

Biological Inventory of Rio Grande and Conejos Counties, Colorado



Prepared for:

The Nature Conservancy
1881 9th St., Suite 200
Boulder, CO 80302

Prepared by:

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Colorado State University
College of Natural Resources
254 General Services Building
Ft. Collins, Colorado 80523

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Executive Summary

Rio Grande and Conejos counties lie in the southern part of Colorado encompassing parts of the San Juan Mountains and the San Luis Valley. The counties contain a diverse array of habitats including grasslands, shrublands, woodlands, riparian areas, wetlands, montane forests, and alpine tundra. The Nature Conservancy, with funding from Great Outdoors Colorado! (GOCO) and the U.S Fish and Wildlife Service, contracted the Colorado Natural Heritage Program to inventory the counties for areas of special biological significance. Such locations were identified by: 1) examining existing biological data for rare or imperiled plant and animal species, and significant plant communities (collectively called **elements**) from the Colorado Natural Heritage Program's database, 2) accumulating additional information on these elements and, 3) conducting extensive field surveys for these elements. Areas that were found to contain significant elements were delineated as "Potential Conservation Areas."

By compiling information from other sources and from CNHP's fieldwork, over 20 imperiled species or plant communities previously unknown in the two counties were documented. This included 32 new locations for plants, over 25 new locations for plant communities, and 30 new locations for animals. In addition, numerous older records were revisited and information updated. Rio Grande and Conejos counties were found to be very important, and possibly the center of distribution, for two imperiled plants: rock-loving neoparrya (*Neoparrya lithophila*) and Weber's catseye (*Cryptantha weberi*).

In this report, we have profiled 56 Potential Conservation Areas. Priorities were assigned to these areas by considering the urgency for conservation action (areas with the more rare or imperiled elements) and the greatest chance for long-term viability (largest, best condition populations). Of the 56 Potential Conservation Areas, we identified 15 as *very significant* (rank of B2), 22 as *significant* (rank of B3), and 19 as *moderately significant* (rank of B4). These areas harbor some of the world's largest and healthiest populations of two imperiled plant species, the rock-loving neoparrya (*Neoparrya lithophila*) and Weber's catseye (*Cryptantha weberi*), unusual iron fen wetlands, and the only native location in Colorado of the Rio Grande sucker. Overall, the concentration and quality of imperiled elements and habitats attest to the fact that conservation efforts in Rio Grande and Conejos counties will have both state and global significance. These areas are described in the following pages and, where possible, management and protection recommendations are provided. If appropriate conservation actions are taken at these locations, protection of important parts of the biodiversity of Rio Grande and Conejos counties will be facilitated.

Recommendations

1. Work with key local, county, state, and federal agencies and private landowners to develop and implement a plan for protecting the Potential Conservation Areas profiled in this report, with most attention directed toward those with biodiversity rank (B-rank) B2 and B3.
2. Use this report in the review of proposed activities in or near Potential Conservation Areas to determine whether activities do or do not adversely affect elements of biodiversity.
3. Develop and implement comprehensive programs to minimize loss of wetlands.
4. In efforts to protect biodiversity, promote cooperation and incentives among landowners, pertinent government agencies, and non-profit conservation organizations and increase public awareness of the benefits of protecting significant natural areas.
5. Promote wise management of the biodiversity resources that exist within Rio Grande and Conejos counties, recognizing that delineation of potential conservation areas does not by itself guarantee protection of the plants, animals, and plant communities.
6. Continue inventories where necessary, including inventories for species that cannot be surveyed adequately in one field season and inventories on lands that CNHP could not access in 1999.
7. Discourage the introduction and/or sale of non-native species that are known to significantly impact natural areas.

Introduction

The inventory of Rio Grande and Conejos counties is part of an ongoing biological inventory of Colorado counties by the Colorado Natural Heritage Program (CNHP). To date, CNHP has conducted similar inventories in all or parts of over a dozen counties. In 1997, CNHP began the San Luis Valley inventory with Saguache County (Rondeau et al. 1998). A survey of Mineral County was conducted in 1998 (Rondeau 1999). In the future, we hope to continue the effort with inventories in Alamosa and Costilla County. In addition to the County Inventories, a riparian vegetation classification study was conducted in the Rio Grande Basin in 1995 and 1998 (Kittel et al. 1999).

The Rio Grande and Conejos County Biological Inventory was conducted using the methodology that is used by Natural Heritage Programs throughout North America. Our primary focus was to identify the locations of rare and imperiled plants and animals, and significant plant communities (rare or high quality examples of common plant communities), delineate Potential Conservation Areas (PCAs) based on these locations, assess conservation values, and systematically prioritize PCAs for conservation action. Conservation actions may include a variety of tools such as conservation easements, voluntary management agreements, fee acquisition of land, etc.

These locations of imperiled species and significant plant communities were identified by:

- Examining existing biological data for rare or imperiled plant and animal species, and significant plant communities (collectively called **elements**);
- Accumulating additional existing information;
- Conducting extensive field surveys for these elements;
- Identifying Potential Conservation Areas supporting these elements and prioritizing these areas for conservation action.

Locations in the counties with natural heritage significance (those places where elements have been documented) are presented in this report as Potential Conservation Areas. The goal of the process is to identify a land area that can provide the habitat and ecological needs upon which a particular element or suite of elements depends for their continued existence. The best available knowledge of each species' life history, in conjunction with information about topographic, geomorphic, and hydrologic features, vegetative cover, as well as current and potential land uses is used to delineate PCA boundaries. The following sections describe the general study area, methods used, and the PCAs.

General Study Area Description

Rio Grande and Conejos counties are located in south-central Colorado, encompassing portions of the San Luis Valley and the San Juan Mountains (see Figure 1). Elevations range from approximately 7,400 feet at the New Mexico state line to over 13,000 feet on several of the highest peaks. The San Luis Valley is Colorado's largest and driest mountain valley, while the San Juan Mountains are one of the largest mountain ranges in Colorado. The montane portions of both counties fall into the Southern Rocky Mountain Steppe ecoregional province. The San Luis valley floor is included in the Great Plains-Palouse Dry Steppe province (Bailey and others 1994).

The San Juan Mountains are composed of ash and lava deposits of Tertiary origin and basalts and tuffs of Pliocene/Miocene (Tweto 1979). Alluvial fans contain sedimentary type cobbles and are found at the base of the mountains. The San Luis Hills are basalt batholiths, while the San Luis Valley floor is composed of sediments up to 30,000 feet thick with embedded clay layers and lava flows. Soils in the counties are highly variable, especially in relation to how they affect plant growth. For more information, see the soils surveys published by the USDA Natural Resources Conservation Service (NRCS) for the Rio Grande County Area and the Conejos County Area.

The San Juan Mountains within Rio Grande and Conejos counties contain support typical southern Rocky Mountain vegetation. Douglas fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*) forests and woodlands occur at lower elevations with occasional stands of white fir (*Abies concolor*). Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) are the dominant species at higher elevations. Dry south-facing slopes at high elevations support open bristle-cone pine (*Pinus aristata*) woodlands. Aspen (*Populus tremuloides*) stands are abundant throughout the study area at elevations over 8,500 feet. Mountain wetlands are largely vegetated with willows (*Salix* spp.), sedges (*Carex* spp.), and mesic grasses such as Canadian reedgrass (*Calamagrostis canadensis*) and tufted hairgrass (*Deschampsia cespitosa*). Montane grasslands are abundant and are primarily dominated by Arizona fescue (*Festuca arizonica*), Thurber fescue (*Festuca thurberi*), and Parry's oatgrass (*Danthonia parryi*). In the foothills of the San Juan Mountains, open ponderosa pine stands are not uncommon and grade into piñon pine (*Pinus edulis*) and juniper (*Juniperus scopulorum*) woodlands at the lower treeline. Piñon pine and juniper are also common in the San Luis Hills. Where the foothills descend down to the valley floor, shrublands dominated by winterfat (*Krascheninnikovia lanata*) and rabbitbrush (*Chrysothamnus* spp.) are common with various grasslands interspersed. The most common grassland dominants are blue grama (*Bouteloua gracilis*), squirreltail (*Elymus elymoides*), needle-and-thread (*Stipa comata*), and Indian ricegrass (*Oryzopsis hymenoides*). Figure 2 shows the general vegetation patterns in the two counties.

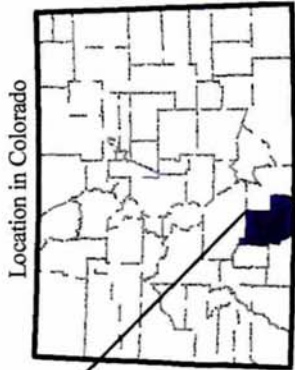
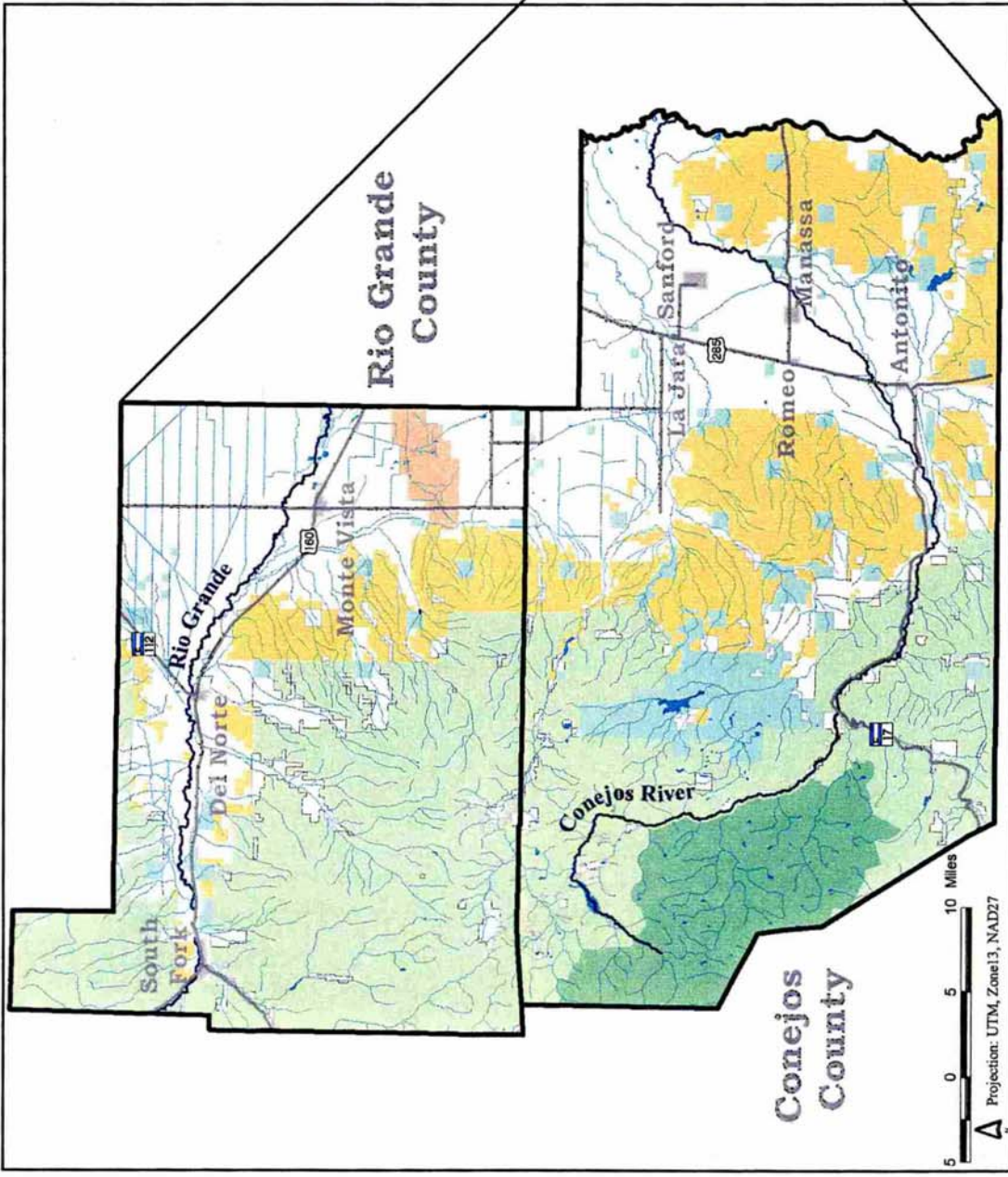
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LEGEND

- Highways
- Major Rivers
- Streams and Creeks
- Lakes and Reservoirs
- Municipalities
- Land Status
- State Land
- National Forests and Grasslands
- Wilderness Areas
- Bureau of Land Management
- National Wildlife Refuge
- Private Lands

Base Layers: Land Status produced by the Colorado Division of Wildlife Habitat Resources Section, 1998 Scale - 1:1,000,000



The accuracy of the data shown on this map is not guaranteed. The Colorado Natural Heritage Program is not responsible and shall not be liable to the user for incidental, consequential or special damages arising from data use or interpretation.

The absence of data for a particular area or habitat does not necessarily mean that the species does not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence.

Although every attempt is made to provide the most current and precise information possible, please be aware that some of our source provides a higher level of accuracy than others, and some interpretation may be required. CNHP's data system is constantly updated and revised. Please contact CNHP for an update or assistance with interpretation of this natural heritage information.

Data are not appropriate for site level planning or evaluation.

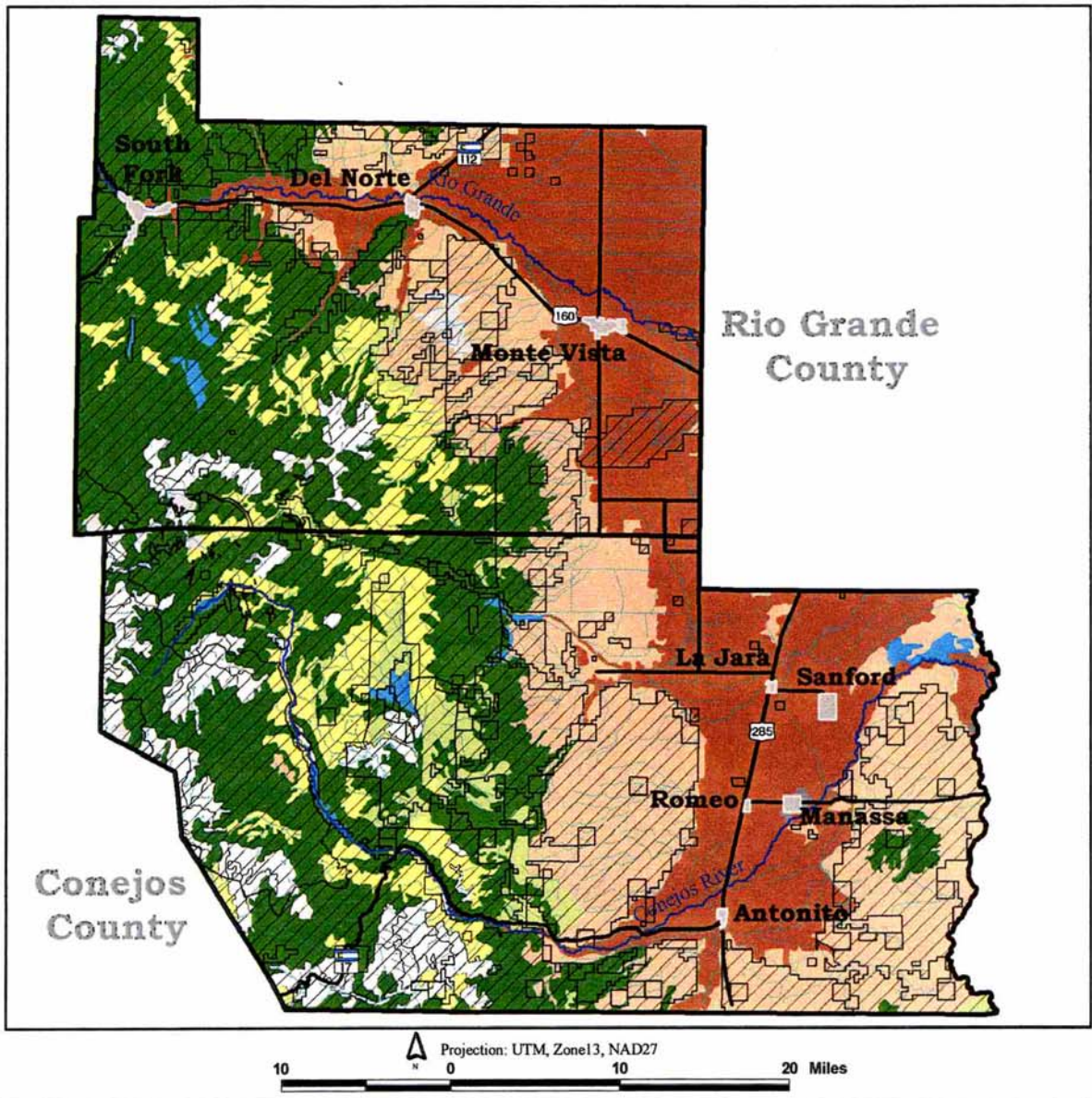
Figure 1. Rio Grande and Conejos Counties

Cold winters and cool summers characterize the study area. The higher elevations are decidedly cooler and more moist, except during winter thermal inversions, which trap the coldest air at the valley floor. Precipitation decreases rapidly with decreasing elevation. Climate data for several long-term stations were obtained from the Western Regional Climate Center (<http://www.wrcc.dri.edu>).

Table 1. Climate data from selected weather stations in or near the study area.

Station (elevation in feet)	Avg. Annual Precipitation (in.)	Avg. Total Snowfall (in.)	Avg. Max. Temperature (degrees F)	Avg. Min. Temperature (degrees F)
Wolf Creek Pass (10,640)	45.16	441.4	45.9	21.4
Platoro (9,990)	27.10	237.3	50.1	16.0
Del Norte (7,880)	9.92	43.5	58.2	28.1
Monte Vista (7,760)	7.50	22.1	58.4	24.3
Manassa (7,690)	7.54	23.9	59.7	24.8

Both counties contain a high proportion of public land (managed by the federal or state government). Of the 823,872 acres in Conejos County, approximately 59% are publicly owned and managed by the Rio Grande National Forest and the Bureau of Land Management, 7% state owned, <1% city and county owned, and 34% privately owned. Of the 584,512 acres in Rio Grande County, 59% are publicly owned and managed by federal agencies, 2% state owned, <1% city and county owned, and 39% privately owned (Essington 1996). The majority of the private lands are located on the valley floor and along streams in the mountainous areas. Figure 2 shows the pattern of land ownership in the two counties in relation to general vegetation.




<p>Colorado Natural Heritage Program Colorado State University - CNR 254 General Services Building Fort Collins, CO 80523</p> <p>map created 25 February 2000</p> 	<p align="center">LEGEND</p> <table border="0"> <tr> <td></td> <td>Highways</td> <td></td> <td>Agriculture</td> </tr> <tr> <td></td> <td>Major Rivers</td> <td></td> <td>Aspen</td> </tr> <tr> <td></td> <td>Streams and Creeks</td> <td></td> <td>Conifer</td> </tr> <tr> <td></td> <td>Municipalities</td> <td></td> <td>Grasslands</td> </tr> <tr> <td></td> <td>Public Lands</td> <td></td> <td>Mixed Forest</td> </tr> <tr> <td></td> <td>Private Lands</td> <td></td> <td>Open Water</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Shrublands</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Soil/Rock</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Tundra</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Urban</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Wetland/Riparian</td> </tr> </table> <p>Base Layers:</p> <p>Vegetation produced by the Colorado Division of Wildlife Habitat Resources Section 1998 Scale 1:100000</p> <p>Land Status produced by the Colorado Division of Wildlife Habitat Resources Section, 1998 Scale - 1:100000</p>		Highways		Agriculture		Major Rivers		Aspen		Streams and Creeks		Conifer		Municipalities		Grasslands		Public Lands		Mixed Forest		Private Lands		Open Water				Shrublands				Soil/Rock				Tundra				Urban				Wetland/Riparian
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Figure 2. General Vegetation

Methods

The methods for assessing and prioritizing conservation needs over a large area are necessarily diverse. The Colorado Natural Heritage Program follows a general methodology that is continuously being developed for this specific purpose. The Rio Grande and Conejos Counties Biological Inventory was conducted in several steps as summarized below. Additionally, input from local experts was sought at all stages.

Collect Available Information

Colorado Natural Heritage Program databases were updated with known locations and biological information for imperiled species and significant plant communities within Rio Grande and Conejos counties and nearby areas with similar habitat. 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, Adams State College, Rocky Mountain Herbarium, and local private collections. The Colorado Division of Wildlife provided extensive data on the fishes and bats of Rio Grande and Conejos counties, as well as information regarding the status of the boreal toad. Information from expert interviews was also sought. Results from literature sources were incorporated into CNHP databases, in the form of either locational information or as biological data pertaining to a species in general.

Identify Rare or Imperiled Species and Significant Plant Communities with Potential to Occur in Rio Grande and Conejos counties.

Information regarding basic species and community biology including range, habitat, phenology (reproductive timing), food sources, and substrates collected in the previous step was used to refine the list of elements with potential to occur in the study area and to develop a “search image.” In general, species and plant communities that had been previously recorded from Rio Grande and Conejos counties, or from adjacent counties, were included on this list. Species or plant communities that occur in habitats that do not occur in this study area were removed from the list.

The following list (Table 2) includes those elements currently tracked by CNHP that were thought to potentially occur in Rio Grande or Conejos 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 imperiled (G1 - G3) elements were given highest priority and greatest amount of search effort, state imperiled elements (G4-G5/S1-S3) were secondary. See Appendix A for an explanation of ranks.

Table 2. List of Targeted Elements for Rio Grande and Conejos Counties

Scientific name	Common name	Global rank	State rank	Federal status	Federal agency status	State status
Amphibians						
BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G4T1Q	S1	C	FS	E
Birds						
ACCIPITER GENTILIS	NORTHERN GOSHAWK	G5	S3B,SZN		FS/BLM	
AEGOLIUS FUNEREUS	BOREAL OWL	G5	S2		FS	
AMPHISPIZA BELLI	SAGE SPARROW	G5	S3B,SZN	(PS)		
ASIO FLAMMEUS	SHORT-EARED OWL	G5	S2B,SZN			
BUTEO REGALIS	FERRUGINOUS HAWK	G4	S3B,S4N		FS/BLM	SC
CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2	S2B,SZN	C	FS/BLM	SC
CYPSELOIDES NIGER	BLACK SWIFT	G4	S3B		FS	
EGRETTA THULA	SNOWY EGRET	G5	S2B,SZN			
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G4T3	S2B,SZN	LE-PDL		
GRUS CANADENSIS TABIDA	GREATER SANDHILL CRANE	G5T4	S2B,S4N		FS	T
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4T?Q	S1B,S3N	LT		T
PLEGADIS CHIHUI	WHITE-FACED IBIS	G5	S2B,SZN		FS/BLM	
Fish						
CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3G4	S1			E
GILA PANDORA	RIO GRANDE CHUB	G3	S1?		BLM	SC
ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G4T3	S3		FS/BLM	SC
Invertebrates						
AMBLYSKIRTES SIMIUS	SIMIUS ROADSIDE SKIPPER	G4	S3			
EUPHILOTES SPALDINGI	SPALDING'S BLUE	G3G4	S2S3			
PYRGUS RURALIS	TWO-BANDED SKIPPER	G4	S3	(PS)		
SPEYERIA NOKOMIS NOKOMIS	NOKOMIS FRITILLARY BUTTERFLY	G4T2	S1		BLM	
VALVATA SINCERA	MOSSY VALVATA	G?	S3			
Mammals						
PEROGNATHUS FLAVUS SANLUISEI	SILKY POCKET MOUSE SUBSP.	G5T3	S3			
PLECOTUS TOWNSENDII PALLESCENS	TOWNSEND'S BIG-EARED BAT SUBSP.	G4T4	S2		BLM	
SPERMOPHILUS TRIDECIMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	G5T3	S3			
THOMOMYS BOTTAE PERVAGUS	BOTTA'S POCKET GOPHER SUBSP.	G5T3	S3			
Plant communities						
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	MONTANE RIPARIAN FORESTS	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	MONTANE RIPARIAN FOREST	G5	S4			
ALNUS INCANA/MESIC FORB	THINLEAF ALDER/MESIC FORB RIPARIAN SHRUBLAND	G3G4Q	S3			
ALNUS INCANA/MESIC GRAMINOID	MONTANE RIPARIAN SHRUBLAND	G5Q	S3			
ALNUS INCANA-CORNUS SERICEA	THINLEAF ALDER-RED-OISER DOGWOOD RIPARIAN SHRUBLAND	G3G4	S3			
ALNUS INCANA-MIXED SALIX SPECIES	THINLEAF ALDER-MIXED WILLOW SPECIES	G3	S3			

Scientific name	Common name	Global rank	State rank	Federal status	Federal agency status	State status
CALTHA LEPTOSEPALA	MONTANE WET MEADOWS	G4	S4			
CAREX LANUGINOSA	MONTANE WET MEADOWS	G3?	S3			
CAREX UTRICULATA	BEAKED SEDGE MONTANE WET MEADOWS	G5	S4			
FESTUCA ARIZONICA-MUHLENBERGIA MONTANA	MONTANE GRASSLANDS	GU	SU			
KRASCHENINNIKOVIA LANATA/ORYZOPSIS HYMENOIDES	WESTERN SLOPE GRASSLANDS	G4	S3?			
PICEA PUNGENS/CORNUS SERICEA	MONTANE RIPARIAN FOREST	G4	S2			
PINUS ARISTATA/FESTUCA ARIZONICA	MONTANE WOODLANDS	G4	S3			
PINUS PONDEROSA/FESTUCA ARIZONICA	LOWER MONTANE FORESTS	G4G5	S4			
POLYGONUM AMPHIBIUM	MONTANE WET MEADOWS	G4	S3			
POPULUS ANGUSTIFOLIA/ALNUS INCANA	MONTANE RIPARIAN FOREST	G3?	S3			
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	COTTONWOOD RIPARIAN FOREST	G4	S3			
POPULUS ANGUSTIFOLIA/MIXED SALIX SPECIES	NARROWLEAF COTTONWOOD/MIXED WILLOWS MONTANE RIPARIAN FOREST	G3	S3			
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	NARROWLEAF COTTONWOOD RIPARIAN FORESTS	G4	S4			
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	MONTANE RIPARIAN FORESTS	G4	S4			
PSEUDOTSUGA MENZIESII/JUNIPERUS COMMUNIS	LOWER MONTANE FORESTS	G5	SU			
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	MONTANE WILLOW CARR	G2G3	S2S3			
SALIX EXIGUA/MESIC GRAMINOID	COYOTE WILLOW/MESIC GRAMINOID	G5	S5			
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	GEYER'S WILLOW-ROCKY MOUNTAIN WILLOW/MESIC FORB	G3	S3			
SALIX GEYERIANA-SALIX MONTICOLA/MESIC GRAMINOID	MONTANE RIPARIAN WILLOW CARR	G3?	S3			
SALIX LUCIDA SSP. CAUDATA	MONTANE RIPARIAN SHRUBLAND	G3Q	S2S3			
SALIX MONTICOLA/CALAMAGROSTIS CANADENSIS	MONTANE WILLOW CARR	G3	S3			
SALIX MONTICOLA/CAREX AQUATILIS	MONTANE RIPARIAN WILLOW CARR	G3	S3			
SALIX MONTICOLA/MESIC FORB	MONTANE RIPARIAN WILLOW CARR	G3	S3			
SALIX MONTICOLA/MESIC GRAMINOID	MONTANE RIPARIAN WILLOW CARR	G3	S3			
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	SUBALPINE RIPARIAN WILLOW CARR	G4	S4			
SALIX PLANIFOLIA/CAREX AQUATILIS	SUBALPINE RIPARIAN WILLOW CARR	G5	S4			
SPARGANIUM EURYCARPUM	FOOTHILLS/PLAINS FLOATING/SUBMERGENT PALUSTRINE WETLANDS	G5	S2S3			
Plants						
ASTRAGALUS BRANDEGEEI	BRANDEGEE MILKVETCH	G3G4	S1S2		BLM	
ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3	S2		FS/BLM	
ASTRAGALUS WOOTONII VAR WOOTONII	WOOTON MILKVETCH	G4T3?	S1			
BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2	S2		FS	

Scientific name	Common name	Global rank	State rank	Federal status	Federal agency status	State status
BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3	S2			
BOTRYCHIUM LANCEOLATUM	LANCE-LEAVED MOONWORT	G5	S2S3			
BOTRYCHIUM LUNARIA	COMMON MOONWORT	G5	S2S3			
BOTRYCHIUM PALLIDUM	PALE MOONWORT	G2	S2		FS	
CAREX LIMOSA	MUD SEDGE	G5	S2			
CAREX OREOCHARIS	A SEDGE	G3	S1			
CLEOME MULTICAULIS	SLENDER SPIDERFLOWER	G2G3	S2S3		BLM	
COMARUM PALUSTRE	MARSH CINQUEFOIL	G5	S1S2			
CRYPTANTHA WEBERI	WEBER'S CATSEYE	G3	S3			
CRYPTOGRAMMA STELLERI	SLENDER ROCK-BRAKE	G5	S2		BLM	
CYSTOPTERIS MONTANA	MOUNTAIN BLADDER FERN	G5	S1			
DRABA FLADNIZENSIS	ARCTIC DRABA	G4	S2S3			
DRABA RECTIFRACTA	MOUNTAIN WHITLOW-GRASS	G3?	S2			
DRABA SPECTABILIS	DRABA	G3?	S3			
DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3	S3			
GILIA PENSTEMONOIDES	BLACK CANYON GILIA	G2G3	S2S3		FS	
IPOMOPSIS MULTIFLORA	MANY-FLOWERED GILIA	G4?	S1			
ISOETES SETACEA SSP MURICATA	SPINY-SPORED QUILLWORT	G5	S2			
MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2?	S2		FS	
NEOPARRYA LITHOPHILA	ROCK-LOVING NEOPARRYA	G3	S3		FS/BLM	
PYROLA PICTA	PICTURELEAF WINTERGREEN	G4G5	S3S4			
SISYRINCHIUM DEMISSUM	BLUE-EYED GRASS	G5	S2			
SPARGANIUM EURYCARPUM	BROODFRUIT BURREED	G5	S2?			
STELLARIA IRRIGUA	ALTAI CHICKWEED	G4?	S2			

Identify Targeted Inventory Areas

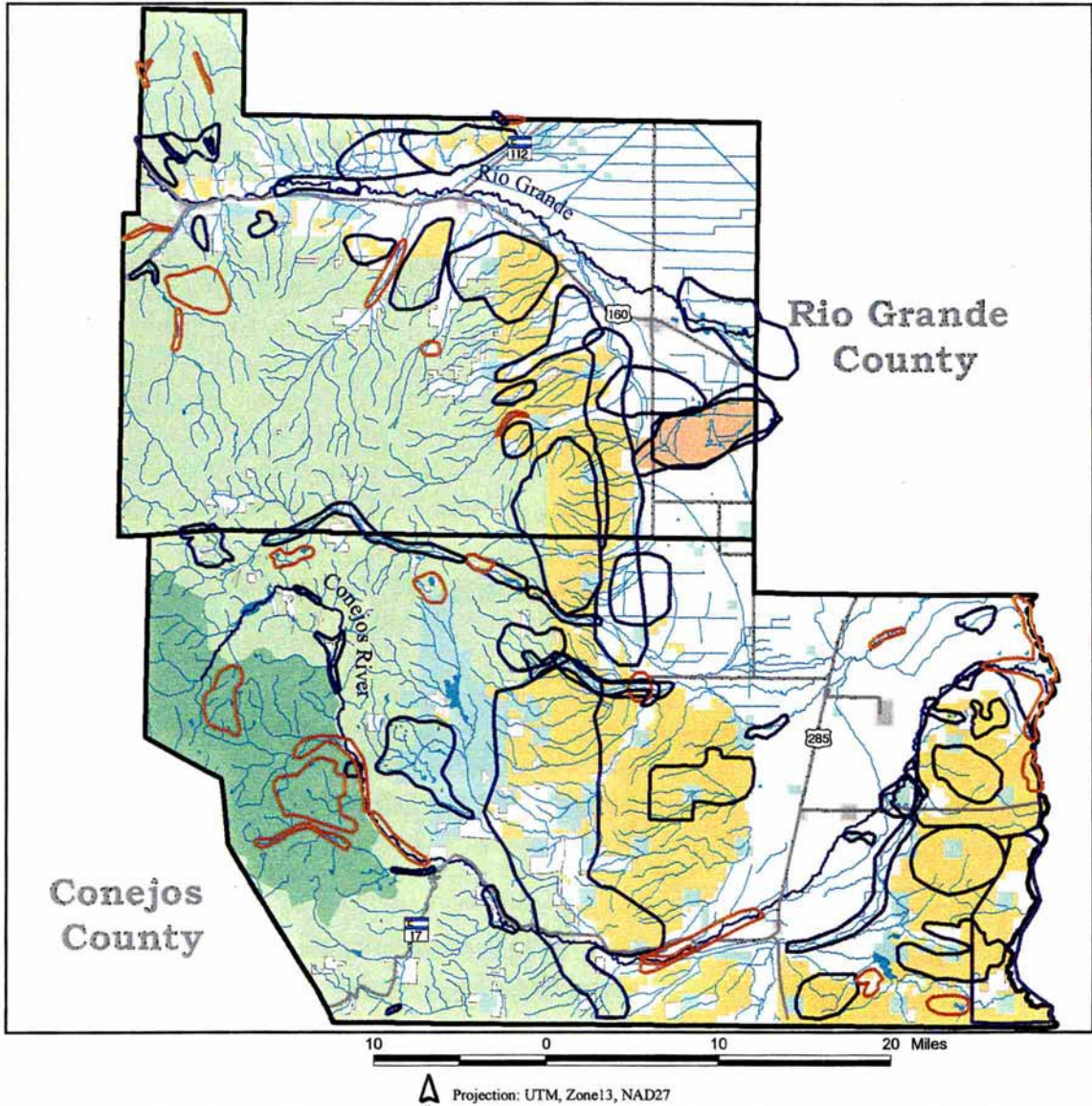
Targeted Inventory Areas (TIAs) are locations thought likely to harbor imperiled species or significant plant communities and are targeted for field inventory. Previously known locations were targeted when updated information was needed. Additional TIAs were chosen using aerial photography, topographic maps, geology maps, vegetation surveys, personal recommendations from knowledgeable local residents, and numerous roadside surveys by our field scientists.

High altitude infrared photography is well suited for identifying potential habitat for some imperiled species, assessing general vegetation types and, to some extent, natural conditions on the ground. For this project 1:40,000 scale aerial photos (NAPP) were used to identify large, intact plant communities. Those chosen as TIAs appeared to be the largest, least fragmented, and relatively free of visible disturbances such as roads, trails, fences, quarries, and other human modifications.

The above information was used to delineate over TIAs that were believed to have relatively high probability of harboring natural heritage elements. These areas, illustrated on the map of Targeted Inventory Areas (Figure 3), varied in size from less than 100 acres to several thousand acres and included the major habitat types in the study area.

Because of the large number and size of Targeted Inventory Areas, and limited resources, surveys for all elements were prioritized by the degree of imperilment. For example, all species and plant communities with Natural Heritage ranks of G1-G3 were the primary target of our inventory efforts. Although elements 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 included in the surveys and documented as they were encountered. Our concentration for the inventory was on private lands, but we also surveyed some public lands to gather more thorough information for high priority elements. Much of the privately-owned land in Rio Grande and Conejos counties on the valley floor has been converted from native vegetation to agricultural fields or hay meadows. These altered lands have low potential to harbor imperiled elements in most cases, so little survey effort was targeted on those lands.

Where possible, the condition of TIAs was evaluated with roadside surveys. For instance, the condition of grasslands is especially difficult to discern from aerial photographs, but a quick survey from the road can reveal such features as weed infestation or modification from heavy grazing and help to avoid spending limited field time in areas with little chance of supporting significant elements.



<p>Colorado Natural Heritage Program Colorado State University - CNR 254 General Services Building Fort Collins, CO 80523</p> <p style="text-align: right;">map created 25 February 2000</p> <p><small>The accuracy of the data shown on this map is not guaranteed. The Colorado Natural Heritage Program is not responsible and shall not be liable to the user for incidental, consequential or special damages arising from data use or interpretation.</small></p> <p><small>The absence of data for a particular area or habitat does not necessarily mean that the species does not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence.</small></p> <p><small>Although every attempt is made to provide the most current and precise information possible, please be aware that some of our sources provide a higher level of accuracy than others, and some interpretation may be required. CNHP's data system is constantly updated and revised. Please contact CNHP for an update or assistance with interpretation of this natural heritage information.</small></p> <p><small>Data are not appropriate for site level planning or evaluation.</small></p>	<p style="text-align: center;">LEGEND</p> <p>Targeted Inventory Areas</p> <ul style="list-style-type: none"> Visited Not Visited Highways Major Rivers Streams and Creeks Lakes and Reservoirs Municipalities <p>Land Status</p> <ul style="list-style-type: none"> State Land National Forests and Grasslands Wilderness Areas Bureau of Land Management National Wildlife Refuge Private Lands <p>Base Layer: Land Status produced by the Colorado Division of Wildlife Habitat Resources Section, 1998 Scale - 1:100000</p>
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Figure 3. Targeted Inventory Areas

Contact Landowners

Obtaining permission to conduct surveys on private property is an essential component of CNHP county inventories. Once Targeted Inventory Areas were chosen, land ownership of these areas was determined using records at the Rio Grande and Conejos County assessors' office and information from local citizens. Landowners were then contacted by phone or in person. If landowners could not be contacted, or if permission to access the property was denied, this was recorded and the site was not visited. **Under no circumstances were properties surveyed without landowner permission.**

Conduct Field Surveys

Where permission to access could be obtained, Targeted Inventory Areas were visited at the appropriate time as dictated by the phenology or activity patterns 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 parts of the growing 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/or document their presence. These are summarized below:

Amphibians and Reptiles: visual, hand capture, or with aquatic nets

Mammals: visual, live traps, pitfall traps

Birds: visual or by song/call, evidence of breeding sought

Insects: aerial net

Plants and plant communities: visual, collect qualitative or quantitative composition data

Wetland plant communities: visual, collect qualitative or quantitative composition, soil, hydrological, and functions and value data

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

When a rare or imperiled species or significant plant community was detected, its precise location and known extent were 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. This record is tracked as an *element occurrence record* or more simply an *occurrence*. The overall significance of each occurrence (relative to others occurrences of the same element) was estimated by rating the size of the population or community, the condition or naturalness of the habitat, and the landscape context in which it occurs. These factors are combined into

an *element occurrence rank*, useful in refining conservation priorities. See Appendix A for more information about element occurrence ranking.

