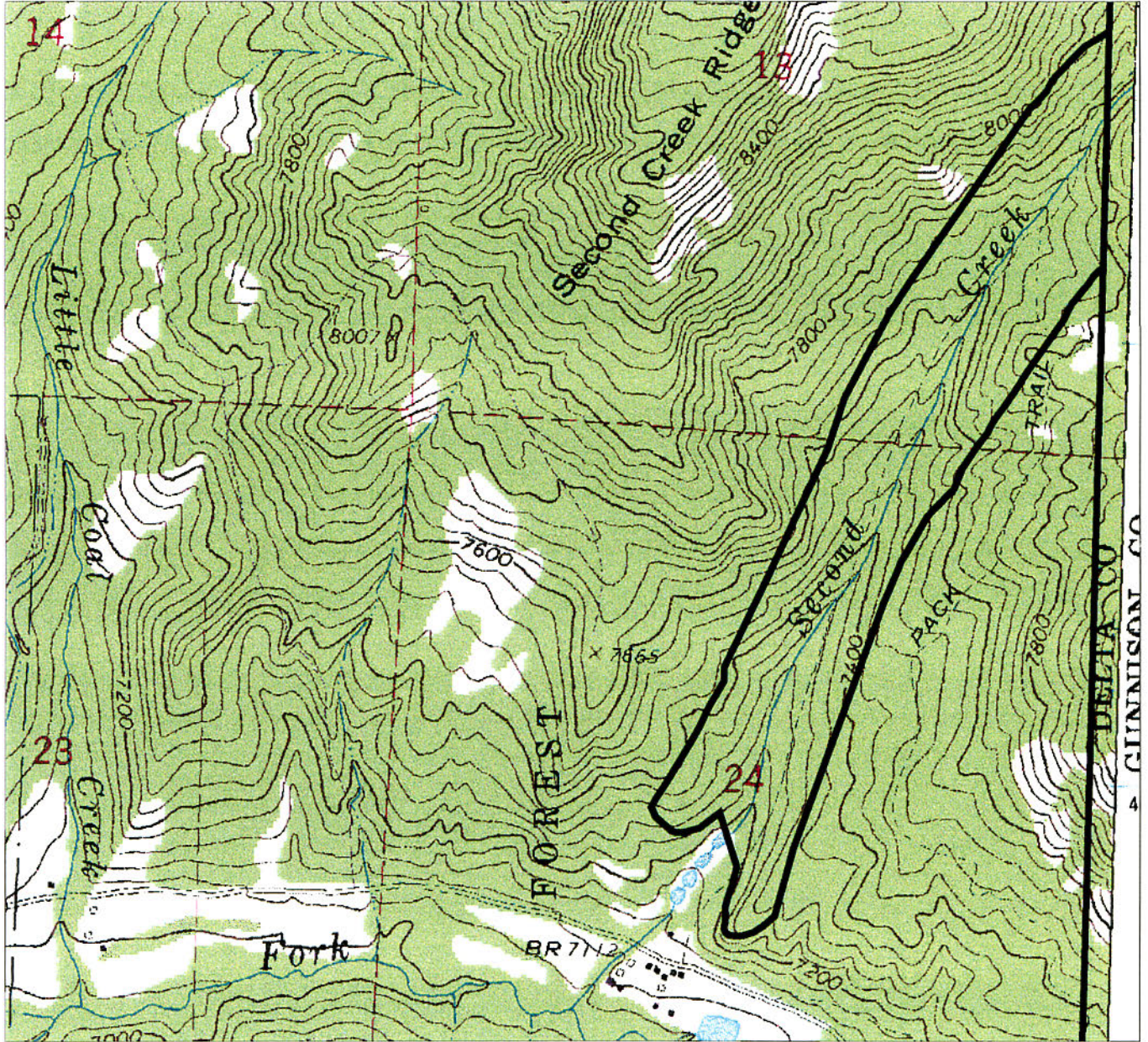
Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Atriplex confertifolia</i> / <i>Leymus salinus</i>	Cold desert shrublands	G3	S2		B
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	T	D
<i>Dipodomys ordii</i> ssp. <i>sanrafaeli</i>	Ord's kangaroo rat ssp.	G5	S2		B

\*EO = Element Occurrence



**Boundary Justification:** The boundary is drawn to include high quality occurrences of cold desert shrublands, including the rocky draws that are habitat of the Ord's kangaroo rat.

# Second Creek



## Second Creek

**Biodiversity Rank: B4.** Moderate significance.

The Second Creek site contains a native population of Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*).

**Protection Urgency Rank: P4.**

Although most of this site is within the Gunnison National Forest, the downstream portion of the site is privately owned. Future actions on this property could imperil the native trout population by allowing contamination by non-native species.

**Management Urgency Rank: M4.**

A grazing trail crosses the site, but there are currently no negative effects evident. The recreational trail at the site receives low use. A private landowner has water rights, but does not currently take much water. This rank could change if future use begins to adversely impact the species at this site. This situation is being monitored by CDOW. Hydrological processes originating outside the planning boundary, including water quality, quantity, and timing, must be managed to maintain site viability.

**Location:** Approximately five miles east northeast of Crawford, in the Gunnison National Forest.

U.S.G.S. 7.5 min. quadrangles (Delta County): Crawford and Paonia

Legal Description (Delta County): T15S R91W S 13, 24

**Elevation range:** 7,200 to 10,200 feet.

**Size:** 158 acres.

**General Description:** Second Creek is located at the eastern boundary of Delta County, in the upper Smith Fork drainage, in the Gunnison National Forest. The Colorado river cutthroat population here is a relict native population, as opposed to the majority in the state, which were stocked by the Division of Wildlife. This population was reconfirmed in 1996, and its purity ranked as A-. Both the trout and the northern leopard frogs were reported by Forest Service personnel.

**Biodiversity Rank Justification:** Unranked occurrences of a state rare fish and amphibian.

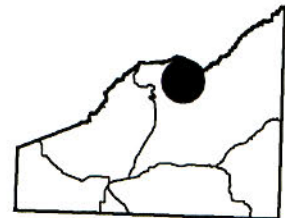
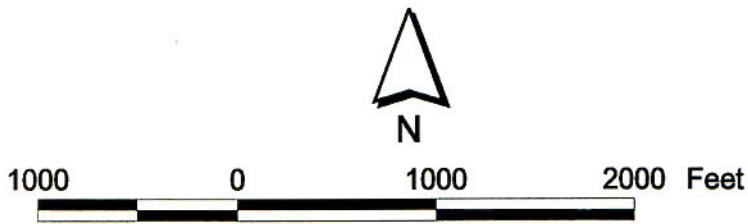
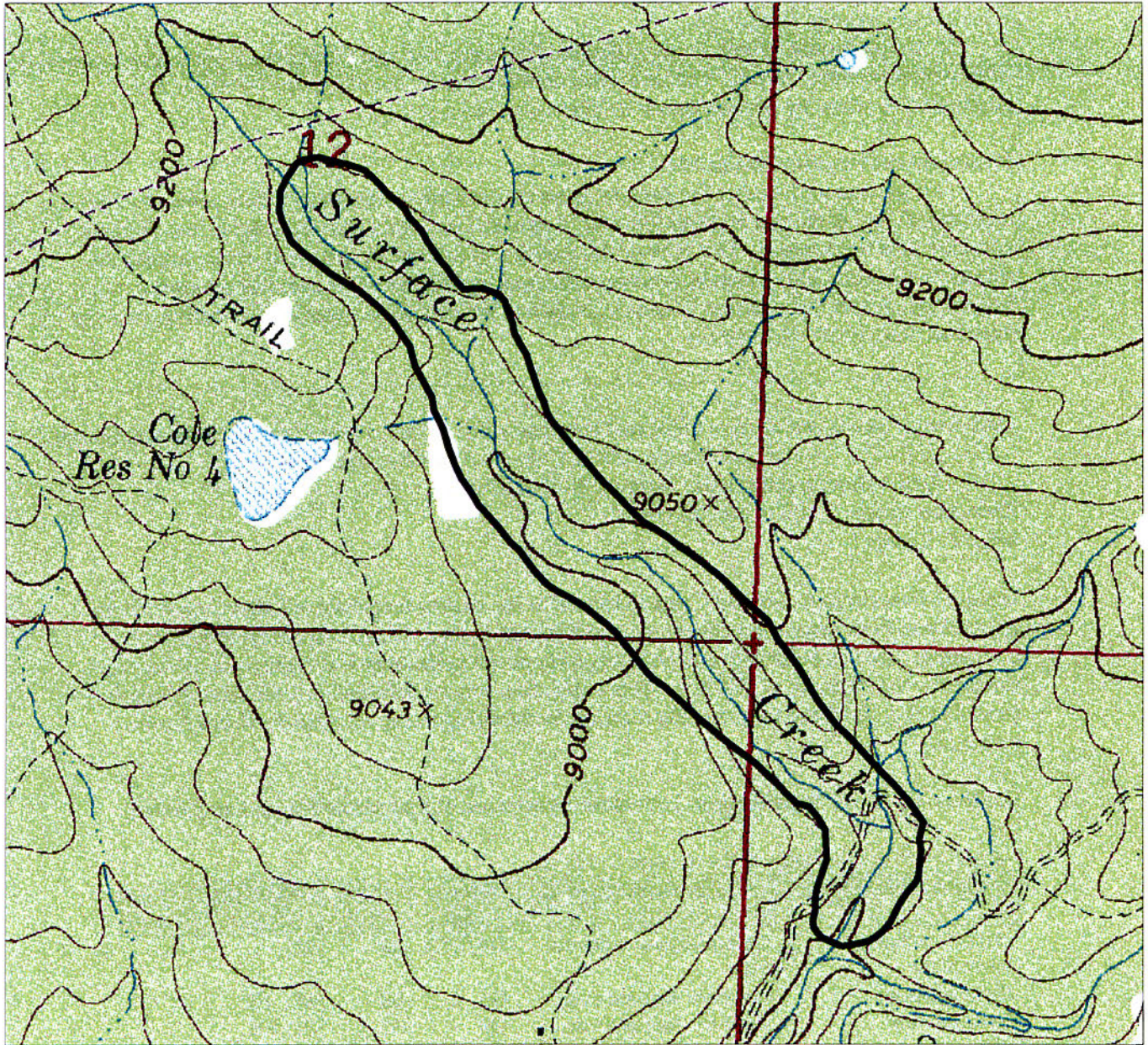
Natural Heritage elements at the Second Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Oncorhynchus clarki pleuriticus</i>	Colorado river cutthroat trout	G4T2T3	S2	SC	B
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	

\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the sub-watershed upstream, and provides a buffer of approximately 1,000 feet downstream. This should be sufficient to protect potential breeding habitat and to prevent direct disturbance to the northern leopard frog population.

# Surface Creek



## Surface Creek

**Biodiversity Rank: B4.** Moderate significance.  
The Surface Creek site includes a high quality example of montane riparian forest.

**Protection Urgency Rank: P4.**  
The site is entirely within the Grand Mesa National Forest. The site is subject to a grazing permit. No special protection should be needed if management concerns are met.

**Management Urgency Rank: M3.**  
The area near Y Lane is heavily grazed. There has been some invasion of Canada thistle. Cattle should be fenced out of the entire riparian area to protect water quality and riparian vegetation.

**Location:** Approximately nine miles north-northeast of Cedaredge. Take Colorado Highway 65 north from Cedaredge, then U50 Road east, 2500 Road north, then east on Y Lane.

U.S.G.S. 7.5 min. quadrangle: Leon Peak

Legal Description: T12S R94W S12, 13; T12S R93W S 18.

**Elevation range:** 8,800 to 9,120 feet.

**Size:** 79 acres.

**General Description:** Surface Creek is one of the major tributaries of the Gunnison River in Delta County, draining a large portion of Grand Mesa. The riparian vegetation of the creek was sampled on the West Fork above the confluence of Marcott Creek, at 9,000 feet elevation. A diverse assortment of plant species, dominated by subalpine fir and Engelmann spruce, line the low gradient stream. Tall shrubs include thinleaf alder, Drummond willow and Rocky Mountain willow. Native herbaceous species present were horsetails, fireweed, raspberry, serviceberry, chiming bells, osha, bittercress, and several sedges and rushes. Steep, shady banks above the creek were covered with mosses and mountain lover. The few exotic species noted were Kentucky bluegrass, redtop, and white clover. Uplands have a mixture of Engelmann spruce and aspen.

**Biodiversity Rank Justification:** A good (B-ranked) occurrence of a plant community with a restricted range (G3).

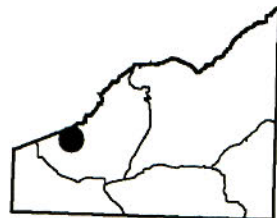
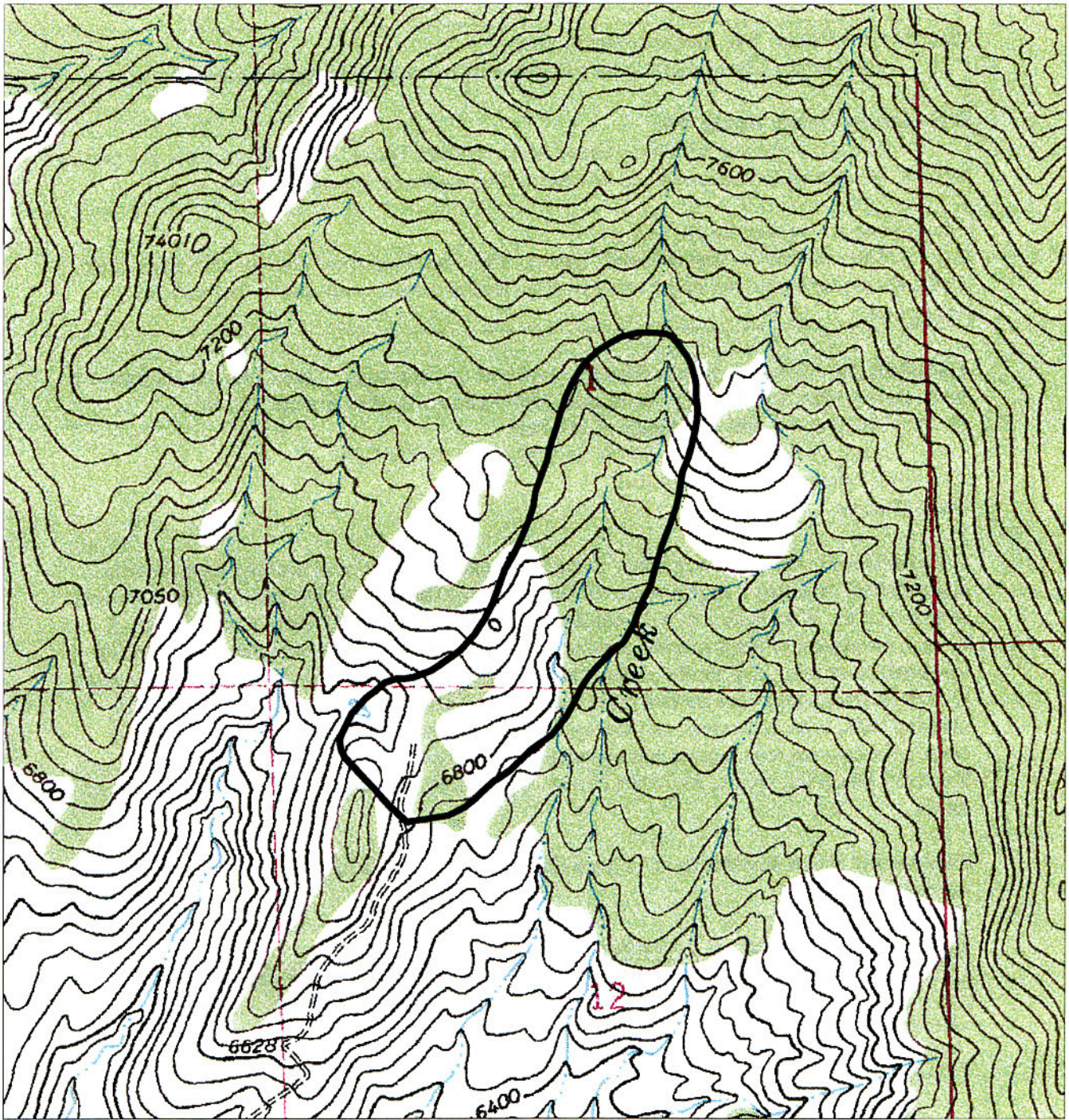
Natural Heritage elements at the Surface Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Abies lasiocarpa-Picea engelmannii / Alnus incana</i>	Montane riparian forests	G3	S3		B

\*EO = Element Occurrence

**Boundary Justification:** The site was drawn to include the area sampled and the adjacent riparian zone upstream, which is roadless, and presumed to be similar, in as good or better condition.