Delineate Potential Conservation Area Boundaries

Since the objective for this inventory was to identify and prioritize specific areas for conservation efforts, boundaries for Potential Conservation Areas were delineated. Such a boundary is an estimation of the primary area needed to ensure long-term persistence of the element. In order to ensure this persistence, the ecological processes that support that occurrence must remain functional. The conservation planning boundary is meant to include features in the surrounding landscape that provide these functions and serve as a starting point for planning long-term conservation efforts. 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 area or the element may call for alterations to the boundaries. In developing potential conservation area 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 potential conservation area and the surrounding watershed;
- maintenance of the hydrologic integrity of the groundwater, e.g., by protecting recharge zones;
- land intended to buffer the area against negative impacts of future changes in the use of surrounding lands;
- exclusion or control of invasive exotic species;
- land necessary for management or monitoring activities.

The potential conservation area boundaries delineated in this report do not confer any regulatory protection, nor do they exclude all activity. It is hypothesized that some activities will prove degrading to the element or the ecological processes on which they depend, while others will not. The boundaries represent the best estimate of the primary area supporting the long-term survival of the targeted species or plant communities and are presented for planning purposes. They delineate ecologically sensitive areas where land-use practices should be carefully planned and managed to ensure that they are compatible with protection of 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 to the elements was not conducted. All land within the conservation planning boundary should be considered an integral part of a complex economic, social, and ecological landscape that requires wise land-use planning at all levels.

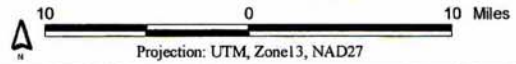
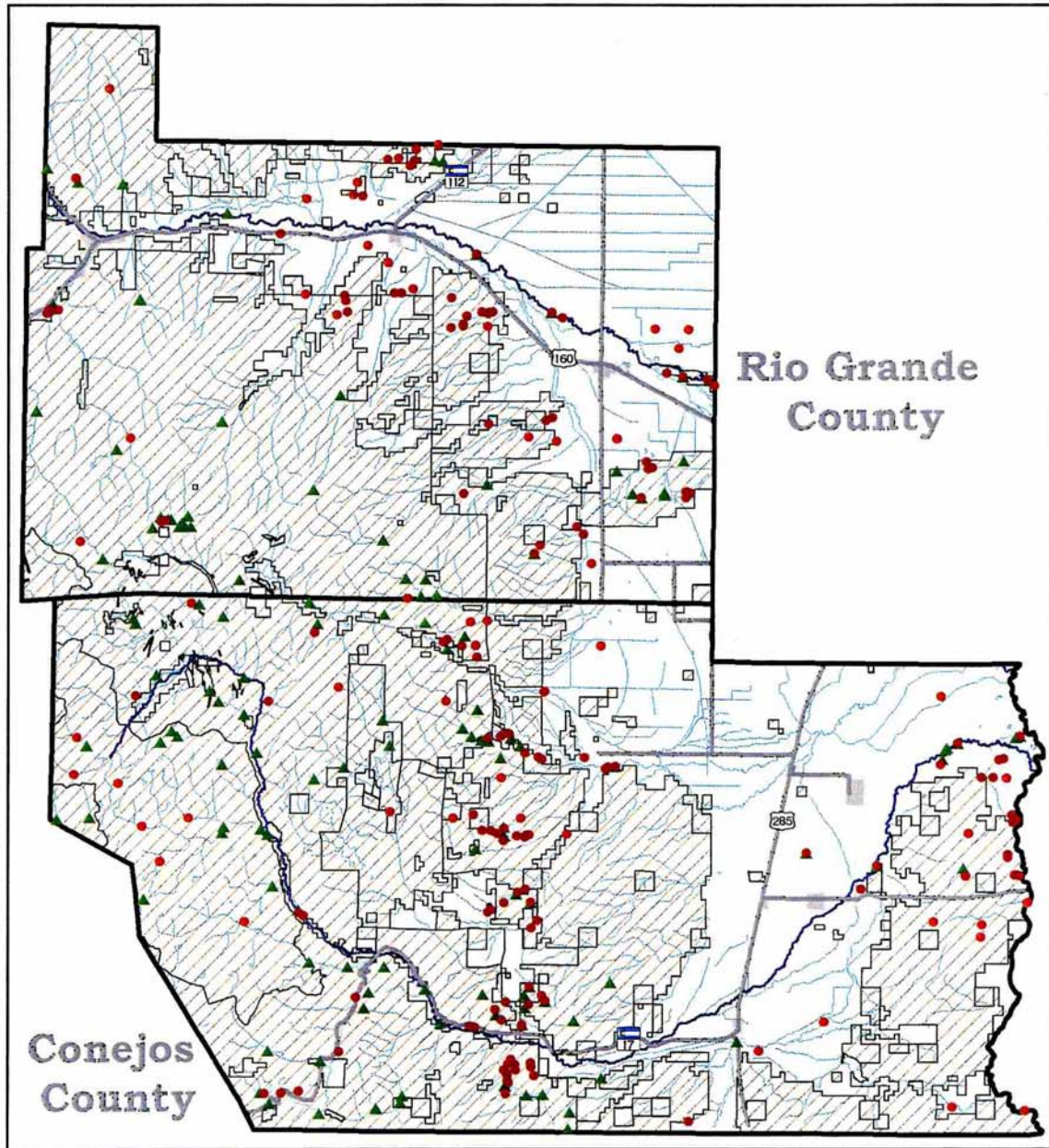
CNHP uses the Natural Heritage Ranking Methodology to help prioritize conservation actions by identifying those areas that have the greatest chance of conservation success for the most imperiled elements. The areas are prioritized according to their **biodiversity significance rank**, or “B-rank,” which ranges from B1 (outstanding biodiversity significance, globally significant) to B5 (general or state-wide biodiversity significance). These ranks are based the conservation ranks (imperilment or rarity) for each element and the element occurrence ranks (quality rank) for that particular location. Therefore, the highest quality occurrences (those with the greatest likelihood of long-term survival) of the most imperiled elements are the highest priority and receive the highest B-rank). See Appendix A for more details on the ranking procedure. The B1-B3 sites are the highest priorities for conservation actions. The sum of all the sites in this report represents the area CNHP recommends be considered for conservation actions to preserve the most imperiled elements of the natural heritage of Rio Grande and Conejos counties.

Results

This project documented a large number of biologically significant elements found throughout Rio Grande and Conejos counties. It should be noted that our results contain information from Colorado Natural Heritage Program field surveys and information collected from other sources (such as the Colorado Division of Wildlife, museums and herbaria, etc.). As of December 1998, there were 230 element occurrences in the CNHP databases from Rio Grande and Conejos counties representing approximately 90 different species and plant communities. Totals after the inventory indicate that nearly 400 significant element occurrences have been documented representing approximately 110 different species and plant communities. See Table 3 for the complete list and Figure 4 for a graphic comparison of element occurrences before and after the project. These elements of concern and their occurrences provide the foundation for 72 Potential Conservation Areas in the two counties of which 56 are presented in this report. Prior to the project there were 31 Potential Conservation Area in the two counties. All of the data collected are housed and maintained in the Biological and Conservation Data System (BCD) at the Colorado Natural Heritage Program.

There are 16 Potential Conservation Areas in the two counties that are not presented in this report. These areas are depicted with hatched polygons on Figure 5. These are areas for which CNHP does not have enough information to recommend conservation actions and/or those that are lower priority (B5). It should be noted that these areas might be important for conservation, but need to be verified before specific actions are recommended. Contact CNHP for more information regarding these areas.

Most of our inventory efforts were focused on elements that potentially occurred on private land and BLM land just above the San Luis Valley floor. Thus, inventory for the elements in those locations was reasonably thorough. Little time was spent on lands managed by the U.S. Forest Service. The Forest Service and Colorado Division of Wildlife have done biological inventories on those lands.



<p>Colorado Natural Heritage Program Colorado State University - CNR 254 General Services Building Fort Collins, CO 80523</p> <p>map created 25 February 2000</p> 	<p style="text-align: center;">LEGEND</p> <ul style="list-style-type: none"> ● Post-Inventory Element Occurrences ▲ Pre-Inventory Element Occurrences Highways Major Rivers Streams and Creeks Municipalities Land Status Private Lands Public Lands <p>Base Layers Land Status produced by the Colorado Division of Wildlife Habitat Resources Section, 1998 Scale - 1:100000</p>	<p><i>The accuracy of the data shown on this map is not guaranteed. The Colorado Natural Heritage Program is not responsible and shall not be liable to the user for incidental, consequential or special damages arising from data use or interpretation. The absence of data for a particular area or habitat does not necessarily mean that the species does not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence. Although every attempt is made to provide the most current and precise information possible, please be aware that some of our sources provide a higher level of accuracy than others, and some interpretation may be required. CNHP's data system is constantly updated and revised. Please contact CNHP for an update or assistance with interpretation.</i></p>
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Figure 4. Element Occurrences Before and After the Project

Table 3. Elements documented in Rio Grande and/or Conejos counties.
Elements newly documented in the counties during the 1999 survey are in bold.

Scientific name	Common name	Global rank	State rank	Federal status	Federal agency status	State status
Amphibians						
BUFO BOREAS POP 1	BOREAL TOAD (SOUTHERN ROCKY MOUNTAIN POPULATION)	G4T1Q	S1	C	FS	E
Birds						
ACCIPITER GENTILIS	NORTHERN GOSHAWK	G5	S3B,SZN		FS/BLM	
AEGOLIUS FUNEREUS	BOREAL OWL	G5	S2		FS	
AMPHISPIZA BELLI	SAGE SPARROW	G5	S3B,SZN	(PS)		
ASIO FLAMMEUS	SHORT-EARED OWL	G5	S2B,SZN			
BUTEO REGALIS	FERRUGINOUS HAWK	G4	S3B,S4N		FS/BLM	SC
CATOPTROPHORUS SEMIPALMATUS	WILLET	G5	S1B,SZN			
CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2	S2B,SZN	C	FS/BLM	SC
CYPSELOIDES NIGER	BLACK SWIFT	G4	S3B		FS	
EGRETTA THULA	SNOWY EGRET	G5	S2B,SZN			
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G4T3	S2B,SZN	LE-PDL		
GRUS CANADENSIS TABIDA	GREATER SANDHILL CRANE	G5T4	S2B,S4N		FS	T
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4T?Q	S1B,S3N	LT		T
PLEGADIS CHIHII	WHITE-FACED IBIS	G5	S2B,SZN		FS/BLM	
Fish						
CATOSTOMUS PLEBEIUS	RIO GRANDE SUCKER	G3G4	S1			E
GILA PANDORA	RIO GRANDE CHUB	G3	S1?		BLM	SC
ONCORHYNCHUS CLARKI VIRGINALIS	RIO GRANDE CUTTHROAT TROUT	G4T3	S3		FS/BLM	SC
Invertebrates						
AMBLYSCIRTES SIMIUS	SIMIUS ROADSIDE SKIPPER	G4	S3			
EUPHILOTES SPALDINGI	SPALDING'S BLUE	G3G4	S2S3			
PYRGUS RURALIS	TWO-BANDED SKIPPER	G4	S3	(PS)		
SPEYERIA NOKOMIS NOKOMIS	NOKOMIS FRITILLARY BUTTERFLY	G4T2	S1		BLM	
VALVATA SINCERA	MOSSY VALVATA	G?	S3			
Mammals						
LYNX CANADENSIS	LYNX	G5	S1	(PS)	FS	E
PEROGNATHUS FLAVUS SANLUISEI	SILKY POCKET MOUSE SUBSP.	G5T3	S3			
PLECOTUS TOWNSENDII PALLESCENS	TOWNSEND'S BIG-EARED BAT SUBSP.	G4T4	S2		BLM	
SPERMOPHILUS TRIDECIMLINEATUS BLANCA	THIRTEEN-LINED GROUND SQUIRREL SUBSP.	G5T3	S3			
THOMOMYS BOTTAE PERVAGUS	BOTTA'S POCKET GOPHER SUBSP.	G5T3	S3			
Plant communities						
ABIES LASIOCARPA-PICEA ENGELMANNII/ALNUS INCANA	MONTANE RIPARIAN FORESTS	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/MERTENSIA CILIATA	MONTANE RIPARIAN FORESTS	G5	S5			
ABIES LASIOCARPA-PICEA ENGELMANNII/SALIX DRUMMONDIANA	MONTANE RIPARIAN FOREST	G5	S4			

Scientific name	Common name	Global rank	State rank	Federal status	Federal agency status	State status
ALNUS INCANA/MESIC FORB	THINLEAF ALDER/MESIC FORB RIPARIAN SHRUBLAND	G3G4Q	S3			
ALNUS INCANA/MESIC GRAMINOID	MONTANE RIPARIAN SHRUBLAND	G5Q	S3			
ALNUS INCANA-CORNUS SERICEA	THINLEAF ALDER-RED-OISER DOGWOOD RIPARIAN SHRUBLAND	G3G4	S3			
ALNUS INCANA-MIXED SALIX SPECIES	THINLEAF ALDER-MIXED WILLOW SPECIES	G3	S3			
ALNUS INCANA-SALIX DRUMMONDIANA	MONTANE RIPARIAN SHRUBLAND	G3	S3			
CALTHA LEPTOSEPALA	MONTANE WET MEADOWS	G4	S4			
CARDAMINE CORDIFOLIA-MERTENSIA CILIATA-SENECIO TRIANGULARIS	ALPINE WETLANDS	G4	S4			
CAREX AQUATILIS	MONTANE WET MEADOWS	G5	S4			
CAREX AQUATILIS-CAREX UTRICULATA	MONTANE WET MEADOWS	G4	S4			
CAREX ATHERODES	MONTANE WET MEADOWS	G4	S2?			
CAREX LANUGINOSA	MONTANE WET MEADOWS	G3?	S3			
CAREX SIMULATA	WET MEADOW	G3	S3			
CAREX UTRICULATA	BEAKED SEDGE MONTANE WET MEADOWS	G5	S4			
CAREX UTRICULATA PERCHED WETLAND	BEAKED SEDGE PERCHED WETLAND	G3?	S3			
CORNUS SERICEA	FOOTHILLS RIPARIAN SHRUBLAND	G4	S3			
DISTICHLIS SPICATA	SALT MEADOW	G5	S3			
DISTICHLIS SPICATA-(SCIRPUS NEVADENSIS	SALT MEADOW	G4	S3?			
ELEOCHARIS PALUSTRIS	EMERGENT WETLAND	G5	S4			
FESTUCA ARIZONICA-MUHLENBERGIA MONTANA	MONTANE GRASSLANDS	GU	SU			
JUNCUS BALTICUS VAR. MONTANUS	WESTERN SLOPE WET MEADOWS	G5	S5			
KRASCHENINNIKOVIA LANATA/ORYZOPSIS HYMENOIDES	WESTERN SLOPE GRASSLANDS	G4	S3?			
PICEA PUNGENS/CORNUS SERICEA	MONTANE RIPARIAN FOREST	G4	S2			
PINUS ARISTATA/FESTUCA ARIZONICA	MONTANE WOODLANDS	G4	S3			
PINUS ARISTATA/RIBES MONTIGENUM	UPPER MONTANE WOODLANDS	G2G4	S1			
PINUS EDULIS/STIPA COMATA	XERIC WESTERN SLOPE PINYON-JUNIPER WOODLANDS	G2	S2			
PINUS EDULIS/STIPA SCRIBNERI	TWO-NEEDLE PINYON/SCRIBNER'S NEEDLE GRASS	G3	S2			
PINUS PONDEROSA/FESTUCA ARIZONICA	LOWER MONTANE FORESTS	G4G5	S4			
POLYGONUM AMPHIBIUM	MONTANE WET MEADOWS	G4	S3			
POPULUS ANGUSTIFOLIA/ALNUS INCANA	MONTANE RIPARIAN FOREST	G3?	S3			
POPULUS ANGUSTIFOLIA/CORNUS SERICEA	COTTONWOOD RIPARIAN FOREST	G4	S3			
POPULUS ANGUSTIFOLIA/MIXED SALIX SPECIES	NARROWLEAF COTTONWOOD/MIXED WILLOWS MONTANE RIPARIAN FOREST	G3	S3			
POPULUS ANGUSTIFOLIA/SALIX EXIGUA	NARROWLEAF COTTONWOOD RIPARIAN FORESTS	G4	S4			

Scientific name	Common name	Global rank	State rank	Federal status	Federal agency status	State status
POPULUS ANGUSTIFOLIA-PICEA PUNGENS/ALNUS INCANA	MONTANE RIPARIAN FORESTS	G4	S4			
POTAMOGETON GRAMINEUS	MONTANE FLOATING/ SUBMERGENT WETLAND	G4?	S4?			
PSEUDOTSUGA MENZIESII/JUNIPERUS COMMUNIS	LOWER MONTANE FORESTS	G5	SU			
SALIX ERIOCEPHALA VAR. LIGULIFOLIA	MONTANE WILLOW CARR	G2G3	S2S3			
SALIX EXIGUA/MESIC GRAMINOID	COYOTE WILLOW/MESIC GRAMINOID	G5	S5			
SALIX GEYERIANA-SALIX MONTICOLA/MESIC FORB	GEYER'S WILLOW-ROCKY MOUNTAIN WILLOW/MESIC FORB	G3	S3			
SALIX GEYERIANA-SALIX MONTICOLA/MESIC GRAMINOID	MONTANE RIPARIAN WILLOW CARR	G3?	S3			
SALIX LUCIDA SSP. CAUDATA	MONTANE RIPARIAN SHRUBLAND	G3Q	S2S3			
SALIX MONTICOLA/ CALAMAGROSTIS CANADENSIS	MONTANE WILLOW CARR	G3	S3			
SALIX MONTICOLA/CAREX AQUATILIS	MONTANE RIPARIAN WILLOW CARR	G3	S3			
SALIX MONTICOLA/MESIC FORB	MONTANE RIPARIAN WILLOW CARR	G3	S3			
SALIX MONTICOLA/MESIC GRAMINOID	MONTANE RIPARIAN WILLOW CARR	G3	S3			
SALIX PLANIFOLIA/CALTHA LEPTOSEPALA	SUBALPINE RIPARIAN WILLOW CARR	G4	S4			
SALIX PLANIFOLIA/CAREX AQUATILIS	SUBALPINE RIPARIAN WILLOW CARR	G5	S4			
SARCOBATUS VERMICULATUS/DISTICHLIS SPICATA	SALINE BOTTOMLAND SHRUBLANDS	G4	S1			
SARCOBATUS VERMICULATUS/SPOROBOLUS AIROIDES	SALINE BOTTOMLAND SHRUBLANDS	G3?	S3?			
SCIRPUS ACUTUS	MARSH WETLAND	G5	S3?			
SCIRPUS MARITIMUS	EMERGENT WETLAND (MARSH)	G4	S2			
SCIRPUS PUNGENS	BULRUSH	G3G4	S3			
SCIRPUS TABERNAEMONTANI-SCIRPUS ACUTUS	GREAT PLAINS MARSHES	G3	S2S3			
SPARGANIUM ANGUSTIFOLIUM	MONTANE FLOATING/SUBMERGENT PALUSTRINE WETLANDS	G4?	S2S3			
SPARGANIUM EURYCARPUM	FOOTHILLS/PLAINS FLOATING/SUBMERGENT PALUSTRINE WETLANDS	G5	S2S3			
STIPA NEOMEXICANA	NEW MEXICO FEATHERGRASS PRAIRIE	G3	S3			
Plants						
ASKELLIA NANA	DWARF HAWKSBEARD	G5	S2			
ASTRAGALUS BRANDEGEEI	BRANDEGEE MILKVETCH	G3G4	S1S2		BLM	
ASTRAGALUS RIPLEYI	RIPLEY MILKVETCH	G3	S2		FS/BLM	
ASTRAGALUS WOOTONII VAR WOOTONII	WOOTON MILKVETCH	G4T3?	S1			
BOTRYCHIUM ECHO	REFLECTED MOONWORT	G2	S2		FS	
BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	G3	S2			
BOTRYCHIUM LANCEOLATUM	LANCE-LEAVED MOONWORT	G5	S2S3			
BOTRYCHIUM LUNARIA	COMMON MOONWORT	G5	S2S3			
BOTRYCHIUM MINGANENSE	MINGAN MOONWORT	G4	S1			
BOTRYCHIUM PALLIDUM	PALE MOONWORT	G2	S2		FS	
BOTRYCHIUM PINNATUM	NORTHERN MOONWORT	G4?	S1			

Scientific name	Common name	Global rank	State rank	Federal status	Federal agency status	State status
CAREX LIMOSA	MUD SEDGE	G5	S2			
CAREX OREOCHARIS	A SEDGE	G3	S1			
CLEOME MULTICAULIS	SLENDER SPIDERFLOWER	G2G3	S2S3		BLM	
COMARUM PALUSTRE	MARSH CINQUEFOIL	G5	S1S2			
CRYPTANTHA WEBERI	WEBER'S CATSEYE	G3	S3			
CRYPTOGRAMMA STELLERI	SLENDER ROCK-BRAKE	G5	S2		BLM	
CYSTOPTERIS MONTANA	MOUNTAIN BLADDER FERN	G5	S1			
DRABA FLADNIZENSIS	ARCTIC DRABA	G4	S2S3			
DRABA RECTIFRACTA	MOUNTAIN WHITLOW-GRASS	G3?	S2			
DRABA SPECTABILIS	DRABA	G3?	S3			
DRABA STREPTOBRACHIA	COLORADO DIVIDE WHITLOW-GRASS	G3	S3			
IPOMOPSIS MULTIFLORA	MANY-FLOWERED GILIA	G4?	S1			
ISOETES SETACEA SSP MURICATA	SPINY-SPORED QUILLWORT	G5	S2			
LIMNORCHIS ENSIFOLIA	CANYON BOG-ORCHID	G4G5	S3			
MACHAERANTHERA COLORADOENSIS	COLORADO TANSY-ASTER	G2?	S2		FS	
NEOPARRYA LITHOPHILA	ROCK-LOVING NEOPARRYA	G3	S3		FS/BLM	
PYROLA PICTA	PICTURELEAF WINTERGREEN	G4G5	S3S4			
SISYRINCHIUM DEMISSUM	BLUE-EYED GRASS	G5	S2			
SPARGANIUM EURYCARPUM	BROADFRUIT BURREED	G5	S2?			
STELLARIA IRRIGUA	ALTAI CHICKWEED	G4?	S2			

Potential Conservation Areas

In order to help prioritize conservation efforts on Rio Grande and Conejos counties' most biologically important areas, we have presented 56 Potential Conservation Areas in this report (Figure 5 and Table 4). Identification and protection of these areas will serve as an important step in preserving the natural heritage of the counties.

Of the 56 Potential Conservation Areas, several stand out as very significant. Table 4 lists the 56 Potential Conservation Areas in order of their biodiversity significance (i.e., a area with a B1 biodiversity rank is the most irreplaceable and in need of permanent protection, while a site with a B4 biodiversity rank is moderately significant and lower priority). Overall, of the 56 Potential Conservation Areas presented, we identified 15 that were ranked as *very significant* (B2), 22 *significant* (B3), and 19 *moderately significant* (B4). Figure 5 denotes the location of all of Rio Grande and Conejos counties' Potential Conservation Areas with their associated B-ranks.

All of the element and site data are housed in the Biological and Conservation Data System (BCD) which is maintained by the Colorado Natural Heritage Program. Moreover, a geographic information system (GIS) coverage has been created for the Potential Conservation Areas. This coverage can be provided to Rio Grande and Conejos counties upon request.

Table 4. Potential Conservation Areas.

The PCAs listed here are presented in the following section.

Potential Conservation Area	Biodiversity Rank
Alamosa River at Government Park	B2
Cedar Spring Uplands	B2
Dry Creek Uplands	B2
East Butte	B2
Fivemile Park	B2
Grayback Mountain	B2
Hot Creek	B2
La Jara Creek Uplands	B2
Lasausas	B2
Limekiln Creek Uplands	B2
Ojito Creek Uplands	B2
Park Creek at Summit Pass	B2
Ra Jadero Canyons	B2
San Luis Hills – Flat Top	B2
Spring Creek at Greenie Mountain	B2
Alamosa River at De la Luz Cemetery	B3
Coal Creek at Platoro Reservoir	B3
Conejos River at Menkhaven Ranch	B3
Conejos River at Platoro	B3
Dry Pole Creek Uplands	B3
Elephant Rocks	B3
Hicks Canyon	B3
Highway Spring	B3
Hot Creek/La Jara Creek Confluence	B3
Indian Head	B3
Iron Creek	B3
Lake Fork	B3
La Manga Creek	B3
Lower Rock Creek	B3
McIntire Springs	B3
Rio Grande at Monte Vista	B3
Rito Hondo Creek	B3
Rock Creek Gaging Station	B3
South Fork of the Conejos River and Hansen Creek	B3
Terrace Reservoir North	B3
Tower Hill	B3
West Alder Creek	B3
Adams Fork of Conejos River	B4
Bighorn Creek	B4
Bishop Rock	B4
Cascade Creek at Osier	B4
Conejos River Springs	B4
Fairy Hills	B4
Greenie Mountain Foothills	B4
Limekiln Point	B4
Osier Creek	B4
Poso Creek	B4
Rio Grande at Embargo Creek	B4
Rio San Antonio	B4
Rito Gato	B4
San Francisco Lakes	B4
San Luis Hills at Emory Orr Spring	B4
San Luis Hills at Lasausas	B4
Sego Springs	B4
Southwest Cumbres Pass	B4
Sugar Loaf	B4

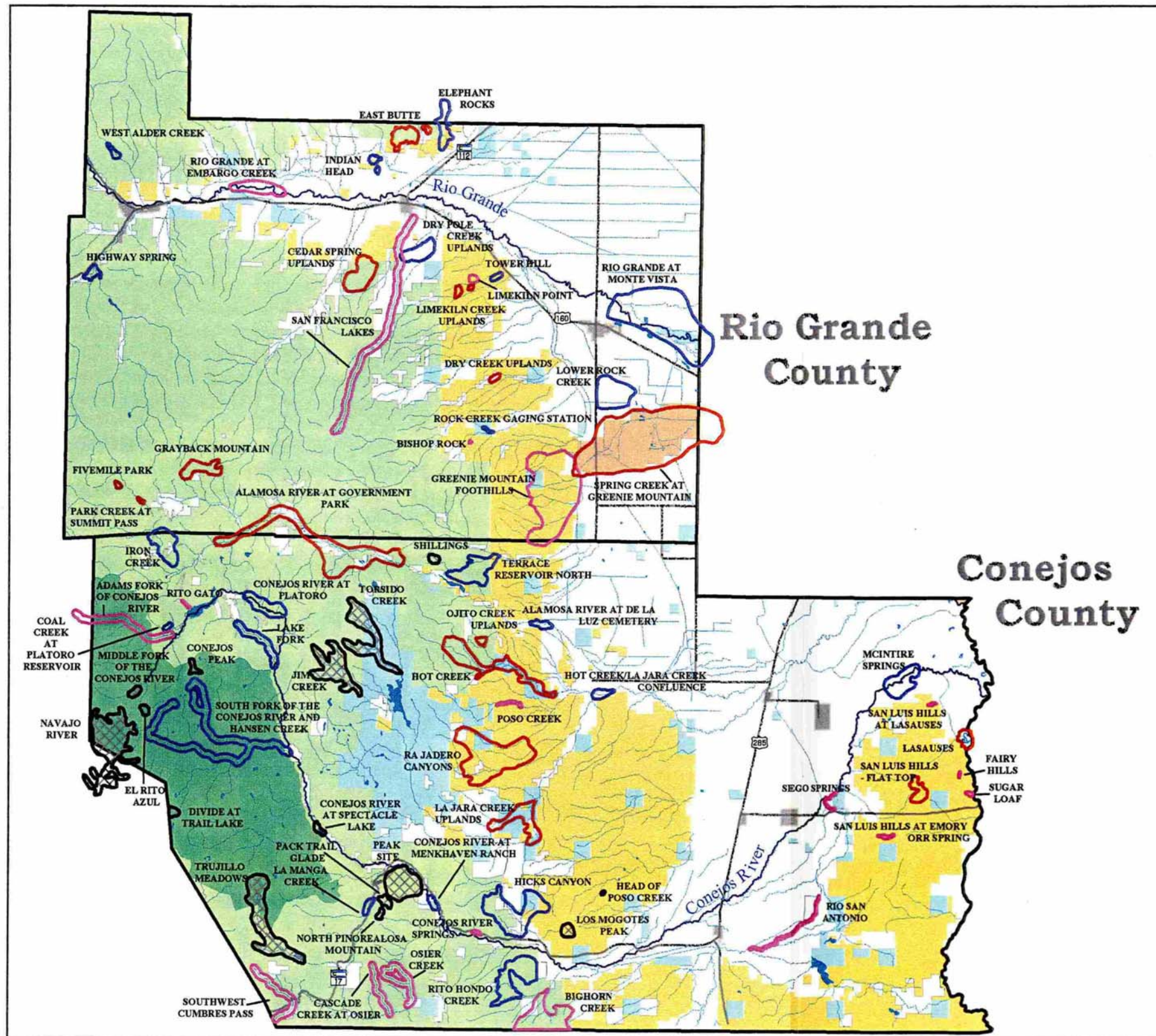


Figure 5. Potential Conservation Areas in Rio Grande and Conejos Counties

Colorado Natural Heritage Program
 Colorado State University - CNR
 254 General Services Building
 Fort Collins, CO 80523



map created 29 February 2000

LEGEND

PCAS PROFILED IN THE REPORT

- B2: Very High Biodiversity Significance
- B3: High Biodiversity Significance
- B4: Moderate Biodiversity Significance

AREAS NOT PROFILED IN THE REPORT

- Highways
- Major Rivers
- Streams and Creeks
- Lakes and Reservoirs
- Municipalities

LAND STATUS

- State Land
- National Forests and Grasslands
- Wilderness Areas
- Bureau of Land Management
- National Wildlife Refuge
- Private Lands

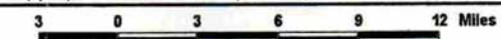
Base Layers: Land Status produced by the Colorado Division of Wildlife Habitat Resources Section, 1998 Scale - 1:100000

The accuracy of the data shown on this map is not guaranteed. The Colorado Natural Heritage Program is not responsible and shall not be liable to the user for incidental, consequential or special damages arising from data use or interpretation.

The absence of data for a particular area or habitat does not necessarily mean that the species does not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence.

Although every attempt is made to provide the most current and precise information possible, please be aware that some of our sources provide a higher level of accuracy than others, and some interpretation may be required. CNHP's data system is constantly updated and revised. Please contact CNHP for an update or assistance with interpretation of this natural heritage information.

Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

Significant Wildlife Habitat

The Colorado Division of Wildlife (CDOW) has produced a Significant Wildlife Habitat map as a way to summarize information on a variety of wildlife on one map in an easily understood format. This composite map is produced by "stacking" activity areas for each of the individual species mapped for the Southeast Region (see Appendix B or consult the local CDOW office for more information). Personnel from the CDOW review the individual species maps and rank activity areas based on the potential impact to wildlife from development. The CDOW rankings are based on knowledge of the species biology and, in particular, knowledge of its habitat needs.

CDOW wildlife information can be used in conjunction with CNHP county inventory results to present a larger relational view of the region that portrays the biological significance of the area while suggesting potential conservation priorities. The map showing CNHP PCAs and CDOW Significant Wildlife Habitat (Figure 6) demonstrates that many areas of significance described by CNHP are believed by CDOW to have a very high or high potential of being impacted by disturbance. Planning for the conservation of biologically significant areas based upon the existence of CNHP PCAs, to some extent, addresses protection and conservation priorities of CDOW. Similarly, using the CDOW information to prioritize conservation efforts often includes some of the most biologically important areas as determined by CNHP. Planning for multiple goals, whether it's the protection of rare or imperiled species, species of economic importance or regionally important open spaces, need not be exclusive of each other and will generally compliment one another. Utilizing CNHP PCA boundaries in conjunction with CDOW Composite Mapping can assist planners in the prioritization, conservation and protection of biologically significant habitats, help refine existing open space planning efforts and provide a basis for coordinating the pattern of development.

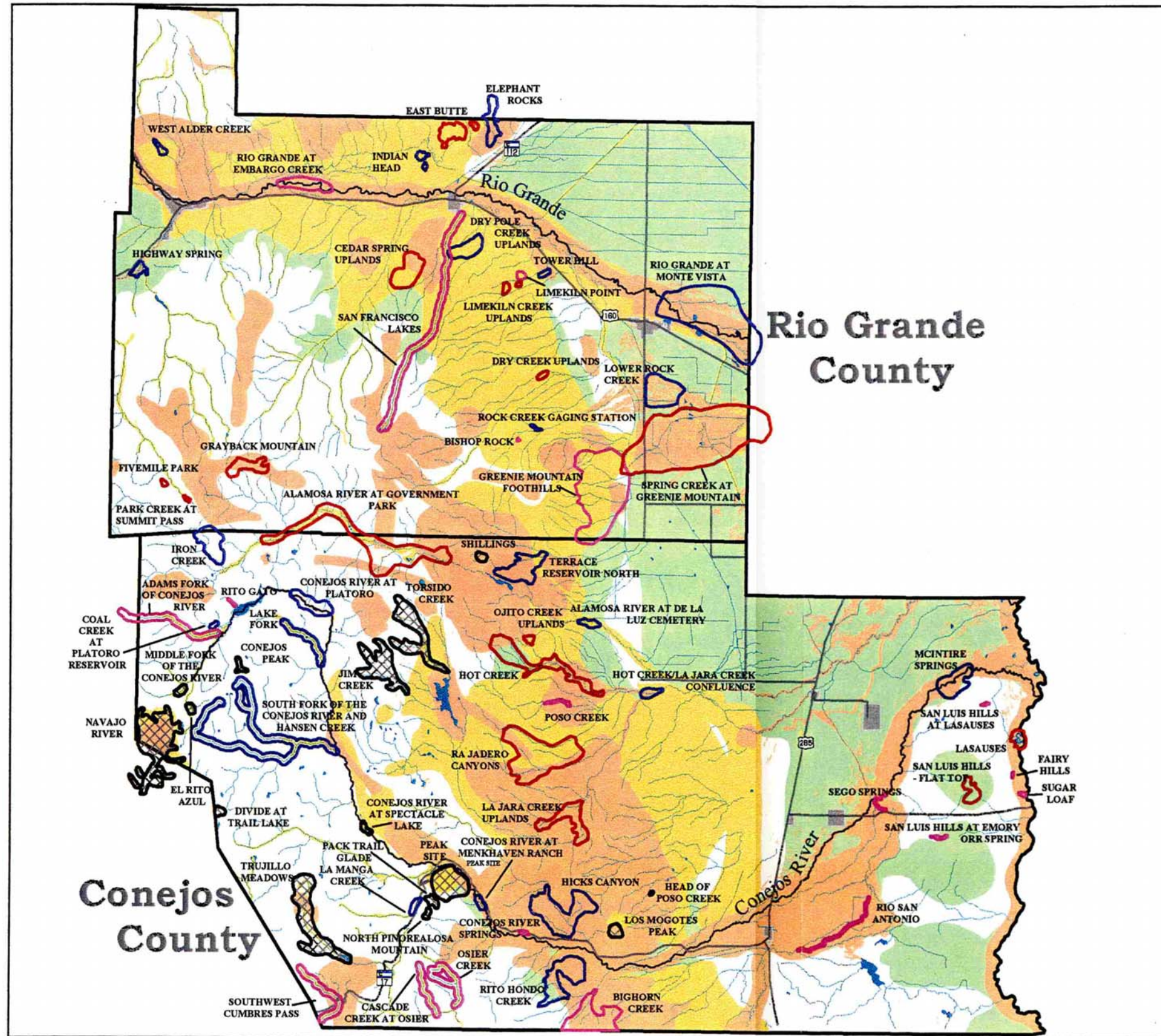


Figure 6. CNHP PCAs and CDOW Significant Wildlife Habitat

Colorado Natural Heritage Program
 Colorado State University - CNR
 254 General Services Building
 Fort Collins, CO 80523



map created 29 February 2000

LEGEND

PCAS PROFILED IN THE REPORT

- B2: Very High Biodiversity Significance
- B3: High Biodiversity Significance
- B4: Moderate Biodiversity Significance
- AREAS NOT PROFILED IN THE REPORT

SIGNIFICANT WILDLIFE HABITAT*

- Very High Potential for Impact
- High Potential for Impact
- Moderate Potential for Impact
- Moderately Low Potential for Impact

- Highways
- Major Rivers
- Streams and Creeks
- Lakes and Reservoirs
- Municipalities

*Significant Wildlife Habitat produced by the Colorado Division of Wildlife, 1999

The accuracy of the data shown on this map is not guaranteed. The Colorado Natural Heritage Program is not responsible and shall not be liable to the user for incidental, consequential or special damages arising from data use or interpretation.