# Upper Point Creek



## Upper Point Creek

**Biodiversity Rank: B4.** Moderate significance.

This is a probable nesting site of the gray vireo (*Vireo vicinior*), an imperiled neotropical migratory bird.

**Protection Urgency Rank: P4.**

The site is on BLM land, and is roadless. No threats are known in the foreseeable future.

**Management Urgency Rank: M4.**

Present management does not appear to negatively impact the gray vireo. BLM's management plan calls for managing with emphasis on preventing increased salinity of the Colorado River Basin by reducing erosion in the highly saline adobe soils. ORV use is limited to designated roads and trails.

**Location:** Approximately eleven air miles north of Delta. Take BLM Road 3555 north from Highway 50, to the end of the road.

U.S.G.S. 7.5 min. quadrangle: Point Creek

Legal Description: T14S R97W S1, 12.

**Elevation range:** 6,800 to 7,280 feet.

**Size:** 100 acres.

**General Description:** This site is located in a small canyon, in the common pinyon-juniper community which dominates the slopes of Grand Mesa between 6,500 and 7,500 feet. An unimproved road ends at the southern boundary of the site. A singing male gray vireo was sighted in the canyon during the breeding season, indicating that this is a breeding site for the species.

**Biodiversity Rank Justification:** The site has a good (B ranked) occurrence of the state rare gray vireo.

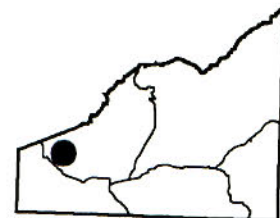
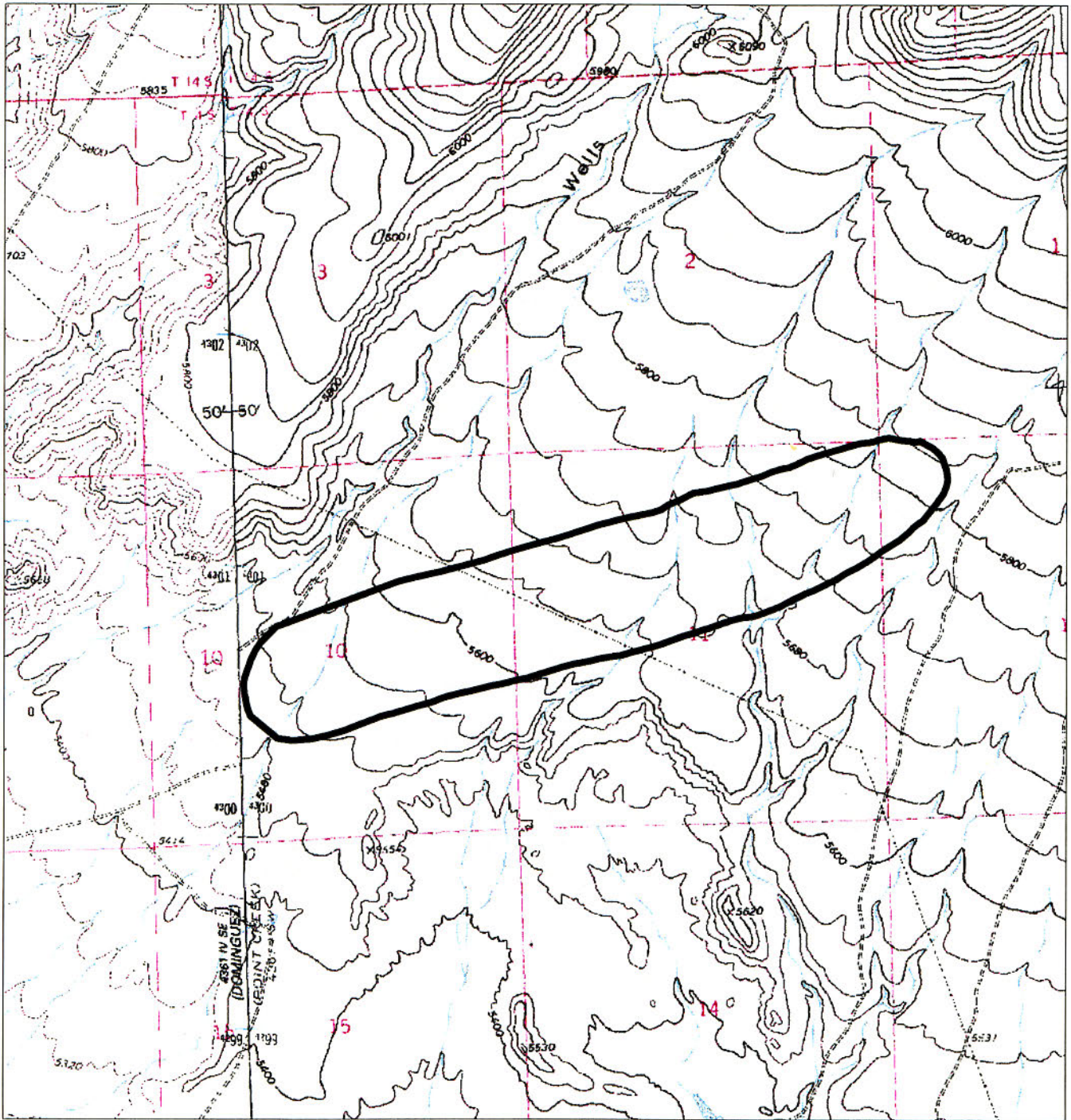
Natural Heritage elements at the Upper Point Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Vireo vicinior</i>	Gray vireo	G5	S2B		B

\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the small canyon where the bird is presumably nesting.

# Wells Gulch East





## Wells Gulch East

**Biodiversity Rank: B5.** General biodiversity significance.

The Wells Gulch site has an unranked occurrence of Ord's kangaroo rat, a state rare mammal.

**Protection Urgency Rank: P5.**

The area is entirely on BLM land, and no further protection needs are anticipated.

**Management Urgency Rank: M4.**

Cheatgrass and halogeton have invaded disturbed areas along roads. BLM is trying to minimize their spread. Good grass cover is important for the perpetuation of the kangaroo rat. 1997 was an excellent year for grass growth; however, range management practices should ensure that adequate grass cover is maintained in drier years. Grazing is presently limited to winter use by sheep, which should not highly impact the grass.

**Location:** Approximately eleven miles west-northwest of Delta, on K50 Road, east of Highway 50.

U.S.G.S. 7.5 min. quadrangle: Point Creek

Legal Description: T4S R3E S 10, 11, 12.

**Elevation range:** 5,480 to 5,840 feet.

**Size:** 407 acres.

**General Description:** This site is in typical semi-desert shrubland, on gently sloping hills between Grand Mesa and the Gunnison River. Vegetation consists primarily of shadscale and galleta. A gravel road (K50 Road) runs through the site. The landscape is dissected by rocky draws which are dry most of the year. Six sub-populations of Ord's kangaroo rat were observed along the draws. This constitutes the first record of the species for Delta County. The kangaroo rats eat grass seeds, including both native species such as galleta, needle and thread, and Indian rice grass, and the introduced cheatgrass.

**Biodiversity Rank Justification:** An unranked occurrence of a state rare mammal.

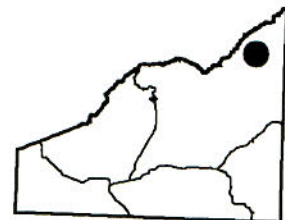
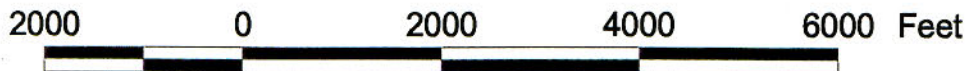
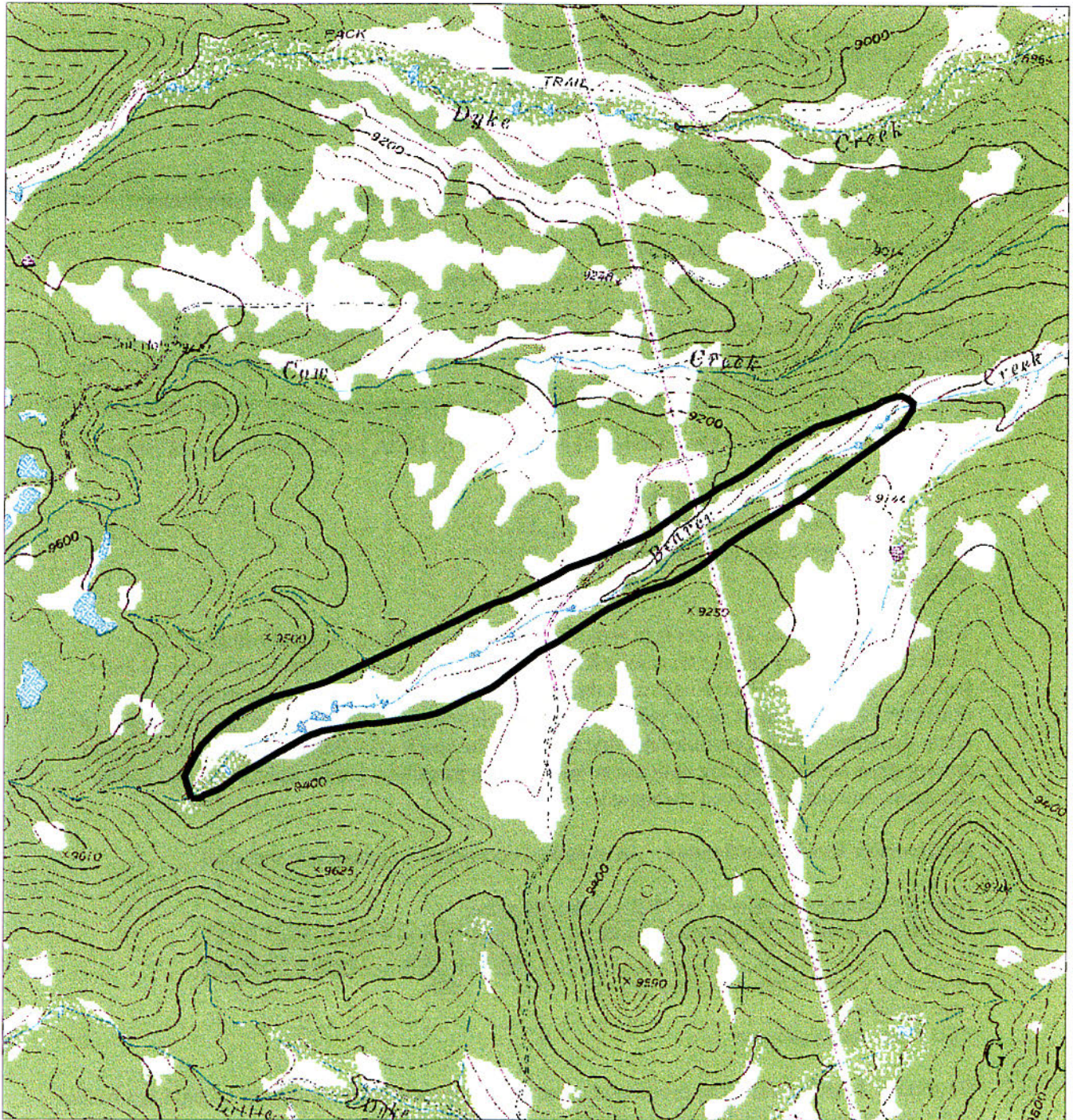
Natural Heritage elements at the Wells Gulch East site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Dipodomys ordii</i> ssp. <i>sanrafaeli</i>	Ord's kangaroo rat ssp.	G5	S2		

\*EO = Element Occurrence

**Boundary Justification:** The proposed conservation site includes the locations of sightings of the Ord's kangaroo rat, and adjacent grasslands which provide forage.

# Beaver Creek



## Beaver Creek

**Biodiversity Rank: B5.** General biodiversity significance.

An unranked occurrence of the Northern leopard frog was found at this site.

**Protection Urgency Rank: P4.**

Beaver Creek is located within the Gunnison National Forest. No direct threats are known for this site, although future research may modify this.

**Management Urgency Rank: M4.**

Although Delta County Road 4010 and a powerline bisect the site, and there is some grazing, the riparian community is in good condition. No current management needs have been identified. However, hydrological processes originating outside the planning boundary, including water quality, quantity, and timing, are also important for maintaining the viability of the site.

**Location:** Grand Mesa National Forest, approximately sixteen air miles north of Paonia.

U.S.G.S. 7.5 min. quadrangle: Electric Mountain

Legal Description: T11S R91W S17, 18, 19; T11S R92W S24

**Elevation range:** 9,000 to 9,400 feet.

**Size:** 160 acres.

**General Description:** Beaver Creek, a tributary of West Muddy Creek, in the Gunnison National Forest, is well named for its series of beaver dams. This section of the stream, at about 9,200 feet, has a low gradient, with some shallow, quiet water and extensive open, marshy areas. Adjacent forested land is dominated by aspen and spruce. The creek provides the necessary permanent water where Northern leopard frogs lay their eggs, usually attached to aquatic vegetation (Livo 1995). The wetlands along the creek provide habitat for adults from March through October or November, when they may range quite far from the water. Newly metamorphosed frogs move to the wetlands in late summer (Hammerson 1986). The site is based on 1993 observations by J. LeFevre of the Gunnison National Forest.