The absence of data for a particular area or habitat does not necessarily mean that the species does not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence.

Although every attempt is made to provide the most current and precise information possible, please be aware that some of our sources provide a higher level of accuracy than others, and some interpretation may be required. CNHP's data system is constantly updated and revised. Please contact CNHP for an update or assistance with interpretation of this natural heritage information.

Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

Recommendations

1. **Work with key local, county, state, and federal agencies and private landowners to develop and implement a plan for protecting the Potential Conservation Areas profiled in this report, with most attention directed toward those with biodiversity rank (B-rank) B2 and B3.** The sum of all the sites in this report represents the area CNHP currently recommends be considered for conservation action to ensure that the counties' natural heritage is not lost as the human population and associated land uses change. The B2 and B3 sites have global significance and therefore should receive priority attention.
2. **Use this report in the review of proposed activities in or near Potential Conservation Areas to determine whether activities do or do not adversely affect elements of biodiversity.** All of the areas presented contain natural heritage elements of state or global significance. Certain land use activities in or near a site may affect the element(s) present there. Wetland and riparian areas are particularly susceptible to impacts from off-site activities if the activities affect water quality or hydrologic regimes. In addition, cumulative impacts from many small changes can have effects as profound and far-reaching as one large change. As proposed land use changes within Rio Grande and Conejos counties are considered, they should be compared to the maps presented herein. If a proposed project has the potential to impact a site, planning personnel should contact persons, organizations, or agencies with the appropriate biological expertise for input in the planning process. The Colorado Natural Heritage Program, Colorado Natural Areas Program, and Colorado Division of Wildlife routinely conduct environmental reviews statewide and should be considered as valuable resources. To contact CNHP's Environmental Review Coordinator call 970-491-7331.
3. **Develop and implement comprehensive programs to minimize loss of wetlands.** Wetlands are defined as lands transitional between terrestrial and aquatic systems, including riparian areas, where the water table is usually at or near the surface or the land is covered by shallow water. Off-site activities, such as pollution, sedimentation, or groundwater pumping have the potential to impact some wetlands and may require planning which considers areas outside a Potential Conservation Area.
4. **In efforts to protect biodiversity, promote cooperation and incentives among landowners, pertinent government agencies, and non-profit conservation organizations and increase public awareness of the benefits of protecting significant natural areas.** The long-term protection of natural diversity in Rio Grande and Conejos counties will be facilitated with the cooperation of many private landowners, government agencies, and non-government organizations. Efforts to provide stronger ties among federal, state, local, and private interests involved in the protection or management of natural lands will increase the chance of success.

5. **Promote wise management of the biodiversity resources that exist within Rio Grande and Conejos counties, recognizing that delineation of potential conservation areas does not by itself guarantee protection of the plants, animals, and plant communities.** Development of a site specific conservation plan is a necessary component of the long-term protection of a Potential Conservation Area. Because some of the most serious impacts to Rio Grande and Conejos county ecosystems are at a large scale (altered hydrology, residential encroachment, and non-native species invasion), considering each area in the context of its surroundings is critical. Several organizations and agencies are available for consultation in the development of conservation plans, including the Colorado Natural Heritage Program, Colorado Natural Areas Program, the Colorado Division of Wildlife, the Natural Resources Conservation Service, and various academic institutions. With the rate of population growth in Colorado, rare and imperiled species will continue to decline if not given appropriate protection. This will result not only in the reduction of our natural heritage and quality of life, but may also lead to additional conflicts between landowners and natural resource managers if regulatory solutions are sought. Increasing the public's knowledge of the remaining significant areas will build support for the initiatives necessary to protect them, and allow proactive planning which can help to avoid regulatory actions.
6. **Continue inventories where necessary, including inventories for species that cannot be surveyed adequately in one field season and inventories on lands that CNHP could not access in 1999.** Not all targeted inventory areas can be field surveyed in one year due to either lack of access or inadequate time. Because some species are ephemeral or migratory, completing inventory in one field season is often difficult and may only provide inconclusive results. Despite the best efforts during one field season, it is likely that some elements that are present in the counties were not documented during the inventory and other important sites are not identified in this report.
7. **Discourage the introduction and/or sale of non-native plant and animal species that are known to significantly impact natural areas.** Natural area managers, public agencies, and private landowners should be encouraged to remove these species from their properties. Encourage the use of native species for revegetation and landscaping efforts. The Colorado Natural Areas Program has published a book entitled Native Plant Revegetation Guide for Colorado that describes appropriate species to be used for revegetation. This resource is available on the World Wide Web at http://elbert.state.co.us/cnap/Revegetation_Guide/Reveg_index.html. Lists of invasive non-native species are available from several county and state agencies.

Potential Conservation Area Profiles

Profile Explanation

Biodiversity Rank: B# (Level of significance)

The relative global significance of the Potential Conservation Area (referred to as a **site** in the following discussions) in terms of the imperilment of the Natural Heritage resources and the quality (condition, size, landscape context) of the occurrences.

Protection and Management Issues:

Short summary of the land ownership and protection status. Management issues, which could affect the elements, are discussed.

Biodiversity Rank Justification: A synopsis of the imperiled species and significant plant communities that occur within the potential conservation area. A table within the profile lists each element occurrence found in the site, global and state ranks of these elements, the occurrence ranks and federal and state agency special designations. See Appendix A for explanations of ranks.

Location: General location.

Legal Description: U.S.G.S. 7.5-minute Quadrangle name and Township Range Section(s).

General Description: A brief narrative picture of the topography, vegetation, and current use of the potential conservation area. Common names are used along with the scientific names.

Boundary Justification: Justification for the location of the potential conservation area boundary delineated in this report, which includes occurrences of natural heritage resources and, in some cases, adjacent lands required for their protection.

Protection and Management Comments: More detailed information on protection and management issues at the site is presented. Formal protection status refers to areas designated as a Research Natural Area, Area of Critical Environmental Concern, special management area, National Wildlife Refuge etc., land under a private conservation easement, or areas where the elements of concern are specifically addressed in a management plan.

Potential threats are discussed in general terms. In many cases, these threats are not currently an issue (such as invasion by non-native species at many sites), but they do have the potential to become an issue in the future. Occasional monitoring of the sites would help identify changing threats, and allow proactive management before the elements of concern are impacted. Knowledgeable biologists should be consulted to recommend appropriate monitoring intervals.

B2 Potential Conservation Areas

Alamosa River at Government Park Potential Conservation Area

Biodiversity Rank: B2 (Very High significance)

The site supports four good and two fair examples of plant communities vulnerable on a global scale .

Protection and Management Issues: Approximately half the site is privately owned while the Rio Grande National Forest manages the remaining portion of public land. No formal protection exists for any part of this site. Heavy grazing, heavy recreation use and the presence of Forest Service Road 250 have resulted in an abundance of non-native species. Water quality in the Alamosa River is an ongoing concern.

Biodiversity Rank Justification: The high concentration of globally vulnerable plant communities at this site is the primary reason for the very high biodiversity rank. Plant communities found at this site include: a quaking fen wet meadow (*Carex simulata*) which is vulnerable on a global scale; two willow carrs (*Salix monticola*/Mixed Forbs and *Salix monticola*/Mixed Graminoids) vulnerable on a global scale; three montane riparian forests (*Alnus incana*-Mixed *Salix* species, *Picea pungens*/Bare ground, and *Populus angustifolia*/*Alnus incana*) which are vulnerable on a global scale.

Table 5. Natural Heritage element occurrences at Alamosa River at Government Park PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
<i>Alnus incana</i> -Mixed <i>Salix</i> species	Thinleaf alder-mixed willow species	G3	S3		B
<i>Carex simulata</i>	Wet meadows	G3	S3		B
<i>Picea pungens</i> /Bare ground	Blue spruce riparian forest	GU	SU		B
<i>Populus angustifolia</i> / <i>Alnus incana</i>	Montane riparian forest	G3?	S3		
<i>Salix monticola</i> /Mixed Forbs	Montane riparian willow carr	G3	S3		B
<i>Salix monticola</i> /Mixed Graminoids	Montane riparian willow carr	G3	S3		C

*EO=Element Occurrence

Location: The Alamosa River at Government Park site occurs along the Alamosa River upstream from Terrace Reservoir but below the Summitville Mine in Rio Grande County. The site begins near the Alamosa River Campground and continues upstream to the west side of Government Park.

U.S.G.S. 7.5-min. quadrangle: Jasper, Greenie Mountain
Legal Description: T36N R05E S 4, 5, 6, 8, 9, 10, 11, 12
T37N R05E S 25, 29, 30, 31, 32, 36
Elevation: 8,600-9,400 ft. Approximate Size: 5,764 acres

General Description: The site is large, stretching approximately 12 miles along the Alamosa River. This stretch of the Alamosa River is in relatively good condition. Since this site is upstream from Terrace Reservoir, the natural hydrologic regime is relatively intact. Due to natural sources of mineralization, the Alamosa River has probably always had a relatively high amount of heavy metals in the water compared to other local drainages (Stern 1997). However, since the 1870's when mining in the watershed commenced, acidic runoff from abandoned mines has increased the amount of heavy metals and acidity in the waters of the Alamosa River. Until the late 1980's, the river was able to buffer against excess acidity and large heavy metal loads. After many years of runoff and spills from an open pit gold mine located in Summitville, CO, the river lost its capability of withstanding these stresses and large fish kills occurred in Terrace Reservoir (Stern 1997). This open pit gold mine is now the Summitville Mine Superfund Site.

Hydrological processes appear to be intact and seasonal flooding appears to occur in the area. There are also a few beaver ponds scattered throughout the site. Common shrub and tree species growing along the banks of the Alamosa River and the floodplain include narrowleaf cottonwood (*Populus angustifolia*), thinleaf alder (*Alnus incana*), mountain willow (*Salix monticola*), and Colorado blue spruce (*Picea pungens*). Coyote willow (*Salix exigua*) and narrowleaf cottonwood saplings occupy recently disturbed areas. A fen occurs in Government Park and is supported by seeps coming out of nearby slopes on the north side of the river. Short-beaked sedge (*Carex simulata*) dominates the periphery of the fen while beaked sedge (*Carex utriculata*), bluejoint reedgrass (*Calamagrostis canadensis*), and tufted hairgrass (*Deschampsia cespitosa*) along with numerous fen mosses occupy the wettest areas. The peat is extremely deep and many areas are "quaking" and very unstable. The deep accumulation of peat indicates that hydrological processes are intact and very stable. Disturbance within the fen is minimal as the organic soils are unstable and likely do not support livestock.

Boundary Justification: The boundary encompasses all of the known elements that are ecologically connected in this stretch of the river and was drawn to address impacts from direct disturbances such as trampling and overgrazing. Lateral boundaries encompass the entire floodplain allowing the fluvial processes of the river to create new riparian and wetland habitat where the plant communities may establish in the future. The downstream boundaries were delimited by the reservoir. Although the upper watershed is not contained within this site's boundaries, activities there could potentially affect the integrity of the elements at this site.

Protection and Management Comments: Approximately half the site is privately owned while the Rio Grande National Forest manages the remaining portion. No formal protection exists for any part of this site.

Although poor water quality has drastically affected the aquatic community of the Alamosa River, effects on riparian/wetland vegetation along the banks and in the floodplain appear minimal. Potential impacts to wildlife are not known, however some research has suggested that wildlife that exclusively forage in areas of heavy metal contamination may accumulate heavy metals to the point of potential toxicity (Stern 1997). Heavy recreation, intensive grazing in some locations, and the presence of Forest Service Road 250, which traverses the north side of the river through the entire site, have contributed to the presence of non-native species along this stretch of the Alamosa River (mainly Canada thistle - *Cirsium arvense*, Kentucky bluegrass - *Poa pratensis*, and dandelion - *Taraxacum officinale*). Vegetation structure and species composition have been altered in most plant communities along the river due to grazing and/or heavy recreation activities.

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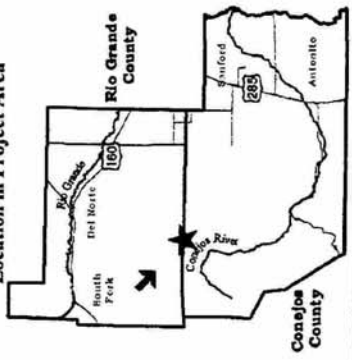


LEGEND

PCA Boundary

Base Layer:
 Antionto, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone13, NAD27

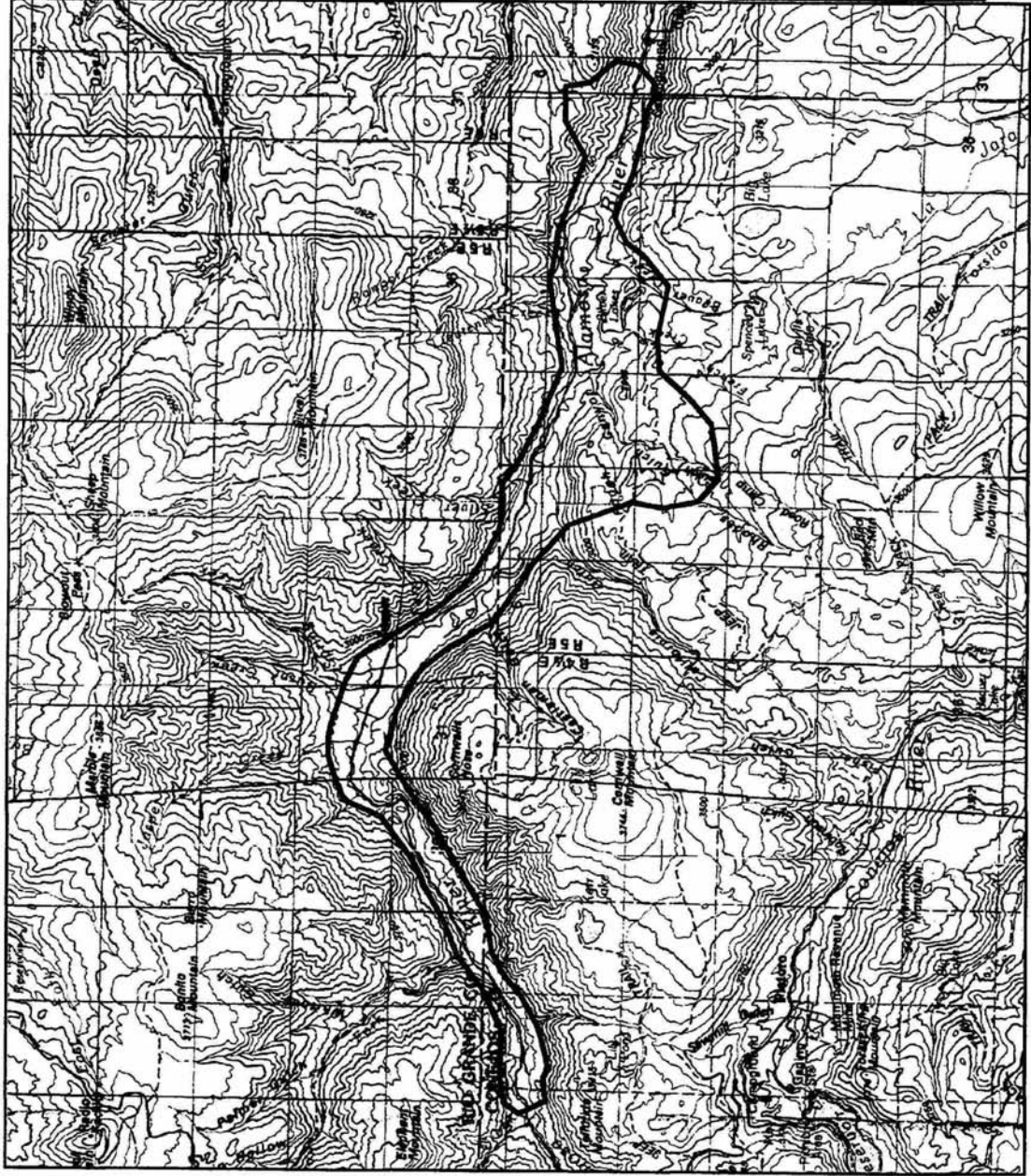


Figure 7. Alamosa River at Government Park

Cedar Spring Uplands Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains an excellent occurrence of a plant species vulnerable on a global scale, a good occurrence of a plant community vulnerable on a global scale, and a fair occurrence of a plant community imperiled on a global scale.

Protection and Management Issues: The site is located on public land managed by the Forest Service and the Bureau of Land Management. The majority of the site is located in the Forest Service Spring Branch Research Natural Area.

Biodiversity Rank Justification: The site contains an excellent occurrence of a plant species vulnerable on a global scale, the rock-loving neoparrya (*Neoparrya lithophila*), a good occurrence of a plant community imperiled on a global scale, the piñon pine/needle-and-threadgrass woodland (*Pinus edulis/Stipa comata*), and a fair occurrence of a plant community vulnerable on a global scale, the piñon pine/Scribner needlegrass woodland (*Pinus edulis/Stipa scribneri*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Rio Grande and Conejos counties have some of the largest populations of this species. The population at this site is very large and the surrounding landscape is in natural condition. Both of the piñon pine woodlands are known from less than 10 sites in Colorado.

Table 6. Natural Heritage element occurrences at Cedar Spring Uplands PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	A
<i>Pinus edulis/Stipa comata</i>	Piñon pine/needle-and-threadgrass woodland	G2	S2		C
<i>Pinus edulis/Stipa scribneri</i>	Piñon pine/Scribner's needle grass woodland	G3	S2		B

*EO=Element Occurrence

Location: This site is located approximately 5 miles south of Del Norte in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Indian Head, Horseshoe Mountain

Legal Description: T39N, R5E S 11, 13, 14, 15, 22, 23

Elevation: 8,350-9,001 ft. Approximate Size: 1,570 acres

General Description: The site encompasses steep cliffs, rock outcrops at the higher elevations, and nearly level plains dissected by numerous drainages at the lower elevations. The vegetation types within the site are numerous and well represent those typical of the San Juan foothills in Rio Grande County. The higher elevations support scattered stands of piñon pine (*Pinus edulis*) with a variety of shrubs and grasses in the understory. Lower slopes and

valley bottoms support rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) shrublands and grasslands dominated by needle-and-threadgrass (*Stipa comata*), blue grama (*Bouteloua gracilis*), or western wheatgrass (*Pascopyrum smithii*). There are numerous two-track roads throughout the site and some stumps (presumably cut for firewood), but little other sign of human disturbance. The area has not been grazed by domestic livestock for at least 10 years (Colorado Natural Areas Program 1997a).

Boundary Justification: The main threat to the rock-loving neoparrya would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population, the plant communities and enough of the adjacent area to incorporate part of other grasslands and shrubland habitats. This additional habitat is assumed to provide additional habitat for plant pollinators as well as include enough area for natural fire regimes to be simulated with prescribed burning to support the various plant communities present. The pollinators of the rock-loving neoparrya are unknown, consequently we are uncertain if the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on public land managed by the Forest Service and the Bureau of Land Management. The majority of the site is located in the Forest Service Spring Branch Research Natural Area.

The area to the east of the site is being subdivided and developed, which could increase recreational pressure at the site. Several two-track roads occur in the site but do not seem to currently impact the targeted elements of concern. The roads may serve as corridors for invasion of non-native species or other impacts in the future. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control. Firewood cutting was observed at the site during the summer of 1999.

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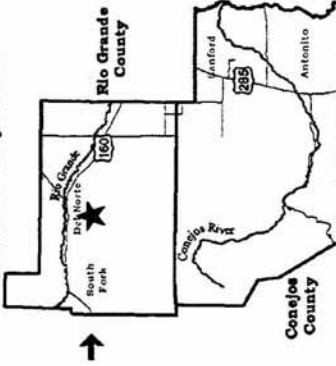
LEGEND

PCA Boundary

Base Layers:

- Horseshoe Mountain, 37106-E4
- Indian Head, 37106-F4
- 7.5 Minute Series
- Digital Raster Graphics produced by the U.S. Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone13, NAD27

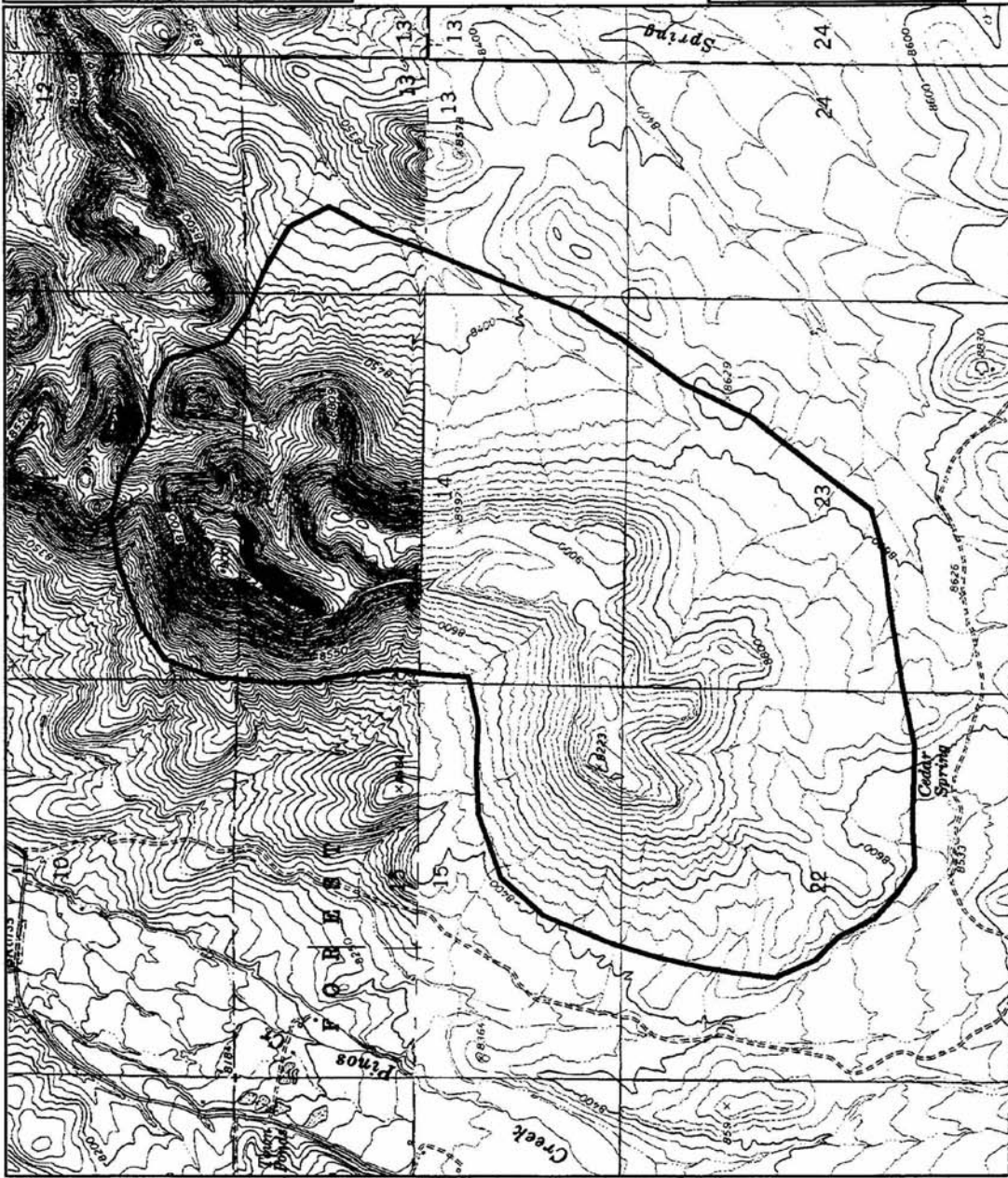


Figure 8. Cedar Spring Uplands

Dry Creek Uplands Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains an excellent occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on private land surrounded by public land managed by the BLM.

Biodiversity Rank Justification: The site contains an excellent occurrence of a plant species vulnerable on a global scale, Weber’s catseye (*Cryptantha weberi*). Weber’s catseye is only known from south-central Colorado. This is the largest known population, with over 1000 plants occurring in a natural landscape.

Table 7. Natural Heritage element occurrences at Dry Creek Uplands PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Cryptantha weberi</i>	Weber’s catseye	G3	S3		A

*EO=Element Occurrence

Location: This site is located approximately 7 miles southwest of Monte Vista in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Dog Mountain

Legal Description: T38N, R6E S 13

T38N, R7E S 18

Elevation: 8,080-8,280 ft. Approximate Size: 115 acres


General Description: The site occurs on a small, isolated mesa along Dry Creek. The edges of the mesa are very rocky giving a “rock pavement” appearance. Blue grama (*Bouteloua gracilis*), fringed sage (*Artemisia frigida*), skunkbush (*Rhus trilobata*), and snakeweed (*Gutierrezia sarothrae*) are common on the rocky areas. Where deeper soils occur on the mesa top, blue grama dominated grasslands are present.

Boundary Justification: The main threat to Weber’s catseye would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant populations and a small amount of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of Weber’s catseye may also require other types of habitat. The pollinators are unknown, consequently we are not certain that the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.


Protection and Management Comments: The site is located on private land surrounded by BLM land.

The owners are very conservation minded and have no plans to subdivide or sell the land. Nearby private lands with similar potential habitat have been subdivided and are being developed.

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 map created 3 March 2000

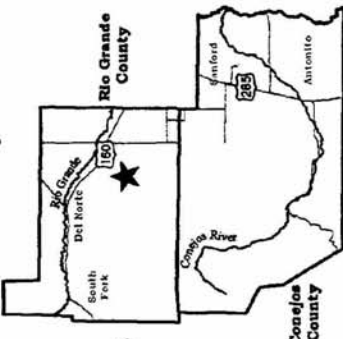


LEGEND

 **PCA Boundary**

Base Layer:
 Monte Vista, 37106-E2
 Dog Mountain, 37106-E3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area




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Data are not appropriate for site level planning or evaluation.

0.2 0 0.2 Miles

 Projection: UTM, Zone13, NAD27

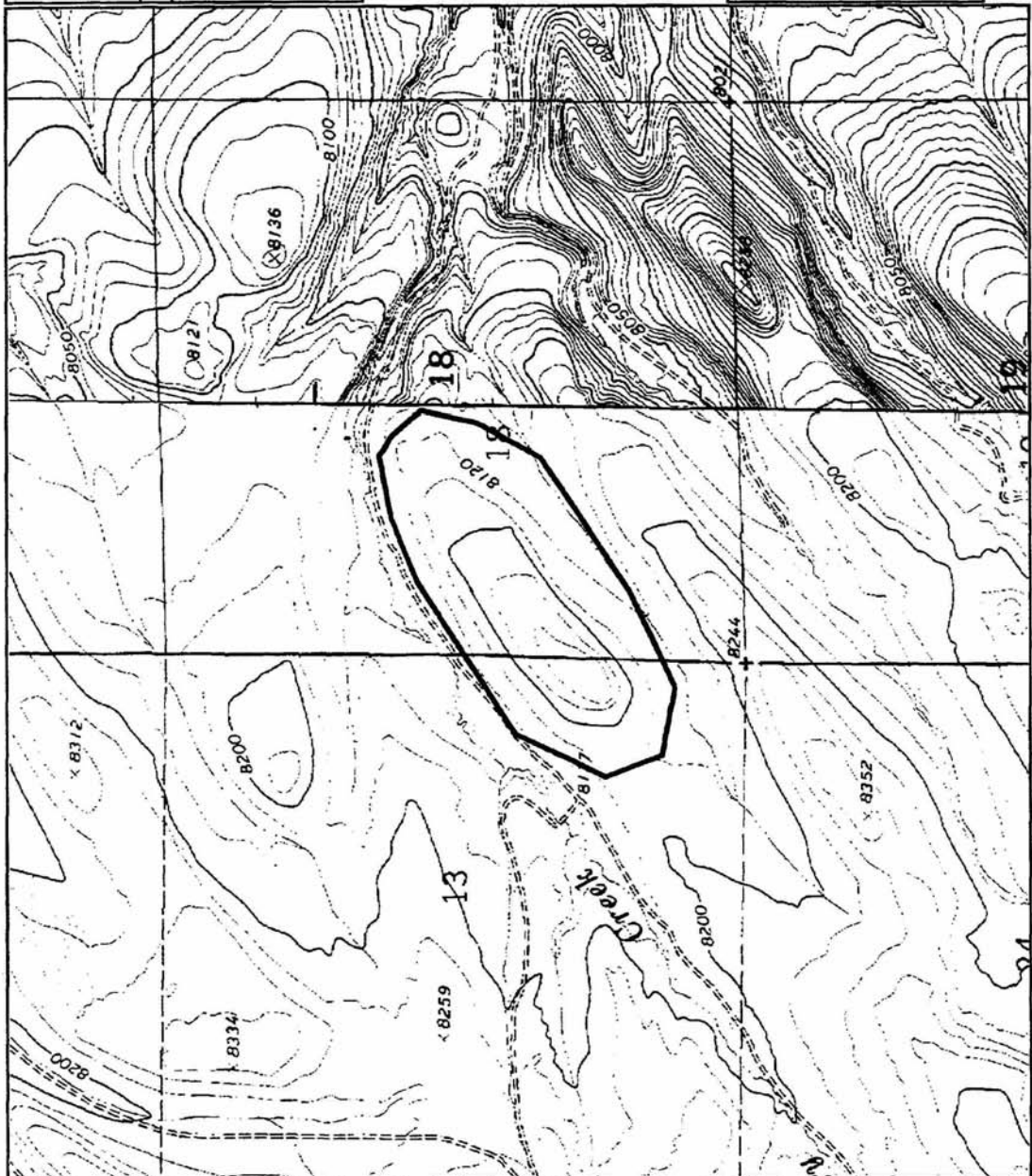


Figure 9. Dry Creek Uplands

East Butte Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains an excellent occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Forest Service and Bureau of Land Management. Part of the site is incorporated into the Forest Service Elephant Rocks Special Interest Area.

Biodiversity Rank Justification: The site contains an excellent occurrence of a plant species vulnerable on a global scale, the rock-loving neoparrya (*Neoparrya lithophila*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM lists of sensitive species. Rio Grande and Conejos counties have some of the largest known populations of this species. This particular population is the largest known for this species, with 7000-8000 plants, and is to some extent naturally protected by the extremely steep topography on which it occurs.

Table 8. Natural Heritage element occurrences at East Butte PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	A

*EO=Element Occurrence

Location: This site is located just north of the Del Norte airport in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Del Norte

Legal Description: T40N, R6E S 4, 5, 6, 7, 8

T40N, R5E S 1, 12

Elevation: 8,000-8,859 ft. Approximate Size: 980 acres

General Description: The site includes two separate buttes which rise above flat plains north of the Rio Grande. Scattered piñon pine (*Pinus edulis*) and juniper (*Juniperus scopulorum*) grow on the steep slopes, but the site is mostly dominated by grassland with a diverse forb component. A few 30-40 foot cliffs occur in addition to numerous smaller cliffs. Rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) dominate the valley flats around the site, with blue grama (*Bouteloua gracilis*) in the understory. Several gravel and two-track roads run near the site. The valley to the south of the site is privately owned and similar areas nearby are being subdivided.

Boundary Justification: The main threat to the rock-loving neoparrya would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya may also require other types of habitat. The pollinators are unknown,

consequently we are uncertain if the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on public land managed by the Forest Service and Bureau of Land Management. The eastern butte in this site is incorporated into the Forest Service Elephant Rocks Special Interest Area but only a small part of the rock-loving neoparrya population occurs on that butte. Private lands border the site at the south end.

Several gravel and two-track roads run near the site. We observed no impact from this, but the roads may serve as corridors for invasion of non-native species. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control.

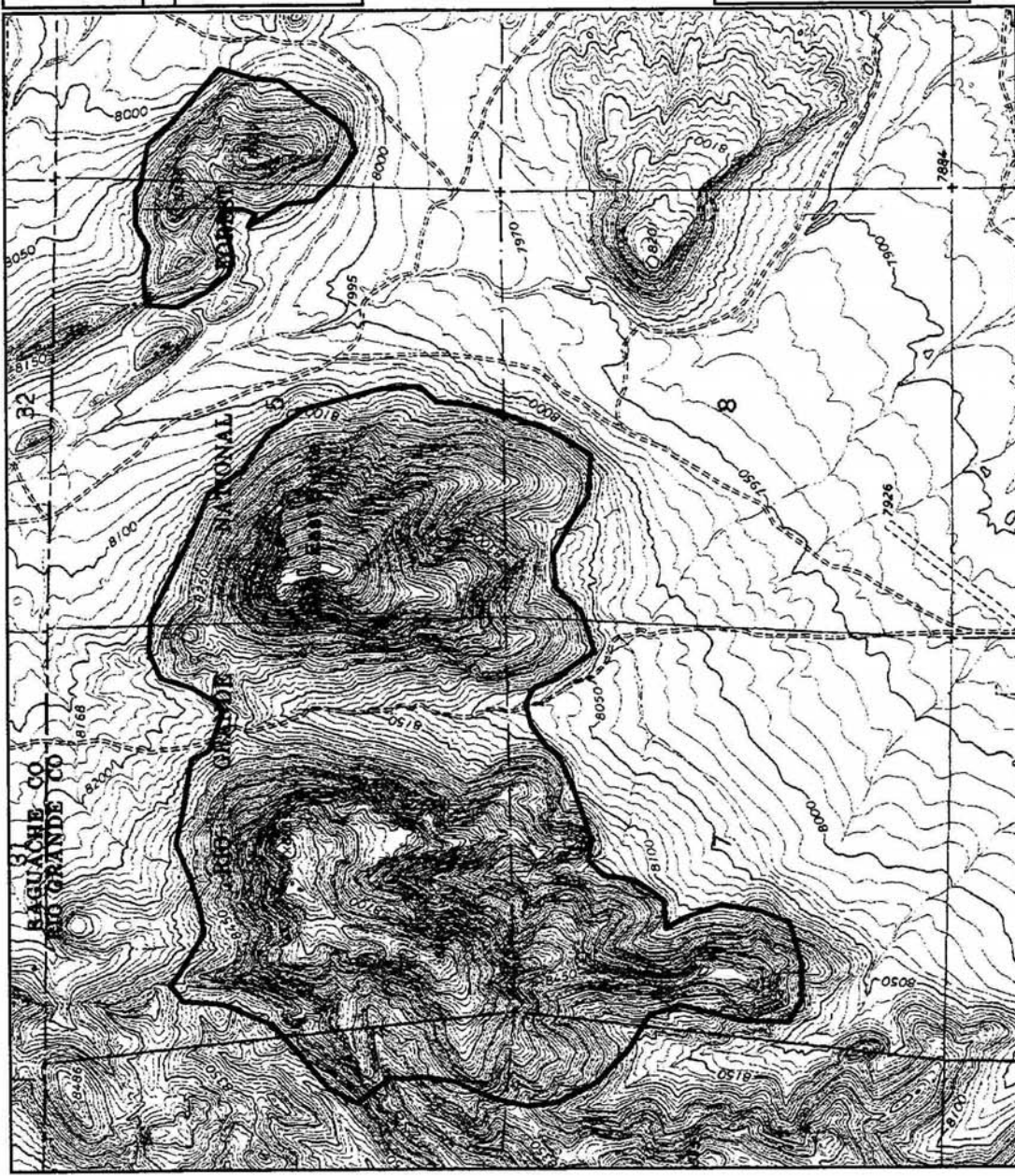
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 map created 8 March 2000



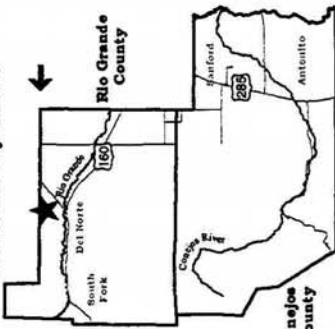
LEGEND

 **PCA Boundary**

Base Layer:
 Del Norte, 37106-F3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



Location in Project Area



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone 13, NAD27

Figure 10. East Butte

Fivemile Park Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains a good occurrence of a plant species imperiled on a global scale, a fair occurrence of a plant species vulnerable on a global scale, and two other occurrences of plant species critically imperiled and imperiled in Colorado.

Protection and Management Issues: The site is located on public land managed by the Forest Service but has no formal protection. The plant occurs on or near an old logging road that has been closed.

Biodiversity Rank Justification: The site contains a good occurrence of a plant species imperiled on a global scale, the reflected moonwort (*Botrychium echo*), a fair occurrence of a plant species vulnerable on a global scale, the western moonwort (*Botrychium hesperium*), and two other occurrences of plant species common on a global scale but critically imperiled and imperiled in Colorado, the Mingan moonwort (*Botrychium minganense*) and common moonwort (*Botrychium lunaria*) respectively. In Colorado, the number of individuals in most populations of these moonworts is very low (often less than 30 plants) and highly variable from year to year, making them highly susceptible to events which could extirpate the entire population at a site.

Table 9. Natural Heritage element occurrences at Fivemile Park PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Botrychium echo</i>	Reflected moonwort	G2	S2	FS	B
<i>Botrychium hesperium</i>	Western moonwort	G3	S2		C
<i>Botrychium minganense</i>	Mingan moonwort	G4	S1		--
<i>Botrychium lunaria</i>	Common moonwort	G5	S2S3		C

*EO=Element Occurrence

Location: This site is located approximately four miles west of Summitville in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Elwood Pass

Legal Description: T37N, R3E S 21, 22

Elevation: 10,800-11,080 ft. Approximate Size: 65 acres

General Description: The site occurs on a southeast slope near Fivemile Park. The adjacent forest is dominated by Engelmann spruce (*Picea engelmannii*) and whortleberry (*Vaccinium* sp.). A Forest Service Road coming from Big Park goes through the site. The area was heavily logged many years ago.

Boundary Justification: The boundary was drawn to include the known extent of the plant populations and some adjacent habitat for the plants to establish in over time. Because the

plants occur on an old logging road, re-opening, recreational use, or road maintenance activities could impact the plant populations.

Protection and Management Comments: The site is within the Rio Grande National Forest but has no formal protection.

The plants occur on an old logging road. Several of these moonworts (*Botrychium* spp.) appear to be adapted to disturbance, as they are known to occur in old clear-cuts, avalanche chutes, and on along roadsides. Although the plants are generally thought to be adapted to some disturbance, the appropriate forest biologist should be consulted if activities such as increased recreation use or opening of the road are planned. Orchardgrass (*Dactylis glomerata*) and timothy (*Phleum pratense*) have been used to reseed the road. These species can be invasive but do not appear to be impacting the plants of concern at this site. An occasional walk-through of the plant populations (possibly every 2-3 years) would be adequate to monitor whether the non-native species are becoming problematic.

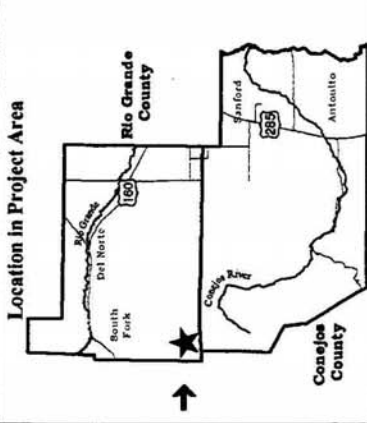
Colorado Natural Heritage Program
 Colorado State University - CNR
 254 General Services Building
 Fort Collins, CO 80523
 map created 8 March 2000



LEGEND

PCA Boundary

Base Layer:
 Elwood Pass, 37106-D6
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone 13, NAD27

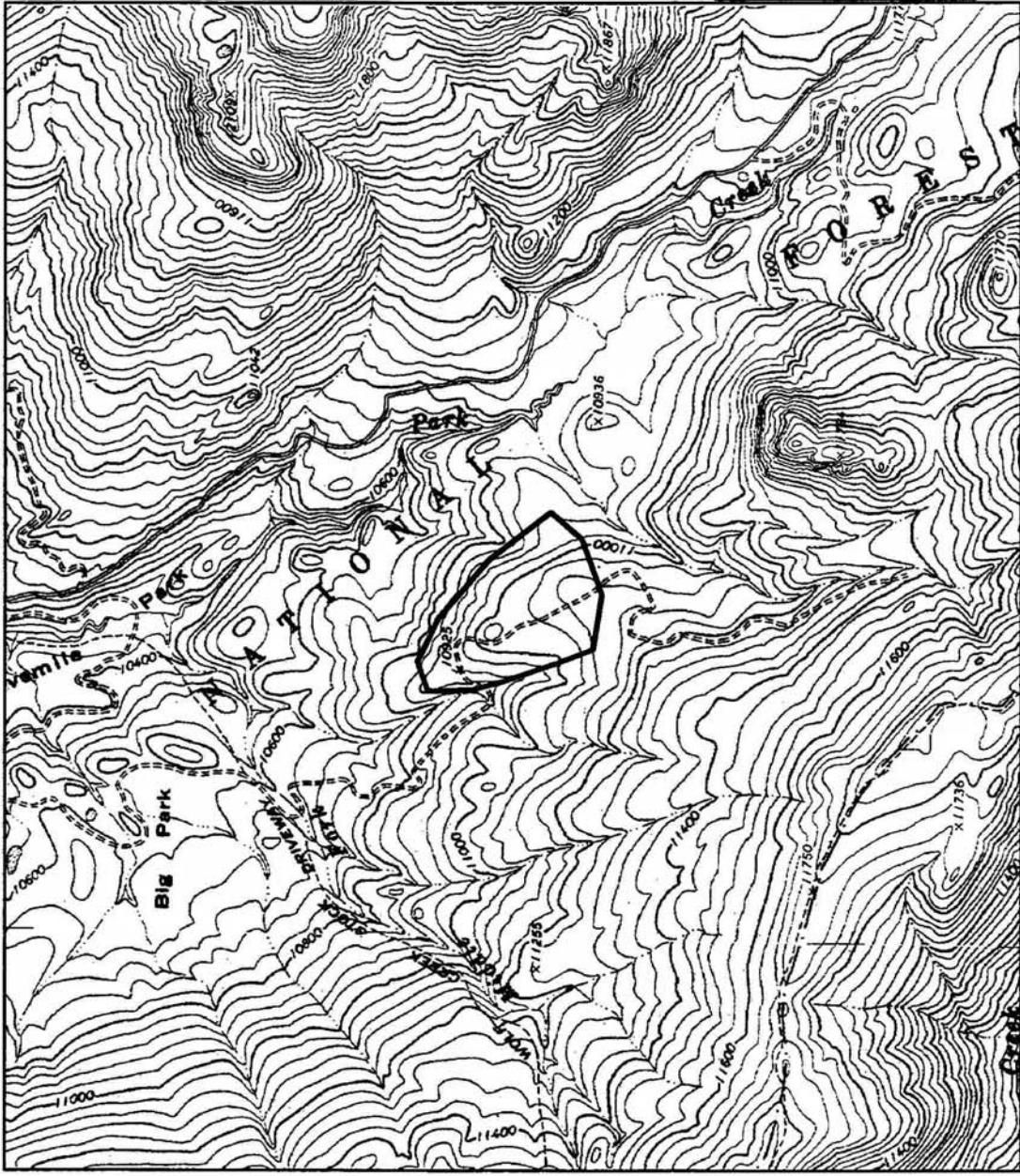


Figure 11. Fivemile Park

Grayback Mountain Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains a good occurrence of a plant species imperiled on a global scale, an occurrence of a plant community vulnerable on a global scale, and an excellent occurrence of a common plant community.

Protection and Management Issues: The site is located on public land managed by the Forest Service but has no formal protection. A Forest Service road, radio tower, and pipeline occur within or adjacent the site.

Biodiversity Rank Justification: The site contains a good occurrence of a plant species imperiled on a global scale, the Colorado tansy-aster (*Machaeranthera coloradensis*), an occurrence of a plant community vulnerable on a global scale the bristlecone pine/gooseberry woodland (*Pinus aristata/Ribes montigenum*), and an excellent occurrence of a common plant community, the beaked sedge wet meadow (*Carex aquatilis*). This Colorado tansy-aster population is the largest known in Colorado.

Table 10. Natural Heritage element occurrences at Grayback Mountain PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Machaeranthera coloradoensis</i>	Colorado tansy-aster	G2?	S2	FS	B
Plant communities					
<i>Pinus aristata/Ribes montigenum</i>	Upper montane woodland	G3	S2		--
<i>Carex aquatilis</i>	Montane wet meadow	G5	S4		A

*EO=Element Occurrence

Location: The site is located approximately 2 miles north of Summitville in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Summitville

Legal Description: T37N, R4E S 8, 9, 10, 15, 16, 17, 18

Elevation: 11,700-12,400 ft. Approximate Size: 930 acres

General Description: A wet alpine valley, gently sloping benches and steep alpine slopes above treeline characterize the site. A major Forest Service Road and a pipeline go through the site and there is a radio tower facility adjacent to the site.

Boundary Justification: The boundary was drawn to include the known extent of the plant populations, adjacent similar habitat to provide areas for the imperiled plant to colonize in the future, and to include the parts of the roads that have the greatest chance of impacting the plant occurrences. These boundaries were delineated because major changes in

sedimentation and erosion, or invasion of non-native species along the roads could impact part of the plant population.

Protection and Management Comments: The site is within the Rio Grande National Forest but has no formal protection.

Road construction or maintenance activities, which could affect sedimentation and erosion, could impact part of the plant population. The Forest Service should consider these effects when planning maintenance activities. Roads are well known as corridors for invasion of non-native plant species. It is unknown if this is a problem at this site but occasional monitoring of the plant population to ensure that non-native species are not invading would be beneficial.

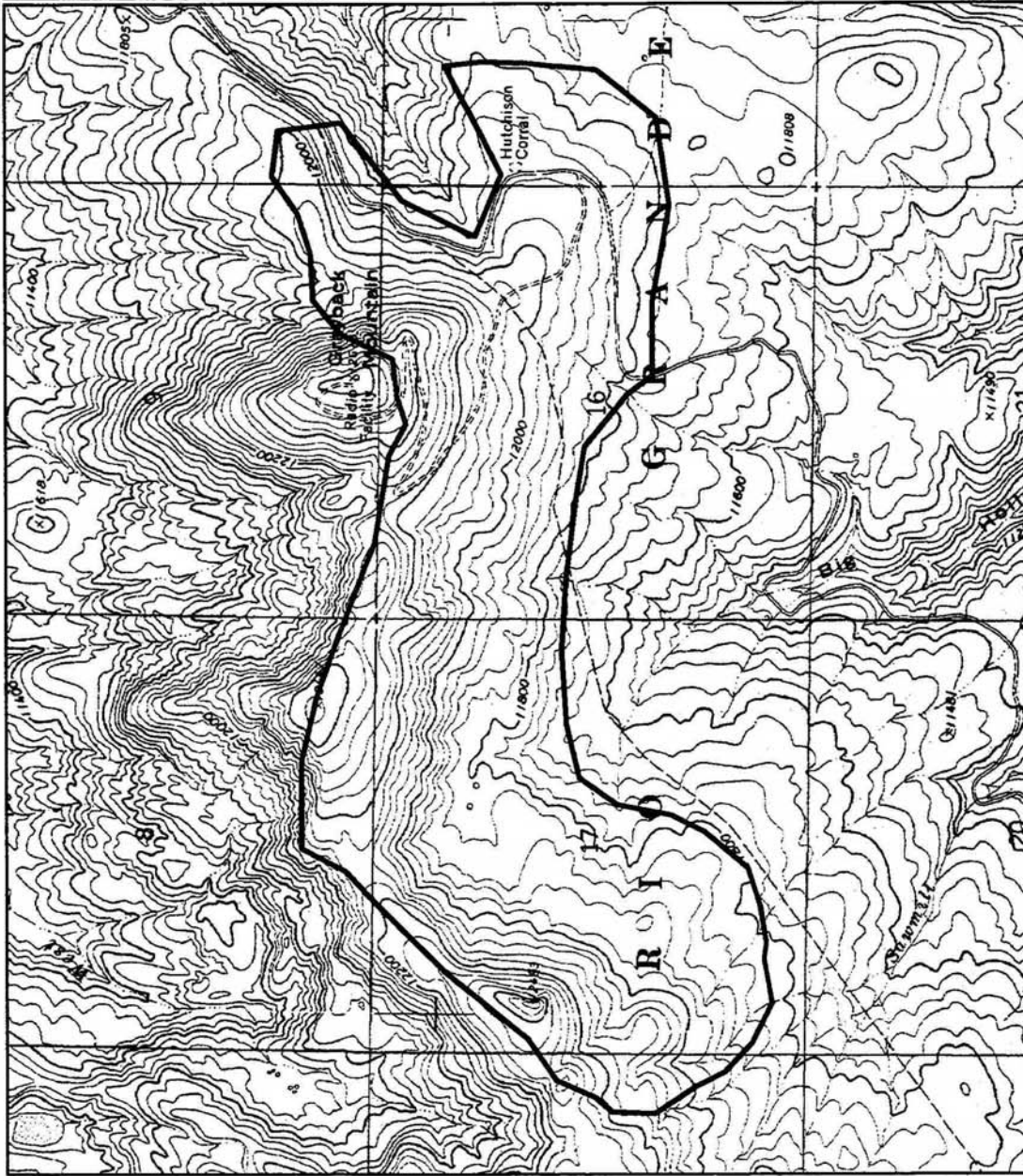
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 Fort Collins, CO 80523
 map created 6 March 2000



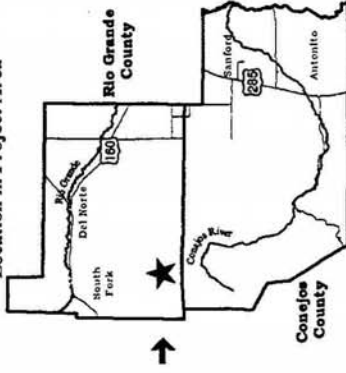
LEGEND

□ PCA Boundary

Base Layer:
 Summitville, 37106-D5
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



Location in Project Area



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone 13, NAD27

Figure 12. Grayback Mountain

Hot Creek Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains excellent occurrences of two fish species and one plant species vulnerable on a global scale, a fair occurrence of a butterfly subspecies imperiled on a global scale, excellent occurrences of two mammal subspecies vulnerable on a global scale, a poor occurrence of a plant vulnerable on a global scale, a good occurrence of a plant community vulnerable on a global scale, and three excellent or good occurrences of common plant communities.

Protection and Management Issues: The site is located on public land managed mainly by the Colorado Division of Wildlife and the Forest Service, with smaller amounts owned by private individuals. Part of the site is contained in the Forest Service Hot Creek Research Natural Area.

Biodiversity Rank Justification: The site contains excellent occurrences of two fish species the Rio Grande chub (*Gila pandora*) and Rio Grande sucker (*Catostomus plebeius*) and one plant species, the rock-loving neoparrya (*Neoparrya lithophila*), vulnerable on a global scale, excellent occurrences of two mammal subspecies vulnerable on a global scale, the silky pocket mouse subspecies (*Perognathus flavus sanluisi*) and Botta's pocket gopher subspecies (*Thomomys bottae pervagus*). Also within the site is a fair occurrence of a butterfly subspecies imperiled on a global scale, the Nokomis fritillary (*Speyeria nokomis nokomis*), a poor occurrence of a plant species vulnerable on a global scale, Ripley milkvetch (*Astragalus ripleyi*), and a good occurrence of a plant community vulnerable on a global scale, beaked sedge (*Carex utriculata*) perched wetland. Three excellent or good occurrences of fairly common plant communities occur within the site.

Once widely distributed throughout the Rio Grande and Mimbres watersheds, the range of the Rio Grande sucker has been greatly reduced. By 1985 only two native populations existed, and in 1993 it was listed as endangered by the state of Colorado. Today, Hot Creek harbors the only native population of Rio Grande sucker in Colorado (Swift-Miller et al. 1999).

The site also contains an excellent occurrence of the Rio Grande chub. The Rio Grande chub was once widespread in creeks of the upper Rio Grande and Pecos watersheds of New Mexico and the upper Rio Grande watershed of southern Colorado (Lee et al. 1980). Populations are reported to be stable in New Mexico but are declining in Colorado.

This silky pocket mouse subspecies is geographically restricted to the San Luis Valley in Colorado and northern New Mexico (Hall 1981). Although believed to be more common in the southern part of its range, in Colorado, capture rates from 1-6 per 1000 trapnights is usually the range of trapping success (Fitzgerald et al. 1994). Little is known about the abundance in any locations.

Similar to the silky pocket mouse, this Botta's pocket gopher subspecies is restricted to the San Luis Valley in Colorado and northern New Mexico (Hall 1981). Pocket gophers, because they are strictly fossorial and have relatively insular genetic groups, are prone to microevolution and genetic isolation (Fitzgerald et al. 1994). There are nearly 300 subspecies of 18 species of pocket gophers in North America. Because of their burrowing habits and sedentary lives, many of the subspecific distinctions have arisen because geographic features such as mountain ridges or soil changes can lead to focussed evolutionary pressure, and thus, isolated evolutionary differences.

The Nokomis fritillary butterfly is only known from Utah and southwest Colorado and is restricted to protected seeps and sloughs in desert landscapes (Ferris and Brown 1981). Although population numbers among colonies can be variable, this species has strict habitat requirements, and is rare over the major portion of its range (Britten et al. 1994, Ferris and Brown 1981).

This site also supports an excellent occurrence of the rock-loving neoparrya, which is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Several of the largest populations of the rock-loving neoparrya are located in Rio Grande and Conejos counties. This population is very large and occurs in good habitat in an area somewhat isolated from disturbance by the steep cliffs.

Ripley milkvetch (*Astragalus ripleyi*) is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species.

The beaked sedge (*Carex utriculata*) perched wetland plant community is vulnerable throughout its range. The ponderosa pine/Arizona fescue (*Pinus ponderosa*/*Festuca arizonica*) plant community is common globally but this location supports an excellent condition old-growth stand, which is very uncommon. The blue spruce/dogwood (*Picea pungens*/*Cornus sericea*) plant community is in excellent condition. The alder/mesic forb (*Alnus incana*/mesic forb) plant community is in good condition.

Table 11. Natural Heritage element occurrences at Hot Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Fish					
<i>Gila pandora</i>	Rio Grande chub	G3	S1?	SC, BLM	A
<i>Catostomus plebeius</i>	Rio Grande sucker	G3G4	S1	E	A
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S2	FS, BLM	D
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	A
Invertebrates					
<i>Speyeria nokomis nokomis</i>	Nokomis fritillary	G4T2	S1		C
Mammals					
<i>Perognathus flavus sanluisi</i>	Silky pocket mouse subspecies	G5T3	S3		A
<i>Thomomys bottae pervagus</i>	Botta's pocket gopher subspecies	G5T3	S3		A
Plant communities					
<i>Carex utriculata perched wetland</i>	Beaked sedge perched wetland	G3?	S3		B
<i>Alnus incana./Mesic forb</i>	Thinleaf alder/Mesic forb riparian shrubland	G3G4Q	S3		B
<i>Picea pungens./Cornus sericea</i>	Blue spruce/red-osier dogwood riparian forest	G4	S2		A
<i>Pinus ponderosa/ Festuca arizonica</i>	Ponderosa pine/ Arizona fescue woodland	G4G5	S4		A
<i>Pseudotsuga menziesii./Juniperus communis</i>	Douglas-fir/ common juniper forest	G5	SU		--

*EO=Element Occurrence

Location: This site is located approximately 5 miles west of Centro in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Centro, Terrace Reservoir

Legal Description: T35N, R7E S 5, 6, 7, 8, 9, 15, 16, 17
T35N, R6E S 2, 3, 4, 10, 11, 12, 13, 14

Elevation: 7,980-9,400 ft. Approximate Size: 2,710 acres

General Description: The site encompasses a variety of habitats from arid shrublands at the lower end of the site to ponderosa pine woodlands at the higher elevations. At the downstream end of the site, steep cliffs rise above the Hot Creek floodplain. At the upper elevations, exposed bedrock is common and ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) occur among the rock. There are several riparian and wetland plant communities along Hot Creek, scattered piñon pine (*Pinus edulis*) and juniper (*Juniperus scopulorum*) on steep slopes and rock outcrops, and open grasslands dominated

by blue grama (*Bouteloua gracilis*) and low shrubs such as winterfat (*Krascheninnikovia lanata*) and rabbitbrush (*Chrysothamnus Greenei*).

Beaver dams are present in the creek. There is good vegetation cover along the banks and some undercut banks, which offer protection for the fish. The hydrology of the perched wetland is supported by groundwater seepage from nearby slopes to the north. Near the center of the seep discharge cattails (*Typha latifolia*) dominate. Beaked sedge (*Carex utriculata*) occurs in the next zone away from the center followed by Baltic rush (*Juncus balticus*) furthest from the water discharge.

Numerous non-native species occur along the riparian area. These include Canada thistle (*Cirsium arvense*), Kentucky bluegrass (*Poa pratensis*), redtop (*Agrostis stolonifera*), Kochia (*Kochia* sp.), smooth brome (*Bromus inermis*), and clover (*Medicago lupulinus*). Knapweed (possibly *Centaurea diffusa*) was observed along the Ojito Creek drainage near Hot Creek.

Boundary Justification: The main threat to the rock-loving neoparrya would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya may also require other types of habitat. The pollinators are unknown, consequently we are not certain that the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

The boundary also encompasses the location of the Ripley milkvetch and some adjacent suitable habitat. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.). The suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators.

The site encompasses the highest quality parts of the upland plant communities. The natural fire regime is thought to remain intact here (Colorado Natural Areas Program 1997b), helping to support the plant communities.

Much of the upstream watershed of Hot Creek is incorporated within the site. Proper management within this site should allow natural hydrologic regimes and help support the imperiled fish, butterfly, and wetland and riparian plant communities.

Protection and Management Comments: The site occurs mainly on public land managed by the Forest Service and Colorado Division of Wildlife. There is some land managed by the Bureau of Land Management and several small privately owned parcels in the site. Most of the watershed above the site occurs on Forest Service land, part of which is designated as the Hot Creek Research Natural Area.

Any management activities that impact the hydrology of Hot Creek could impact the fish and riparian/wetland plant communities at the site. A two-track road runs along the creek at the site. Numerous non-native plant species occur in the riparian area already, and the road may serve as a corridor for more invasive species or other impacts in the future. Knapweed species (*Centaurea* spp.) are known to be highly invasive and should be controlled before the area becomes increasingly infested. A weed monitoring and management plan for the site would help protect the imperiled elements.

The Nokomis fritillary is sought by collectors for commercial sale. Because of the specific habitat needed by this species, and the limited amount of this habitat, it would be relatively simple for collectors to find this colony and potentially impact it. Patrolling the area when the species is newly emerged (usually August) would help to prevent impacts from collectors.

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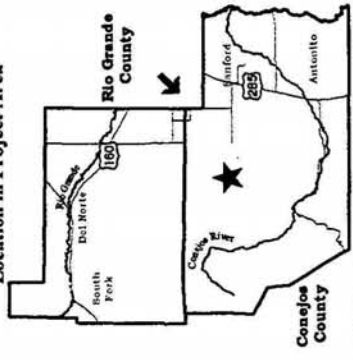


LEGEND

 **PCA Boundary**

Base Layer:
 Antioch, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone 13, NAD27

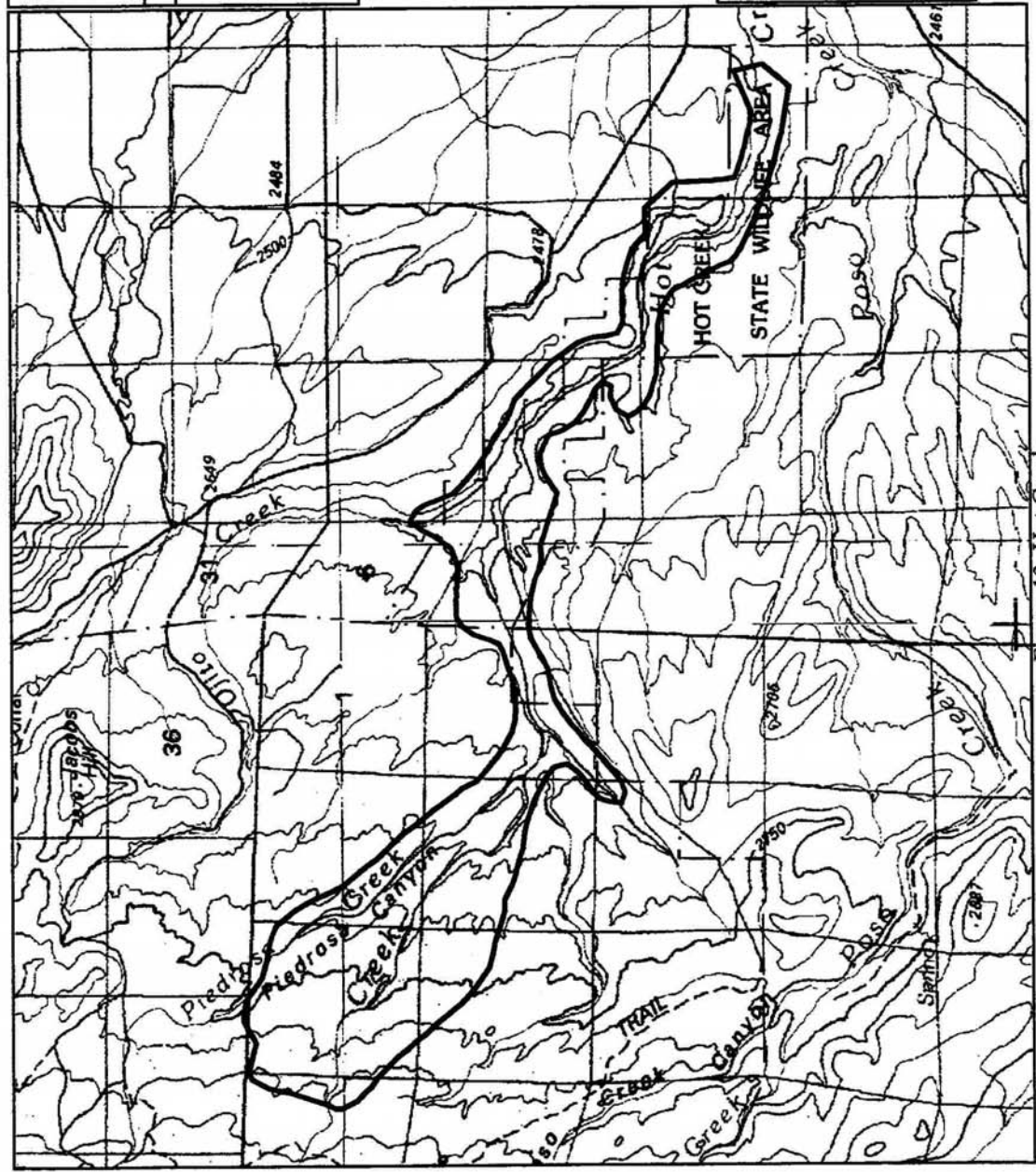


Figure 13. Hot Creek

La Jara Creek Uplands Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains an excellent occurrence and a good occurrence of two plant species that are vulnerable on a global scale.

Protection and Management Issues: Most of the land within the site is publicly owned and managed by the Bureau of Land Management and the Colorado Division of Wildlife. Small parts of the site are privately owned.

Biodiversity Rank Justification: The site contains an excellent occurrence, one of the best known, of the rock-loving neoparrya (*Neoparrya lithophila*) and a good occurrence of Ripley milkvetch (*Astragalus ripleyi*), both vulnerable on a global scale. The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Several of the largest populations of the rock-loving neoparrya are located in Rio Grande and Conejos counties. The occurrence of the Ripley milkvetch is large, but livestock grazing may be impacting some parts of the population. Ripley milkvetch is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species.

Table 12. Natural Heritage element occurrences at La Jara Creek Uplands PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	A
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	B

*EO=Element Occurrence

Location: This site is located in and around La Jara State Wildlife Area in Conejos County. U.S.G.S. 7.5 minute quadrangle: Vicente Canyon, La Jara Canyon

Legal Description: T34N, R7E S 16, 17, 19, 20, 21, 28, 29, 30, 33
T34N R6E S 24, 25

Elevation: 8,200-9,350 ft. Approximate Size: 1,595 acres

General Description: The site is characterized by narrow canyons with riparian vegetation along La Jara Creek and Canyon del Rancho. Steep slopes rise to mesas in the center of the site. The steep north facing slopes are dominated by ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) with some aspen (*Populus tremuloides*). Patches of sagebrush (*Artemisia tridentata*) and scattered mountain mahogany (*Cercocarpus montanus*) occur on the site. Slopes at the south end of the site have eroded heavily this year and some areas appear to have been heavily grazed in the past by livestock or wildlife.

Boundary Justification: The main threat to the rock-loving neoparrya would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the


plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya may also require other types of habitat. The pollinators are unknown, consequently we are not certain that the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

The boundary also encompasses the Ripley milkvetch locations and enough adjacent habitat to include open grasslands or savanna-like vegetation and the numerous small drainages downstream from known Ripley milkvetch locations. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.). A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.


Protection and Management Comments: Land within the site is publicly owned and managed by the Bureau of Land Management and the Colorado Division of Wildlife, although small parts of the site are privately owned.

A rough two-track road follows along La Jara Creek and is used by anglers and campers. The road does not currently seem to impact either of the vulnerable plants but could serve as a corridor for invasion of non-native species or other impacts in the future, especially if use of the road increases significantly. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control. Some parts of the site were apparently heavily grazed in the past. A few consecutive years of heavy grazing do not appear to significantly impact the Ripley milkvetch, but over the long-term heavy grazing may eventually degrade the population. Altering the timing of the grazing from year to year may help the population recover, set seed, and establish seedlings. Although the species appears to be long-lived, seedling establishment may be a limiting factor for the populations. Near normal to above average April - June precipitation may allow for better seedling survival (Julie Burt – pers. comm.). If flexibility exists with grazing management, reducing or delaying grazing until later in the summer during wet years may allow more seedling establishment.

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LEGEND

 **PCA Boundary**

Base Layer:
 Antoinito, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



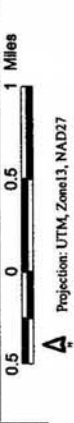
The inset map shows the state of Colorado with Rio Grande County and Conejos County highlighted. A star and an arrow indicate the project location within Conejos County. Major roads like I-76 and US-160 are shown. Labels include 'Rio Grande County', 'Conejos County', 'Antoinito', 'South Fork', 'Del Norte', 'Rio Grande', and 'Conejos River'.

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Projection: UTM, Zone13, NAD27

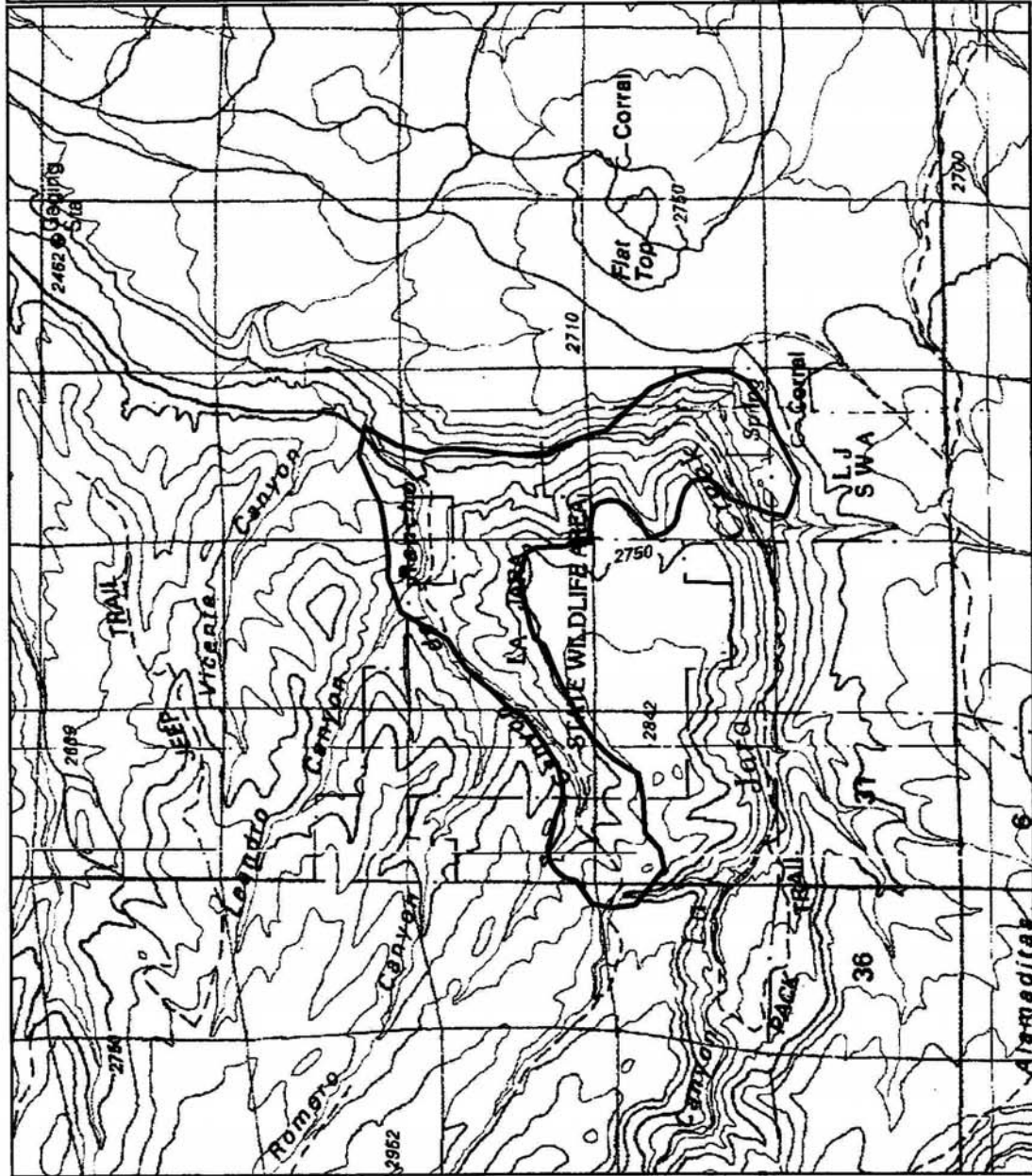


Figure 14. La Jara Creek Uplands

Lasauses Potential Conservation Area

Biodiversity Rank: B2 (Very High significance)

The Lasauses site supports a good example of a plant imperiled on a global scale and a fair example of a wetland plant community imperiled in Colorado.

Protection and Management Issues: Most of the site is privately owned and is not formally protected. Areas along the Rio Grande are heavily grazed and in poor condition. Non-native species are numerous in certain locations on the site. More information is needed concerning management of a headgate present on one of the oxbow lakes and its effects on the elements.

Biodiversity Rank Justification: The site supports a good example of the globally imperiled slender spiderflower (*Cleome multicaulis*), which is the primary reason for the site’s very high biodiversity rank. The slender spiderflower has a global range from southern Wyoming to central Mexico. In spite of its large range, populations of this plant have decreased dramatically in the last 100 years, especially in the southwestern states. No occurrences of this species have been documented in New Mexico or Arizona since the 1940’s. There are some occurrences in Texas and Mexico while Wyoming only has one. The San Luis Valley contains the most numerous, largest, and healthiest populations in the world. There are approximately 35 occurrences of this species in Colorado. Slender spiderflower is limited by very specific habitat requirements including moist alkaline soils and some form of soil disturbance. These discriminating habitat requirements limit the slender spiderflower to the edges of alkaline wet meadows and playas.

In addition to the slender spiderflower, the site also supports a fair example of a submergent giant bur-reed (*Sparganium eurycarpum*) wetland community imperiled in Colorado, which is mainly found on the eastern plains of Colorado and in the San Luis Valley. This plant is also considered imperiled in Colorado.

Table 13. Natural Heritage element occurrences at Lasauses PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants Communities					
<i>Sparganium eurycarpum</i>	Foothills submergent wetland	G5	S2S3		C
Plants					
<i>Cleome multicaulis</i>	Slender spiderflower	G2G3	S2S3	BLM	B
<i>Sparganium eurycarpum</i>	Giant bur-reed	G5	S2?		

*EO=Element Occurrence

Location: The Lasauses site is located approximately 1 mile south of the town of Lasauses in Conejos County, on the west side of the Rio Grande.

U.S.G.S. 7.5-min. quadrangle: Manassa NE, Mesito Reservoir

Legal Description: T35N R11E S 26, 27, 34, 35

Elevation: 7,500 ft. Approximate Size: 450 acres

General Description: The site occurs along the western side of the Rio Grande within a broad floodplain where numerous large oxbow lakes occur. The site occurs just upstream from where the Rio Grande begins to cut a narrow gorge into the volcanic bedrock.

The hydrological source of the site is the Rio Grande and associated local groundwater tables. The two southern-most oxbow lakes that occur within the floodplain of the Rio Grande in Colorado are the primary hydrological features at this site. A series of oxbow lakes occur from this site northward to the Alamosa National Wildlife Refuge. Water levels in these oxbows are likely associated with water levels in the Rio Grande via local groundwater tables in the floodplain. A headgate was observed near the eastern side of the large oxbow located at this site. The headgate does not feed into an irrigation ditch but rather appears to control the amount of water that flows from the oxbow into the Rio Grande. The drainage from this headgate does not appear to be natural and may have been constructed to attempt to drain the oxbow when high water levels threaten to flood nearby hay meadows and rangeland.

Bands of cattail (*Typha latifolia*), hardstem bulrush (*Scirpus acutus*), and giant bur-reed (*Sparganium eurycarpum*) occur along the periphery of the oxbows. Saturated soils and the presence of duckweed (*Lemna* spp.) on the soil surface indicated that these areas are periodically inundated, but no standing water was observed during the site visit. Along the western edge of the site the typical sequence of vegetation types is: drier upland areas dominated by rabbitbrush (*Chrysothamnus* spp.) grading into wet meadows dominated by foxtail barley (*Hordeum jubatum*), saltgrass (*Distichlis spicata*), and Baltic rush (*Juncus balticus*). Other species present in these meadows include common threesquare (*Scirpus pungens*), greasewood (*Sarcobatus vermiculatus*), and broom seepweed (*Suaeda calceoliformis*). Slender spiderflower (*Cleome multicaulis*) was found growing along the fringe of the wet meadow and near the base of greasewood shrubs. The wet meadows grade into the band of cattail, bulrush, and giant bur-reed that line the oxbow lakes. A narrowleaf cottonwood (*Populus angustifolia*) riparian forest lines the banks of the Rio Grande.

Boundary Justification: The boundary encompasses enough of the Rio Grande floodplain to allow natural communities to shift in distribution as geomorphic settings change due to hydrological processes. Avoiding direct disturbances within the boundary (such as continuous trampling and overgrazing) will help ensure the continued existence of the elements. Upstream activities outside of these boundaries, such as water diversions and intensive grazing and agriculture, could affect the viability of the elements by altering hydrology and sedimentation processes.

Protection and Management Comments: The majority of the site is privately owned with a very small portion managed by the Bureau of Land Management. No formal protection exists for the site.