**Biodiversity Rank Justification:** Unranked occurrence of the state rare Northern leopard frog.

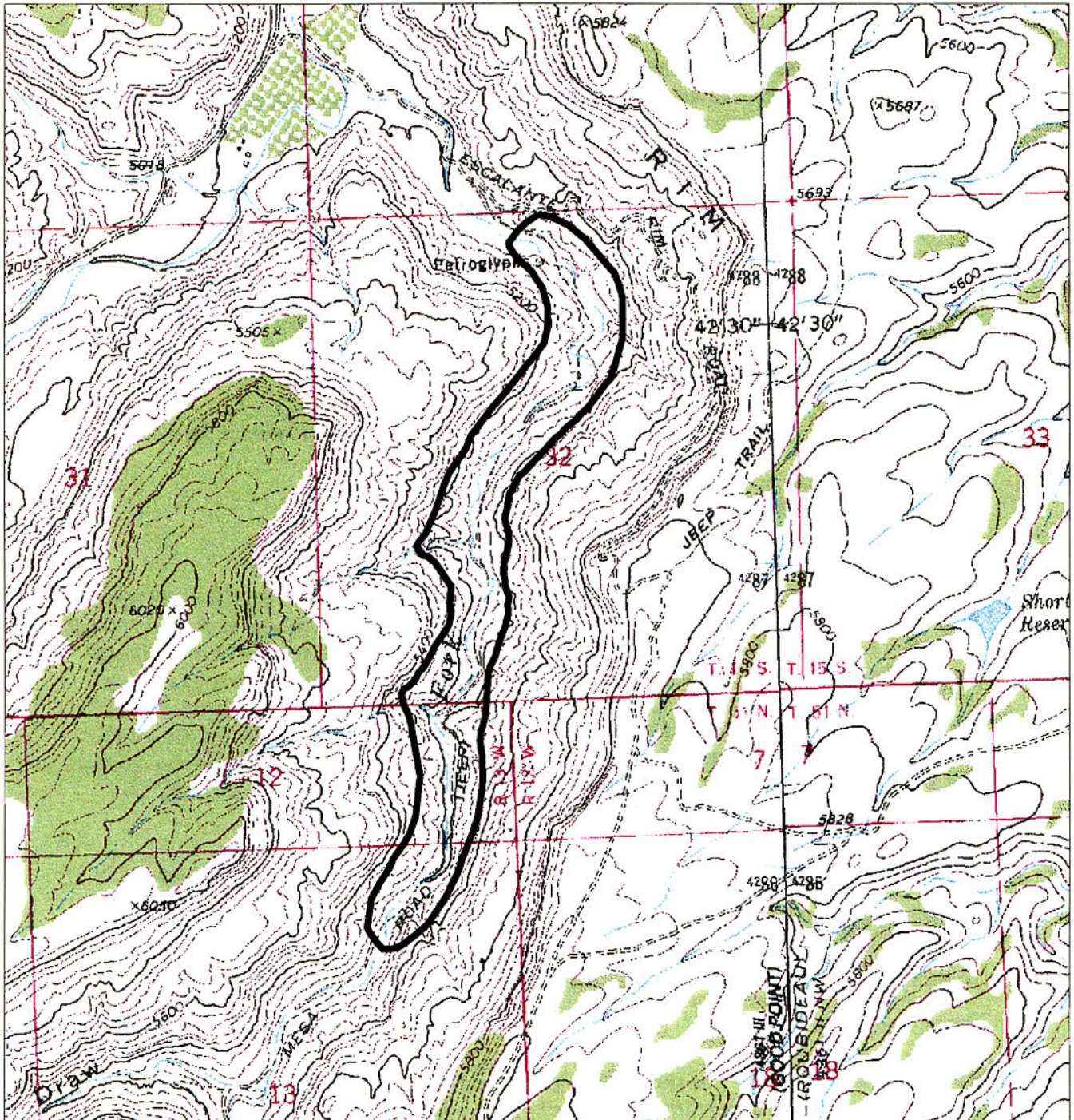
Natural Heritage elements at the Beaver Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Rana pipiens</i>	northern leopard frog	G5	S3	SC	

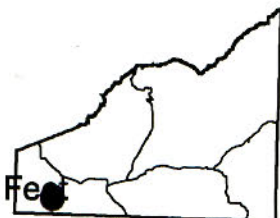
\*EO = Element Occurrence

**Boundary Justification:** The site includes a stretch of Beaver Creek about two miles long, encompassing approximately 160 acres. The boundary was drawn to include open areas adjacent to the creek for approximately 500 feet from the center of the creek. This should be sufficient to protect potential breeding sites from direct disturbance.

# Dry Fork Escalante Creek



6000 Feet



## Dry Fork of Escalante Creek

**Biodiversity Rank: B5.** General biodiversity significance.

**Protection Urgency Rank: P4.** The site is entirely on BLM land. Threats to the site are management concerns.

**Management Urgency Rank: M3.**

This site is in BLM’s management unit 9, which calls for managing to restore and enhance riparian vegetation along intermittent and perennial streams (USDI 1989b). Riparian zones are to be intensively monitored. The dirt road that follows the creek crosses and recrosses the creek numerous times, causing serious erosion. The area is open to off-road vehicles (ORVs). Although there is no grazing allotment on this site, it is not prohibited by the management plan, except from March 1 through “range readiness”. Cattle trail through the area in the fall and spring, to and from an allotment in the Uncompahgre National Forest. Both livestock trailing and vehicle use of the road have direct impacts on water quality and riparian vegetation, as well as indirect impacts on the vegetation by subjecting the area to invasion by exotic weeds. Relocation of the road away from the stream would further the management objectives of improving “species diversity, streambank cover and stability, and instream structure...”(USDI 1989b)

**Location:** About ten miles west southwest of Delta.

U.S.G.S. 7.5 min. quadrangle: Good Point

Legal Description: T15S R97W S32; T51N R13W S12, 13.

**Elevation range:** 5,000 to 5,400 feet.

**Size:** 143 acres.

**General Description:** This tributary of Escalante Creek supports a narrow band of riparian vegetation, varying from ten to one hundred feet wide, with both narrowleaf and plains cottonwoods (*Populus angustifolia* and *P. deltoides* ssp. *wislizenii*) and their hybrid (*P. X acuminata*). The floodplain has a high diversity of shrubs, including greasewood, skunkbrush, big sagebrush, rabbitbrush, spearleaf rabbitbrush, and sand bar willow. Beneath and between the shrubs there may be saltgrass or seablight. A jeep trail parallels and crosses the creek many times, which probably impairs downstream water quality in the spring and promotes the spread of exotic species like cocklebur, redtop, and sweet clover, which are common there. A wall of petroglyphs at the downstream end adds archaeological value to the site.

**Biodiversity Rank Justification:** A C-ranked occurrence of a globally restricted community.

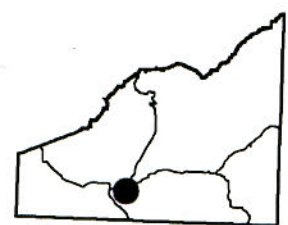
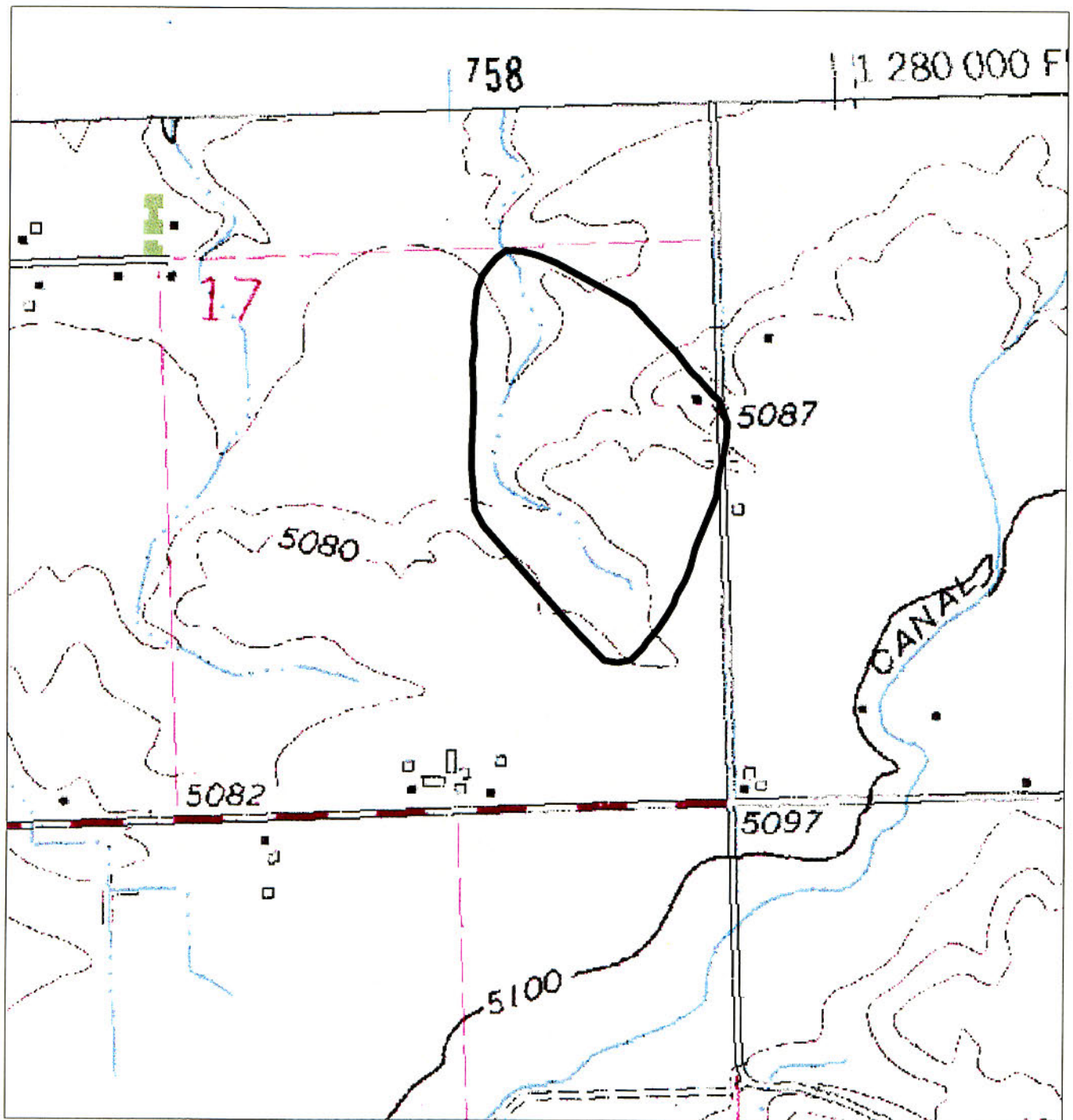
Natural Heritage elements at the Dry Fork site.

Scientific name	Common name	Global rank	State rank	Fed/state status	*EO Rank
<i>Sarcobatus vermiculatus/Distichlis spicata</i>	Greasewood/saltgrass	G3	S1		C

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to include the creek, floodplain and adjacent slopes within 250 feet of the stream.

# Graybeal Ranch



## Graybeal Ranch

**Biodiversity Rank: B5.** General biodiversity significance.

The Graybeal Ranch site contains a good occurrence of a state rare amphibian, the Northern leopard frog.

**Protection Urgency Rank: P4.**

The property is privately owned. No threats are known in the foreseeable future.

**Management Urgency Rank: M4.**

The Northern leopard frog's survival at this site will depend on the continued supply of water from the natural spring and irrigation.

**Location:** Two miles east of Delta.

U.S.G.S. 7.5 min. quadrangle: Delta

Legal Description: T15S R95W S17

**Elevation:** 5,780 feet.

**Size:** 37 acres.

**General Description:** This small site has wetlands fed by a natural spring and irrigation runoff. Vegetation includes cattails, giant reed, and pasture grasses. It provides habitat for several common species such as red-wing blackbirds, common snipe, orioles, finches, warblers, sparrows and water snakes, in addition to the Northern leopard frog.

**Biodiversity Rank Justification:** A good occurrence of a state rare animal.

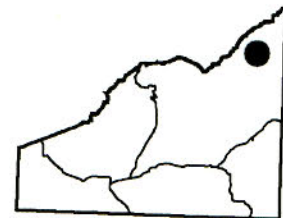
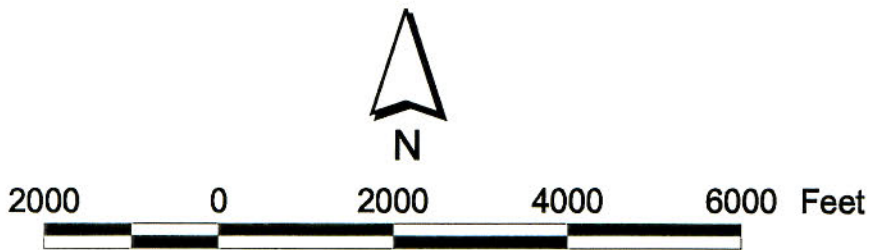
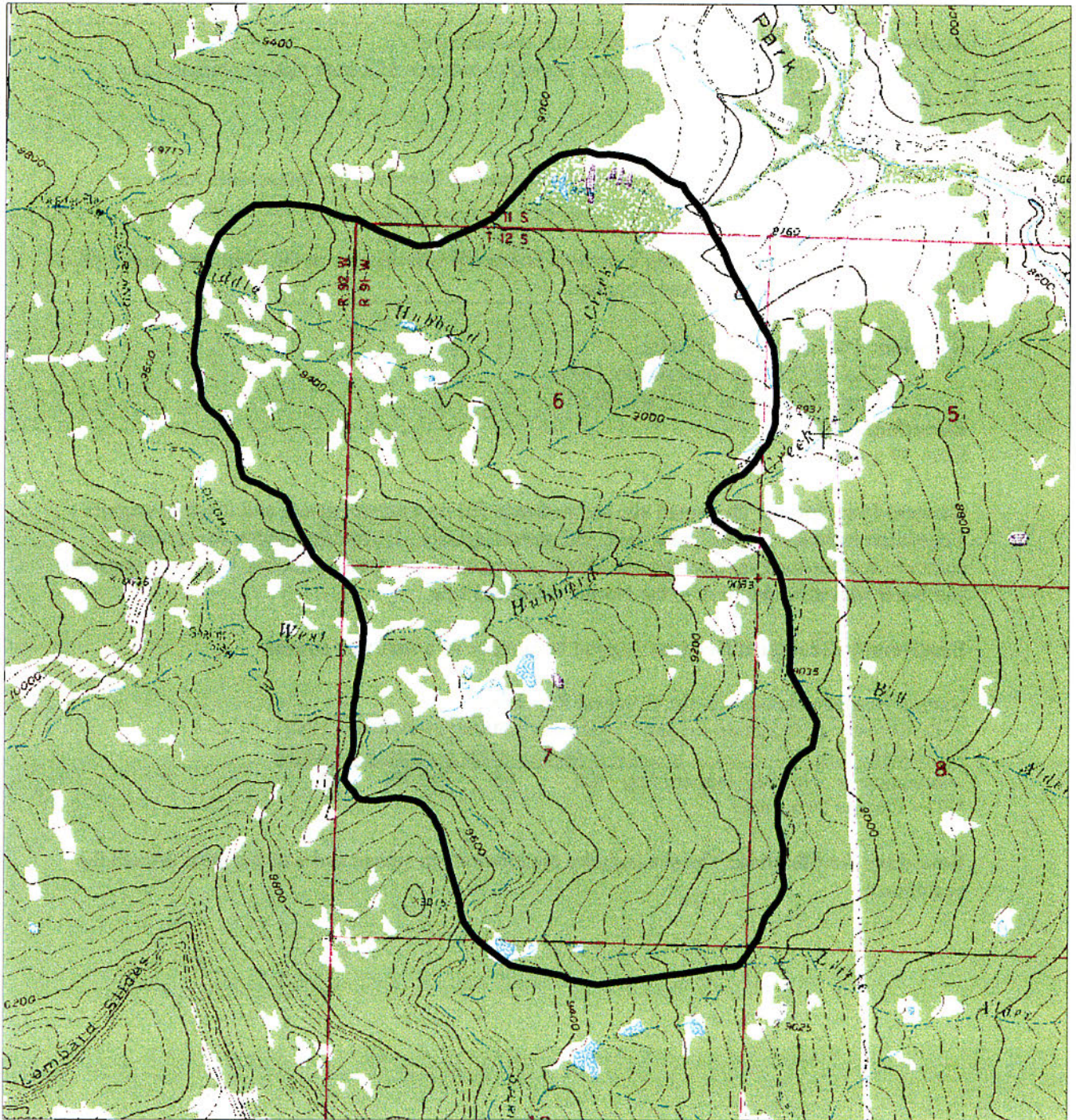
Natural Heritage elements at the Graybeal Ranch site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	B

\*EO = Element Occurrence

**Boundary Justification:** The site includes the intermittent stream and wetland areas around the occurrence.

# Little Alder Creek





## Little Alder Creek

**Biodiversity Rank: B5.** General biodiversity significance.

The Little Alder Creek site contains active nests of the Northern goshawk (*Accipiter gentilis*).

**Protection Urgency Rank: P3.**

This site is scheduled to be logged, beginning in 1998. Roads were completed in 1995. The Forest Service is working with the loggers to ensure that active nest sites are protected.

**Management Urgency Rank: M2.**

Forest Service agreements with the logging company provide that approximately 30 acres around the nest sites will be undisturbed, and that disturbance in the area will be minimized until after young are fledged.

**Location:** Gunnison National Forest, north of Paonia via Stevens Gulch Road (Road 4100).

U.S.G.S. 7.5 min. quadrangle: Electric Mountain

Legal Description: T12 S R91W S 5,6,7,8,17,18; T12S R92W S1,12; T11S

R91W S31; T11S R92W S36.

**Elevation range:** 9,000 to 9,600 feet.

**Size:** 1,616 acres.

**General Description:** This site in the Gunnison National Forest is scheduled to be logged, beginning in 1998. Forest Service biologists observed the goshawk nesting site in 1997, as part of annual monitoring program, and documented that two young goshawks were fledged. The site also contains a population of the Sierra corydalis, a plant species which was formerly considered rare, but has been removed from the list of species of concern this year.

**Biodiversity Rank Justification:** An unranked breeding occurrence of a state rare bird.

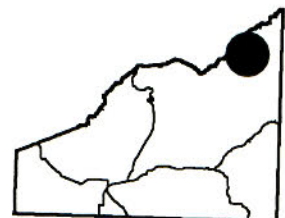
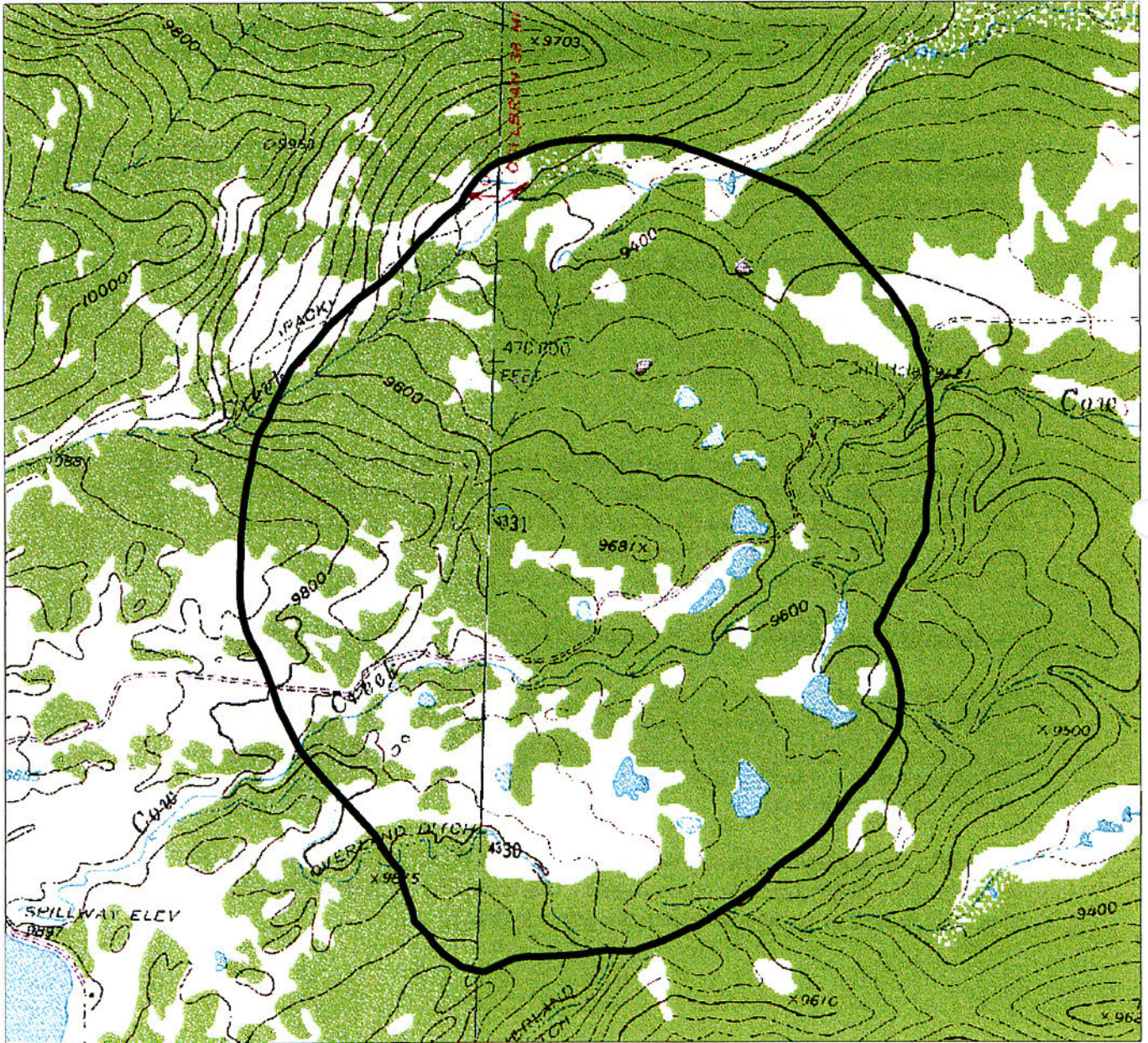
Natural Heritage elements at the Little Alder Creek site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Accipiter gentilis</i>	Northern goshawk	G5	S3B,SZ N		

\*EO = Element Occurrence

**Boundary Justification:** The site was drawn to protect the active and alternate goshawk nests with a buffer of approximately one half mile. This should be sufficient to protect nest sites and viewshed, as well as contiguous habitat for primary forage.

# Overland Reservoir



## Overland Reservoir

**Biodiversity Rank: B5.** General biodiversity significance.

The Overland Reservoir site contains an unranked occurrence of the northern goshawk (*Accipiter gentilis*), a raptor with limited breeding sites in Colorado.

**Protection Urgency Rank: P3.**

This site is scheduled for a timber sale in 1998, with cutting to be performed over five years. National Forest managers are designing mitigation measures which should include protecting active and alternative nest sites from direct and indirect disturbances.

**Management Urgency Rank: M2.**

Mitigation measures for this site call for a no-cut zone of thirty acres around nests, and no activity which might cause nest abandonment from March 1 to July 31, or until fledging, and no harvest in 75% of “family areas” until the end of September.

**Location:** Approximately sixteen air miles north of Paonia.

U.S.G.S. 7.5 min. quadrangles: Electric Mountain | Chalk Mountain

Legal Description: T11S R92W S 11-14, 23, 24; T11S R91W S7, 18.

**Elevation range:** 9,280 to 9,840 feet.

**Size:** 1,022 acres.

**General Description:** The Overland Reservoir site is located in the Gunnison National Forest, at 9,600 feet, in dense Engelmann spruce forest with patches of aspen. Within the site are several beaver ponds and wet meadows. Goshawk nests were found in trees near small meadow openings. A gravel road, GG65 Drive, bisects the site, and leads to Overland Reservoir. The area is very popular for recreation and hunting.

**Biodiversity Rank Justification:** Unranked occurrence of a state rare breeder.

Natural Heritage elements at the Overland Reservoir site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Accipiter gentilis</i>	Northern goshawk	G5	S3B,SZN		

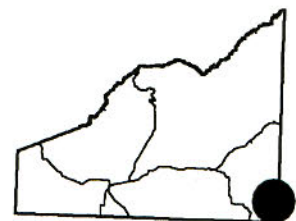
\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to provide a buffer of approximately 1/2 mile. This should be sufficient to protect nesting habitat, viewshed, and primary forage for the goshawks.

# Saddle Mountain - Highline Ditch



900 0 900 1800 2700 Feet



## Saddle Mountain Highline Ditch

**Biodiversity Rank: B5.** General biodiversity significance.  
Northern leopard frogs (*Rana pipiens*) are found at this site.

**Protection Urgency Rank: P4.**  
Most of the site is in the Gunnison National Forest. Special area designation should not be necessary for protection if management issues are adequately addressed.

**Management Urgency Rank: M3.**  
CNHP recommendations for preserving the habitat of the northern leopard frog specify that 70% of the area around ponds should have both emergent vegetation, at least four inches tall, and submergent vegetation. This may require special grazing management provisions.

**Location:** Approximately five miles east northeast of Crawford.  
U.S.G.S. 7.5 min. quadrangle: Crawford  
Legal Description: T15S R91W S 23-26

**Elevation range:** 7,000 to 7,400 feet.

**Size:** 100 acres.

**General Description:** Wetlands along an irrigation ditch and the Smith Fork provide habitat for the northern leopard frog at this site. The northern leopard frog was reported by Gunnison National Forest personnel in 1994.

**Biodiversity Rank Justification:** An unranked occurrence of a state rare animal.

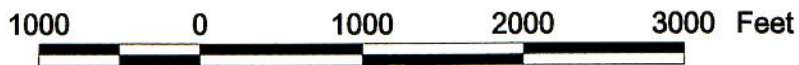
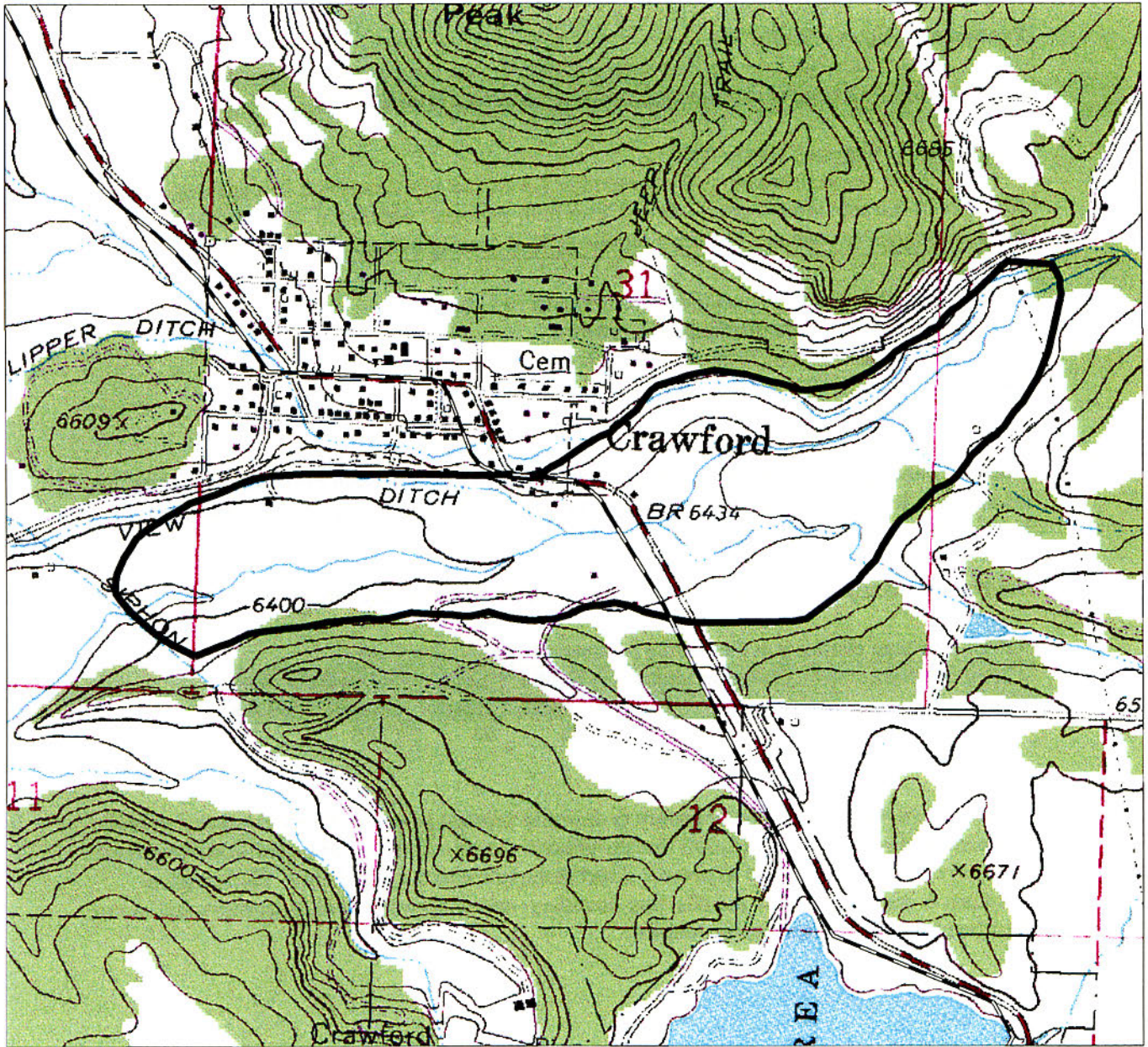
Natural Heritage elements at the Saddle Mountain Highline Ditch site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to provide a buffer of approximately one mile upstream and downstream, and 1,000 feet up adjacent slopes. This should be sufficient to protect potential breeding habitat and to prevent direct disturbance to the population. Hydrological processes originating outside the planning boundary, including water quality, quantity and timing, must be managed to maintain site viability.

# Smith Fork at Crawford



## Smith Fork at Crawford

**Biodiversity Rank: B5.** General biodiversity significance.

This site has fair examples of the narrowleaf cottonwood/coyote willow riparian community, with a great blue heron rookery and adjacent wetlands with cattail marshes.

**Protection Urgency Rank: P5.**

The site is privately owned. Land protection is adequate under present ownership. The owners are interested in conservation, and do not plan to sell or develop the property.

**Management Urgency Rank: M4.**

Although the area has been grazed for many years, and there are introduced pasture grasses present, the site is in generally good condition. Canada thistle should be controlled to prevent its spreading. No other serious management needs are known.

**Location:** Crawford, upstream and downstream from the Highway 92 bridge across the Smith Fork.

U.S.G.S. 7.5 min. quadrangle: Crawford

Legal Description: T15S R92W S36; T15S R91W S31, 32.

**Elevation range:** 6,380 to 6,480 feet.

**Size:** 193 acres.

**General Description:** The Smith Fork at Crawford has moderately good examples of the narrowleaf cottonwood riparian community. A grove of mature cottonwoods near Highway 92 provides the location for a great blue heron rookery. Cottonwoods on benches above the stream are regenerating by suckering. Other common plants in this association are skunkbrush, red osier dogwood, Rocky Mountain willow, thinleaf alder, box elder, Gambel oak, and wild rose. There are some small infestations of Canada thistle. The grasses on the benches are mostly introduced pasture grasses, while native saltgrass grows in the lower and wetter areas. Nearby ponds and wetlands have extensive cattail marshes with reed canary grass, providing habitat for a variety of birds and amphibians.