Areas surrounding the elements, especially near the banks of the Rio Grande, are heavily grazed. There are some hay meadows south of the large oxbow dominated by many non-native species (e.g., Kentucky bluegrass (*Poa pratense*), Canada thistle (*Cirsium arvense*), yellow sweetclover (*Melilotus officinalis*), clover (*Trifolium* spp.), and redtop (*Agrostis gigantea*). Management of non-native species on the site may be necessary. More information is needed concerning the use and purpose of the headgate on the east end of the large oxbow and its effects on the elements.

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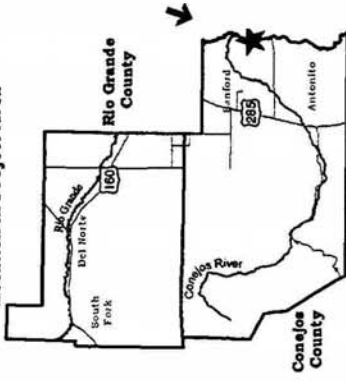
LEGEND

 **PCA Boundary**

Base Layers:

Mesito Reservoir, 37105-B6
 Manassa NE, 37105-B7
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.

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Projection: UTM, Zona13, NAD27

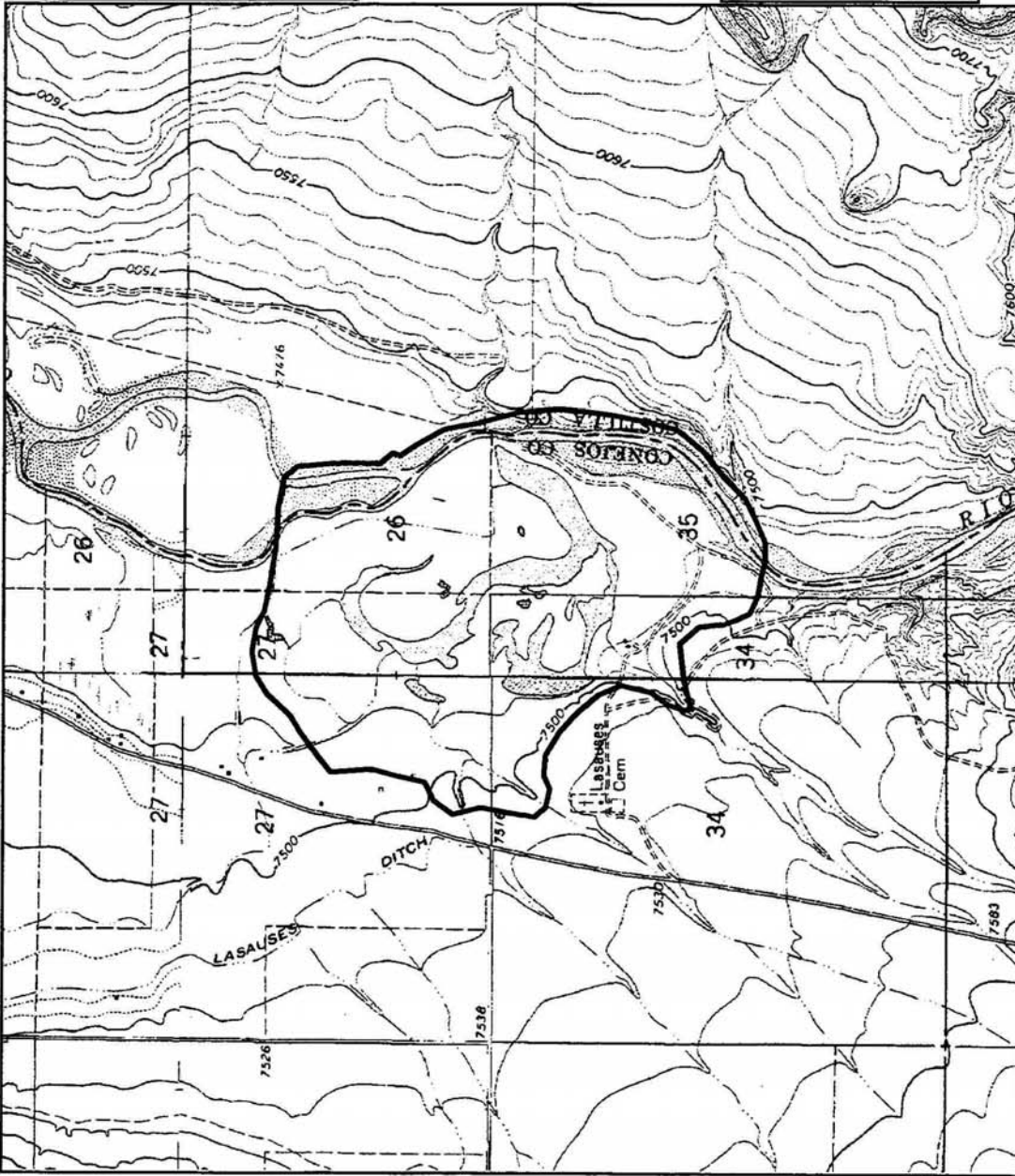


Figure 15. Lasaluses

Limekiln Creek Uplands Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains an excellent occurrence of a plant species vulnerable on a global scale and two good occurrences of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land Management but has no formal protection.

Biodiversity Rank Justification: The site contains an excellent occurrence of a plant species vulnerable on a global scale, the rock-loving neoparrya (*Neoparrya lithophila*), and two good occurrences of a plant vulnerable on a global scale, Weber’s catseye (*Cryptantha weberi*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Rio Grande and Conejos counties have some of the largest populations of this species. This particular population was one of the largest and most dense seen during the 1999 field season. Weber’s catseye is only known from south-central Colorado. The two populations here have hundreds of plants and occur in high quality habitat.

Table 14. Natural Heritage element occurrences at Limekiln Creek Uplands PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	A
<i>Cryptantha weberi</i>	Weber’s catseye	G3	S3		B
<i>Cryptantha weberi</i>	Weber’s catseye	G3	S3		B

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: This site is located approximately 4 miles southwest of Sevenmile Plaza in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Dog Mountain

Legal Description: T39N, R6E S 22, 23, 27

Elevation: 8,040-8,372 ft. Approximate Size: 175 acres

General Description: The site includes two areas; a small rock outcrop and the east portion of a small mesa. The two are separated by small drainages dominated by rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) shrublands with blue grama (*Bouteloua gracilis*) in the understory. The two areas are close enough that they are considered one PCA. Two-track roads occur between the sites and are used frequently by people recreating in the area.

Boundary Justification: The main threat to these two species would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant populations and enough of the adjacent area to incorporate portions of other habitat types.

This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya and Weber's catseye may also require other types of habitat. The pollinators are unknown, consequently we are uncertain if the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on public land managed by the Bureau of Land Management but has no formal protection.

Some two-track roads occur near the plants but do not seem to impact the species at this time. The roads may serve as corridors for invasion of non-native species or other impacts in the future. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control.

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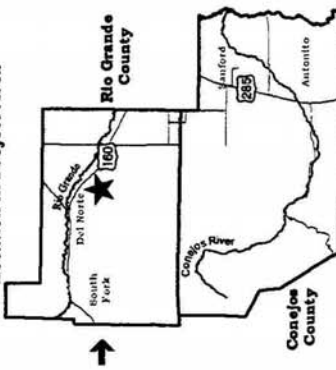


LEGEND

 **PCA Boundary**

Base Layer:
 Dog Mountain, 37106-E3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



The accuracy of the data shown on this map is not guaranteed. The Colorado Natural Heritage Program is not responsible and shall not be liable to the user for incidental, consequential or special damages arising from data use or interpretation.

The absence of data for a particular area or habitat does not necessarily mean that the species does not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence.

Although every attempt is made to provide the most current and precise information possible, please be aware that some of our sources provide a higher level of accuracy than others, and some interpretation may be required. CHRP's data system is constantly updated and revised. Please contact CHRP for an update or assistance with interpretation of this natural heritage information.

Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone13, NAD27

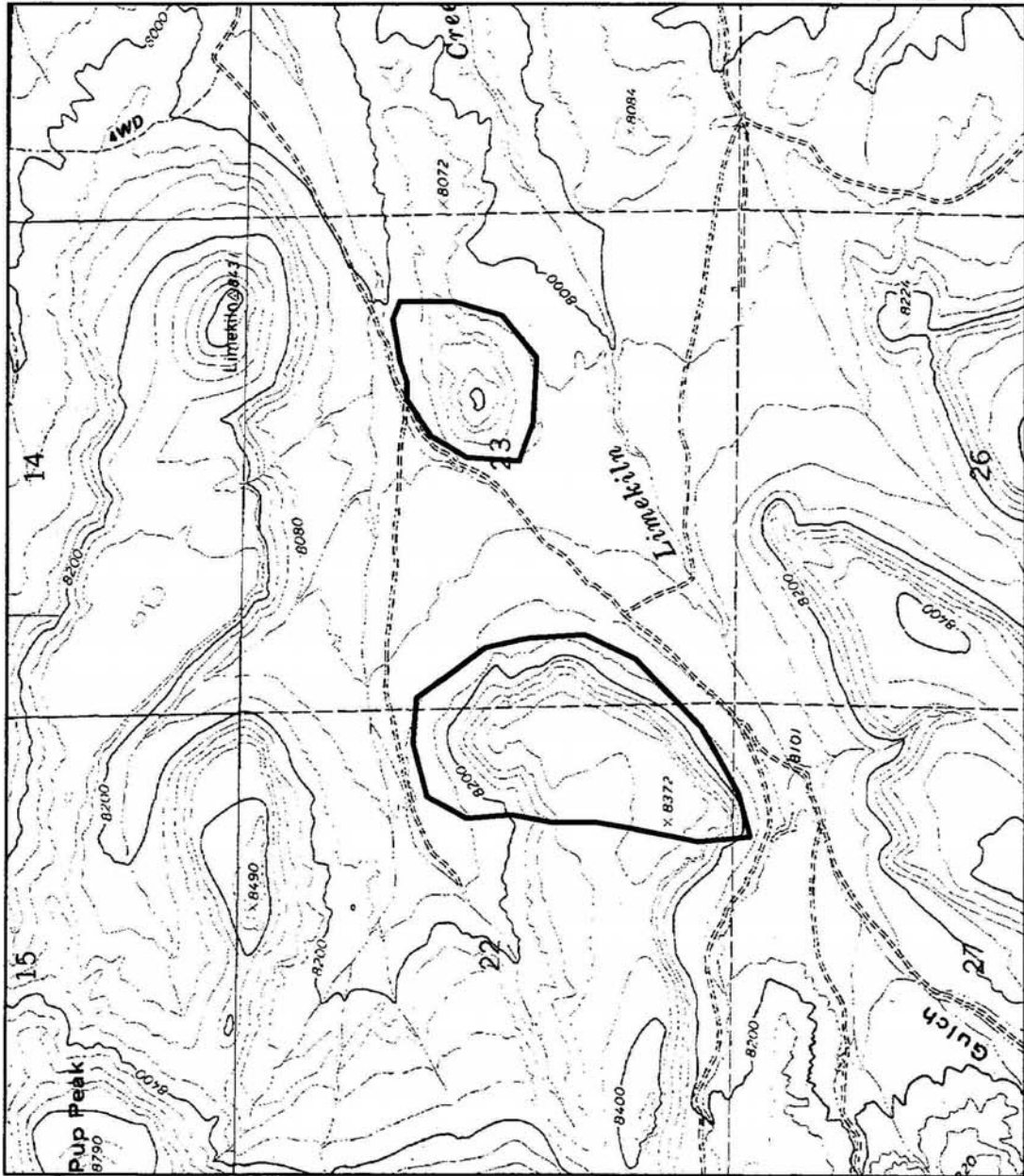


Figure 16. Limekiln Creek Uplands

Ojito Creek Uplands Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains an excellent occurrence of a plant species that is vulnerable on a global scale.

Protection and Management Issues: Land within the site is publicly owned and managed by the Bureau of Land Management and the Colorado Division of Wildlife.

Biodiversity Rank Justification: The site contains an excellent occurrence of a plant species that is vulnerable on a global scale, the Ripley milkvetch (*Astragalus ripleyi*). The occurrence of the Ripley milkvetch is large and the habitat and surrounding landscape are in good condition. Ripley milkvetch is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species.

Table 15. Natural Heritage element occurrences at Ojito Creek Uplands PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	A

*EO=Element Occurrence

Location: This site is located approximately 5 miles southwest of Centro in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Centro

Legal Description: T35N, R6E S 1, 2
T36N, R6E S 36

Elevation: 8,500-8,680 ft. Approximate Size: 135 acres

General Description: The site includes a meadow in an opening between rock outcrops and drainages with scattered ponderosa pine (*Pinus ponderosa*), piñon pine (*Pinus edulis*), and juniper (*Juniperus* spp.). Blue grama (*Bouteloua gracilis*) and needle-and-threadgrass (*Stipa comata*) generally dominate the grassland openings. A little used two-track road runs through the site.

Boundary Justification: The boundary encompasses the Ripley milkvetch location and a small amount of the adjacent habitat to include open grasslands or savanna-like vegetation. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.). A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.

Protection and Management Comments: Land within the site is mainly publicly owned and managed by the Bureau of Land Management and the Colorado Division of Wildlife.

The two-track road may serve as a corridor for invasion of non-native species or other impacts in the future, especially if use of the road increases significantly. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control. A few consecutive years of heavy grazing do not appear to significantly impact Ripley milkvetch, but over the long-term this may eventually degrade the population. Altering the timing of the grazing from year to year may help the population recover, set seed, and establish seedlings. Although the species appears to be long-lived, seedling establishment may be a limiting factor for the populations. Near normal to above average April - June precipitation may allow for better seedling survival (Julie Burt – pers. comm.). If flexibility exists with grazing management, reducing or delaying grazing until later in the summer during wet years may allow more seedling establishment. In some areas where terracing has been done or ditches occur, the non-native yellow sweetclover (*Melilotus officinalis*) has become common and seems to reduce the abundance of the Ripley milkvetch (Julie Burt – pers. comm.).

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 map created 7 March 2000



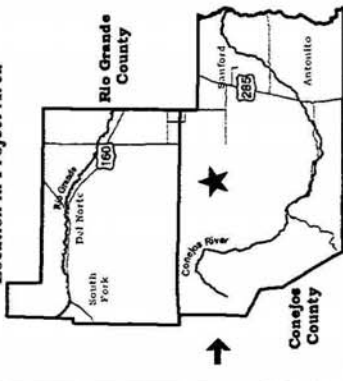
LEGEND



PCA Boundary

Base Layer:
 Terrace Reservoir, 37106-C3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

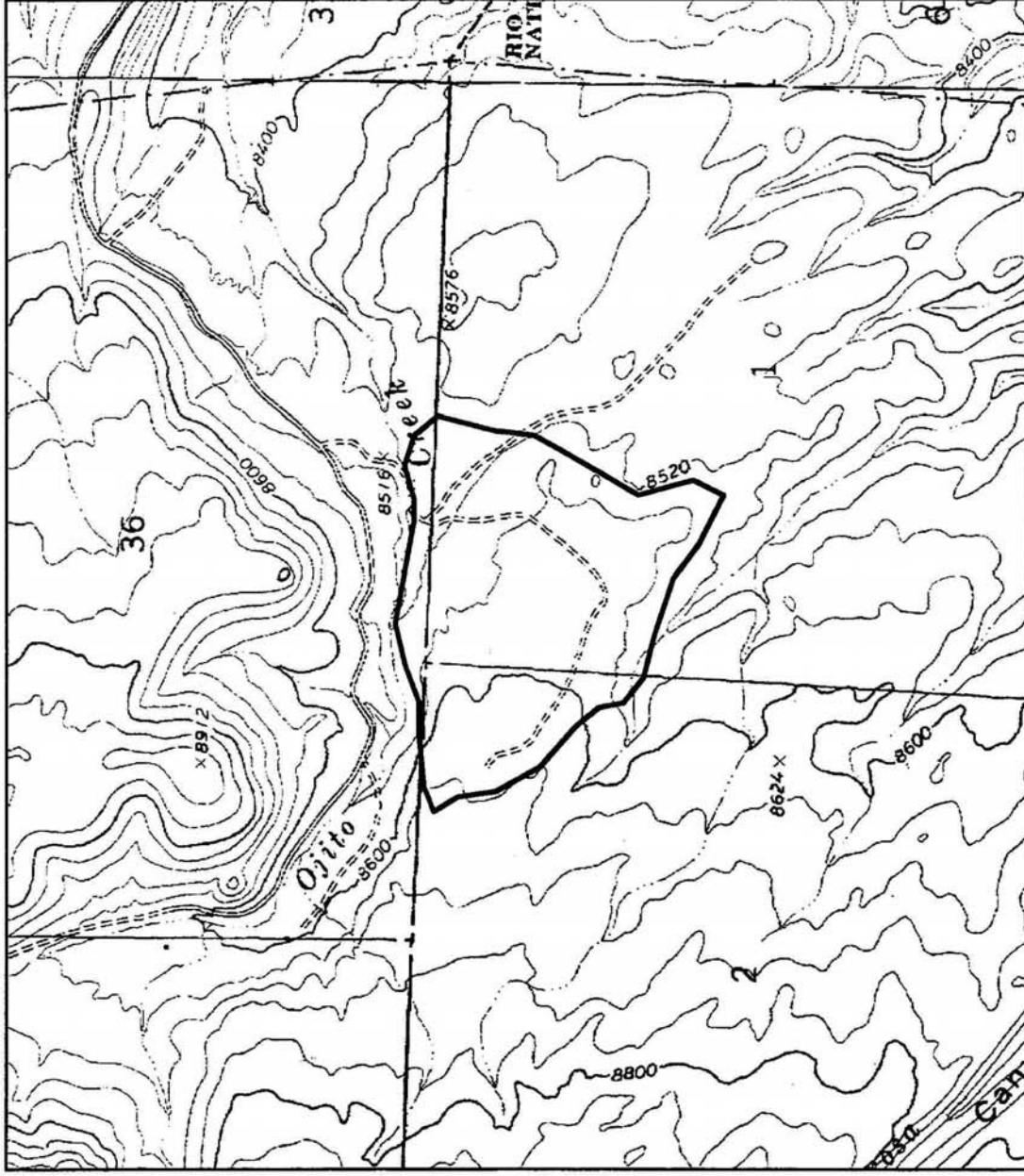


Figure 17. Ojito Creek Uplands

Park Creek at Summit Pass Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains a good occurrence of a plant species imperiled on a global scale.

Protection and Management Issues: The site is located on public land managed by the Forest Service land but has no formal protection.

Biodiversity Rank Justification: The site contains a good occurrence of a plant species, Colorado tansy-aster (*Machaeranthera coloradoensis*), imperiled on a global scale. This plant is only known from southeast Wyoming, Colorado, and possibly Nevada. This is one of the largest populations documented in Colorado with approximately 700 plants.

Table 16. Natural Heritage element occurrences at Park Creek at Summit Pass PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Machaeranthera coloradoensis</i>	Colorado tansy-aster	G2?	S2	FS	B

*EO=Element Occurrence

Location: This site is located near Summit Pass in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Elwood Pass

Legal Description: T37N, R3E S 23, 26

Elevation: 11,000-11,200 ft. Approximate Size: 55 acres

General Description: The site is along a small stream near the Continental Divide. The area along the stream and lower slopes is dominated by herbaceous species growing on gravelly soils. A major Forest Service road occurs on a slope above the site and a two-track road crosses the stream at the lower end of the site.

Boundary Justification: The boundary was drawn to include the known extent of the plant populations, adjacent similar habitat to provide areas for the plant to colonize in the future, and includes the parts of the roads near the plant occurrences which have the greatest chance of impacting the imperiled plant. These boundaries were delineated because major changes in sedimentation and erosion, or invasion of non-native species along the roads could impact the population.

Protection and Management Comments: The site is within the Rio Grande National Forest but has no formal protection.

Road construction or maintenance activities, which could affect sedimentation and erosion, could impact the plants. The Forest Service should consider these effects when planning maintenance or improvement activities. Roads are well known as corridors for invasion of

non-native plant species. Occasional monitoring of the plant population to ensure non-native species are not invading would be fairly simple and inexpensive, and help identify problematic species before they become widespread.

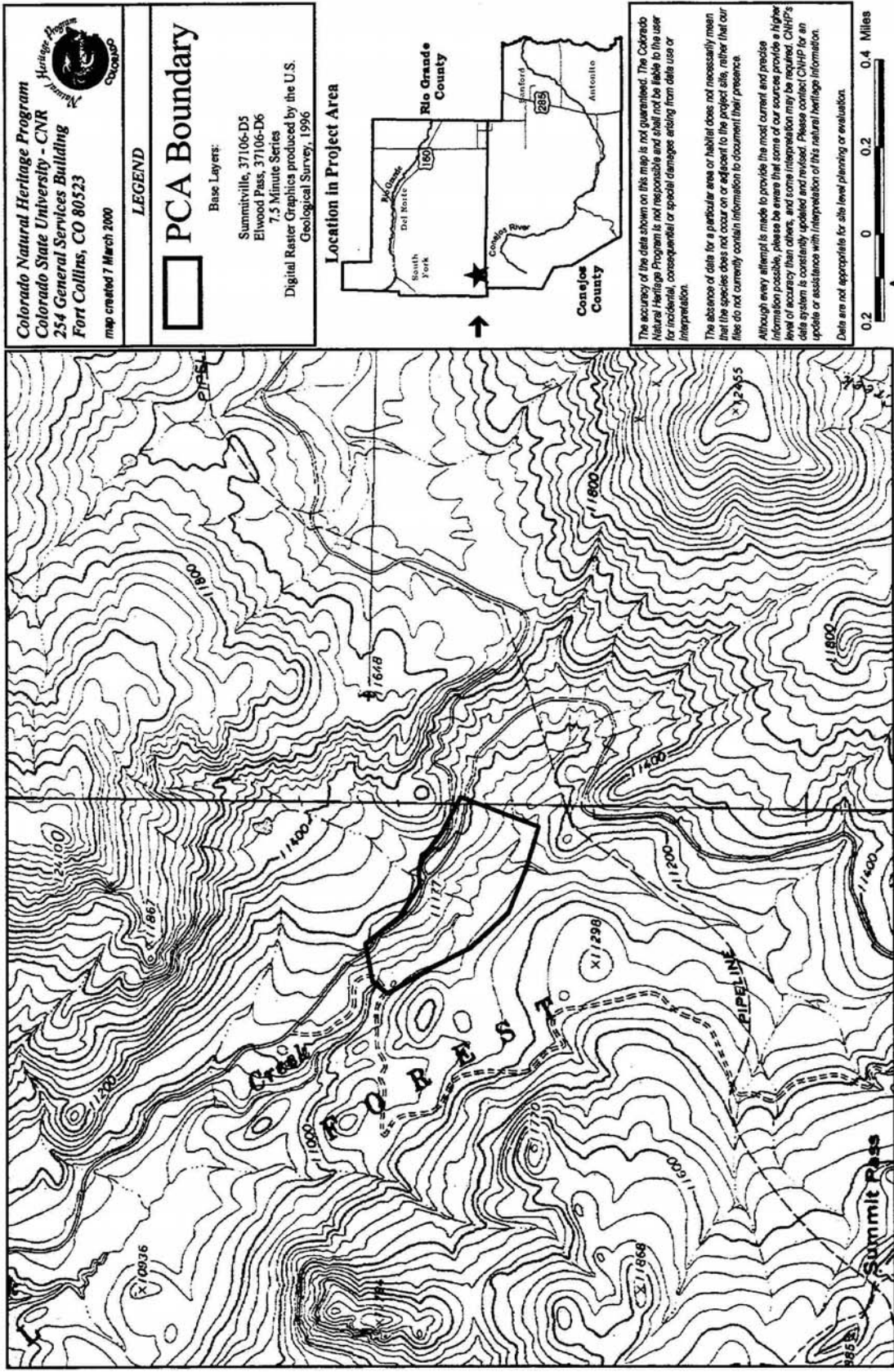


Figure 18. Park Creek at Summit Pass

Ra Jadero Canyons Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains an excellent occurrence and two good occurrences of a plant species that is vulnerable on a global scale.

Protection and Management Issues: Most of the land within the site is publicly owned and managed by the Bureau of Land Management or State Land Board although small parts of the site are owned by private individuals. The BLM has designated Ra Jadero Canyon as an Area of Critical Environmental Concern (ACEC).

Biodiversity Rank Justification: The site contains an excellent occurrence and two good occurrences of a plant species that is vulnerable on a global scale, the Ripley milkvetch (*Astragalus ripleyi*). The occurrences of the Ripley milkvetch are large but appear to have been impacted by past livestock grazing. Ripley milkvetch is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species.

Table 17. Natural Heritage element occurrences at Ra Jadero Canyons PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	A
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	B
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	B

*EO=Element Occurrence – Multiple listings represent separate locations.

Location: This site is located approximately 7 miles southwest of Centro in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Vicente Canyon, La Jara Canyon

Legal Description: T35N, R7E S 32, 33
 T35N, R6E S 26, 27, 34, 35, 36
 T34N, R7E S 4, 5, 6, 7
 T24N, R6E S 1, 2, 11, 12

Elevation: 8,300-9,500 ft. Approximate Size: 5,215 acres

General Description: The site includes several shallow canyons around a large mesa with open grasslands and patches of forest. Ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), piñon pine (*Pinus edulis*), and juniper (*Juniperus monosperma*) are the common trees. Grasslands are often dominated by Arizona fescue (*Festuca arizonica*) but sometimes dominated by weedy native species such as Richardson hymenoxys (*Hymenoxys richardsonii*) or hairy golden aster (*Heterotheca villosa*). A major Forest Service access road runs through the site, as do numerous two-track roads.

Boundary Justification: The boundary encompasses the Ripley milkvetch locations and enough adjacent habitat to include open grasslands or savanna-like vegetation and the numerous small drainages downstream from known Ripley milkvetch locations. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.). A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.

Protection and Management Comments: Land within the site is mainly publicly owned and managed by the Bureau of Land Management, although small parts of the site are owned by the State Land Board and private individuals. The BLM has designated Ra Jadero Canyon as an Area of Critical Environmental Concern.

Roads run along several of the canyon bottoms. These may serve as corridors for invasion of non-native species in the future, especially if use of the road increases significantly. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control. The road along Ra Jadero Canyon is eroding in places resulting in gullies forming on the slopes below. Currently, no Ripley milkvetch plants are impacted but this should be monitored in the future. Some parts of the site appear to have been heavily grazed in the past (little grass cover, weedy species common). A few consecutive years of heavy grazing do not appear to significantly impact the plants, but over the long-term this may eventually degrade the population. Altering the timing of the grazing from year to year may help the population recover, set seed, and establish seedlings. Although the species appears to be long-lived, seedling establishment may be a limiting factor for the populations. Near normal to above average April - June precipitation may allow for better seedling survival (Julie Burt – pers. comm.). If flexibility exists with grazing management, reducing or delaying grazing until later in the summer during wet years may allow more seedling establishment.

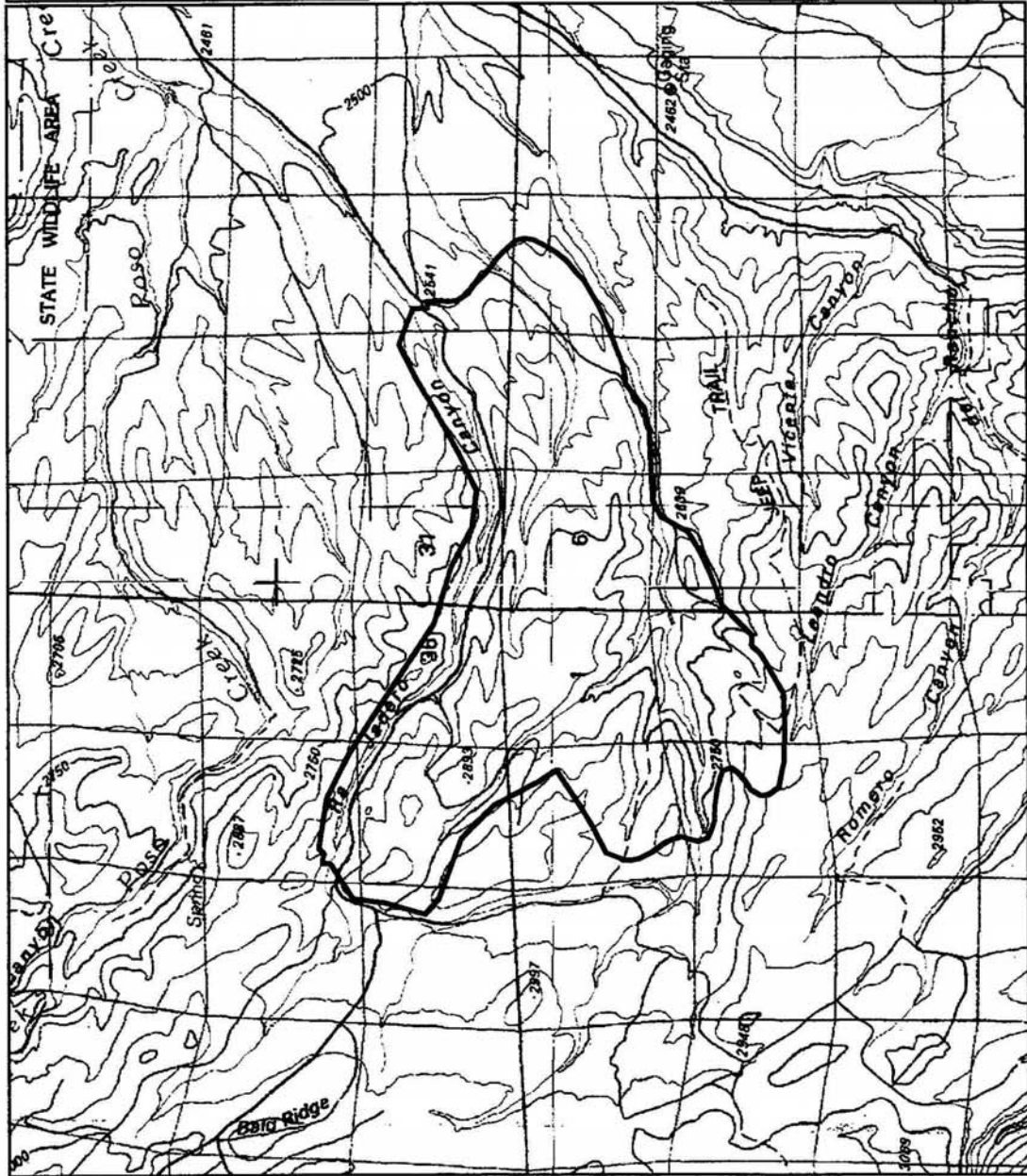
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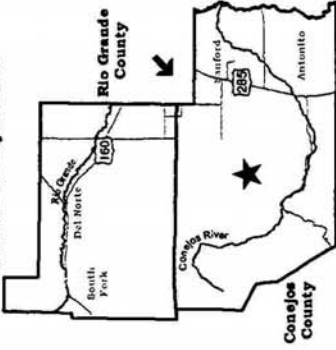
LEGEND

 **PCA Boundary**

Base Layer:
 Antionito, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



Location in Project Area



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone13, NAD27

Figure 19. Ra Jadero Canyons

San Luis Hills – Flat Top Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

The site contains an excellent occurrence of a plant species vulnerable on a global scale and a poor occurrence of a plant vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land Management and is within the San Luis Hills Area of Critical Environmental Concern (ACEC).

Biodiversity Rank Justification: The site contains an excellent occurrence of a plant species vulnerable on a global scale, the rock-loving neoparrya (*Neoparrya lithophila*) and a poor occurrence of a plant vulnerable on a global scale, Weber’s catesye (*Cryptantha weberi*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Several of the largest populations of the rock-loving neoparrya are located in Rio Grande and Conejos counties. This location is by far the largest known population in the San Luis Hills and a very important conservation site for this species. Only a few Weber’s catesye plants were observed, although potential habitat exists that was not surveyed.

Table 18. Natural Heritage element occurrences at San Luis Hills – Flat Top PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	A
<i>Cryptantha weberi</i>	Weber’s catesye	G3	S3		D

*EO=Element Occurrence

Location: This site is located approximately 7 miles east of Manassa north of Highway 142 in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Manassa NE

Legal Description: T34N, R11E S 7, 8, 17, 18

Elevation: 8,200-9,140 ft. Approximate Size: 580 acres

General Description: The site is located on the south end of the Flat Top mesa in the San Luis Hills. Slopes are steep and are generally southeast to southwest facing, except for the hogback like ridge on the south end of the site. Scattered piñon pine (*Pinus edulis*) and juniper (*Juniperus* sp.) occur on steep slopes and the top of the mesa, but the vegetation is mostly dominated by low shrubs. Rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) are the dominant species at the lower parts of the site. Rocky parts of the slopes often are dominated by sagebrush (*Artemisia tridentata*). Two-track roads occur below the site on the valley flats but there is little sign of human disturbance within the site.

Boundary Justification: The main threat to these species would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant populations and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya and Weber's catseye may also require other types of habitat. The pollinators are unknown, consequently we are not certain that the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on public land managed by the Bureau of Land Management and is within the San Luis Hills Area of Critical Environmental Concern (ACEC).

Parts of the slopes show evidence of intense wildlife use. Some of the lower parts of the site and surrounding area are heavily invaded by the annual non-natives tumbleweed (*Salsola* sp.) and Kochia (*Kochia* sp.). It is unclear if the abundance of the non-natives is a result of past disturbance or the timing and abundance of the summer (1999) precipitation. Manassa received over 3.5 inches of rain in August compared to the average of 1.42 inches. Often annual species respond positively to unusually high precipitation.

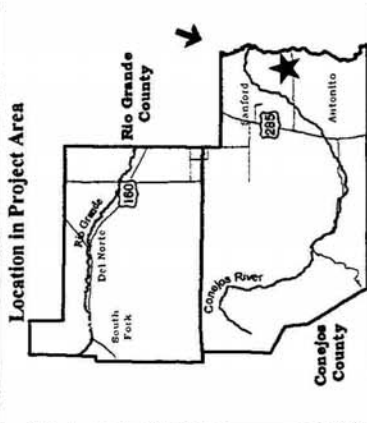
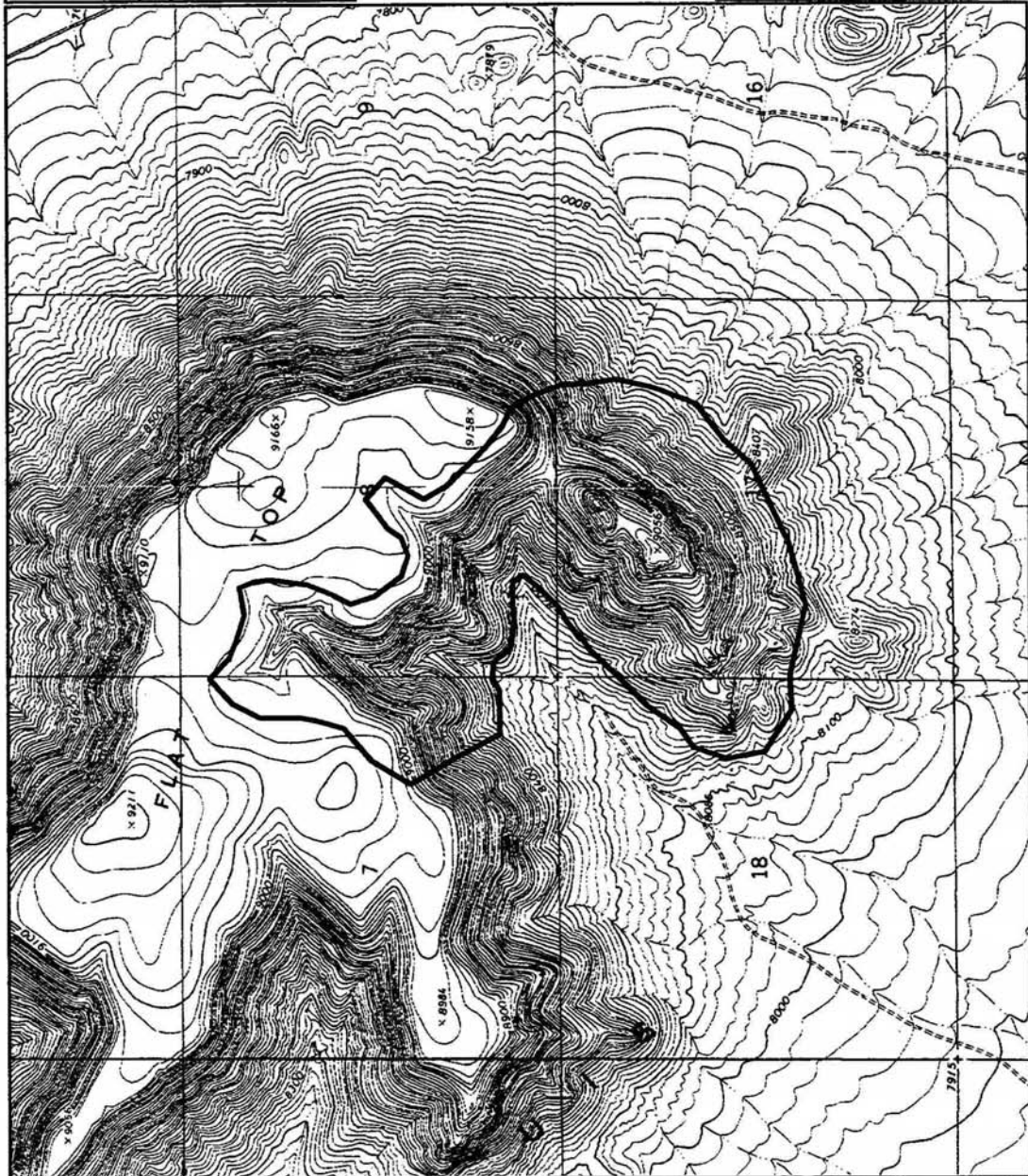
Colorado Natural Heritage Program
 Colorado State University - CNR
 254 General Services Building
 Fort Collins, CO 80523
 map created 9 March 2000



LEGEND

PCA Boundary

Base Layer:
 Manassa NE, 37105-B7
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone13, NAD27

Figure 20. San Luis Hills - Flat Top

Spring Creek at Greenie Mountain Potential Conservation Area

Biodiversity Rank: B2 (Very high significance)

This site supports good examples of a plant species imperiled on a global scale and a state vulnerable plant species, fair to good examples of three plant communities vulnerable on a global scale, six good examples of widespread to abundant plant communities, five excellent occurrences of waterbirds, and one excellent example of a mouse sub-species vulnerable on a global scale.