**Biodiversity Rank Justification:** Moderately good examples of common riparian plant communities, and a heron rookery.

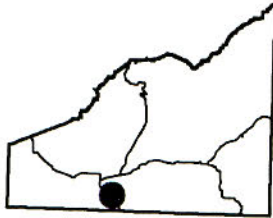
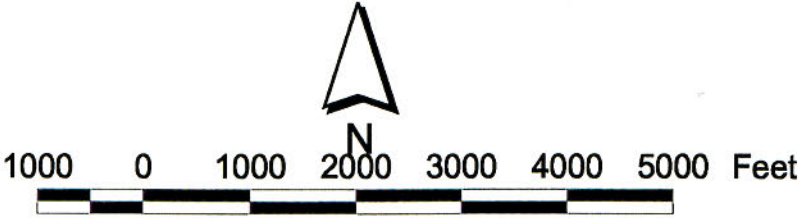
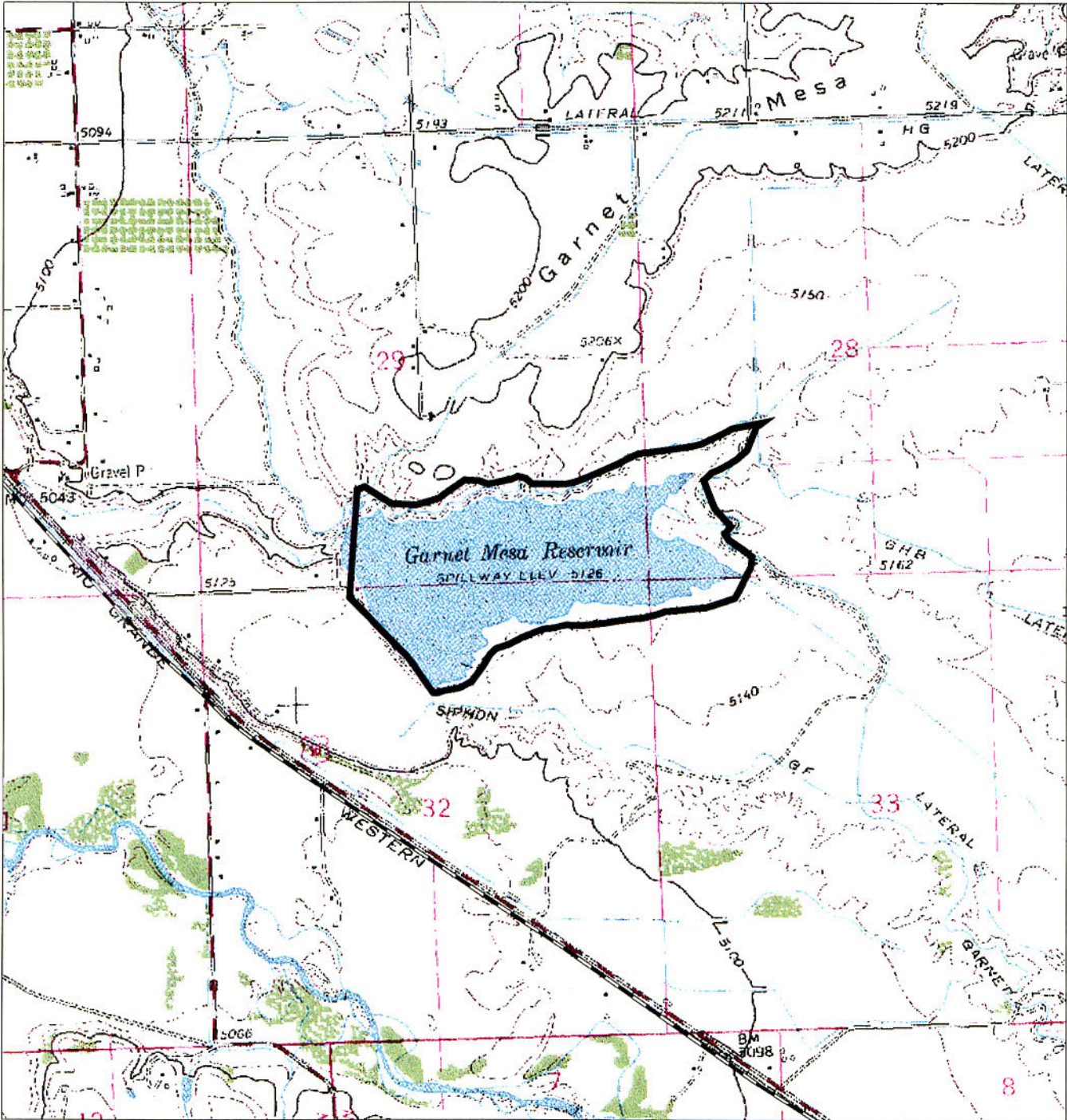
Natural Heritage elements at the Smith Fork at Crawford site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Ardea herodias</i>	Great blue heron	G5	S3BSZN		C
<i>Populus angustifolia</i> / <i>Salix exigua</i>	Narrowleaf cottonwood riparian forests	G4	S4		C
<i>Typha latifolia</i>	Narrowleaf cattail marsh	G5	S3		C

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to include the cottonwood forests and adjacent wetlands that were surveyed in 1997, although the community continues both upstream and downstream. This includes the great blue heron colony and contiguous adjacent riparian habitat which provides a buffer around the nesting site.

# Sweitzer Lake





## Sweitzer Lake

**Biodiversity Rank: B5.** General biodiversity significance.  
This site contains an unranked occurrence of a state rare amphibian.

**Protection Urgency Rank: P5.**  
The site is managed as a recreation area by Colorado State Parks. No additional protection is needed.

**Management Urgency Rank: M5.**  
Leopard frogs appear to be abundant in spite of the unnatural condition of the vegetation and the recreational use of the site. State Parks personnel are interested in improving opportunities for wildlife viewing.

**Location:** Two miles southeast of Delta. Take E Road east from Highway 50.

U.S.G.S. 7.5 min. quadrangle: Delta

Legal Description: T15S R95W S 28, 29, 32, 33.

**Elevation:** 5,126 feet.

**Size:** 193 acres.

**General Description:** Sweitzer Lake is a man-made reservoir which provides water recreation opportunities to the Delta area. It is used for picnicking, boating, water-skiing and hunting. Fishing is not allowed because of the high selenium content of the water. There is a very narrow band of natural vegetation, consisting mainly of bulrushes and reed canary grass, along the edge of the reservoir. Northern leopard frogs were found along the shoreline. A cattail marsh occupies the upstream end, and provides cover and nesting sites for waterfowl. The reservoir is surrounded by picnic sites and a gravel road. Adjacent areas are arid, with shadscale or greasewood and saltgrass. Much of the surrounding area is weedy, with cockleburs, sweet clover, and Canada thistle.

**Biodiversity Rank Justification:** An unranked occurrence of a state rare amphibian.

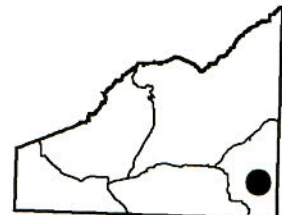
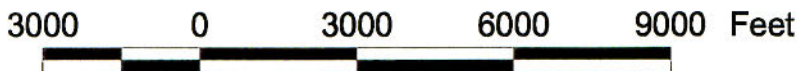
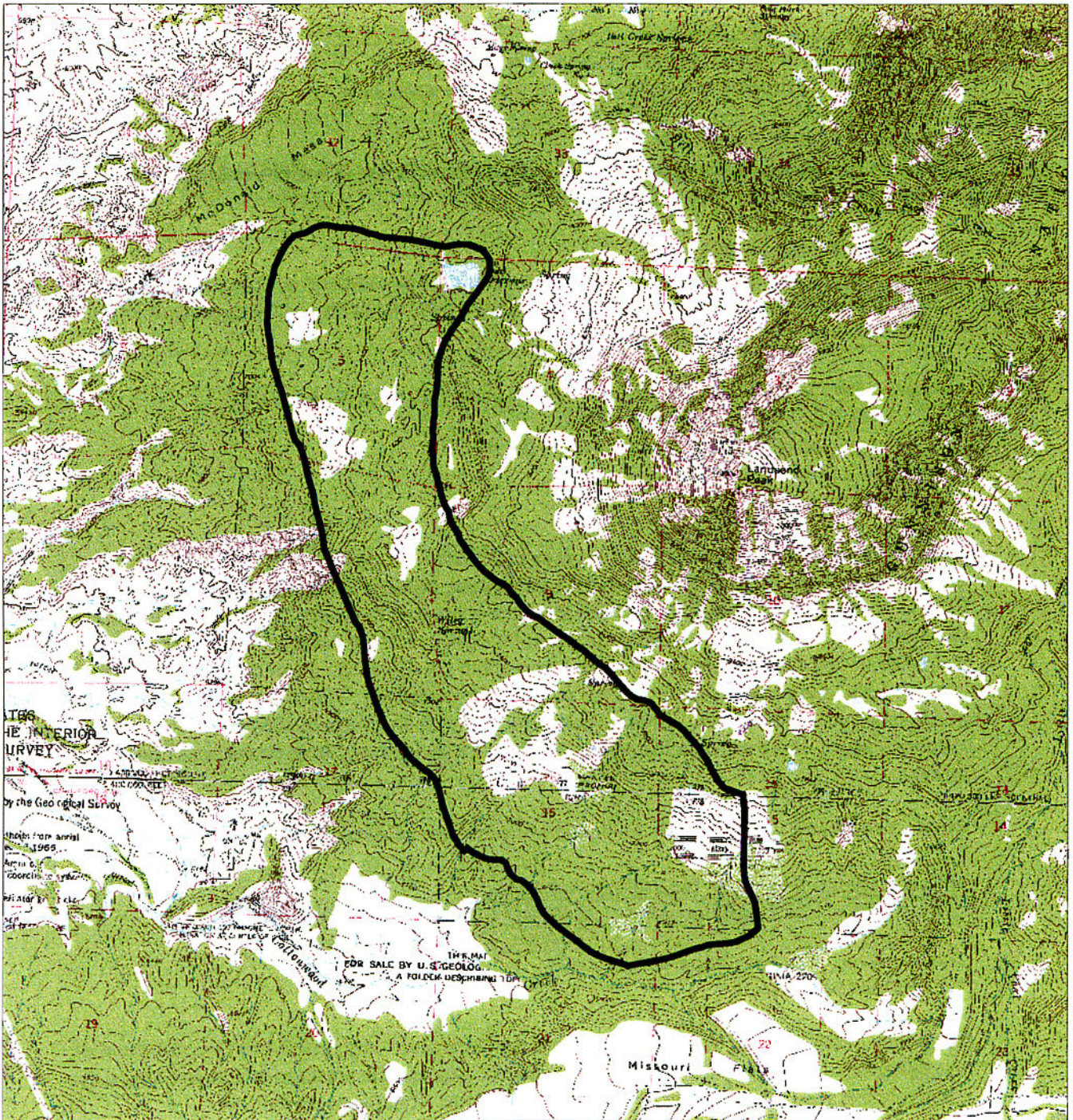
Natural Heritage elements at the Sweitzer Lake site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	

\*EO = Element Occurrence

**Boundary Justification:** The boundary was drawn to include only the lake and the thin band of vegetation surrounding it. The aridity of the adjacent area and the presence of a gravel road make it unlikely that the frogs will venture more than a few feet from the reservoir.

# Wiley Springs



## Wiley Springs

**Biodiversity Rank: B5.** General biodiversity significance.  
Wiley Springs has two unranked occurrences of the northern leopard frog, a state rare amphibian.

**Protection Urgency Rank: P4.**  
The site is within the Gunnison National Forest. Special area designation should not be necessary for protection if management issues are adequately addressed.

**Management Urgency Rank: M3.**  
Grazing should be managed so that at least 70% of the area around ponds has both emergent vegetation at least four inches tall, and submergent vegetation.

**Location:** Approximately three air miles northeast of Crawford.  
U.S.G.S. 7.5 min. quadrangles: Crawford | Paonia  
Legal Description: T15S R91W S 4, 5, 8, 9, 10, 15-17, 21, 22; T14S R91W S 32, 33.

**Elevation range:** 6,800 to 8,600 feet.

**Size:** 1,890 acres.

**General Description:** This site is located in the Gunnison National Forest, on the west side of Land's End Peak. The occurrence information is based on observations by National Forest personnel in 1994 and 1995. Each occurrence has several sub-populations. In general, it appears that much of the potential northern leopard frog habitat in this area is occupied.

**Biodiversity Rank Justification:** The site contains two unranked occurrences of the state rare northern leopard frog.

Natural Heritage elements at the Wiley Springs site.

Scientific name	Common name	Global rank	State rank	Fed/State status	*EO Rank
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	SC, FS	

\*EO = Element Occurrence

**Boundary Justification:** The boundary is drawn to encompass nearby ponds and springs. A buffer of at least 1/2 mile around each occurrence is provided to protect breeding sites and populations from direct disturbance.

## Appendix I

### The Natural Heritage Network and Biodiversity

Colorado is well known for its rich diversity of geography, wildlife, plants, and plant 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 conservation efforts made in this country were not based upon preserving biodiversity; instead, they primarily focused on preserving game animals, striking scenery, and locally favorite open spaces. To address the absence of a methodical, scientifically-based approach to preserving biodiversity, Robert Jenkins, in association with The Nature Conservancy, developed the Natural Heritage Methodology in 1978.

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

The Natural Heritage Methodology is used by Natural Heritage Programs throughout North, Central, and South America, forming an international database network. Natural Heritage Network data centers are located in each of the 50 U.S. states, five provinces of Canada, and 13 countries in South and Central 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 focusing conservation efforts.

#### *What is Biological Diversity?*

Protecting biological diversity has become an important management issue for many natural resource professionals. Biological diversity at its most basic level includes the full range of species on Earth, from species such as bacteria, and protists, through multicellular kingdoms of 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 a single population. On a wider scale, diversity includes variations in the biological communities in which species live, the ecosystems in which communities exist, and the interactions among these levels. All levels are necessary for the continued survival of species and plant communities, and all are important for the well-being of humans. It stands to reason that biological diversity should be of concern to all people.

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 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.

2. **Species Diversity** -- the total number and abundance of plant and animal species and subspecies in an area.
3. **Community Diversity** -- the variety of plant communities within an area that represent the range of species relationships and inter-dependence. These communities may be diagnostic or even endemic to an area. It is within communities that all life dwells.
4. **Landscape Diversity** -- the type, condition, pattern, and connectedness of plant communities. A landscape consisting of a mosaic of plant communities may contain one multifaceted ecosystem, such as a wetland ecosystem. A landscape also may contain several distinct ecosystems, such as a riparian corridor meandering through shortgrass prairie. Fragmentation of landscapes, loss of connections and migratory corridors, and loss of natural communities all result in a loss of biological diversity for a region. Humans and the results of their activities are integral parts of most landscapes.

*The conservation of biological 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 environment and human environment go hand in hand, and that recognition of the most imperiled elements is an important step in comprehensive conservation planning.*

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

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

CNHP is the state's primary comprehensive biological diversity data center, gathering information and field observations to help develop state-wide conservation priorities. 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 plant communities of Colorado. Life history, status, and locational data are incorporated into a continually updated data system. Sources include published and unpublished literature, museum and herbaria labels, and field surveys conducted by knowledgeable naturalists, experts, agency personnel, and our own staff of botanists, ecologists, and zoologists. Information management staff carefully plot the data on 1:24,000 scale U.S.G.S. maps and enter it into the Biological and Conservation Data System. The Element Occurrence database can be accessed from a variety of angles, including taxonomic group, global and state rarity rank, federal and state legal status, source, observation date, county, quadrangle map, watershed, management area, township, range, and section, precision, and conservation unit.

CNHP is part of an international network of conservation data centers that use the Biological and Conservation Data System (BCD) developed by The Nature Conservancy. CNHP has effective relationships with several state and federal agencies, including the Colorado Natural Areas Program, Colorado Department of Natural Resources and the Colorado Division of Wildlife, the U.S. Environmental Protection Agency, 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 Natural Heritage Programs around the globe provides a means to protect species before the need for legal endangerment status arises.

Concentrating on site-specific data for each element of natural diversity enables us to evaluate the significance of each location to the conservation of natural biological diversity in Colorado and in the nation. By using species imperilment ranks and quality ratings for each location, priorities can be established for the protection of the most sensitive or imperiled sites. A continually updated locational database and priority-setting system such as that maintained by CNHP provides an effective, proactive land-planning tool.