Protection and Management Issues: The majority of the site lies within the Monte Vista National Wildlife Refuge (the remaining portion is located on private land) and currently has adequate protection. However, any alterations in the current hydrological regime could potentially affect the elements. Also of concern are current populations of non-native species, whitetop (*Cardaria* spp.) and Canada thistle (*Cirsium arvense*).

Biodiversity Rank Justification: This site contains 14 elements of concern at 16 locations. The large population of the globally imperiled slender spiderflower (*Cleome multicaulis*) found throughout the site is the primary reason for the high biodiversity rank. The slender spiderflower has a global range from southern Wyoming to central Mexico. In spite of its large range, populations of this plant have decreased dramatically in the last 100 years, especially in the southwestern states. No occurrences of this species have been documented in New Mexico or Arizona since the 1940's. There are some occurrences in Texas and Mexico while Wyoming only has one. The San Luis Valley contains the most numerous, largest, and healthiest populations in the world. There are approximately 35 occurrences of this species in Colorado. Slender spiderflower is limited by very specific habitat requirements including moist alkaline soils and some form of soil disturbance. These discriminating habitat requirements limit the slender spiderflower to the edges of alkaline wet meadows and playas.

In addition to the slender spiderflower, a population of the state imperiled giant bur-reed, which is mainly found on the eastern plains and in the San Luis Valley, is also supported by the site. Nine significant wetland plant communities were located at this site: small flowered sedge wet meadow (*Carex simulata*), two types of salt meadows (*Distichlis spicata* and *Distichlis spicata*-(*Scirpus nevadensis*)), three types of emergent marsh (*Eleocharis palustris*, *Scirpus acutus*, *S. maritimus*), two types of wet meadows (*Juncus balticus* var. *montanus* and *Scirpus pungens*), and saline bottomland shrublands (*Sarcobatus vermiculatus*/*Sporobolus airoides*).

Several animal species imperiled in Colorado are also represented at this site: two bird species, Snowy Egret (*Egretta thula*) and White-faced Ibis (*Plegadis chihi*) and one imperiled mammal subspecies, the silky pocket mouse (*Perognathus flavescens sanluisi*). Other state imperiled bird species that are known to use the site include the short-eared owl (*Asio flammeus*) and the Greater Sandhill Crane (*Grus canadensis tabida*).

Table 19. Natural Heritage element occurrences at Spring Creek at Greenie Mountain PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Cleome multicaulis</i>	Slender spiderflower	G2G3	S2S3	BLM	B
<i>Sparganium eurycarpum</i>	Giant bur-reed	G5	S2?		B
Plant Communities					
<i>Carex simulata</i>	wet meadow	G3	S3		B
<i>Distichlis spicata</i>	Salt meadows	G5	S3		B
<i>Distichlis spicata</i> - (<i>Scirpus nevadensis</i>)	Salt meadows	G4	S?		B
<i>Eleocharis palustris</i>	Spikerush emergent wetland	G5	S4		B
<i>Juncus balticus</i> var. <i>montanus</i>	Western slope wet meadows	G5	S5		B
<i>Sarcobatus vermiculatus</i> / <i>Sporobolus airoides</i>	Saline bottomland shrublands	G3?	S3		B
<i>Scirpus acutus</i>	Hardstem bulrush emergent wetland	G5	S3?		B
<i>Scirpus maritimus</i>	Alkali bulrush emergent wetland	G4	S2		B
<i>Scirpus pungens</i>	Common threesquare emergent wetland/wet meadow	G3G4	S3		B
Birds					
<i>Asio flammeus</i>	Short-eared owl	G5	S2B, SZN		
<i>Egretta thula</i>	Snowy Egret	G5	S2B, SZN		A
<i>Egretta thula</i>	Snowy Egret	G5	S2B, SZN		A
<i>Grus canadensis tabida</i>	Greater sandhill crane	G5T4	S2B, S4N		
<i>Plegadis chihi</i>	White-Faced Ibis	G5	S2B, SZN	FS, BLM	A
<i>Plegadis chihi</i>	White-Faced Ibis	G5	S2B, SZN	FS, BLM	A
Vertebrates					
<i>Perognathus flavus sanluisi</i>	Silky pocket mouse subsp.	G5T3	S3		A

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: Approximately 5 air miles southeast of Monte Vista in Rio Grande County. Much of the refuge is only open to the public by special permission from the refuge manager.

U.S.G.S. 7.5-min. quadrangle: Homelake, Monte Vista, Waverly, and Fulcher Gulch

Legal Description: T37N, R07E S 1, 11, 12, 13, 14
 T37N, R08E S 1-12, 17, 18
 T37N, R09E S 5, 6
 T38N, R08E S 25, 26, 27, 28, 29, 30, 31, 32, 33
 T38N, R09E S 29, 30, 31, 32

Elevation: 7,580-7,800 ft. Approximate Size: over 15,000 acres

General Description: This site contains a diverse assemblage of open water, emergent marsh, saline wet meadows, peatland, riparian communities, and some uplands. Historically, much of the site received flow from Spring Creek and possibly from groundwater discharge. The natural hydrology of the site has been altered due to groundwater pumping and water diversions for local irrigation and for habitat management on the Monte Vista National Wildlife Refuge (Refuge). Remnants of a large fen occur near the headwaters of Spring Creek. Most of the Refuge's cultural resources occur in this area suggesting that the site used to support large populations of wildlife and was a predominant feature on the landscape (Mike Blenden - pers. comm.). The fen is almost entirely dry, as the series of springs have not exhibited flow since the late 1970's due to the development of large wells in the area. The remaining portion of the PCA is heavily managed for waterbird use. Water is conveyed via numerous ditches and canals to waterbird management units to inundate these areas during seasonal use. Spring Creek has also been channelized for much of its length through the site.

Although the hydrology within the PCA does not likely represent natural historic conditions, current hydrologic management supports all of the elements found at the site. For instance, seepage from canals, ditches, and ponds supplement natural groundwater discharge is supporting sedge meadows (*Carex simulata*, *C. atherodes*, and *Scirpus pungens*) and emergent marshes (*Scirpus maritimus*, *S. acutus*, *Eleocharis palustris*, *Typha latifolia*, and *Sparganium eurycarpum*) whereas open water areas within the habitat management units support floating/submergent species (*Ranunculus aquatilis* and *Potamogeton* spp.).

It has been speculated that much of the refuge, prior to European settlement, was dominated by greasewood (*Sarcobatus vermiculatus*), saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), and rabbitbrush (*Chrysothamnus* spp.). There are still some very large tracts of land dominated by such species within the site. Exact species composition varies with the degree of soil moisture and salinity. For example, in areas where seasonal soil moisture is high, salt crusts may develop on the soil surface, limiting species composition to those tolerable of saline and/or alkaline soils. This occurs when the soil solution (soil water and its constituents (nutrients, salts, etc.)) becomes concentrated due to evaporation. This increase in concentration limits the solubility of calcium sulfate, calcium carbonate, and magnesium carbonate, which, as evaporation increases, eventually precipitate out of the soil solution and form salt crusts. This process also increases the proportion of

soluble sodium in the soil solution, thus creating a saline soil environment (United States Salinity Laboratory Staff 1954). Often areas with thick salt crusts are void of any vegetation, however pickleweed (*Salicornia rubra*) is sometimes found in these areas and is the most saline tolerant species in the area. However, no pickleweed was located at this site. Broom seepweed (*Suaeda calceoliformis*), saltgrass, and Nevada bulrush (*Scirpus nevadensis*) occupy slightly less saline areas. Decreasing salinity and moisture allows greasewood (*Sarcobatus vermiculatus*), alkali sacaton (*Sporobolus airoides*), and Baltic rush (*Juncus balticus*) to establish. Thus, a consistent pattern of species distribution is conspicuous on the landscape: the lowest areas of saline bottomland meadows and shrublands were typically void of vegetation; saltgrass occupied bands of slightly less saline soils whereas Baltic rush and greasewood occurred on sporadic knolls. Slender spiderflower was typically found growing around the base of these knolls, occupying a very narrow band between the more saline saltgrass community and the less saline areas of Baltic rush and greasewood. Near the northeastern edge of the site, a large stand of greasewood and alkali sacaton occupies slightly drier areas than those dominated by greasewood and Baltic rush.

In addition to Spring Creek, it has also been suggested that Cat Creek and potentially Rock Creek used to flow through portions of what is now the Refuge and that most natural wetlands probably occurred along these drainages (Mike Blenden - pers. comm.). Examples of which species these wetlands may have been comprised of can still be found along Spring Creek, where the creek has not been channelized. A nice example of this occurs just east of where Spring Creek crosses CO Highway 15. Here, the creek exhibits a slow, meandering flow allowing productive stands of sedges (*Carex* spp.), rushes (*Juncus* spp.), and slough grass (*Beckmannia syzigachne*) to establish across a relatively broad floodplain. Early explorers who came to the Valley in the late 1800's noted that the Alamosa River, which is just south of this site, was a sinuous, marshy stream with cottonwoods and willows only occurring in periodic patches (Essington 1996). Early records also indicate that marshy areas along the Conejos River were more frequent than they are today (Essington 1996).

This area along Spring Creek, although small in extent, may best represent what freshwater marshes were like in the western portion of the San Luis Valley prior to European settlement.


Boundary Justification: The boundary is drawn to encompass the ecological processes believed necessary for long term viability of the majority of the elements. The source of Spring Creek (the historic fen) is captured to ensure natural surface water flow through the site and also to allow future restoration efforts of the fen. Much of the Refuge was encompassed in order to provide rare and imperiled bird species the area, and ability to move freely in this area to find necessary resources. This also provides many source areas for seed dispersal for the plant and plant community elements. Such areas are extremely important to buffer long-term population fluctuations of the elements. Although the boundary does encompass the source of surface water input to the site, it is difficult to account for areas that contribute groundwater discharge. Thus, it is important to note that any changes in the current status of groundwater pumping and water diversions from water bodies that recharge groundwater would likely affect the elements (both positively and negatively depending on the element). Also, although the silky pocket mouse occurrence is encompassed within this

site, it should be noted that site boundaries were not drawn to account for the ecological processes necessary for the viability of this element.

Protection and Management Comments: The site is mostly within the boundaries of the Monte Vista National Wildlife Refuge. A small portion of the site occurs on privately owned land. No development threats are foreseen in the immediate future, however the private lands have no formal protection.

Changes in water management could impact the integrity of the elements on this site. In addition, whitetop (*Cardaria* spp.) and Canada thistle (*Cirsium arvense*), introduced and highly aggressive species, are found within the site occupying wet meadows and irrigated areas.

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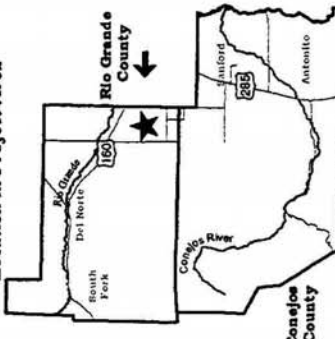


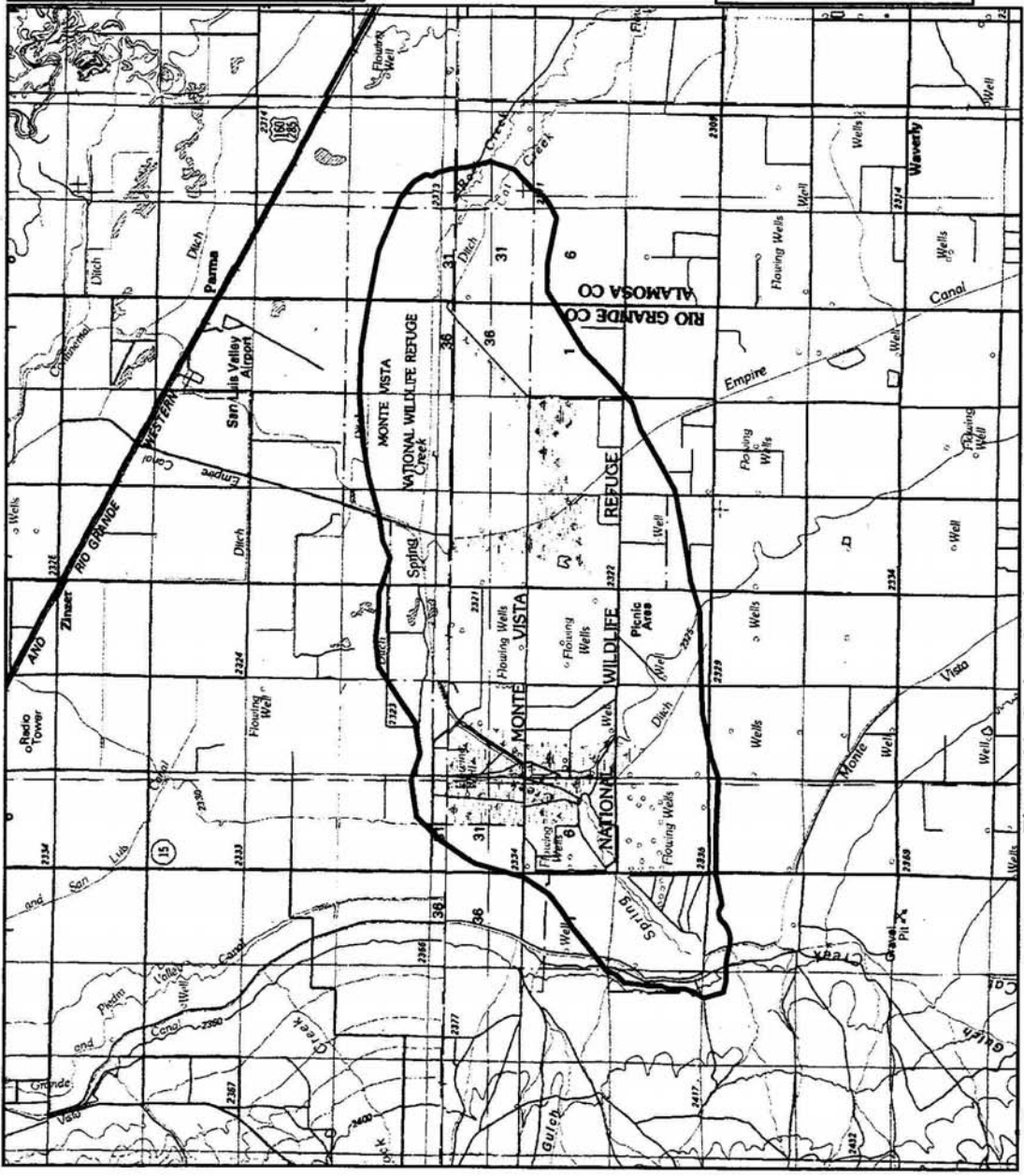
LEGEND

PCA Boundary

Base Layers:
 Antonito, 37106-A1
 Del Norte, 37106-E1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area





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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone13, NAD27

Figure 21. Spring Creek at Greenie Mountain

B3 Potential Conservation Areas

Alamosa River at De la Luz Cemetery Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The Alamosa River at De la Luz Cemetery site supports one good example of a riparian plant community vulnerable on a global scale and one fair example of a submergent wetland plant community.

Protection and Management Issues: The site is privately owned and has no formal protection. The site has not been under any intensive management (grazing or agriculture) for the past five years. Besides the cumulative effects that an upstream reservoir has had on hydrology, non-native species, mainly Canada thistle (*Cirsium arvense*) and smooth brome (*Bromus inermis*), are the only known management concerns at this time.

Biodiversity Rank Justification: This site contains two elements of concern: the globally vulnerable montane riparian forest (*Populus angustifolia/Alnus incana*) and a montane floating/submergent wetland (*Sparganium angustifolium*). In Colorado, the narrowleaf cottonwood/thinleaf alder montane riparian forest is a fairly common community along montane streams, but few high quality examples exist. Although threatened by stream flow alterations and some effects of past grazing, this occurrence has not been grazed in five years.

Table 20. Natural Heritage element occurrences at Alamosa River at De la Luz Cemetery PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Populus angustifolia/Alnus incana</i>	Montane Riparian Forest	G3?	S3		B
<i>Sparganium angustifolium</i>	Montane Floating/Submergent Wetlands	G4?	S2S3		C

*EO=Element Occurrence

Location: This site is located approximately 3 miles northwest of Centro in Conejos County, and occurs along the Alamosa River just southeast of the De la Luz Cemetery.

U.S.G.S. 7.5-min. quadrangle: Centro

Legal Description: T36N, R07E S 27, 28

Elevation: 8,100-8,160 ft. Approximate Size: 280 acres

General Description: This site contains submergent, wet meadow, and riparian habitat along the Alamosa River, and occurs at the meeting of the foothills of the San Juan mountains and the San Luis Valley floor. Topography of the site is relatively flat.

This riparian/wetland complex is maintained by flows in the Alamosa River and the high groundwater table located in the narrow floodplain. Terrace Reservoir, which lies approximately four miles upstream, has greatly changed the hydrology of this site. Although periodic flooding does occur on the Alamosa River (often ditch companies are not diverting water in late spring), the volume of peak floods has been reduced by the presence of the reservoir (Stern 1997). Reservoirs often do not allow sediment to pass through the impoundment, which, in addition to channelization, causes the river downstream to scour the banks and the river bottom until its bed load has reached equilibrium with the sediment carrying capacity of the river (Federal Interagency Stream Restoration Working Group, 1998). This process causes the river channel to become incised, lowering local water tables and destroying riparian and floodplain habitat (Federal Interagency Stream Restoration Working Group 1998). Near the upstream end of the site, an abandoned irrigation headgate sits almost 10 feet higher than the current level of the river due to these processes. Although current hydrological conditions appear to be supporting the elements, the incision of the river channel and subsequent reduction in seasonal flooding limits the ability of these communities to regenerate on a scale that would maintain viable occurrences in the long-term. For example, the local groundwater table does not appear to have been lowered enough to negatively affect the floating/submergent wetland community. However seasonal flooding is necessary for creating the proper geomorphic setting for populations of cottonwood to establish, such as a sinuous river system (e.g., oxbows) and flood channel scouring.

Narrowleaf cottonwood (*Populus angustifolia*) and thinleaf alder (*Alnus incana*) are the dominant species along the riverbank, forming a long, narrow riparian community. Wet meadows occur within the floodplain with graminoids, such as Baltic rush (*Juncus balticus*) and timothy (*Phleum pratense*), and mixed forbs dominating these areas. A small slough (old oxbow) occurs on the south side of the river where beaked sedge (*Carex utriculata*) occupies the margins and narrow-leaved bur-reed (*Sparganium angustifolium*) occurs in open water areas.

Grazing has not occurred on the site (at least south of the river) in the past five years; as a result vegetation growth is dense and tall. Early explorers to the San Luis Valley noted “crops of rank sedges and grasses” and “rich, dark grasses” growing along many riparian areas (Essington 1996). Based on these statements and on observations of understory growth in other healthy riparian areas (e.g., McIntire Springs), this site could serve as a reference site for restoration efforts along the Alamosa River downstream of this location.

Boundary Justification: The site boundary includes the immediate floodplain and a secondary floodplain terrace to allow the river to continue its geomorphic processes when possible (i.e., water releases from Terrace Reservoir). Although grazing appears to be minimal on adjacent properties, the boundary provides a buffer against potential impacts of this activity by filtering surface water runoff from heavy nutrient and sediment loads that could potentially affect the elements, and protection from excessive trampling and browsing. It should be noted that although upstream portions of the Alamosa River were not included

within the site boundary, but these areas and the ecological processes they support are vital to the viability of the elements.

Protection and Management Comments: The site is entirely under private ownership and has no formal protection. However, the landowner has not utilized the property, other than for recreation, for the past five years.

Non-native species such as Canada thistle (*Cirsium arvense*) and smooth brome (*Bromus inermis*) are conspicuous within wet meadow areas. Although this site has been disturbed by past grazing and the consequences of an upstream reservoir, it is in relatively good condition compared to downstream areas where heavy grazing still occurs along the river, water diversions are prevalent, and the river channel has been deeply incised. The cumulative effects from the upstream reservoir and downstream channelization are important management concerns.

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PCA Boundary

Base Layer:
 Centro, 37106-C2
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 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

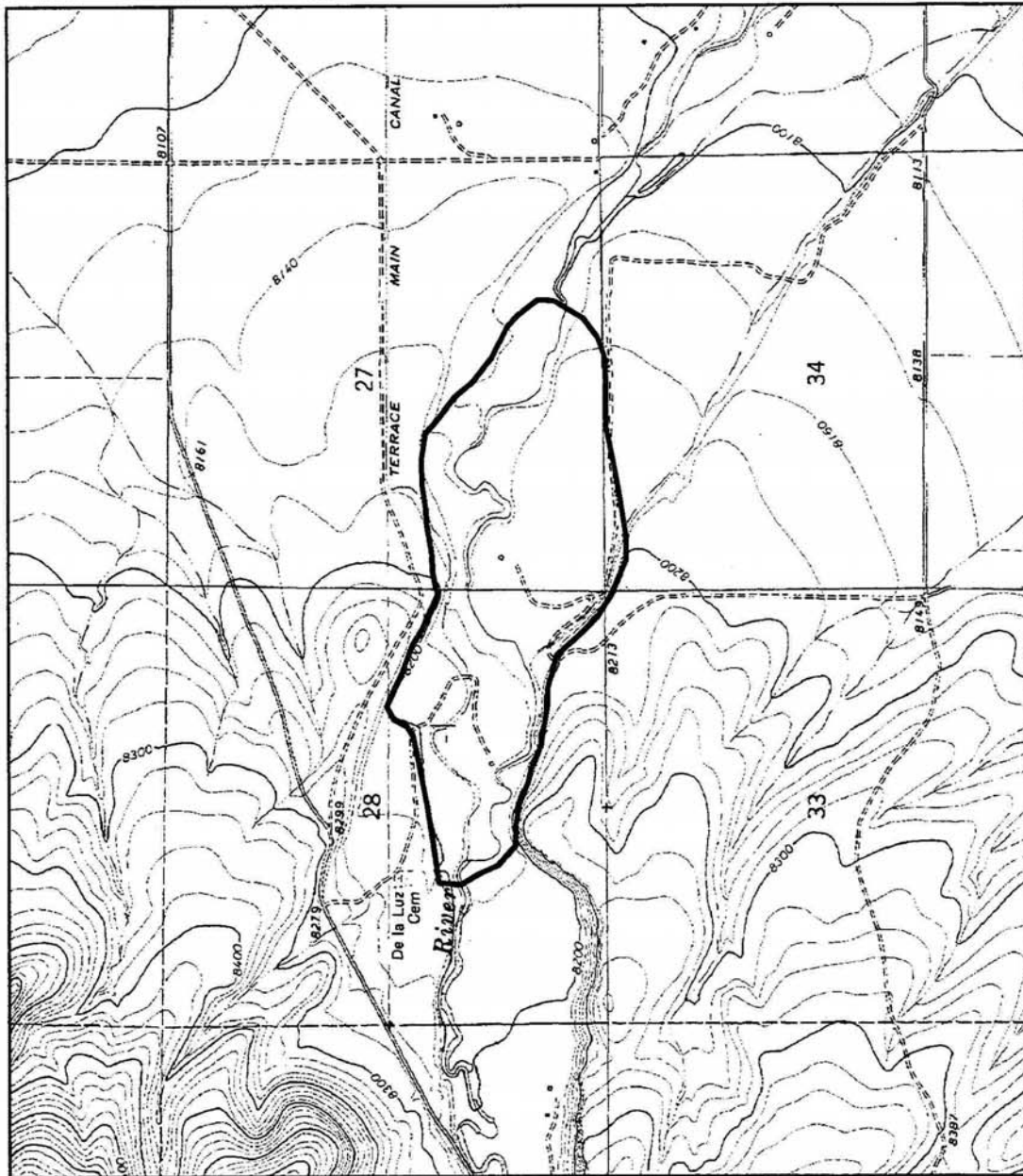


Figure 22. Alamosa River at de la Luz Cemetery

Coal Creek at Platoro Reservoir Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site contains a fair occurrence of a plant species imperiled on a global scale, a fair occurrence of a plant species vulnerable on a global scale, and several other occurrences of plant species common on a global scale but critically imperiled to vulnerable in Colorado.

Protection and Management Issues: The site is located on public land managed by the Forest Service land but has no formal protection. A Forest Service road falls within the site.

Biodiversity Rank Justification: The site contains a fair occurrence of a plant species imperiled on a global scale, the reflected moonwort (*Botrychium echo*), a fair occurrence of a plant species vulnerable on a global scale, the western moonwort (*Botrychium hesperium*), and several other occurrences of plant species common on a global scale but critically imperiled to vulnerable in Colorado, the Mingan moonwort (*Botrychium minganense*), northern moonwort (*Botrychium pinnatum*), lance-leaved moonwort (*Botrychium lanceolatum*), and common moonwort (*Botrychium lunaria*). In Colorado, the number of individuals in most populations of these moonworts is very low (often less than 30 plants) and highly variable from year to year, making them highly susceptible to events which could extirpate the entire population at a site.

Table 21. Natural Heritage element occurrences at Coal Creek at Platoro Reservoir PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Botrychium echo</i>	Reflected moonwort	G2	S2	FS	C
<i>Botrychium hesperium</i>	Western moonwort	G3	S2		C
<i>Botrychium minganense</i>	Mingan moonwort	G4	S1		--
<i>Botrychium pinnatum</i>	Northern moonwort	G4?	S1		--
<i>Botrychium lanceolatum</i>	Lance-leaved moonwort	G5T4	S2		--
<i>Botrychium lunaria</i>	Common moonwort	G5	S2S3		C

*EO=Element Occurrence

Location: This site is located approximately one mile southwest of Platoro Reservoir in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Platoro

Legal Description: T36N, R4E S 25, 30

T36N, R5E S 30, 31

Elevation: 10,200-10,680 ft. Approximate Size: 91 acres

General Description: The site occurs on a southeast-facing slope near Platoro Reservoir. The adjacent forest is dominated by Engelmann spruce (*Picea engelmannii*) with a whortleberry (*Vaccinium myrtillus*.) understory. A Forest Service Road (leading to Hilman


Park) with several switch-backs occurs on the site. There is also an old gravel pit within the site.

Boundary Justification: The boundary was drawn to include the known extent of the plant populations and to include the parts of the road upslope of the plant populations. Sedimentation or erosion from the road upslope could potentially impact the plants. The Forest Service should consider these effects when planning road maintenance.


Protection and Management Comments: The site is within the Rio Grande National Forest but has no formal protection.

The plants occur along a roadcut on a Forest Service Road. Several of these moonworts appear to be adapted to disturbance, as they are known to occur in old clear-cuts, avalanche chutes, on along roadsides. Although the plants are generally thought to be adapted to some disturbance, the appropriate Forest Service biologist should be consulted if maintenance activities are planned along this road within this site to ensure that these activities will not impact the populations.

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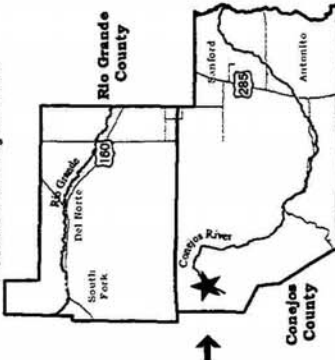


LEGEND

 **PCA Boundary**

Base Layer:
 Platoro, 37106-C5
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area




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A Projection: UTM, Zone13, NAD27

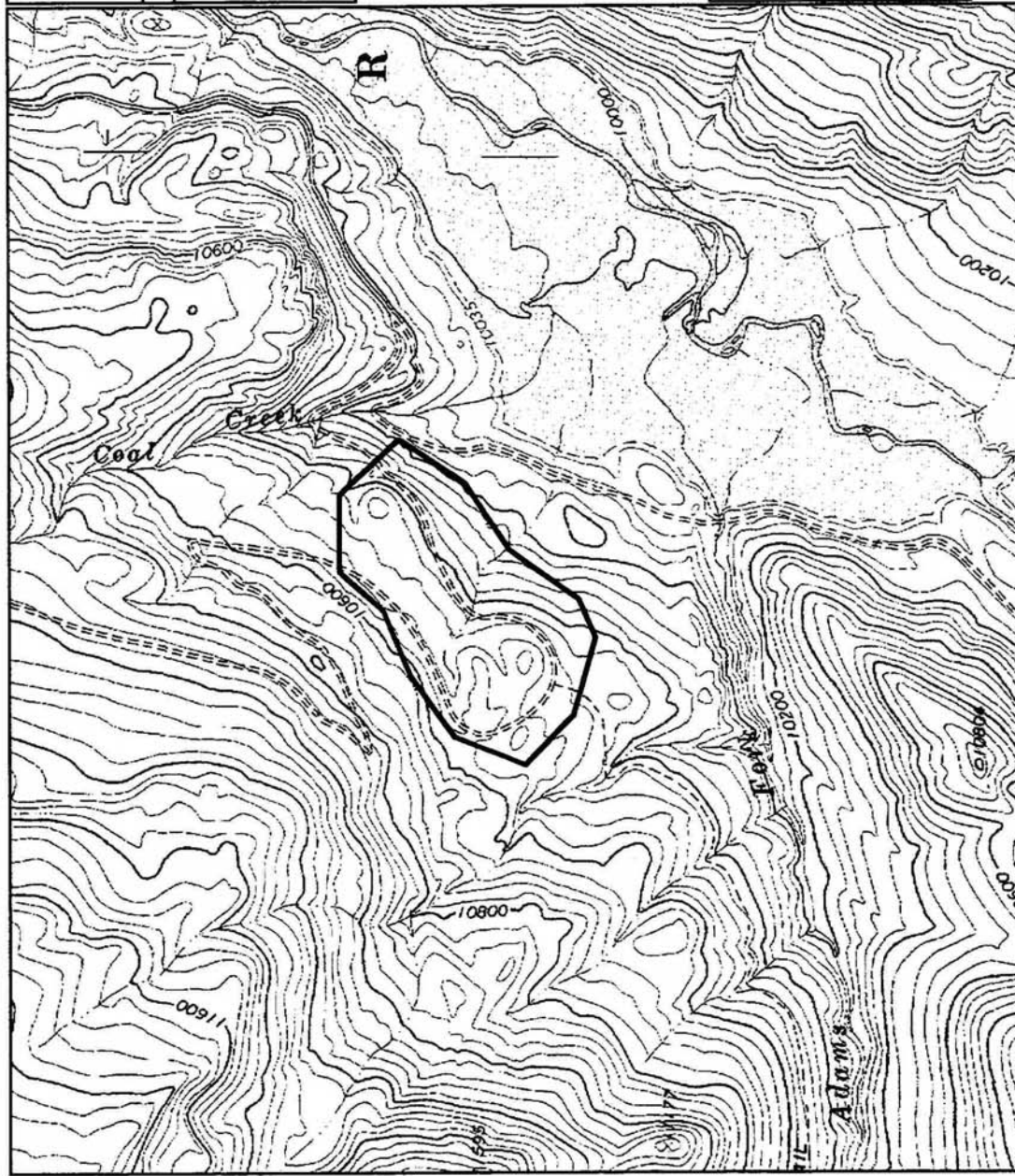


Figure 23. Coal Creek at Platoro Reservoir

Conejos River at Menkhaven Ranch Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site supports a good example of a plant community vulnerable on a global scale.

Protection and Management Issues: Almost the entire site is privately owned while the Rio Grande National Forest manages the remaining portion. The Colorado Division of Wildlife maintains a fishing access easement with the private landowners. Development pressure is a concern at this site as summer home developments are common along this stretch of the Conejos River. The site has historically been grazed, but not in recent years.

Biodiversity Rank Justification: The site supports a good example of a montane willow carr (Mountain willow/bluejoint reedgrass - *Salix monticola/Calamagrostis canadensis*). This plant community apparently only occurs in Colorado, where mountain willow appears to be at the center of its distribution.

Table 22. Natural Heritage element occurrences at Conejos River at Menkhaven Ranch PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Salix monticola/ Calamagrostis canadensis</i>	Montane willow carr	G3	S3		B

*EO=Element Occurrence

Location: The Conejos River at Menkhaven Ranch site is located approximately ¼ mile downstream of the Menkhaven Ranch which is approximately 16 miles west of Antonito, along Highway 17 in Conejos County.

U.S.G.S. 7.5-min. quadrangle: Osier

Legal Description: T33N R06E S 19, 10, 15, 16

Elevation: 8,600 ft. Approximate Size: 217 acres

General Description: The site occurs in a broad valley with steep volcanic cliffs covered by aspen (*Populus tremuloides*), Engelmann spruce (*Picea engelmannii*), and sub-alpine fir (*Abies lasiocarpa*). The river has created a broad meandering channel through the valley floor where point bars, oxbows, and floodplain areas provide a diversity of riparian and wetland habitat. Narrowleaf cottonwood (*Populus angustifolia*) and Colorado blue spruce (*Picea pungens*) dominate the majority of the floodplain. Mountain willow (*Salix monticola*) and Bebb willow (*Salix bebbiana*) occupy wet areas within the floodplain and near beaver ponds and old oxbows. The understory in these areas consists of bluejoint reedgrass (*Calamagrostis canadensis*), woolly sedge (*Carex lanuginosa*), Kentucky bluegrass (*Poa pratensis*), woodreed (*Cinna latifolia*), redtop (*Agrostis stolonifera*), and dandelion (*Taraxacum officinale*).

Boundary Justification: The boundary includes the floodplain to allow natural fluvial processes (lateral flow, creation of oxbows, scouring) to continue to create potential habitat for the element.

Protection and Management Comments: Almost the entire site is privately owned, while the Rio Grande National Forest manages the remaining portion. Numerous summer home developments occur in the area and the Menkhaven Ranch sits just upstream from the site. The Colorado Division of Wildlife currently maintains a fishing access easement with the private landowners.

Direct disturbance such as trampling and incompatible grazing should be minimized or avoided. Signs of past grazing are visible, but the site does not appear to have been grazed in recent years. Non-native species such as Kentucky bluegrass, timothy (*Phleum pratense*), dandelion, and clover (*Trifolium repens*) are present but not in large numbers. Platoro Reservoir has likely altered natural hydrology, and may impact the plant community. Development pressure is a concern at this site.

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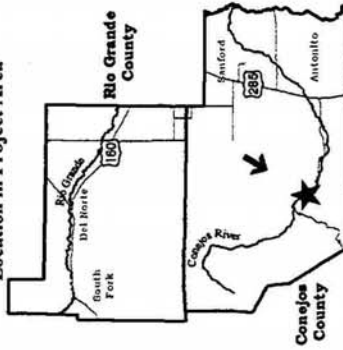


LEGEND

□ PCA Boundary

Base Layer:
 Oster, 37106-A3
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 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.

0.2 0 0.2 0.4 Miles



Projection: UTM, Zone13, NAD27

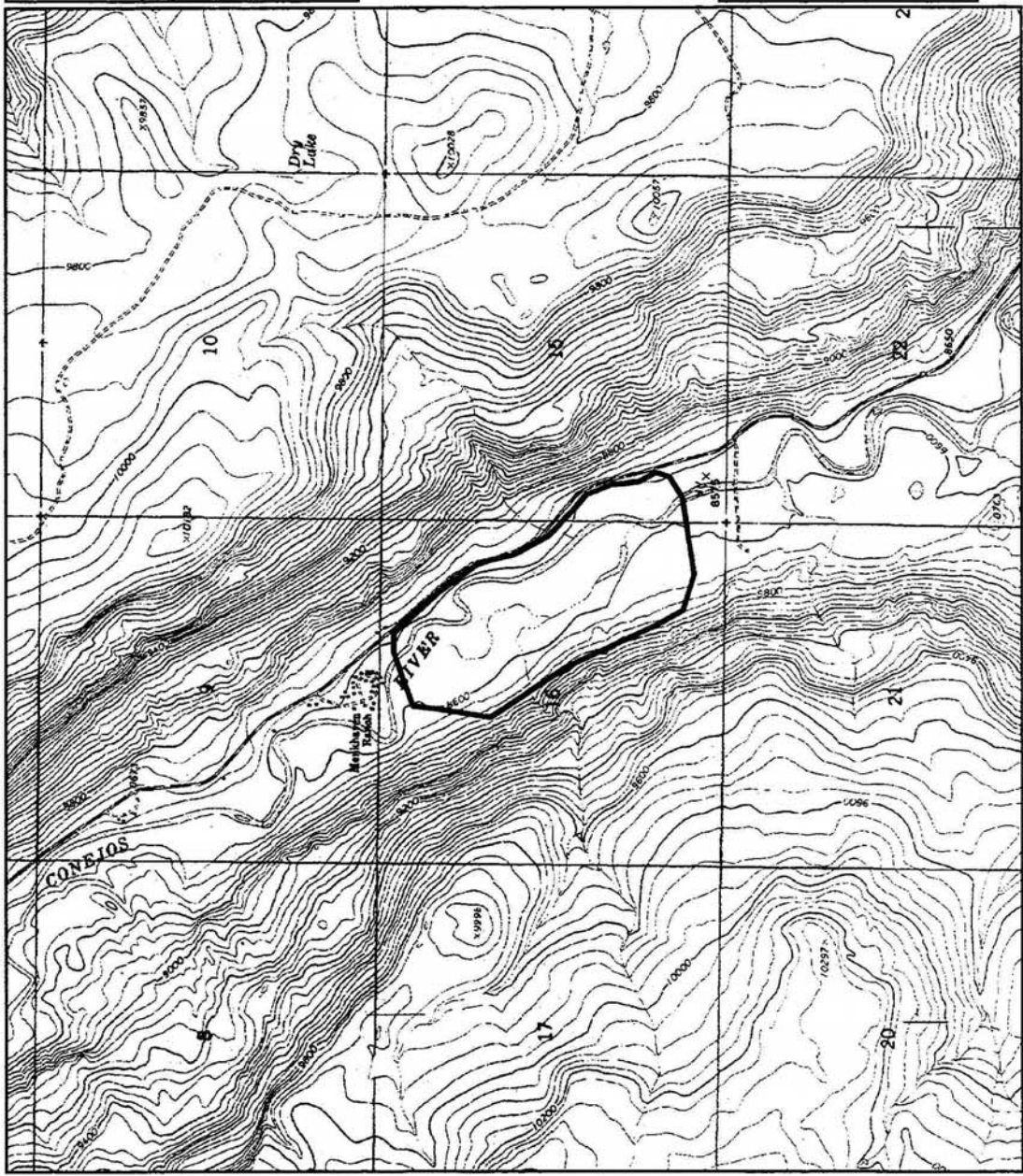


Figure 24. Conejos River at Menkhaven Ranch

Conejos River at Platoro Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site supports a good example of a plant community vulnerable on a global scale.

Protection and Management Issues: Most of the site is publicly owned and managed by the Rio Grande National Forest, while a small portion is privately owned. The site has no formal protection. No signs of current grazing were observed however old pack trails were still evident. Heavy recreational use is a concern at this site.

Biodiversity Rank Justification: The site supports a good example of a montane willow carr (Mountain willow/mesic forb - *Salix monticola*/Mesic forb). This plant community appears to occur only in Colorado, where mountain willow appears to be at the center of its distribution.

Table 23. Natural Heritage element occurrences at Conejos River at Platoro PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Salix monticola</i> /Mesic forb	Montane willow carr	G3	S3		B

*EO=Element Occurrence

Location: The Conejos River at Platoro site is located approximately 1 miles downstream from the town of Platoro in Conejos County.

U.S.G.S. 7.5-min. quadrangle: Red Mountain, Platoro

Legal Description: T36N R04E S 23, 24, 25, 26, 35, 36

Elevation: 9,800 ft. Approximate Size: 1,164 acres

General Description: The site is in a glaciated valley along the Conejos River and contains scrub/shrub riparian habitat and slope wetlands. The river meanders across a wide valley floor leaving many wetlands associated with numerous oxbows. Natural hydrological processes have been altered due to the presence of Platoro Reservoir. Seasonal flooding has likely been minimized relative to historical flows. However, many small drainages and seeps on adjacent slopes appear to maintain saturated conditions in much of the site. The seeps support willow carrs dominated by a complex of willows (*Salix* spp.), sedges (*Carex* spp.), and mixed forbs. Drier areas of adjacent slopes are dominated by aspen (*Populus tremuloides*), Engelmann spruce (*Picea engelmannii*) and sub-alpine fir (*Abies lasiocarpa*). Mountain willow (*Salix monticola*), Booth willow (*Salix boothii*), water sedge (*Carex aquatilis*), tufted hairgrass (*Deschampsia cespitosa*), beaked sedge (*Carex utriculata*), and elephantella (*Pedicularis groenlandica*) occur in the floodplain around old oxbows and in low-lying areas. Shrubby cinquefoil (*Pentaphylloides floribunda*) occupies slightly drier areas in the floodplain.

Boundary Justification: The floodplain of the Conejos River was included in the boundary to allow the river to meander, thereby creating potential habitat for the plant community to establish. The willow carrs observed on adjacent slopes were included as they provide important hydrological functions, such as maintenance of surface and groundwater flow. Although not included in the site, upstream activities along the Conejos River could potentially affect the elements.

Protection and Management Comments: Most of the site is contained within the Rio Grande National Forest, however a small portion is privately owned. The site has no formal protection status.

Recreational impacts (e.g., trampling, trash, etc.) are apparent at the site. No signs of grazing were observed however old pack trails were evident. Activities associated with the upstream presence of Platoro Reservoir and the town of Platoro pose potential threats to the elements such as future manipulation of hydrology and increased nutrient loads from wastewater. Forest Service Road 250 also passes through the site. Non-native plants such as dandelion (*Taraxacum officinale*) and clover (*Trifolium repens*) are abundant at the site.

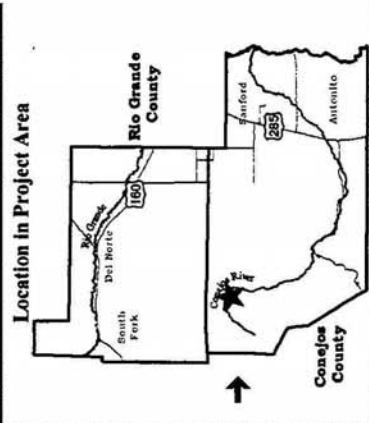
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 map created 20 February 2000



LEGEND

□ PCA Boundary

Base Layers:
 Platoro, 37106-C5
 Red Mountain, 37106-C4
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Projection: UTM, Zone13, NAD27

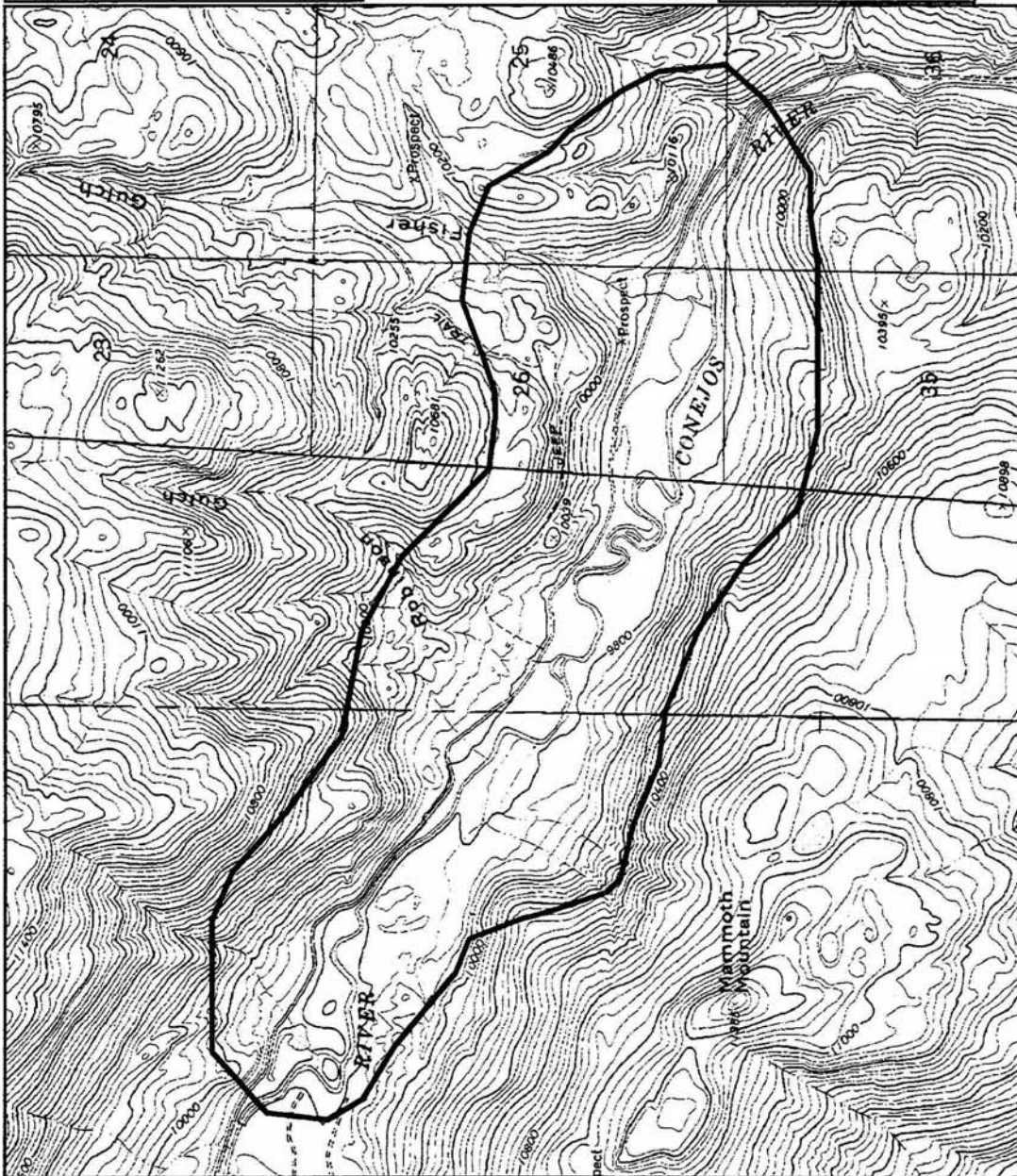


Figure 25. Conejos River at Platoro

Dry Pole Creek Uplands Potential Conservation Area

Biodiversity Rank: B3 (high significance)

The site contains good occurrences of two plant species vulnerable on a global scale and a good occurrence of a plant community vulnerable on a global scale.

Protection and Management Issues: The site is located on privately owned land.

Biodiversity Rank Justification: The site contains good occurrences of two plant species vulnerable on a global scale the rock-loving neoparrya (*Neoparrya lithophila*) and Weber’s catseye (*Cryptantha weberi*) and a good occurrence of a New Mexico feathergrass (*Stipa neomexicana*) plant community vulnerable on a global scale. The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Several of the largest populations of the rock-loving neoparrya are located in Rio Grande and Conejos counties. Weber’s catseye is only known from south-central Colorado. The populations of both species here are fairly large, occur in good habitat, and are in an area isolated from disturbance by the very steep terrain on which they occur.

Table 24. Natural Heritage element occurrences at Dry Pole Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving Neoparrya	G3	S3	FS, BLM	B
<i>Cryptantha weberi</i>	Weber’s catseye	G3	S3		B
<i>Stipa neomexicana</i>	New Mexico feathergrass grassland	G3	S2		B

*EO=Element Occurrence

Location: This site is located approximately 3 miles south of Del Norte in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Del Norte

Legal Description: T39N, R6E S 4, 5, 7, 8, 9, 17, 18

Elevation: 8,000-8,893 ft. Approximate Size: 985 acres

General Description: The site is located south of Del Norte on a large butte rising abruptly above the Rio Grande floodplain. Scattered piñon pine (*Pinus edulis*) and juniper (*Juniperus scopulorum*) occur on steep slopes and more densely on the top of the butte; otherwise grasses and forbs mainly dominate the vegetation. Two track roads occur below the site on the valley flats and a county road runs along the western side, but there is little sign of human disturbance on the slopes or on top of the butte.

Boundary Justification: The main threat to plant species would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant populations and enough of the adjacent area to incorporate portions of other habitat types.

This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya and Weber's catseye may also require other types of habitat. The pollinators are unknown, consequently we are not certain that the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change. The physical extent of the grassland is included in the site but ecological processes such as natural fire regimes may be difficult to mimic in the site alone.

Protection and Management Comments: The site occurs on private land. Private lands to the southwest along San Francisco Creek have been subdivided and are currently being built on.

A gravel county road and a two-track road run near the site. We observed no impact to the plant populations but the roads may serve as corridors for invasion of non-native species or other impacts in the future. Occasional monitoring in the future would help identify any possible invasion of non-native species before they became widespread and more difficult to control.

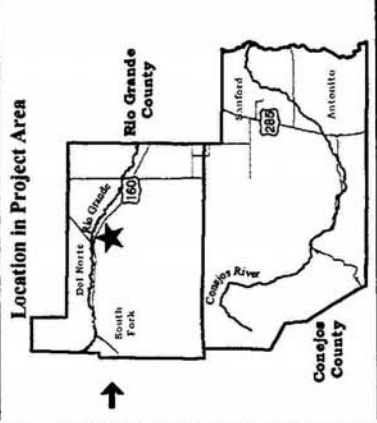
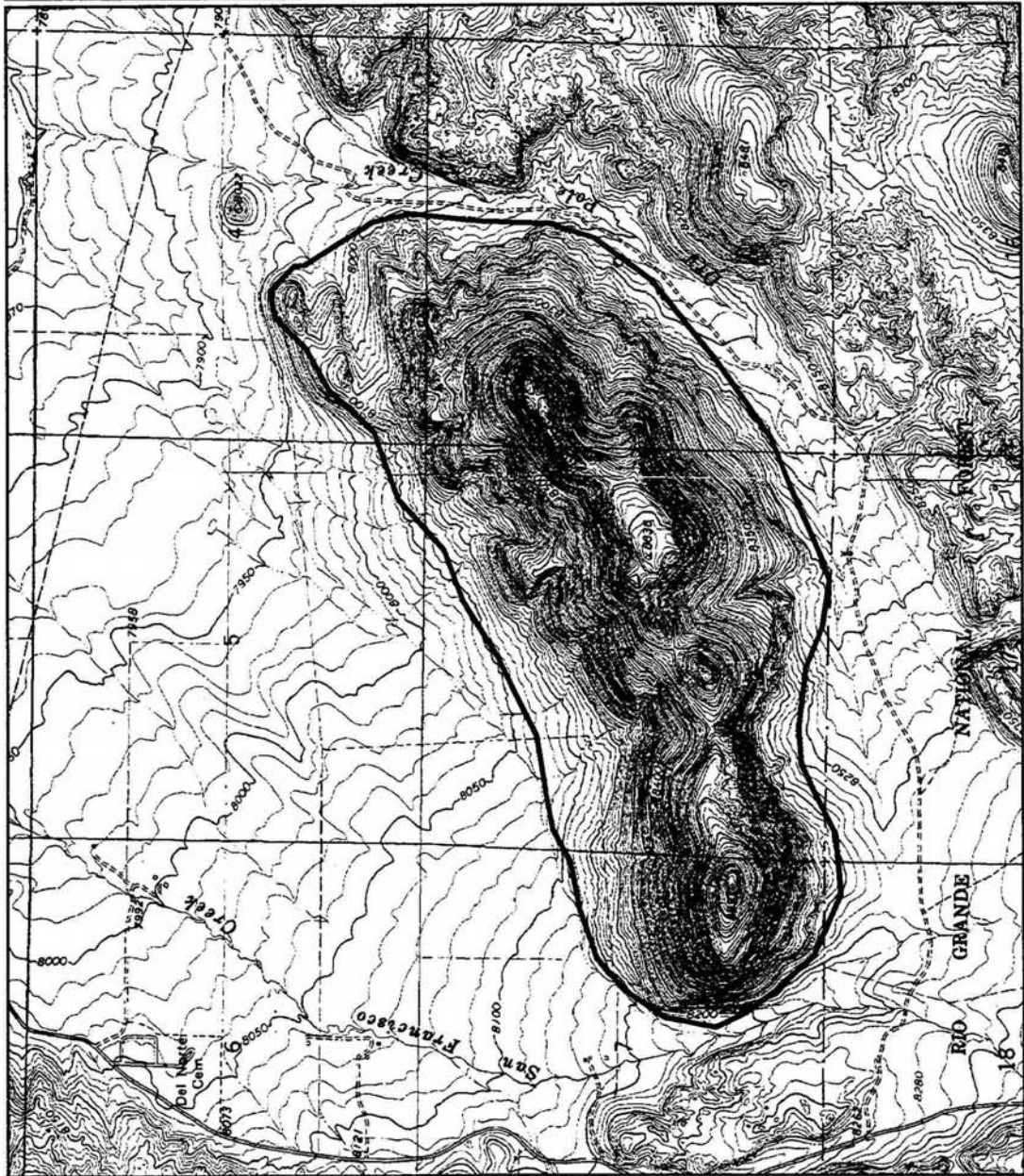
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 map created 3 March 2000



LEGEND

□ PCA Boundary

Base Layer:
 Del Norte, 37106-F3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

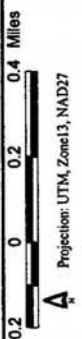


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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

Figure 26. Dry Pole Creek Uplands

Elephant Rocks Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The Elephant Rocks site supports a fair example of a wetland plant imperiled on a global scale, one good and two fair examples of plants vulnerable on a global scale, and an excellent example of a San Luis Valley endemic pocket mouse subspecies.

Protection and Management Issues: The majority of the site is publicly owned and managed by the Bureau of Land Management. However, the portion that is privately owned contains a population of the globally imperiled slender spiderflower (*Cleome multicaulis*). Consideration of this private inholding would be beneficial to a conservation plan at this site. Current land use practices do not appear to be endangering the elements of concern.

Biodiversity Rank Justification: This site supports a moderate-sized population of the globally imperiled slender spiderflower (*Cleome multicaulis*), which has a global range from southern Wyoming to central Mexico. The San Luis Valley contains the most numerous, largest, and healthiest populations in the world. Slender spiderflower has a limited distribution due to its requirement of moist alkaline soil along with periodic soil disturbance, such as pocket gopher (*Thomomys* sp.) diggings. These habitat requirements limit the slender spiderflower to the edges of alkaline wet meadows and playas. The site also supports a medium-sized population of the rock-loving neoparrya, a plant endemic to south-central Colorado. This species is restricted to south-central Colorado and is on the BLM and Forest Service lists of sensitive species. The size of this population is estimated at 2000 individuals. In addition to the rock-loving neoparrya, a silky pocket mouse subspecies (*Perognathus flavus sanluisi*) population is found here. The silky pocket mouse is a subspecies restricted to the San Luis Valley and is rare within its range. A small occurrence of the grass fern (*Asplenium septentrionale*) at this site represents the southern most extension of this uncommon fern.

Table 25. Natural Heritage element occurrences at Elephant Rocks PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3		B
<i>Asplenium septentrionale</i>	Grass fern	G3G4	S3S4		C
<i>Cleome multicaulis</i>	Slender spiderflower	G2G3	S2S3	BLM	C
Vertebrates					
<i>Perognathus flavus sanluisi</i>	Silky pocket mouse	G5T3	S3		A

*EO=Element Occurrence

Location: The Elephant Rocks site is located in south-western Saguache and northern Rio Grande counties, approximately 3.5 miles northeast of the town of Del Norte.

U.S.G.S. 7.5 min. quadrangle: Twin Mountains SE, Del Norte
Legal Description: T40N R06E S 2, 3, 4, 9
T41N R06E 33, 34
Elevation: 7,800-8,000 ft. Approximate Size: 890 acres

General Description: The Elephant Rocks site lies at the base of the San Juan foothills on the Saguache-Rio Grande County line. It is comprised of a complex of volcanic boulders, rock outcrops, and shrublands separating the prairie of the valley floor from the San Juan Mountains. The vegetation among the boulders is sparse piñon pine-juniper open woodland (*Pinus edulis-Juniperus monosperma*). Numerous native grasses and forbs occupy pockets of soil between the boulders and in crevices, including blue grama (*Bouteloua gracilis*), Fendler's poa (*Poa fendleriana*), and mountain muhly (*Muhlenbergia montana*). These grasses usually dominate the intermittent streams that separate the boulder outcrops as well.

Slender spiderflower is found along a permanent stream that drains from Shaw Springs. This is a newly documented population, first documented during the 1999 inventory. The stream and Shaw Springs are located on private land. The landowner, in partnership with local natural resource agencies, recently constructed a series of wetland cells along the course of the stream in order to enhance and create wildlife habitat. This activity resulted in the establishment of a medium-sized population of slender spiderflower. The plants were located along the periphery of each wetland cell and along the banks of the stream. The plants were more robust in their appearance than any other population located during this study. Although the hydrological source of the site is natural, human-induced disturbance modified the local soils creating a welcoming environment for slender spiderflower. Seeds carried by birds or possibly a remnant seed bank likely explain the proliferation of this species in such a short time frame.

The vulnerable rock-loving neoparrya, a forb in the carrot family, is found between crevices in rocks and on small flat pockets of soils between boulders. Overhanging boulders often protect the plant. The area surrounding the boulders are dominated by rabbitbrush (*Chrysothamnus nauseosus*), greasewood (*Sarcobatus vermiculatus*), and a grassland of blue grama, Indian rice grass (*Oryzopsis hymenoides*), and squirrel tail (*Elymus elymoides*). The silky pocket mouse (*Perognathus flavus sanluisi*), a San Luis Valley endemic, was found in the shrub and grassland habitat. Much of this site is part of a state-designated natural area. It receives some recreation, including hunting and camping. Certain areas have trash piles at the base of the rocks.

Boundary Justification: This boundary encompasses an area in which direct impacts to the elements, such as trampling or other surface disturbance, should be avoided and provides suitable habitat where additional individuals can become established over time. The boundary also encompasses Shaw Springs to ensure the hydrological source necessary for the viability of the slender spiderflower is protected.

Protection and Management Comments: The majority of this site is managed by either the Bureau of Land Management or Rio Grande National Forest, and part is a State Natural Area.

Consideration of the private inholding would be beneficial to any protection plan. A conservation easement may be a useful tool to ensure long-term protection. The landowner expressed a strong interest in protecting the cultural and natural resources located on the property.

Current land use practices at this site do not appear to be endangering the elements of concern. However, further alteration of the stream, springs, and constructed wetland cells may affect the population of slender spiderflower.

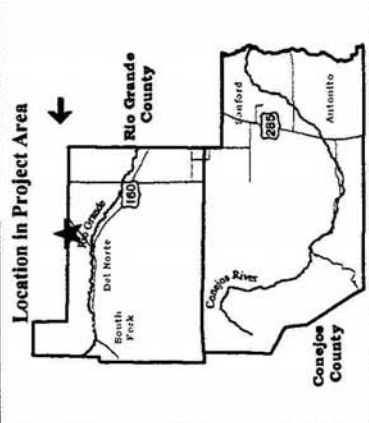
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 Fort Collins, CO 80523
 map created 6 March 2000



LEGEND

□ PCA Boundary

Base Layer:
 Del Norte, 37106-E1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone 13, NAD27

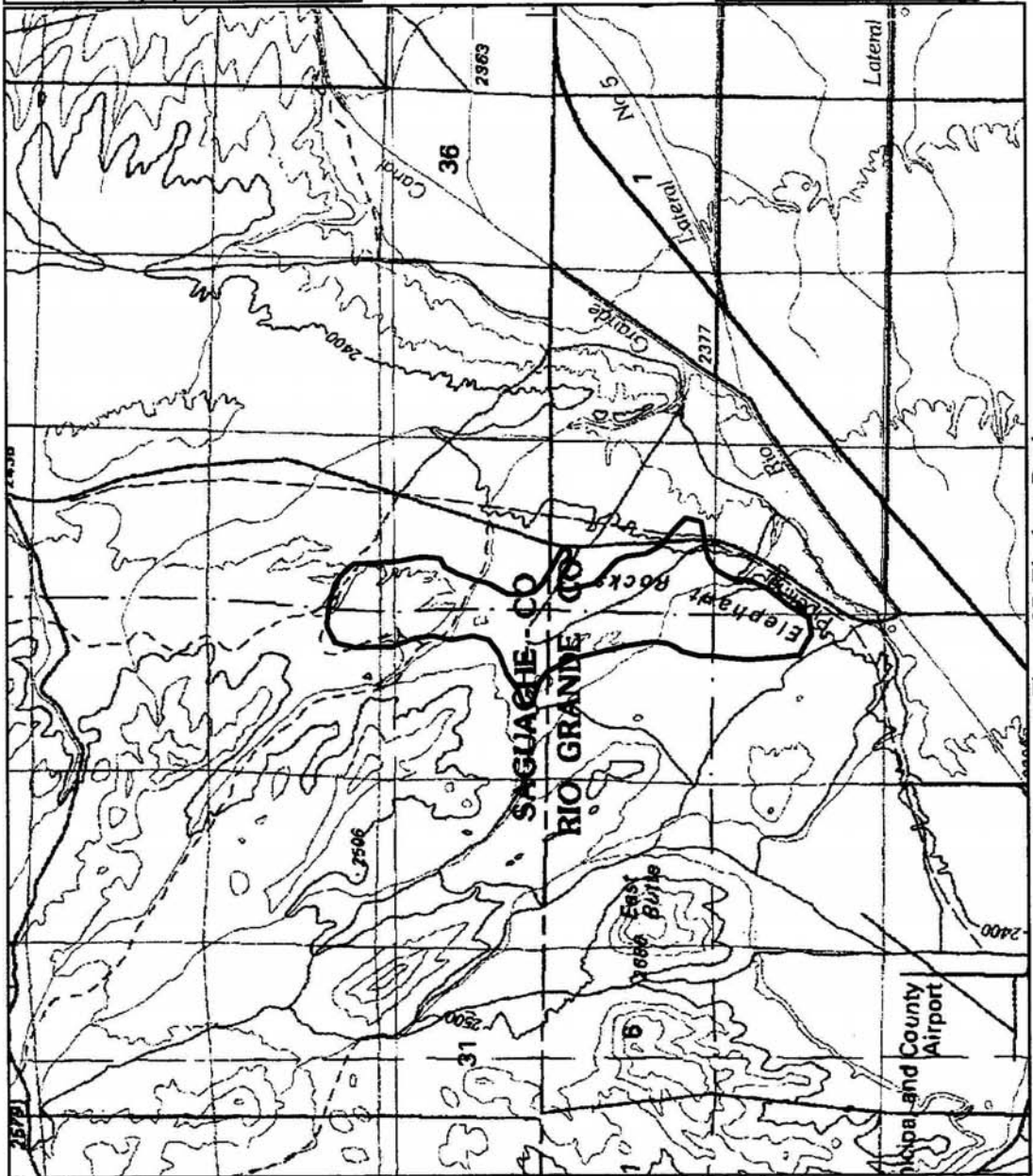


Figure 27. Elephant Rocks

Hicks Canyon Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site contains one good and one fair occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: Land within is both privately owned and publicly owned and managed by the Forest Service, Bureau of Land Management, and State Land Board.

Biodiversity Rank Justification: The site contains one good and one fair occurrence of a plant species vulnerable on a global scale, Ripley milkvetch (*Astragalus ripleyi*). Ripley milkvetch is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species. The population at this site is large (approximately 1300 plants), but heavy grazing has impacted some parts of the population.

Table 26. Natural Heritage element occurrences at Hicks Canyon PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	B
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	C

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: This site is located approximately two miles southwest of Fox Creek in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Fox Creek

Legal Description: T33N, R7E S 7, 9, 15, 16, 17, 18, 19, 20, 21, 22, 28, 29,
T33N, R6E S 12, 13, 24

Elevation: 8,380-9,350 ft. Approximate Size: 3,390 acres

General Description: The site is predominately characterized by open grasslands to the east and scattered woodlands and forests with grassland openings to the west. Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) are the common evergreen species. Aspen (*Populus tremuloides*) is present in scattered patches. Two non-native species, smooth brome (*Bromus inermis*) and yellow sweetclover (*Melilotus officinalis*), are common in some areas. Much of the adjacent area to the south and east is currently being subdivided and sold for development.

Boundary Justification: The boundary also encompasses the Ripley milkvetch locations and enough adjacent habitat to include open grasslands or savanna-like vegetation and the numerous small drainages downstream from known Ripley milkvetch locations. This

boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.). A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.

Protection and Management Comments: Land within the site includes public land managed by the Forest Service, Bureau of Land Management, State Land Board, and private land.

Smooth brome (*Bromus inermis*) is present in parts of the site. This non-native species can be invasive and may need to be controlled to reduce impacts to the Ripley milkvetch. The non-native yellow sweetclover (*Melilotus officinalis*) is also present. In some areas where terracing has been done or ditches occur, yellow sweetclover has become common and seems to reduce the abundance of the Ripley milkvetch (Julie Burt – pers. comm.). New roads and trails associated with impending development in the area may serve as corridors for invasion of non-native plant species that could impact the Ripley milkvetch. Some parts of the site appear to have been heavily grazed in the past. A few consecutive years of heavy grazing do not appear to significantly impact the plants, but over the long-term this may eventually degrade the population. Altering the timing of the grazing from year to year may help the population recover, set seed, and establish seedlings. Although the species appears to be long-lived, seedling establishment may be a limiting factor for the populations. Near normal to above average April - June precipitation may allow for better seedling survival (Julie Burt – pers. comm.). If flexibility exists with grazing management, reducing or delaying grazing until later in the summer during wet years may allow more seedling establishment.

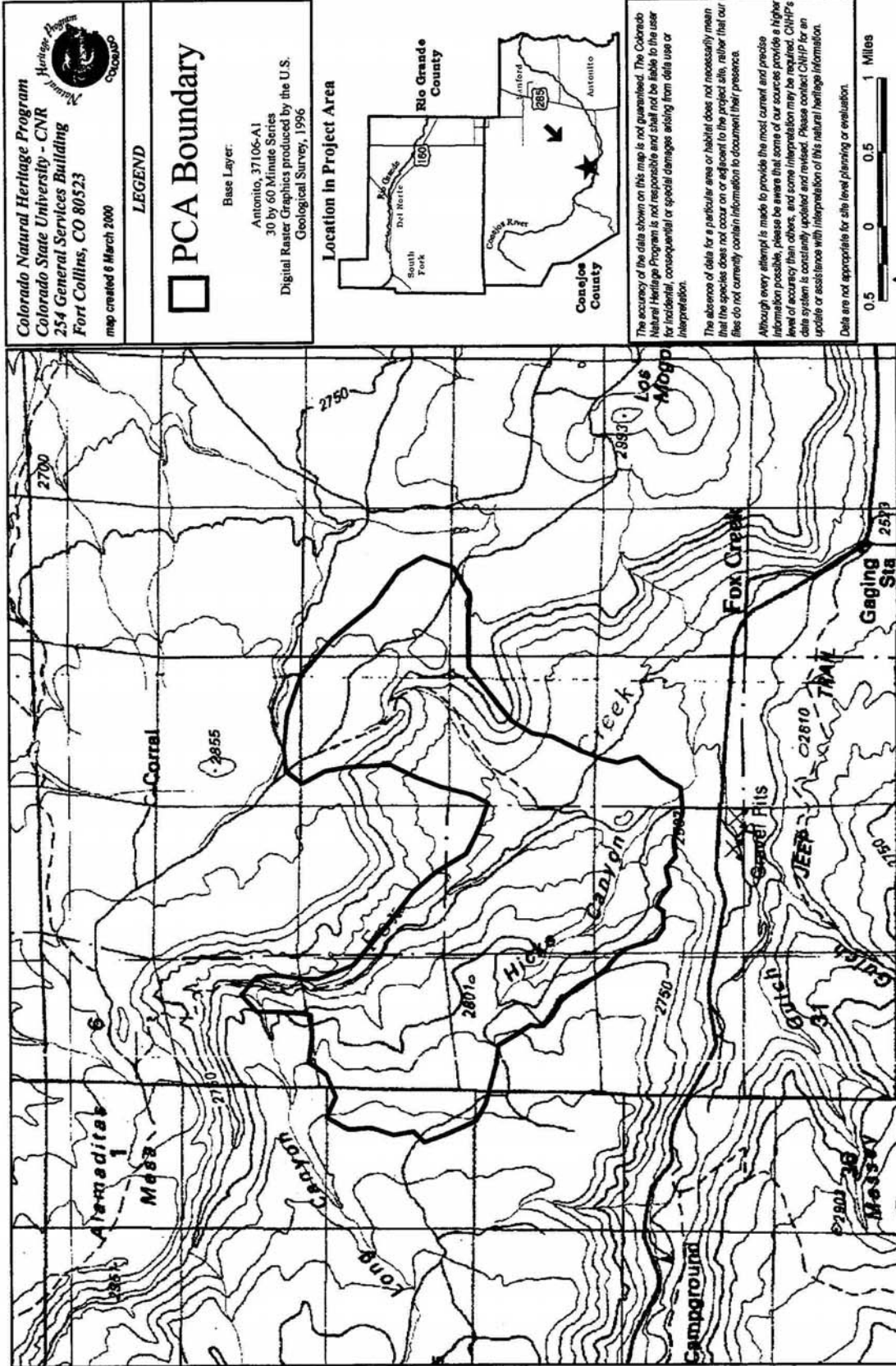


Figure 28. Hicks Canyon

Highway Spring Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site supports a good and excellent example of two riparian plant communities vulnerable on a global scale, a good example of a widespread riparian plant community, a fair and good example of two willow carrs vulnerable on a global scale, and one excellent example of a wetland plant community.

Protection and Management Issues: The majority of the site is publicly owned and managed by the Rio Grande National Forest, while a very small portion is privately owned. The site has no formal protection. Impacts from heavy recreational use associated with a nearby campground could potentially be of concern.

Biodiversity Rank Justification: The site supports an excellent example of the thinleaf alder-red osier dogwood riparian shrubland (*Alnus incana*/*Cornus sericea*), which is widespread throughout the Rocky Mountains. The occurrence at this site is in excellent condition. The site also supports good examples of two narrowleaf cottonwood riparian forests (*Populus angustifolia*/*Alnus incana* and *Populus angustifolia*/*Salix exigua*). Both of these communities are important indicators of fluvial processes and riparian health as they represent mid-seral and early-seral plant communities. The presence of these communities in addition to mature stands of narrowleaf cottonwood and conifers indicates that natural hydrological processes are intact and support a diverse array of successional communities. Also present at the site are good examples of two montane willow carrs (*Salix monticola*/*Calamagrostis canadensis* and *Salix monticola*/Mesic forb), and an excellent example of a submergent wetland plant community (*Sparganium angustifolium*). Overall, the site exhibits high species and habitat diversity.

Table 27. Natural Heritage element occurrences at Highway Spring PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Alnus incana/Cornus sericea</i>	Thinleaf alder-red osier dogwood riparian shrubland	G3G4	S3		A
<i>Populus angustifolia/Alnus incana</i>	Montane riparian forest	G3?	S3		B
<i>Populus angustifolia/Salix exigua</i>	Narrowleaf cottonwood riparian forest	G4	S4		B
<i>Salix monticola/Calamagrostis canadensis</i>	Montane willow carr	G3	S3		B
<i>Salix monticola/Mesic forb</i>	Montane willow carr	G3	S3		C
<i>Sparganium angustifolium</i>	Montane floating/submergent wetland	G4?	S2S3		A

*EO=Element Occurrence

Location: The Highway Springs site is located west of South Fork, along Highway 160 in Rio Grande County. The site is located just below the Highway Springs Campground. U.S.G.S. 7.5-min. quadrangle: Beaver Creek Reservoir
 Legal Description: T39N R03E S 17, 20, 21
 Elevation: 8,400 ft. Approximate Size: 310 acres

General Description: The site encompasses beaver ponds, old oxbows, wet meadows, and scrub/shrub wetlands in addition to riparian communities representing all successional age classes. The site occurs near the confluence of Tewksberry Creek, Beaver Creek, and the South Fork of the Rio Grande. The confluence of these drainages in addition to the many beaver ponds located in the area have created a diverse riparian and wetland complex in a relatively broad floodplain. The riparian vegetation is represented by late (*Populus angustifolia/Picea pungens*), mid (*Populus angustifolia/Alnus incana*), and early seral (*Populus angustifolia/Salix exigua*) plant communities, indicating that fluvial processes (e.g., seasonal flooding, channel scouring, and sediment deposition) are still intact. Narrowleaf cottonwood (*Populus angustifolia*) and coyote willow (*Salix exigua*) were found on point bars and areas of recent disturbance. Thinleaf alder is present in slightly more stable areas, where disturbance from flooding is not as frequent. In areas furthest from the river channel and on slightly higher ground, mature narrowleaf cottonwood and Colorado blue spruce (*Picea pungens*) are the dominant species.

Many beaver ponds and channels were found throughout the site. More recent ponds are dominated by narrowleaved bur-reed (*Sparganium angustifolium*), mare's tail (*Hippuris vulgaris*), and white water-buttercup (*Ranunculus aquatilis*). Around older beaver ponds,

large stands of mountain willow (*Salix monticola*) occur with a diverse understory of Bluejoint reedgrass (*Calamagrostis canadensis*), sedges (*Carex* spp.), and mixed forbs. Wet meadows are dominated by Baltic rush (*Juncus balticus*), Kentucky bluegrass (*Poa pratensis*), and various sedges (*Carex* spp.). Beaked sedge (*Carex utriculata*), water parsnip (*Sium suave*), purple checkermallow (*Sidalcea neomexicana*), and golden banner (*Thermopsis montana*) occupy a large oxbow on the south side of the site. This area has accumulated approximately 25 centimeters of peat and is obviously saturated year round.

Boundary Justification: The entire floodplain of the area is included to allow natural fluvial processes and beaver activity to continue, both of which are crucial for the viability of the elements. Although upstream areas along each of the three drainages are not included, activities in these watersheds could potentially affect the elements.

Protection and Management Comments: The majority of the site is managed by the Rio Grande National Forest. A very small portion along the western side of the site is privately owned. The site has no formal protection.

Direct impacts are associated with recreational use (mainly fishing), but appear minimal. A Forest service campground is located nearby; impacts from recreation should be closely monitored. Non-native species such as Kentucky bluegrass and dandelion (*Taraxacum officinale*) are present but do not appear to be negatively affecting the elements at this time.