### ***The Natural Heritage Ranking System***

Information is gathered by CNHP on Colorado's plants, animals, and plant communities. Each of these species and plant communities is considered an **element of natural diversity**, or simply an **element**. Each element is assigned a rank that indicates its relative degree of imperilment on a five-point scale (e.g., 1 = extremely rare/imperiled, 5 = abundant/secure). The primary criterion for ranking elements is the number of occurrences, i.e., the number of known distinct localities or populations. This factor is weighted more heavily because an element found in one place is more imperiled than something found in twenty-one places. Also of importance are the size of the geographic range, the number of individuals, trends in both population and distribution, identifiable threats, and the number of already protected occurrences.

Element imperilment ranks are assigned both in terms of the element's degree of imperilment within Colorado (its State or S-rank) and the element's imperilment over its entire range (its Global or G-rank). Taken together, these two ranks give an instant picture of the degree of imperilment of an element. For example, the lynx, which is thought to be secure in northern North America but is known from less than 5 current locations in Colorado, is ranked G5S1. The Rocky Mountain Columbine which is known only from

Colorado, from about 30 locations, is ranked a G3S3. Further, a tiger beetle that is only known from one location in the world at the Great Sand Dunes National Monument is ranked G1S1. CNHP actively collects, maps, and electronically processes specific occurrence information for elements considered extremely imperiled to vulnerable (S1 - S3). Those with a ranking of S3S4 are "watchlisted," meaning that specific occurrence data are collected and periodically analyzed to determine whether more active tracking is warranted. A complete description of each of the Natural Heritage ranks is provided in Table 4.

This single rank system works readily for all species except those that are migratory. Those animals that migrate may spend only a portion of their life cycles within the state. In these cases, it is necessary to distinguish between breeding, non-breeding, and resident species. As noted in Table 4, ranks followed by a "B", e.g., S1B, indicate that the rank applies only to the status of breeding occurrences. Similarly, ranks followed by an "N", e.g., S4N, refer to non-breeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state.

**Table 4. Definition of Colorado Natural Heritage Imperilment Ranks.**

Global imperilment ranks are based on the range-wide status of a species. State imperilment ranks are based on the status of a species in an individual state. State and Global ranks are denoted, respectively, with an "S" or a "G" followed by a character. <b>These ranks should not be interpreted as legal</b>	
<b>G/S1</b>	Critically imperiled globally/state because of rarity (5 or fewer occurrences in the world/state; or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction.
<b>G/S2</b>	Imperiled globally/state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range.
<b>G/S3</b>	Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences).
<b>G/S4</b>	Apparently secure globally/state, though it might be quite rare in parts of its range, especially at the periphery.
<b>G/S5</b>	Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
<b>GX</b>	Presumed extinct.
<b>G#?</b>	Indicates uncertainty about an assigned global rank.
<b>G/SU</b>	Unable to assign rank due to lack of available information.
<b>GQ</b>	Indicates uncertainty about taxonomic status.
<b>G/SH</b>	Historically known, but not verified for an extended period, usually.
<b>G#T#</b>	Trinomial rank (T) is used for subspecies or varieties. These species or subspecies are ranked on the same criteria as G1-G5.
<b>S#B</b>	Refers to the breeding season imperilment of elements that are not permanent residents.
<b>S#N</b>	Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used
<b>SZ</b>	Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliably identified, mapped, and protected.
<b>SA</b>	Accidental in the state.
<b>SR</b>	Reported to occur in the state, but unverified.
<b>S?</b>	Unranked. Some evidence that species may be imperiled, but awaiting formal rarity ranking.
Notes: Where two numbers appear in a state or global rank (e.g., S2S3), the actual rank of the element falls between the two numbers.	

## Legal Designations

### **Natural Heritage imperilment ranks are not legal designations and should not be interpreted as such.**

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

Please note that the U.S. Fish and Wildlife Service has issued a Notice of Review in the February 28, 1996 Federal Register for plants and animal species that are "candidates" for listing as endangered or threatened under the Endangered Species Act. The revised candidate list replaces an old system that listed many more species under three categories: Category 1 (C1), Category 2 (C2), and Category 3 (including 3A, 3B, 3C). Beginning with the February 28, 1996 notice, the Service will recognize as candidates for listing most species that would have been included in the former Category 1. This includes those species for which the Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act.

Candidate species listed in the February 28, 1996 Federal Register are indicated with a "C". While obsolete legal status codes (Category 2 and 3) are no longer used, CNHP will continue to maintain them in its Biological and Conservation Data system for reference.

**Table 5. Federal and State Agency Special Designations.**

<b>Federal Status:</b>	
1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993) and (61 Federal Register 7598, 1996)	
<b>LE</b>	Endangered; species or subspecies formally listed as endangered.
<b>E(S/A)</b>	Endangered due to similarity of appearance with listed species.
<b>LT</b>	Threatened; species or subspecies formally listed as threatened.
<b>P</b>	Proposed Endangered or Threatened; species or subspecies formally proposed for listing as endangered or threatened.
<b>C</b>	Candidate: species or subspecies for which the Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened.
2. U.S. Forest Service (Forest Service Manual 2670.5) (noted by the Forest Service as "S")	
<b>FS</b>	Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by:
numbers	a. Significant current or predicted downward trends in population 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")	
<b>BLM</b>	Sensitive: those species found on public lands, designated by a State Director, that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.
<b>State Status:</b>	
1. Colorado Division of Wildlife	
<b>E</b>	Endangered
<b>T</b>	Threatened
<b>SC</b>	Special Concern



## ***Element Occurrence Ranking***

Actual locations of elements, whether they be single organisms, populations, or plant communities, are referred to as element occurrences. The element occurrence is considered the most fundamental unit of conservation interest and is at the heart of the Natural Heritage Methodology. In order to prioritize element occurrences for a given species, an element occurrence rank (EO-Rank) 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 focusing conservation efforts where they will be most successful. The EO-Rank 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 EO-Rank for the occurrence. If there is insufficient information available to rank an element occurrence, an EO-Rank is not assigned. Possible EO-Ranks and their appropriate definitions are as follows:

- A** The occurrence is relatively large, pristine, defensible, and viable.
- B** The occurrence is small but in good condition, or large but removed from its natural condition and/or not viable and defensible.
- C** The occurrence is small, in poor condition, and possibly of questionable viability.
- D** The occurrence does not merit conservation efforts because it is too degraded or not viable.
- H** Historically known, but not verified for an extended period of time.
- I** Introduced

## ***Proposed Conservation Sites***

In order to successfully protect populations or occurrences of important biological elements, delineation of conservation sites has proven to be a useful tool. These proposed conservation sites focus on capturing the ecological processes that are necessary to support the continued existence of a particular element occurrence of natural heritage significance. Proposed Conservation sites may include a single occurrence of a rare element or a suite of rare element occurrences 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 occurrence or suite of element occurrences depends for its continued existence. The best available knowledge of each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features, and vegetative cover, as well as current and potential land uses. **The proposed boundary does not automatically exclude all activity.** It is hypothesized that some activities will prove degrading to the element 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 proposed conservation planning boundary should be carefully considered and evaluated for their consequences to the element on which the conservation unit is based.

## ***Proposed Conservation Site Boundaries***

Once the presence of rare or imperiled species or significant plant communities has been confirmed, the first step toward their protection is the delineation of a **preliminary** conservation planning boundary. In general, the proposed conservation site boundary is our best estimate of the primary area supporting the long-term survival of targeted species and plant communities. In developing such boundaries, CNHP staff consider a number of factors that 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 non-native 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. Please note that these boundaries are based primarily on our understanding of the ecological systems. A thorough analysis of the human context and potential stresses was not conducted. All land within the conservation planning boundary should be considered an integral part of a complex economic, social, and ecological landscape requiring wise land-use planning at all levels.

## ***Off-Site Considerations***

Furthermore, it is often the case that all relevant ecological processes cannot be contained within the proposed conservation planning boundary of reasonable size. For example, 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 and cooperation with private landowners, neighboring land planners, and state and federal agencies.

## ***Ranking of Conservation Sites***

One of the strongest ways that CNHP uses element and element occurrence ranks is to assess the overall biodiversity significance of a site, which may include one or many element occurrences. If an element occurrence is unranked due to a lack of information, the element occurrence rank is considered equivalent to a C rank. Similarly, if an element is a GU or G? it is treated as a G4. 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 or Regional Significance: good example of a community type, excellent or good occurrence of state-rare species.
- B5**     General or State-wide Biodiversity Significance: good or marginal occurrence of a community type, S1, or S2 species.

## Protection Urgency Ranks

Protection urgency ranks (P-ranks) refer to the time frame in which conservation protection should occur to avoid loss or degradation of the occurrences. 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 protection urgency rank reflects the need to take legal, political, or other administrative measures to alleviate threats related to land ownership or designation. The following codes are used to indicate the rank best describing 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 protective measures not required at the site.

A protection action involves increasing the current level of legal protection accorded one or more tracts of 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 threatening the existence of one or more element occurrences at a site; e.g., development potentially destroying, degrading, or seriously compromising the long-term viability of an element occurrence and 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);
- 3) In extraordinary circumstances, a prospective change in ownership management that will make future protection actions more difficult.

## Management Urgency Ranks

Management urgency ranks (M-ranks) indicate the time frame in which a change in management of the element or site should occur in order to avoid loss or degradation of the occurrences. 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). The urgency for management rating focuses on land use management or land stewardship action required to maintain element occurrences at the proposed conservation area.

A management action may include biological management (prescribed burning, removal of non-natives, 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. The following codes are used to indicate the action needed to be taken at the area:

- M1** Management action required immediately or element occurrences could be lost or irretrievably degraded within one year.
- M2** New management action will be needed within 5 years to prevent the loss of element occurrences.
- M3** New management action will be needed 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.

**The management and protection ranking criteria are subjective in nature and the application of them are based on on-site observation but not in-depth research.**

## **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 Delta County Biological Inventory was conducted in several steps summarized below.

### ***Collect available information***

CNHP databases were updated with information regarding the known locations of species and significant plant communities within Delta County. A variety of information sources were searched for this information. The Colorado State University museums and herbarium were searched, as were plant and animal collections at the University of Colorado, Western State, Rocky Mountain Herbarium, and local private collections. The Colorado Division of Wildlife provided extensive data on the fishes of Delta County as well as information regarding the status of the boreal toad. 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. Such information covers basic species and community biology including range, habitat, phenology (timing), food sources, and substrates. This information was entered into CNHP databases.

### ***Identify rare or imperiled species and significant plant communities with potential to occur in Delta County***

The information collected in the previous step was used to refine the potential element list and to refine our search areas. In general, species and plant communities that have been recorded from Delta County, or from adjacent counties, are included in this list. Species or plant communities which prefer habitats that are not included in this study area were removed from the list.

A list of elements includes those elements currently monitored by CNHP that were thought to potentially occur in Delta County, and were therefore targeted in CNHP field inventories.

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

### ***Identify targeted inventory areas***

Survey sites were chosen based on their likelihood of harboring rare or imperiled species or significant plant communities. Known locations were targeted, and additional potential areas were chosen using a variety of information sources, such as aerial photography. 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. 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 local residents, 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 1:40,000 scale (NAPP) were used for this project and are well suited for assessing vegetation types and, to some extent, natural conditions on the ground.

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.

The above information was used to delineate over 150 survey areas that were believed to have relatively high probability of harboring natural heritage resources. These areas vary in size from less than 10 to several thousand acres and include all major habitat types in the study area.

Roadside 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.

Because of the overwhelming number of potential sites and limited resources, surveys for all elements were prioritized by the degree of imperilment. For example, all species with Natural Heritage ranks of G1-G3 were the primary target of our inventory efforts. Although species with lower Natural Heritage ranks were not the main focus of inventory efforts, many of these species occupy similar habitats as the targeted species, and were searched for and documented as they were encountered.

### ***Contact Landowner***

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

### ***Conduct 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 or fruit which are only present during certain times of the season.

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 techniques in order to capture and document their presence. These are summarized below:

**Amphibians:** visual or with aquatic nets

**Mammals:** Sherman live traps

**Birds:** visual or by song/call, evidence of breeding sought

**Insects:** aerial net, pit fall traps, moth lighting

**Plant communities:** visual, collect qualitative or quantitative composition data

**Wetland plant communities:** visual, collect qualitative or quantitative composition, soil, hydrological, function, and value data

**Fishes:** electroshocking, seining, barbless fly fishing, observation

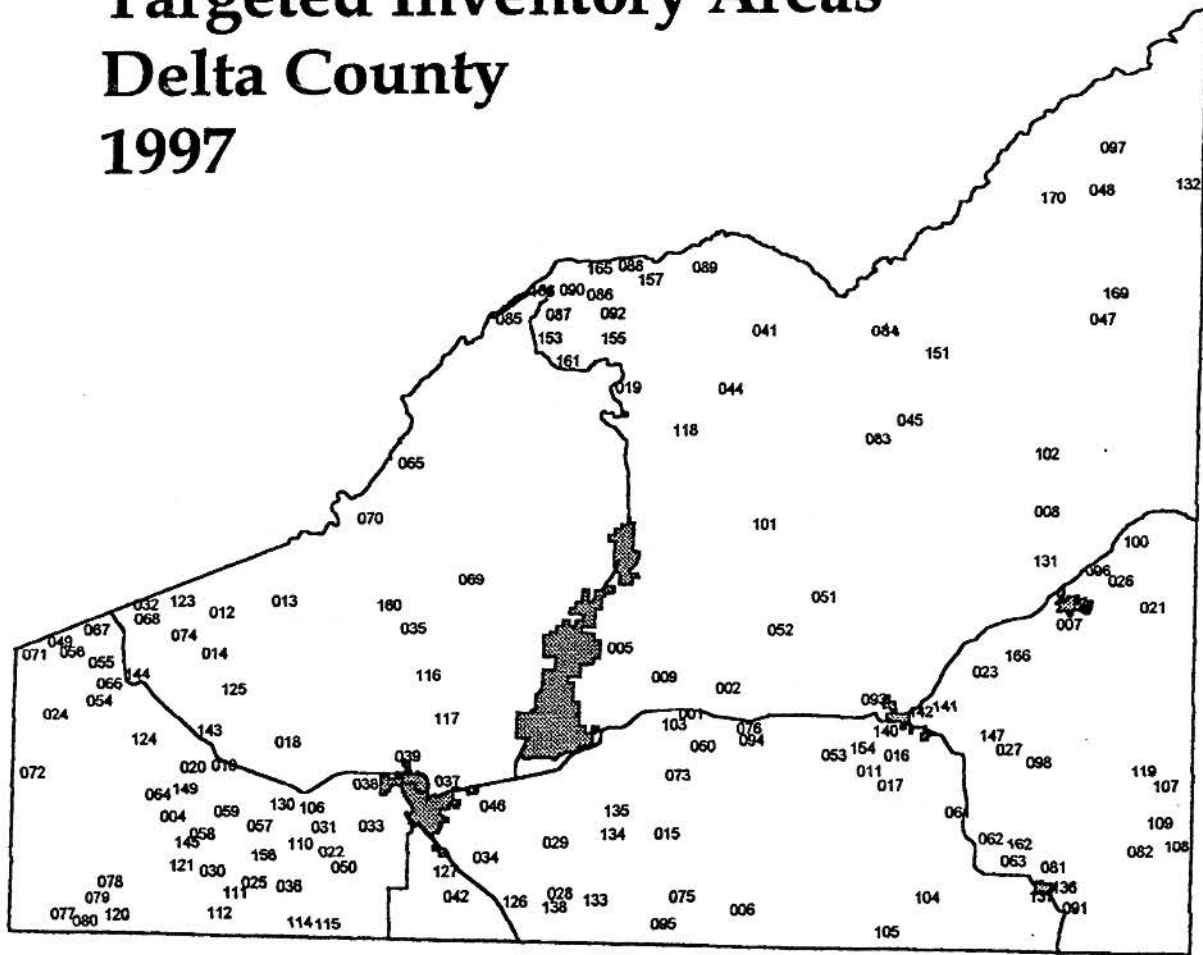
When necessary and permitted, voucher specimens were collected and deposited in local university museums and herbaria.

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 the section on Natural Heritage Methodology for more about element occurrence ranking.

### ***Delineate Proposed Conservation Site Boundaries***

Finally, since the objective for this inventory is to prioritize specific areas for conservation efforts, proposed conservation planning boundaries were delineated. Such a boundary is an estimation of the minimum area needed to assure persistence of the element. Primarily, in order to insure the preservation of an element, 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. These boundaries are considered preliminary and additional information about the site or the element may call for alterations of the boundaries.

# Targeted Inventory Areas Delta County 1997



TIA	TIA name	date visited
001	Lawhead Gulch	4-11
002	Shamrock Mesa	4-11, 4-19
003	Little Dominguez	9-10
004	Escalante Canyon	4-28 (eor); 5-13;
005	Harts Basin	6-19
006	Ute Trail	6-21
007	Paonia-Cedar Hill	5-7, 7-10
008	Stephens Gulch 1	5-10, 7-9
009	St. George Res	5-13
010	Road 730	5-3
011	Gunn	4-27
012	Wells Gulch East	3-9, 4-22, 7-15
013	Upper Point Creek	6-24
014	Negro Mesa	4-26, 8-28
015	Peach Valley 1	6-7, 10-20
016	Hotchkiss Hills 2	4-15, 4-19, 5-3,
017	Hotchkiss Hills 3	4-13, 4-14, 7-10
018	Alkali Creek	6-24
019	Highway 65 North	7-13, 7-21
020	Huff	4-5, 4-15, 5-12, 5-14
021	Minnesota Cr.	5-10
022	Roubideau Cr.	8-27

TIA	TIA name	date visited
023	Bell Cr. South	5-2
024	Little Dominguez	7-23, 9-10
025	Club Gulch	8-23
026	Lennox Mesa	no access
027	Cottonwood Mesa	5-10
028	Road 2100 #1	6-12, 10-19
029	Road 2100 #2	6-12
030	Shortcut Res	8-23
031	Escalante SWA	5-21, 8-6
032	Beaver Gulch	5-8
033	Seep Creek	8-23
034	Sweitzer Lake	8-27
035	Middle Point Creek	6-24
036	Cottonwood Creek	8-27
037	Gunnison R., RR	7-24
038	Oxbows	7-24
039	Confluence	7-24
040	Sanders Ranch	5-2, 6-12, +
041	Surface Creek	8-29
042	Dry Creek-Delta	7-24
043	Uncompahgre R.	9-25
044	2500 Dr.	8-29

TIA	TIA name	date visited
045	Leroux Creek	7-10
046	Graybeal Ranch	6-26
047	Big Alder Creek	7-31
048	Cow Creek	7-31
049	County line	8-27
050	Correction Center	5-5
051	Leroux Creek	7-10
052	Cedar Gulch	5-13
053	Fish Hatchery	7-22
054	Broughton South	7-23
055	Broughton North	7-23
056	Peeples North	7-23
057	Negro Gulch East	not-use BLM data
058	Negro Gulch West	not-use BLM data
059	Negro Gulch North	not-use BLM data
060	Lawhead Gulch	4-11, 5-2, 5-7, 5-13,
061	Grand View 1	4-27-97, 5-2
062	Grand View 2	5-2, 5-10
063	Grand View 3	5-2
064	McCarty Bench Tr.	7-1
065	Porter Reservoir	7-3
066	Dominguez West	7-23
067	Flat tire jeep road	4-24-97 neg. scgl
068	Beaver Gulch west	4-24-97 neg. scgl
069	1975 Dr.	8-29
070	Delta Reservoir	7-3
071	Little Dominguez	7-23, 9-10
072	Lightning Basin	9-10
073	Smith Mt.	5-13
074	Wells Gulch	3-9, 4-17, 4-22, 5-10
075	Ute Trail access rd	6-7
076	Sulphur Gulch N	6-12
077	Cottonwood Spring	7-1
078	Cabin Spring	7-1
079	Cap's Spring	7-1
080	Escalante	4-28
081	Youngs Pk	7-7
082	Needle Rock	7-7
083	Patterson Res.	7-10
084	Bailey Res	7-10
085	Mesa Lakes.	7-13
086	Kennicott Slough	7-14
087	Deep Slough	7-14
088	Crag Crest Trail	7-16
089	Trickel Park	7-20
090	Ward Lake	7-20
091	Crawford Reservoir	5-2
092	Kiser Slough	7-20
093	Hotchkiss Fish	7-22
094	N. Fk. confluence	7-22
095	Peach Valley Rd.	6-7
096	N. Fk. R1	7-29
097	West Muddy Creek	9-1
098	N Fk. R3	7-30
100	N. Fk. R0	8-1
101	Cedar Mesa	7-30
102	Terror Creek	7-29
103	Oasis Reservoir	8-6
104	Fruitland Mesa	8-19
105	Red Canyon	8-19

106	Roubidear Cr conff	8-6
107	Land's End, forest	8-22
108	Smith fork, CG	8-22
109	Little Coal Cr	8-22
110	Club Gulch N	8-23
111	Club Gulch S	8-23
112	Sawmill Mesa Rd	8-23
114	25 Mesa Rd	8-27
115	1100 Rd.	8-27
116	Dry Fork Res	8-27
117	Road 1600	8-27
118	Rd U-50	8-27
119	Land's End Pk	8-30
120	Escalante-east	9-7
121	Dry Fork Escalante	9-7
123	County Line Res	9-13
124	Dominguez Rim	9-13
125	Point Creek	9-13
126	Uncompahgre R. 1	9-25
127	Uncompahgre R. 2	10-14
128	Confluence Park	10-14
129	Lane prop	10-15
130	Powerline Rd to	10-15
131	Stevens Gulch 2	10-17
132	West Muddy Cr.	10-17
133	B50 Rd	10-19
134	McCarty prop	11-2
135	2300 Dr	11-2
136	Smith Fk at Crawford	11-9
137	Smith Fork 2	11-9
138	B50 Rd, Halstead	11-25
140	North Fork CW 2	1-10
141	North Fork CW 3	1-10
142	Delta fairgrounds	1-10
143	Huff East	5-3
144	Fool's Hill	5-10
145	Escalante Rim	5-8
147	McDonald Mesa	5-10
149	Huff South	5-14
151	Elk Wallows Res	7-10
153	GM Rd.122	7-14
154	Chipeta Fish	8-1
155	Old Highway 62	7-21
156	Old Hwy 65	7-21
157	Young's Creek	7-21
158	Cactus Park	8-23
159	Road 730	5-3
160	Prairie Mesa	8-29
161	GM south	7-14
162	Crawford Mesa	5-2
165	Upper Hotel Lk	7-16
166	North Fork airport	5-2
169	Hubbard Cr.	7-29
170	Overland Res.	7-29



### Appendix III.

#### Scientific names of plant and animal species mentioned by common name in the text, and other common species in Delta County

Actinea	<i>Hymenoxys acaulis</i> ssp. <i>ivesiana</i>
Adobe penstemon	<i>Penstemon retrorsus</i>
Alder, thinleaf	<i>Alnus incana</i> ssp. <i>tenuifolia</i>
Alfalfa	<i>Medicago officinalis</i>
Alkali cordgrass	<i>Spartina gracilis</i>
Alkali muhly	<i>Muhlenbergia asperifolia</i>
Alkali sacaton	<i>Sporobolus aeroides</i>
Arizona centaury	<i>Centaurium arizonicum</i>
Arnica, hairy	<i>Arnica mollis</i>
Arnica, heartleaf	<i>Arnica cordifolia</i>
Arrowleaf groundsel	<i>Senecia triangularis</i>
Aspen	<i>Populus tremuloides</i>
Aspen daisy	<i>Erigeron speciosus</i>
Aster, cluster	<i>Aster falcatus</i>
Bahia	<i>Platyschkuhria integrifolia</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Baltic rush	<i>Juncus balticus</i>
Barley, meadow	<i>Hordeum brachyantherum</i>
Barren ground willow	<i>Salix brachycarpa</i>
Basin wildrye	<i>Elymus cinereus</i>
Beardtongue, adobe	<i>Penstemon retrorsus</i>
Big sagebrush	<i>Artemisia tridentata</i> ssp. <i>tridentata</i>
Bigelow's sagebrush	<i>Artemisia bigelovii</i>
Bindweed	<i>Convolvulus arvensis</i>
Birch, Western river	<i>Betula occidentalis</i>
Bitterbrush	<i>Purshia tridentata</i>
Bittercress	<i>Cardamine cordifolia</i>
Black sagebrush	<i>Artemisia nova</i>
Black-eyed susan	<i>Rudbeckia hirta</i>
Blue gramma	<i>Bouteloua gracilis</i>
Blue spruce	<i>Picea pungens</i>
Bluebells	<i>Mertensia ciliata</i>
Boreal owl	<i>Aegolis funereus</i>
Boreal toad	<i>Bufo boreas</i>
Bottlebrush squirreltail	<i>Elymus elymoides</i>
Box elder	<i>Acer negundo</i>
Bracken fern	<i>Pteridium aquilinum</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
Breadroot, large flowered	<i>Pediomelum megalanthum</i>
Broom snakeweed	<i>Gutierrezia sarothrae</i>
Bud sage	<i>Artemisia spinescens</i>
Buffaloberry, silver	<i>Shepherdia argentea</i>
Bulbous desert-parsley	<i>Cymopterus bulbosus</i>
Bull thistle	<i>Cirsium vulgare</i>
Bulrush, hardstem	<i>Scirpus acutus</i>
Bulrush, softstem	<i>Scirpus validus</i>
Bulrush, threesquare	<i>Scirpus pungens</i>
Cactus, hedgehog	<i>Echinocereus triglochidiatus</i>
Cactus, Uinta Basin hookless	<i>Sclerocactus glaucus</i>

Cactus, prickly-pear	<i>Opuntia sp.</i>
Caineville thistle	<i>Cirsium calcareum</i>
Canada thistle	<i>Cirsium arvense</i>
Canada wildrye	<i>Elymus canadensis</i>
Cat's eye, long-flowered	<i>Cryptantha longiflora</i>
Cattail, narrowleaf	<i>Typha latifolia</i>
Chamaechaenactis scaposa	<i>Dwarf pincushion</i>
Cheatgrass	<i>Bromus tectorum</i>
Chiming bells	<i>Mertensia ciliata</i>
Chokecherry	<i>Prunus virginiana</i> var. <i>melanocarpa</i>
Cinquefoil, purple	<i>Comarum palustre</i>
Clay-loving wild buckwheat	<i>Eriogonum pelinophilum</i>
Clematis, western white	<i>Clematis ligusticifolia</i>
Cliff fendlerbush	<i>Fendlera rupicola</i>
Clover, sweet	<i>Melilotus officinalis</i>
Clover, white	<i>Trifolium repens</i>
Clubflower	<i>Cordylanthus wrightii</i>
Cluster aster	<i>Aster falcatus</i>
Cocklebur, rough	<i>Xanthium strumarium</i>
Colorado bedstraw	<i>Galium coloradense</i>
Colorado columbine	<i>Aquilegia coerulea</i>
Colorado cutthroat trout	<i>Oncorhynchus clarki pleuriticus</i>
Colorado desert-parsley	<i>Lomatium concinnum</i>
Colorado squawfish	<i>Ptychocheilus lucius</i>
Columbine, Colorado	<i>Aquilegia coerulea</i>
Columbine, mancos	<i>Aquilegia micrantha</i>
Columbine, yellow	<i>Aquilegia micrantha</i>
Common milkweed	<i>Asclepias speciosus</i>
Common reed	<i>Phragmites australis</i>
Coneflower	<i>Rudbeckia sp.</i>
Corn snake	<i>Elaphe guttata</i>
Corydalis, Sierra	<i>Corydalis caseana</i>
Cottonwood, hybrid	<i>Populus X acuminata</i>
Cottonwood, narrowleaf	<i>Populus angustifolia</i>
Cottonwood, plains	<i>Populus deltoides</i> ssp. <i>wislizenii</i>
Cow parsnip	<i>Heracleum lanatum</i>
Coyote willow	<i>Salix exigua</i>
Cranesbill	<i>Erodium cicutarium</i>
Curly dock	<i>Rumex crispus</i>
Desert-parsley, Colorado	<i>Lomatium concinnum</i>
Different leaved groundsel	<i>Senecio dimorphophyllus</i>
Dogbane	<i>Apocynum cannabinum</i>
Dogwood, red-osier	<i>Cornus sericea</i>
Douglas fir	<i>Pseudotsuga menziesii</i>
Douglas groundsel	<i>Senecio douglasii</i>
Drummond's willow	<i>Salix drummondiana</i>
Easter daisy	<i>Townsendia incana</i>
Eastwood's lomatium	<i>Lomatium eastwoodiae</i>
Eastwood's monkeyflower	<i>Mimulus eastwoodiae</i>
Egret, great	<i>Casmerodius alba</i>
Egret, snowy	<i>Egretta thula</i>
Elderberry	<i>Sambucus racemosa</i>
Elk sedge	<i>Carex geyeri</i>
Elm, Siberian or Chinese	<i>Ulmus pumilus</i>
Engelmann's spruce	<i>Picea engelmannii</i>
Evening primrose	<i>Oenothera caespitosa</i>

False hellebore	<i>Veratrum tenuifolium</i>
False strawberry	<i>Sibbaldia procumbens</i>
Fendler's spring-parsley	<i>Cymopterus fendleri</i>
Fendler's waterleaf	<i>Hydrophyllum fendleri</i>
Fescue, tall	<i>Festuca arundinacea</i>
Field mint	<i>Mentha arvensis</i>
Fireweed	<i>Chamerion angustifolium</i>
Flannelmouth sucker	<i>Catostomus latipinnis</i>
Fleabane, rockslide	<i>Erigeron leiomeris</i>
Foothill sagewort	<i>Artemisia ludoviciana</i>
Four-wing saltbush	<i>Atriplex canescens</i>
Foxtail muhly	<i>Muhlenbergia andina</i>
Fragrant bedstraw	<i>Galium triflorum</i>
Fremont's cottonwood	<i>Populus deltoides ssp. wislizenii</i>
Fremont barberry	<i>Berberis fremontii</i>
Fringed sage	<i>Artemisia frigida</i>
Galleta	<i>Hilaria jamesii</i>
Gambel's oak	<i>Quercus gambelii</i>
Gardner saltbush	<i>Atriplex gardneri</i>
Geranium, Richardson's	<i>Geranium richardsonii</i>
Giant goldenrod	<i>Solidago gigantea</i>
Giant helleborine orchid	<i>Epipactis gigantea</i>
Giant reed	<i>Phragmites australis</i>
Gilia, skyrocket	<i>Ipomopsis aggregata</i>
Globemallow	<i>Sphaeralcea coccinea</i>
Goldeneye daisy	<i>Heliomeris multiflora</i>
Goldenrod, giant	<i>Solidago gigantea</i>
Goldenrod, rock	<i>Petradoria pumila</i>
Goldentop, western	<i>Euthamia occidentalis</i>
Goldenweed, thrift mock	<i>Stenotus armerioides</i>
Goosefoot	<i>Chenopodium sp.</i>
Goshawk, northern	<i>Accipiter gentilis</i>
Grand Junction milkvetch	<i>Astragalus linifolius</i>
Grand Mesa penstemon	<i>Penstemon mensarum</i>
Gray vireo	<i>Vireo vicinior</i>
Greasewood	<i>Sarcobatus vermiculatus</i>
Great Basin spadefoot toad	<i>Scaphiopus intermontanus</i>
Great blue heron	<i>Ardea herodias</i>
Great egret	<i>Casmerodius alba</i>
Groundsel	<i>Senecio sp.</i>
Groundsel, different leaved	<i>Senecio dimorphophyllus</i>
Gumweed	<i>Grindelia squarrosa</i>
Hairgrass, tufted	<i>Deschampsia cespitosa</i>
Hairspine pricklypear	<i>Opuntia polyacantha</i>
Hairy arnica	<i>Arnica mollis</i>
Hairy golden aster	<i>Heterotheca villosa</i>
Halogeton	<i>Halogeton glomeratus</i>
Hardstem bulrush	<i>Scirpus acutus</i>
Hawthorn	<i>Crataegus sp.</i>
Heartleaf arnica	<i>Arnica cordifolia</i>
Hedgehog cactus	<i>Echinocereus triglochidiatus</i>
Helleborine orchid, giant	<i>Epipactis gigantea</i>
Heron, great blue	<i>Ardea herodias</i>
Hooker's evening primrose	<i>Oenothera hookeri</i>
Horsetails	<i>Equisetum arvense</i>
Horseweed, Canadian	<i>Conyza canadensis</i>

Hymenoxys, graylocks	<i>Hymenoxys grandiflora</i>
Indian paintbrush	<i>Castilleja sp.</i>
Indian rice grass	<i>Oryzopsis hymenoides</i>
Interior least tern	<i>Sterna antillarum athalassos</i>
Intermediate wheatgrass	<i>Agropyron intermedium</i>
Jacob's ladder	<i>Polemonium pulcherrimum</i>
Japanese brome	<i>Bromus japonicus</i>
Jim Hill mustard	<i>Sisymbrium altissimum</i>
Kangaroo rat, Ord's	<i>Dipodomys ordii ssp. sanrafaeli</i>
Kentucky bluegrass	<i>Poa pratensis</i>
Large flowered breadroot	<i>Pediomelum megalanthum</i>
Larkspur, tall	<i>Delphinium barbeyi</i>
Leopard frog, northern	<i>Rana pipiens</i>
Licorice, wild	<i>Glycerrhiza lepidota</i>
Littleleaf mock orange	<i>Philadelphus microphyllus</i>
Lomatium, Eastwood's	<i>Lomatium eastwoodiae</i>
Long-flower cat's-eye	<i>Cryptantha longiflora</i>
Lupine	<i>Lupinus sp.</i>
Lupine, silvery	<i>Lupinus argenteus</i>
Mahogany, mountain	<i>Cercocarpus montanus</i>
Mancos columbine	<i>Aquilegia micrantha</i>
Many-lobed groundsel	<i>Senecio multilobatus</i>
Maple, Rocky Mountain	<i>Acer glabrum</i>
Marsh marigold	<i>Caltha leptosepala</i>
Marsh wren	<i>Cistothorus palustris</i>
Mat saltbush	<i>Atriplex corrugata</i>
Matted saxifrage	<i>Cilaria austromontana (Saxifraga bronchialis ssp. austromontana)</i>
Meadowrue	<i>Thalictrum fendleri</i>
Milkvetch, Grand Junction	<i>Astragalus linifolius</i>
Milkweed, showy	<i>Asclepias speciosa</i>
Milkweed, whorled	<i>Asclepias subverticillata</i>
Mock orange, littleleaf	<i>Philadelphus microphyllus</i>
Monkeyflower, Eastwood's	<i>Mimulus eastwoodiae</i>
Mormon tea	<i>Ephedra viridis or E. torreyana</i>
Mountain big sagebrush	<i>Artemisia tridentata ssp. vaseyana</i>
Mountain lover	<i>Paxistima myrsinites</i>
Mountain thistle	<i>Cirsium scopulorum</i>
Mullein, wooly	<i>Verbascum thapsus</i>
Muttongrass	<i>Poa fendleriana</i>
Narrowleaf cottonwood	<i>Populus angustifolia</i>
Nebraska sedge	<i>Carex nebraskensis</i>
Needle and thread	<i>Stipa comata</i>
Nettle-leaf giant hyssop	<i>Agastache urticifolia</i>
Nettles, stinging	<i>Urtica dioecia</i>
Nightshade, deadly	<i>Solanum dulcamara</i>
Northern goshawk	<i>Accipiter gentilis</i>
Northern harrier	<i>Circus cyaneus</i>
Northern leopard frog	<i>Rana pipiens</i>
Northwest Territory sedge	<i>Carex utriculata</i>
Nuttall's sunflower	<i>Helianthus nuttallii</i>
Oak, Gambel's	<i>Quercus gambelii</i>
Old man of the mountain	<i>Hymenoxys grandiflora</i>
Olive, Russian	<i>Eleagnus angustifolia</i>
Orange sneezeweed	<i>Dugaldia hoopsii</i>
Orchard grass	<i>Dactylis glomerata</i>
Ord's kangaroo rat	<i>Dipodomys ordii sanrafaeli</i>

Osha	<i>Ligusticum porteri</i>
Paperflower	<i>Psilostrophe bakeri</i>
Parrot's beak	<i>Pedicularis racemosa</i>
Parsley, wild mountain	<i>Pseudocymopterus montanus</i>
Penstemon, adobe	<i>Penstemon retrorsus</i>
Penstemon, Grand Mesa	<i>Penstemon mensarum</i>
Pepperweed	<i>Lepidium perfoliatum</i>
Peregrine falcon	<i>Falco peregrinus anatum</i>
Pinyon pine	<i>Pinus edulis</i>
Plains cottonwood	<i>Populus deltoides</i> ssp. <i>wislizenii</i>
Planeleaf willow	<i>Salix planifolia</i>
Poison aster	<i>Xylorhiza venusta</i>
Poison ivy	<i>Toxicodendron rydbergii</i>
Prickly lettuce	<i>Lactuca serriola</i>
Pricklypear cactus, hairspine	<i>Opuntia polyacantha</i>
Princes plume	<i>Stanleya pinnata</i>
Purple cinquefoil	<i>Comarum palustre</i>
Purple mustard	<i>Chorispora tenella</i>
Rabbitbrush	<i>Chrysothamnus</i> sp.
Rabbitbrush, low	<i>Chrysothamnus viscidiflorus</i>
Rabbitbrush, rubber	<i>Chrysothamnus nauseosus</i>
Rabbitbrush, spearleaf	<i>Chrysothamnus linifolius</i>
Rabbitfoot grass	<i>Polypogon monspeliensis</i>
Ragwort, tall	<i>Senecio serra</i>
Raspberry	<i>Rubus idaeus</i>
Razorback sucker	<i>Xyrauchen texanus</i>
Red top	<i>Agrostis alba</i>
Red-osier dogwood	<i>Cornus stolonifera</i> ( <i>Swida sericea</i> )
Reed canary grass	<i>Phalaris arundinacea</i>
Richardson's geranium	<i>Geranium richardsonii</i>
River birch	<i>Betula occidentalis</i>
Rock goldenrod	<i>Petradoria pumila</i>
Rock spirea	<i>Holodiscus dumosus</i>
Rockslide fleabane	<i>Erigeron leiomeris</i>
Rocky Mountain juniper	<i>Juniperus scopulorum</i>
Rocky Mountain thistle	<i>Cirsium perplexans</i>
Rocky Mountain willow	<i>Salix monticola</i>
Rocky Mountain spring-parsley	<i>Cymopterus planosus</i>
Rose, wild	<i>Rosa woodsii</i>
Rough brickellbush	<i>Brickellia microphylla</i>
Rough cockleburr	<i>Xanthium strumarium</i>
Roughseed cat's-eye	<i>Cryptantha flavoculata</i>
Roundtail chub	<i>Gila robusta</i>
Rubber rabbitbrush	<i>Chrysothamnus nauseosus</i>
Russian knapweed	<i>Centaurea repens</i>
Russian olive	<i>Eleagnus angustifolia</i>
Russian thistle	<i>Salsola australis</i>
Sagebrush, big	<i>Artemisia tridentata</i> ssp. <i>tridentata</i>
Sagebrush, Bigelow's	<i>Artemisia bigelovii</i>
Sagebrush, black	<i>Artemisia nova</i>
Sagebrush, mountain big	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>
Salina wildrye	<i>Elymus salina</i>
Salix exigua	<i>Sand bar willow</i>
Salsify	<i>Tragapogon dubius</i>
Salsola australis	<i>Russian thistle</i>
Salt cedar	<i>Tamarix ramosissima</i>

Saltbush, four-wing	<i>Atriplex canescens</i>
Saltbush, mat	<i>Atriplex corrugata</i>
Saltgrass, inland	<i>Distichlis spicata</i>
Sand aster	<i>Chaetopappa ericoides</i>
Sand bar willow	<i>Salix exigua</i>
Sand dropseed	<i>Sporobolus cryptandrus</i>
Sand verben	<i>Abronia elliptica</i>
Sandberg bluegrass	<i>Poa secunda</i>
Sandhill crane	<i>Grus canadensis tabida</i>
Saxifrage, matted	<i>Cilaria austromontana</i> ( <i>Saxifraga bronchialis</i> ssp. <i>austromontana</i> )
Scarlet globemallow	<i>Sphaeralcea coccinea</i>
Scorpionweed	<i>Phacelia crenulata</i>
Scouring rush	<i>Hippochaete hyemalis</i>
Sea-blight	<i>Suaeda torreyana</i>
Sedge, elk	<i>Carex geyeri</i>
Sedge, Nebraska	<i>Carex nebraskensis</i>
Sedge, Northwest Territory	<i>Carex utriculata</i>
Sedge, smallwing	<i>Carex microptera</i>
Sedge, water	<i>Carex aquatilis</i>
Sedge, western	<i>Carex occidentalis</i>
Sedge, wooly	<i>Carex lanuginosa</i>
Seep willow	<i>Baccharis salicina</i>
Serviceberry, Utah	<i>Amelanchier utahensis</i>
Shadscale	<i>Atriplex confertifolia</i>
Showy goldeneye	<i>Heliomeris multiflora</i>
Showy milkweed	<i>Asclepias speciosa</i>
Siberian elm	<i>Ulmus pumilus</i>
Sierra corydalis	<i>Corydalis caseana</i>
Silvery lupine	<i>Lupinus argenteus</i>
Single leaf ash	<i>Fraxinus anomala</i>
Skunkbrush	<i>Rhus trilobata</i>
Skyrocket gilia	<i>Ipomopsis aggregata</i>
Smallwing sedge	<i>Carex microptera</i>
Smooth aster	<i>Aster laevis</i>
Smooth brome	<i>Bromus inermis</i>
Snakeweed	<i>Gutierrezia sarothrae</i>
Sneezeweed, orange	<i>Dugaldia hoopsii</i>
Snowberry	<i>Symphoricarpos oreophilus</i>
Snowy egret	<i>Egretta thula</i>
Softstem bulrush	<i>Scirpus validus</i>
Southwestern blackhead snake	<i>Tantilla hobartsmithii</i>
Spanish bayonet	<i>Yucca harrimaniae</i>
Spearleaf buckwheat	<i>Eriogonum lonchocarpum</i>
Spearleaf rabbitbrush	<i>Chrysothamnus linifolius</i>
Spike rush, common	<i>Eleocharis palustris</i>
Spiny greasebush	<i>Forsellesia meionandra</i>
Spiny horsebrush	<i>Tetradymia spinosa</i>
Spirea, rock	<i>Holodiscus dumosus</i>
Spruce, blue	<i>Picea pungens</i>
Spruce, Engelmann's	<i>Picea engelmannii</i>
Squaw apple	<i>Peraphyllum ramosissimum</i>
Squawfish, Colorado	<i>Ptychocheilus lucius</i>
Stemless townsendia	<i>Townsendia incana</i>
Strawberry, false	<i>Sibbaldia procumbens</i>
Subalpine fir	<i>Abies lasiocarpa</i>
Sunflower, common	<i>Helianthus annuus</i>

Sunflower, little	<i>Helianthella quinquenervis</i>
Sunflower, nuttall's	<i>Helianthus nuttallii</i>
Sweet cicely	<i>Osmorhiza depauperata</i>
Sweet clover	<i>Melilotus officinalis</i> or <i>M. alba</i>
Tall fleabane	<i>Erigeron elatior</i>
Tall larkspur	<i>Delphinium barbeyi</i>
Tamarisk	<i>Tamarix ramosissima</i>
Tansy mustard	<i>Descurainia incana</i>
Thinleaf alder	<i>Alnus incana</i>
Threesquare bulrush	<i>Scirpus pungens</i>
Thrift mock goldenweed	<i>Stenotus armerioides</i>
Timothy, meadow	<i>Phleum arvense</i>
Torrey's rush	<i>Juncus torreyana</i>
Towering Jacob's ladder	<i>Polemonium foliosissimum</i>
Tracy's thistle	<i>Cirsium tracyi</i>
Trout, Colorado cutthroat	<i>Oncorhynchus clarki pleuriticus</i>
Tumble mustard	<i>Sisymbrium altissimum</i>
Twin bladderpod	<i>Physaria acutifolia</i>
Uinta Basin hookless cactus	<i>Sclerocactus glaucus</i>
Utah juniper	<i>Juniperus osteosperma</i>
Utah milk snake	<i>Lampropeltis triangulum</i>
Utah serviceberry	<i>Amelanchier utahensis</i>
Vireo, gray	<i>Vireo vicinior</i>
Water parsnip	<i>Berula erecta</i>
Water sedge	<i>Carex aquatilis</i>
Western goldentop	<i>Euthamia occidentalis</i>
Western river birch	<i>Betula occidentalis</i>
Western sedge	<i>Carex occidentalis</i>
Western wheatgrass	<i>Pascopyrum smithii</i>
Western yellowbelly racer	<i>Coluber constrictor mormon</i>
Wetherill milkvetch	<i>Astragalus wetherillii</i>
Whipple penstemon	<i>Penstemon whippleanus</i>
White goosefoot	<i>Chenopodium album</i>
White peavine	<i>Lathyrus leucanthus</i>
White princes plume	<i>Stanleya albescens</i>
White sweet clover	<i>Melilotus alba</i>
White tailed antelope squirrel	<i>Ammospermophilus leucurus pennipes</i>
White top	<i>Cardaria draba</i>
Whooping crane	<i>Grus americana</i>
Whorled milkweed	<i>Asclepias subverticillata</i>
Whortleberry	<i>Vaccinium sp.</i>
Widewing spring-parsley	<i>Cymopterus purpurascens</i>
Wild mountain parsley	<i>Pseudocymopterus montanus</i>
Wild rose	<i>Rosa woodsii</i>
Wildrye, Canada	<i>Elymus canadensis</i>
Willet	<i>Catoptrophorus semipalmatus</i>
Willow, barren ground	<i>Salix brachycarpa</i>
Willow, Drummond's	<i>Salix drummondiana</i>
Willow, planeleaf	<i>Salix planifolia</i>
Willow, Rocky Mountain	<i>Salix monticola</i>
Winterfat	<i>Krascheninnikovia lanata</i>
Wolf currant	<i>Ribes wolfii</i>
Woody aster	<i>Xylorhiza venusta</i>
Wooly milkvetch	<i>Astragalus mollissimus</i>
Wooly sedge	<i>Carex lanuginosa</i>
Wyoming paintbrush	<i>Castilleja linariifolia</i>

Yarrow  
Yellow sweet clover  
Yucca

*Achillea lanulosa*  
*Melilotus officinalis*  
*Yucca harrimaniae*



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