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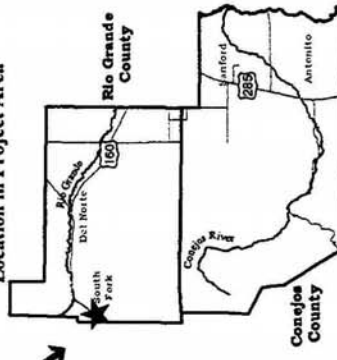


LEGEND

 **PCA Boundary**

Base Layer:
 Beaver Creek Reservoir, 37106-E6
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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A Projection: UTM, Zone13, NAD27

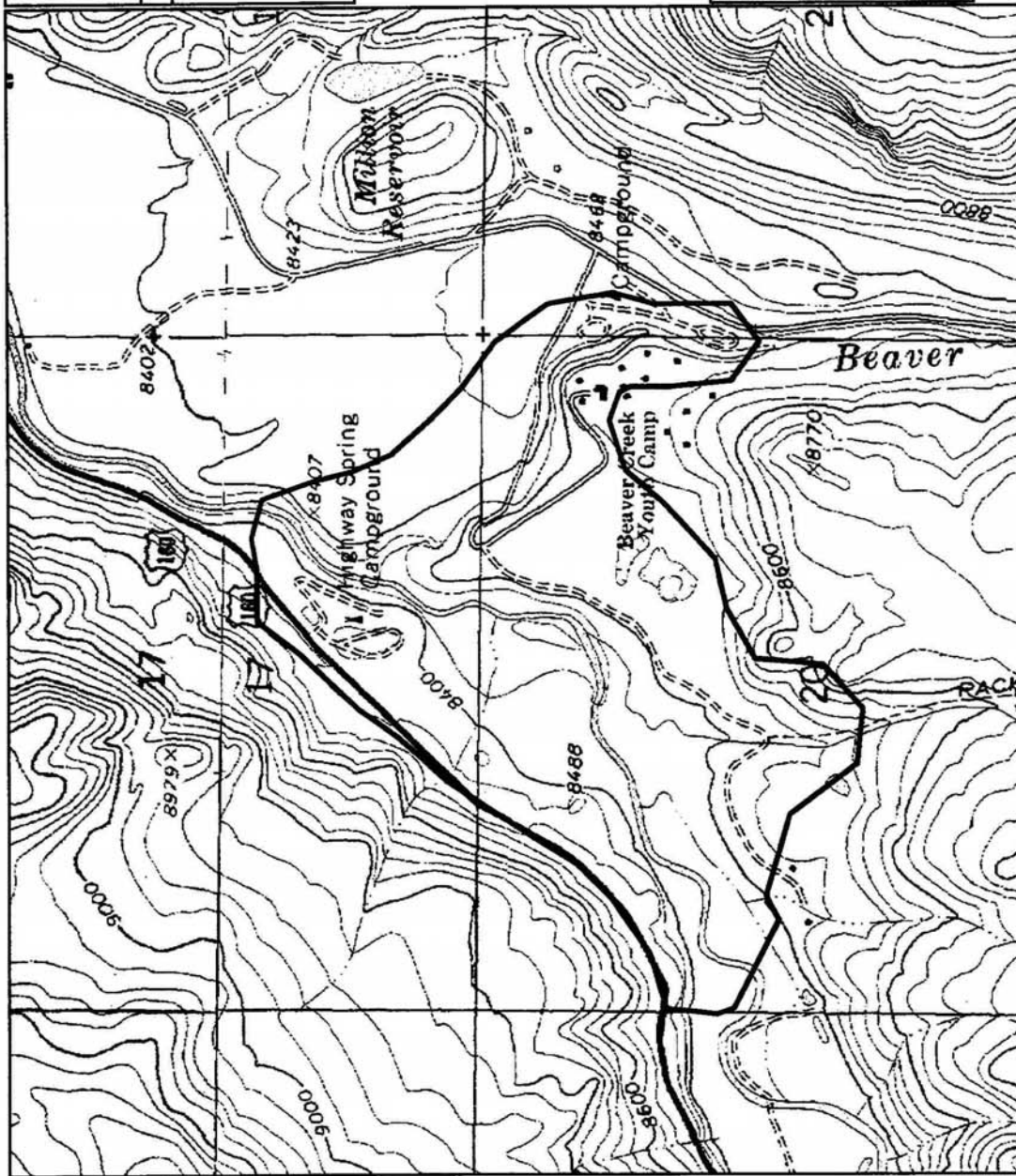


Figure 29. Highway Spring

Hot Creek/La Jara Creek Confluence Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The Hot Creek/La Jara Creek Confluence site supports one good example of a wetland plant community vulnerable on a global scale and one good example of a common riparian plant community.

Protection and Management Issues: The majority of the site is privately owned and has no formal protection. The elements are currently not threatened by management practices. Non-native species along the periphery of the site could potentially impact the plant communities.

Biodiversity Rank Justification: This site contains two elements of concern, with the globally vulnerable montane wet meadow community (*Carex lanuginosa*) being the primary reason for the high biodiversity rank. Although the coyote willow/mesic graminoid community (*Salix exigua*/mesic graminoid) is very common, this stand was the most intact and pristine occurrence located during this survey. Non-native species cover in this stand is estimated at less than 5%. No grazing impacts were observed.

Table 28. Natural Heritage element occurrences at Hot Creek/La Jara Creek Confluence PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Carex lanuginosa</i>	Montane wet meadows	G3?	S3		B
<i>Salix exigua</i> /Mesic Graminoid	Coyote willow/mesic graminoid	G5	S5		B

*EO=Element Occurrence

Location: This site is located approximately ½ mile south of Centro in Conejos County and occurs at the confluence of Hot Creek and La Jara Creek.

U.S.G.S. 7.5-min. quadrangle: Centro

Legal Description: T35N, R08E S 17, 18

Elevation: 7,840-7,870 ft. Approximate Size: 321 acres

General Description: This site occurs near the confluence of Hot Creek and La Jara Creek. The confluence of the two creeks, in addition to many small beaver ponds that line La Jara Creek, has caused permanent impoundment of water over much of the site. It is estimated that at least 150 acres of the site was inundated with approximately six inches of water at the time of the site visit (mid-September). Further upstream along Hot Creek is Hot Creek State Wildlife Area where numerous beaver ponds occur. The impoundment of water caused by these ponds saturate local soils and recharges the local groundwater table, providing perennial flow in Hot Creek. These flows, in addition to those in La Jara Creek (which is supplemented by upstream irrigation along La Jara Creek), are impounded by another series

of beaver ponds near the confluence. This has created a large expanse of emergent marsh and wet meadows between the two creeks.

Woolly sedge (*Carex lanuginosa*), which occurs in sporadic patches throughout the area, is the most dominant community type at this site. Baltic rush (*Juncus balticus*), field mint (*Mentha arvensis*), and silverweed (*Argentina anserina*) occur in wet meadow habitats. Cattail (*Typha latifolia*), spike rush (*Eleocharis palustris*), beaked sedge (*Carex utriculata*), nodding beggarticks (*Bidens cernua*), and water speedwell (*Veronica catenata*) are more prevalent in wetter areas. Coyote willow (*Salix exigua*) is found along the banks of the creeks and edges of beaver ponds. A large stand of coyote willow with a lush understory of mesic graminoids occurs on the western side of the site. In wet meadows along the northern and western portion of the site, signs of grazing become more evident.

Boundary Justification: The inundated area between Hot Creek and La Jara creek, along with numerous beaver ponds, were included within the site boundary. This allows natural sedimentation of beaver ponds and subsequent new channel formation to occur in the area. These hydrologic processes, along with continued beaver activity, are necessary to maintain the mosaic of wetland plant communities and species found at this site. The wet meadows located on the northern and western edge of the site were also included to provide a buffer between the main wetland complex and adjacent agricultural land. Although these areas currently abound with non-native species, future management efforts could potentially reestablish native wet meadow species. Upstream areas are not included in the site boundary, but activities such as water diversions and increased sediment and nutrient loads, occurring in these watersheds (Hot Creek and La Jara Creek) could affect the elements.

Protection and Management Comments: The site is mostly under private ownership. The Bureau of Land Management manages a small parcel, but there is no formal protection.

Impacts from grazing are minimal throughout most of the wetland complex due to very wet conditions (livestock do not appear to enter these areas). Thus, much of the wetland complex is void of non-native species and retains lush, productive growth of native vegetation. However, near the northern and western edges of the site, the soils are drier, evidence of grazing is apparent, and the abundance of non-native species greatly increases. Beyond these weedy meadows, native vegetation has for the most part been cleared for agriculture.

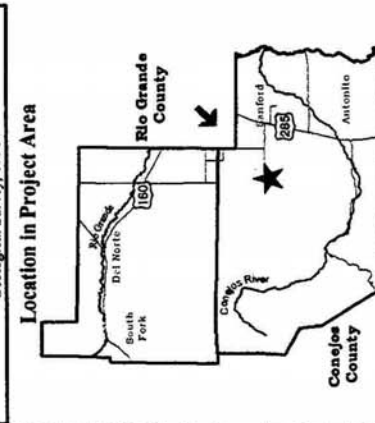
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 Fort Collins, CO 80523
 map created 6 March 2000



LEGEND

PCA Boundary

Base Layers:
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 Centro, 37106-C2
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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A Projection: UTM, Zone13, NAD27

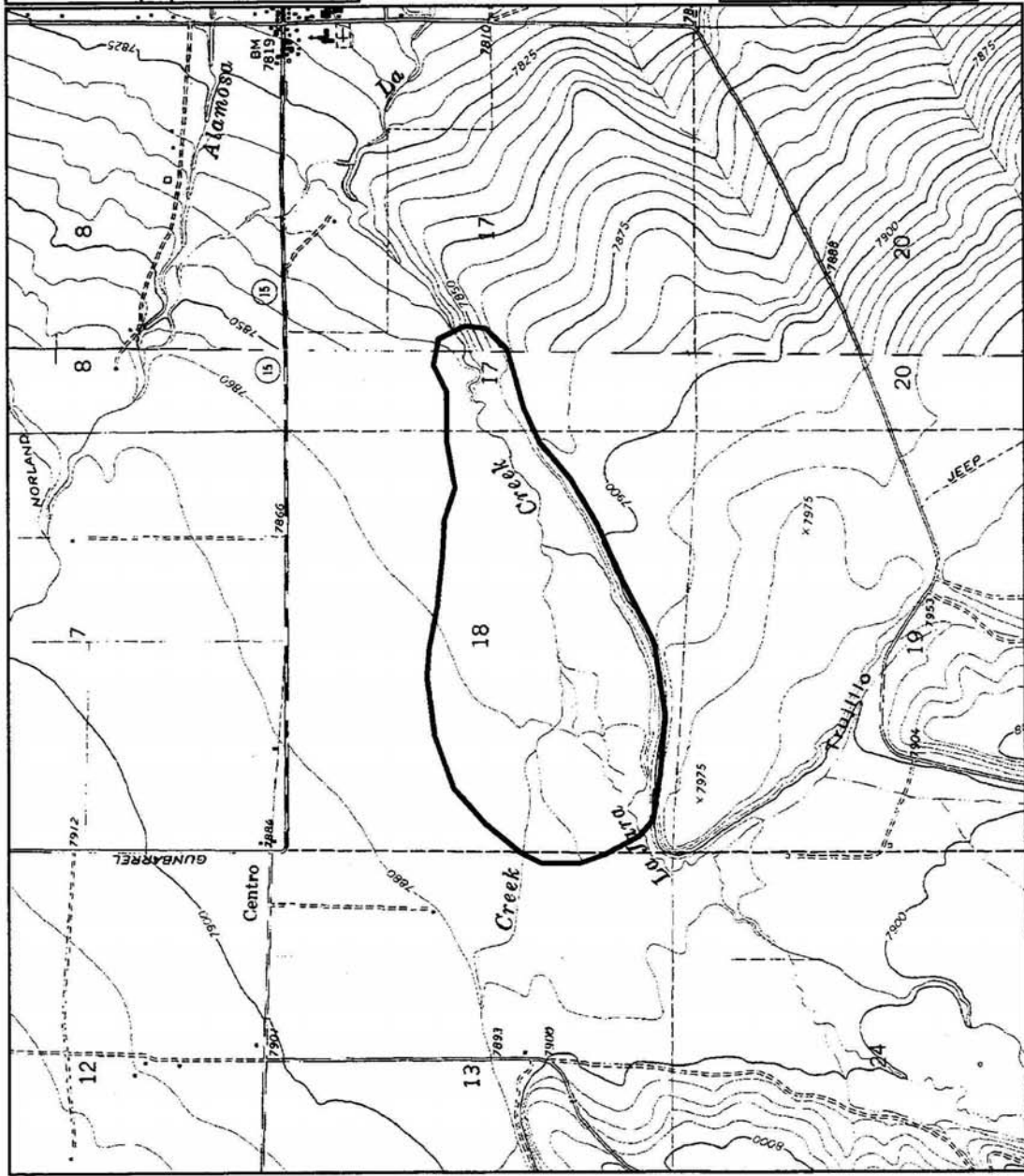


Figure 30. Hot Creek/La Jara Creek Confluence

Indian Head Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site contains a good occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located mainly on public land managed by the Bureau of Land Management with some private land.

Biodiversity Rank Justification: The site contains a good occurrence of a plant species vulnerable on a global scale, rock-loving neoparrya (*Neoparrya lithophila*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Rio Grande and Conejos counties have some of the largest populations of this species. This particular population has over 1000 plants and is, to some extent, naturally protect by the extremely steep topography on which it occurs.

Table 29. Natural Heritage element occurrences at Indian Head PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	B

*EO=Element Occurrence

Location: This site is located approximately 3 miles northwest of Del Norte in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Indian Head

Legal Description: T40N, R5E S 11, 13, 14, 24

Elevation: 8,050-8,588 ft. Approximate Size: 210 acres

General Description: The site includes two separate buttes which rise above flat plains north of the Rio Grande. Grasslands with a diverse forb component and scattered shrubs dominate the buttes. Rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) with blue grama (*Bouteloua gracilis*) in the understory dominate the valley flats around the site. Several gravel and two-track roads run near the site and an old irrigation diversion occurs to the north. Much of the valley to the west of the site is privately owned and has been subdivided.

Boundary Justification: The main threat to the rock-loving neoparrya would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya may also require other types of habitat. The pollinators are unknown, consequently we are uncertain if the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on public land managed by the Bureau of Land Management and privately owned land. Private lands to the west have been subdivided.

Several gravel and two-track roads run near the site. We observed no impact from this but the roads may serve as corridors for invasion of non-native species or other impacts in the future. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control.

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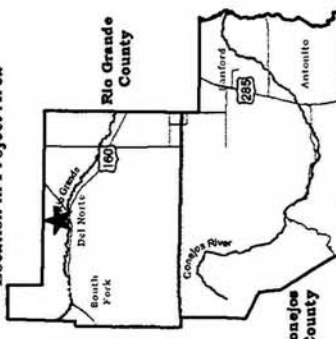


LEGEND

 **PCA Boundary**

Base Layer:
 Indian Head, 37106-F4
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone 13, NAD27

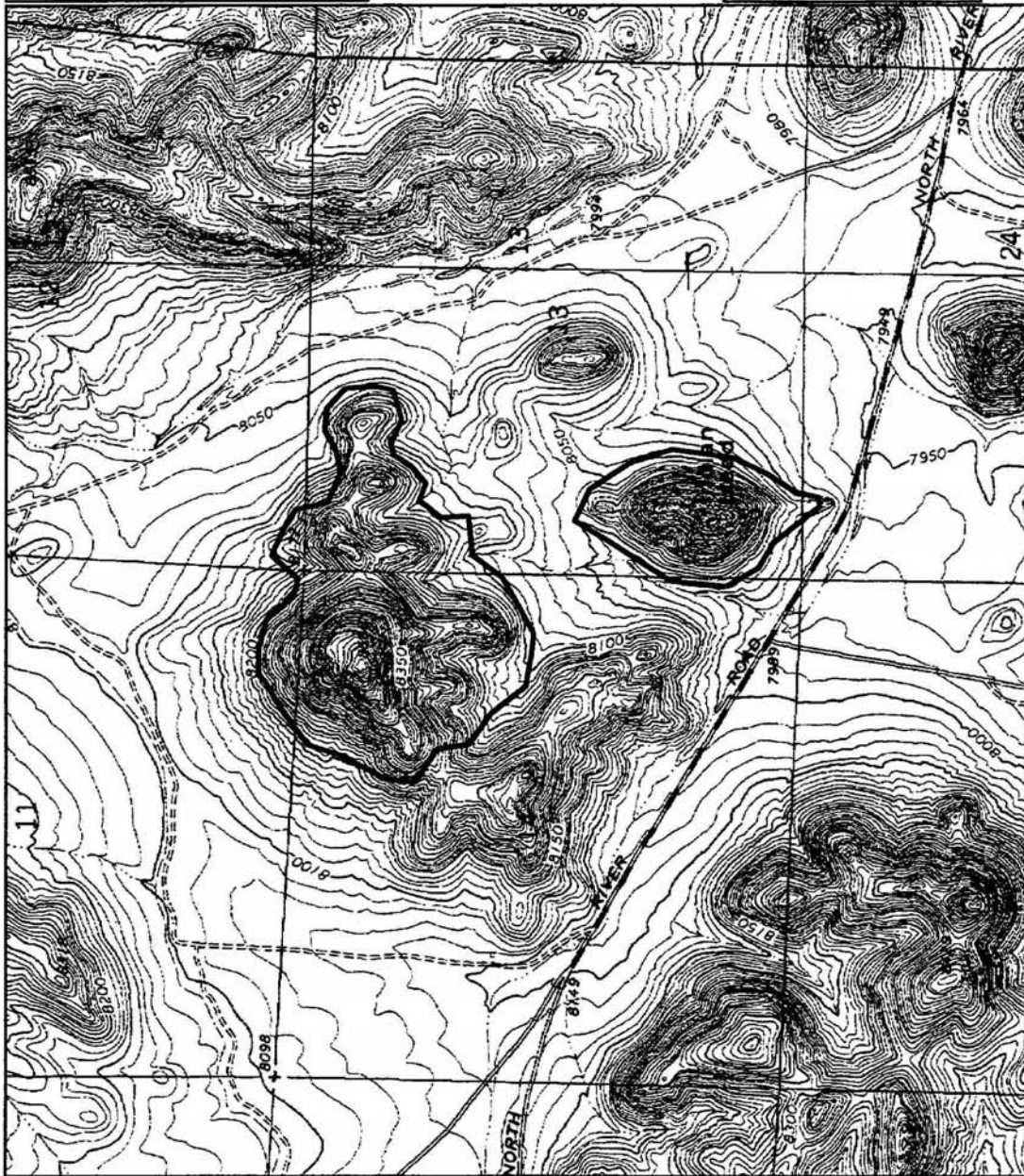


Figure 31. Indian Head

Iron Creek Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site supports fair examples of two plant species imperiled on a global scale and one plant species vulnerable on a global scale. In addition, the site also supports three small examples of a globally imperiled to vulnerable wetland plant community.

Protection and Management Issues: Much of the site is publicly owned and managed by the Rio Grande National Forest, however there are mining claims within the site boundaries. Remnants of an abandoned mine exist on the site and a few occupied private cabins are within site boundaries. There is no formal protection status given to this area. The site was logged prior to 1967 and probably much earlier based on the condition of rotting stumps. The area is regenerating very slowly. Hydrologic modifications could impact the wetlands.

Biodiversity Rank Justification: The occurrences of the two plants imperiled on a global scale, reflected and pale moonworts (*Botrychium echo* and *B. pallidum*, respectively), are the primary reason for the high biodiversity rank. Another plant species vulnerable on a global scale, the western moonwort (*Botrychium hesperium*) is known from the site. In addition to these species, three small occurrences of an extremely unusual wetland type (iron fen) were also located at this site.

Iron fens are unusual peatlands where the surface/groundwater pH and plant species are typical of ombrotrophic bogs and acidic, nutrient poor fens (pH < 4.4), while the concentration of ions is more typical of rich and extreme rich fens (pH > 6.0) (Cooper 1999). The combination of species (more typical of true bogs) that occur in iron fens is rare in Colorado (approximately 8 large occurrences of iron fens are known in the state). Mineralized zones in Idaho, Montana, Wyoming, and South Dakota may contain similar wetlands (George Jones – pers. comm.). For example, there is an Iron Bog Research Natural Area within the Challis National Forest in Idaho where cation concentrations and pH are very similar to the iron fens documented here in Colorado (Fred Rabe - pers. comm.). More research is needed within the Rocky Mountain region to determine the extent of this wetland type.

Table 30. Natural Heritage element occurrences at Iron Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Botrychium echo</i>	Reflected moonwort	G2	S2		C
<i>Botrychium hesperium</i>	Western moonwort	G3	S2		E
<i>Botrychium pallidum</i>	Pale moonwort	G2	S2		C
Plant Communities					
<i>Carex aquatilis</i> / <i>Sphagnum spp.</i>	Iron Fen	G2G3	S2?		E

*EO=Element Occurrence

Location: The Iron Creek site occurs along Iron Creek approximately 3 miles south-southwest of Summitville in Conejos County.

U.S.G.S. 7.5-min. quadrangle: Summitville, Platoro

Legal Description: T36N R04E S 7
T36N R03E S 1, 12
T37N R04E S 31

Elevation: 10,200-12,400 ft. Approximate Size: 1,440 acres

General Description: The site occurs along a steep drainage and includes much smaller and steeper tributaries. The area is characterized by moderate to steep mountain slopes covered with Engelmann spruce (*Picea engelmannii*), aspen (*Populus tremuloides*), and common juniper (*Juniperus communis*). The globally imperiled and vulnerable moonworts (*Botrychium echo*, *B. pallidum*, and *B. hesperium*) were found growing in disturbed areas (e.g., old logged areas, roadsides, etc.). Associated plant species in these areas included: wild strawberry (*Fragaria virginiana* spp. *glauca*), clover (*Trifolium* sp.), spike trisetum (*Trisetum spicatum*), blueberry (*Vaccinium myrtillus* spp. *oreophilum*), pine dropseed (*Blepharoneuron tricholepis*), yarrow (*Achillea lanulosa*), *Oreochrysum parryi*, bottle gentian (*Pneumonanthe parryi*), dwarf fleabane (*Erigeron vetensis*), and goldenrod (*Solidago spathulata* var. *neomexicana*). This Goldenrod species is a diagnostic plant which indicates potential moonwort habitat.

A few small occurrences of iron fens were located along the Iron Creek drainage. Iron fens are unusual peatlands in that surface/groundwater pH and the associated plant species are typical of ombrotrophic bogs and acidic, nutrient poor fens, while the concentration of ions is more typical of rich and extreme rich fens (Cooper 1999). Peatlands are usually classified along a chemical gradient (pH and concentration of cations such as Ca^{2+} , Na^+ , K^+ , and Mg^{2+}). The gradient is typically as follows: ombrotrophic bogs and poor fens are characterized by low pH and low cation concentration, whereas rich and extreme rich fens (e.g., High Creek Fen near Fairplay, CO) are characterized by high pH and high cation concentration. Iron fens do not fit into this gradient because of the unusual biogeochemistry (low pH but high concentration of cations (especially Ca^{2+} and SO_4^{2-}). This occurs due to groundwater and surface water draining through rock rich in pyrite. As the pyrite becomes oxidized, it produces a sulfuric acid, which leaches ions from surrounding rock while also creating an acidic solution, leading to a nutrient rich yet acidic water supply (Cooper 1999). Iron fens are characterized by limonite ledges, which form when iron precipitates out of solution and then solidifies into hard rock. Organic substrates (e.g., peat and coarse woody debris) often are mixed with the iron precipitate thus limonite often contains large amounts of organic materials. The plant species typically found in iron fens include: bog birch (*Betula glandulosa*), dwarf blueberry (*Vaccinium cespitosum*), creeping wintergreen (*Gaultheria humifusa*), swamp-laurel (*Kalmia microphylla*), water sedge (*Carex aquatilis*), bluejoint reedgrass (*Calamagrostis canadensis*), with a continuous carpet of mosses mainly dominated by sphagnum peat moss (*Sphagnum* spp).

The iron fens located at this site were supported by seepage passing over oxidizing pyritic rock causing seepage waters to have a low pH (<4.0). The extent of acidic drainage was often very narrow and areas with low pH often rapidly graded into more alkaline areas where pH was above 6.5. Poor fen sphagnum (*Sphagnum angustifolium*), water sedge, and bluejoint reedgrass are the dominant species whereas dwarf blueberry, creeping wintergreen, and a few other mosses (*Pohlia longicolla*, *Polytrichastrum longisetum*, and *Hypnum lindbergii*) are less abundant. The peat in two of the occurrences was very deep despite being on extremely steep slopes. Although the three occurrences found were quite small, there is high probability that many other small iron fens occur in the area (CNHP was unable to search all potential locations). A large number of small iron fens in one area may have as much or more conservation value than a single large system.

Boundary Justification: The site encompasses most hydrological sources, except for those originating upstream in Schinzel Flats. This also includes habitat in the area that may support additional moonwort populations and to allow the elements additional areas to establish.

Protection and Management Comments: Although the Rio Grande National Forest manages much of the site, there are numerous mining claims within the site boundaries. A few occupied private cabins and remnants of an abandoned mine are within site boundaries. There is no formal protection status given to this area.

The site was logged prior to 1967 and probably much earlier based on the condition of rotting stumps. The area is regenerating very slowly. For example, one of the cabin occupants appears to have rerouted a small tributary that flows near one of the iron fens. Although this does not appear to have affected the iron fen (the area was still saturated and the seep, supporting the fen, was still flowing), long term results could be negative.

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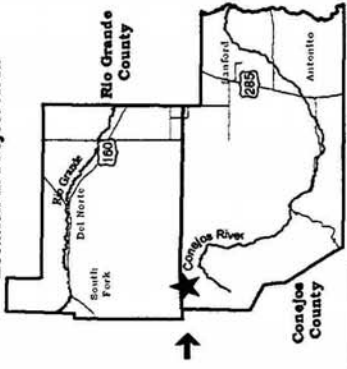


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 **PCA Boundary**

Base Layer:
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 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
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Location in Project Area

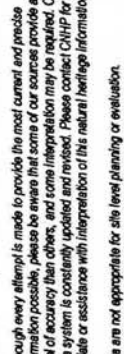


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The absence of data for a particular area or habitat does not necessarily mean that the species does not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence.

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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone 13, NAD27

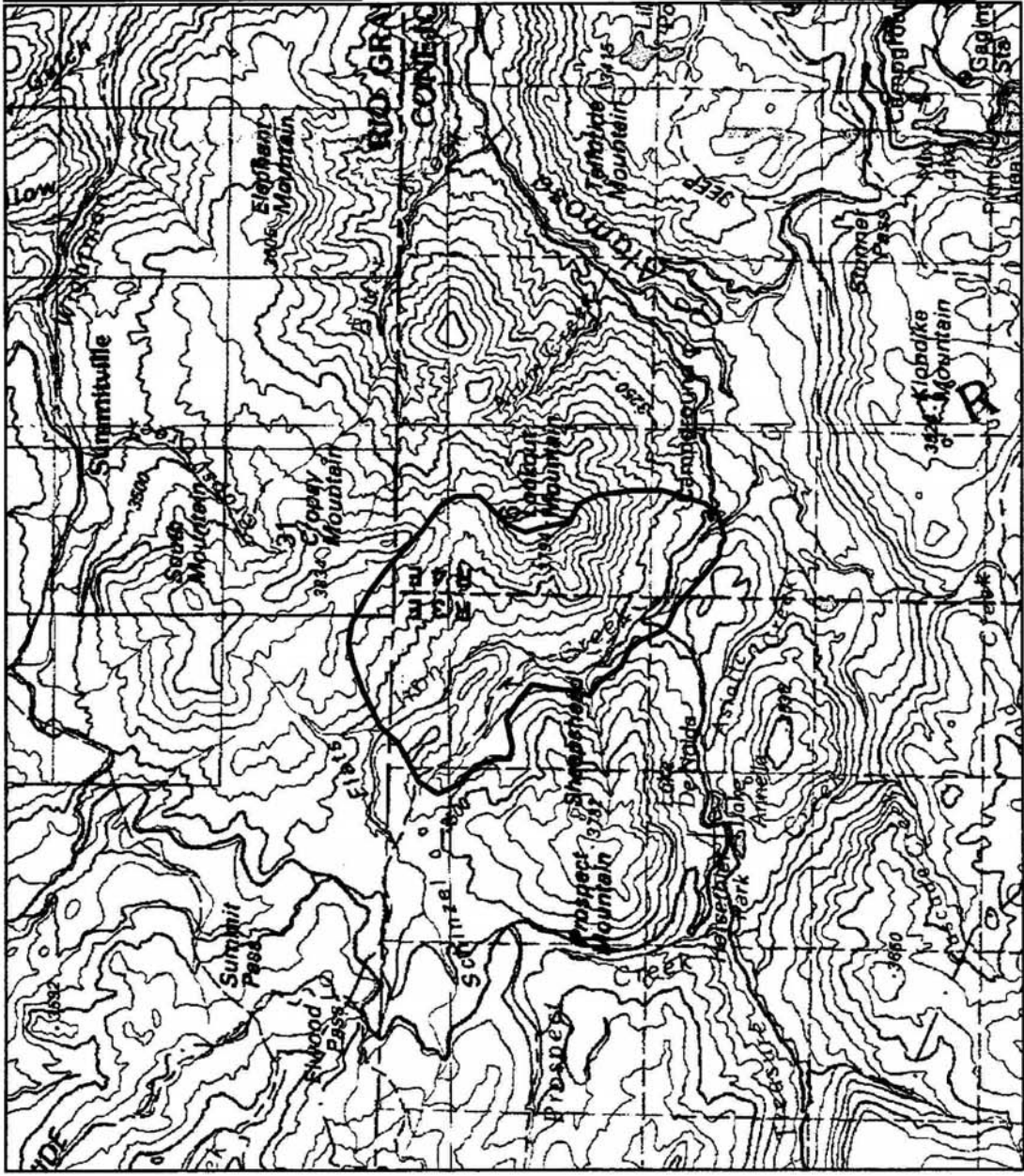


Figure 32. Iron Creek

Lake Fork Potential Conservation Area

Biodiversity Rank: B3 (High significance)

This site contains a good occurrence of a willow carr plant community imperiled on a global scale and a good occurrence of a fish that is vulnerable on a global scale.

Protection and Management Issues:

Lands within this site are both privately owned and publicly owned and managed by the Rio Grande National Forest. Management and protection of the elements found within this site might include prevention of introduced fish stock and minimization of negative grazing impacts.

Biodiversity Rank Justification: This site contains two elements of concern at two locations. The quality of the riparian-associated community and the healthy population of stocked Rio Grande cutthroat trout contribute to the rank of this site. The montane riparian willow carr (*Salix monticola*/mesic graminoid) plant community is not well documented in Colorado. In Colorado, this association is documented at six locations, and an additional twenty to fifty stands are estimated to occur. Stands with native herbaceous undergrowth intact are uncommon, as excessive livestock grazing, stream flow alterations, and heavy recreational use have altered many.

The quality of the reintroduced population of Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) also contributes to the rank of this site. As of the early 1990's, it was estimated that there were only approximately 60-70 relatively pure populations of Rio Grande cutthroat trout from New Mexico and another 30-40 in Colorado (Rinne 1995). This fish is considered "sensitive" by the U.S. Forest Service and is on the State list of species of concern.

Table 31. Natural Heritage element occurrences at Lake Fork PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Salix monticola</i> /mesic graminoids	Montane willow carr	G3	S3		B
Fish					
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	G4T3	S3	FS, BLM, SC	B

*EO=Element Occurrence

Location: This site is located approximately 1 mile south of the Lake Fork Campground in Conejos County.

U.S.G.S. 7.5 minute quadrangles: Platoro and Red Mountain

Legal Description: T36N, R4E S 26, 35, 36

T35N, R4.5E S 2, 11

T35N, R4E S 1

Elevation: 9,400-9,800 feet

Approximate Size: 977 acres

General Description: This site encompasses the riparian floodplain of Lake Fork of Conejos River from where Lake Fork meets the Conejos River drainage to Big Lake. The site encompasses approximately 4.2 miles of Lake Fork.

This site was drawn to ensure the Rio Grande cutthroat trout population reintroduced to Lake Fork has sufficient habitat at the known location and further upstream. Rio Grande cutthroat trout thrive in waters with a mixture of pools and riffles, in-stream boulders and other structure, good cover of riparian vegetation, and mild slopes (Trotter 1987).

Boundary Justification: The boundaries are drawn to provide habitat for the occurrence of the vulnerable montane willow community and the occurrence of cutthroat trout. The boundary of this site is limited to 300 meters on either side of the stream system to provide adequate riparian vegetation for cover and possible prey (insect) needs of the cutthroat, yet this potential conservation area, in and of itself, may not be sufficient to ensure the persistence of the population. Changes in the hydrologic regime upstream from the site need to be considered for long-term persistence of the elements.

Protection and Management Comments: This site is within private and public lands.

Little information is available on conservation strategies for native cutthroat trout (Young 1995). However, the primary threats that have been identified for the Rio Grande cutthroat are management issues, specifically grazing of domestic livestock and water diversion for irrigation (Behnke and Zarn 1976, Behnke 1992, Stumpff and Cooper 1996). To adequately plan for the conservation of the cutthroat trout population identified in this site, biologists and planners should address land management within the immediate watershed. Stumpff and Cooper (1996) recognize that all too frequently management plans focus directly on the riparian area and try to limit impacts in those areas, yet land management in the entire watershed needs to be considered to adequately protect cutthroat trout. Also, exclusion of non-native fish species is vital to the persistence of cutthroat trout populations.

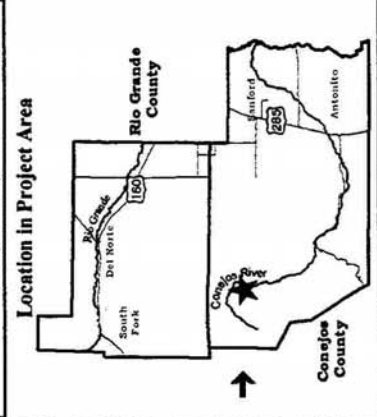
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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone 13, NAD27

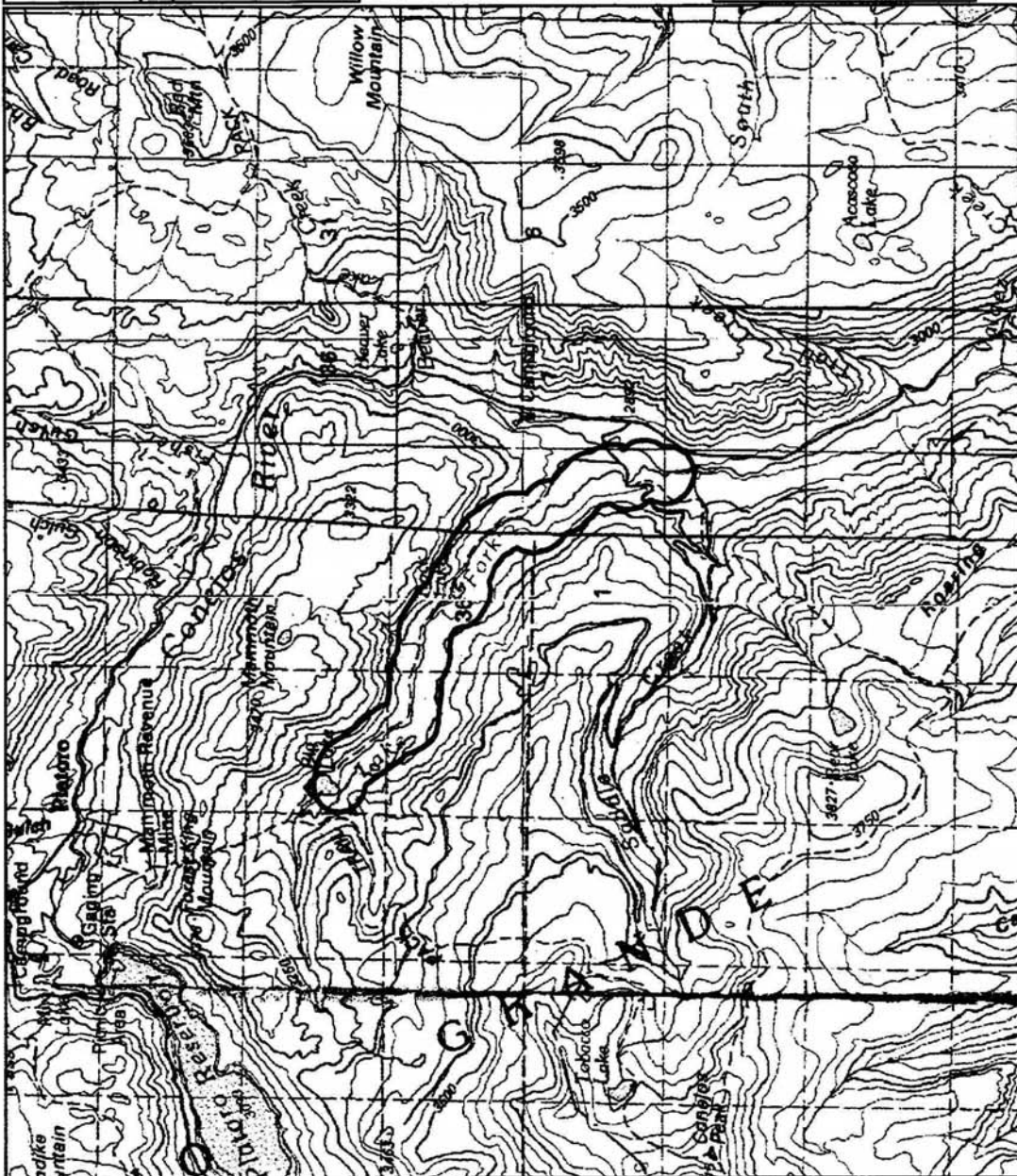


Figure 33. Lake Fork

La Manga Creek Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site supports good examples of a riparian plant community vulnerable on a global scale and a widespread riparian plant community.

Protection and Management Issues: The entire site is managed by the Rio Grande National Forest but has no formal protection. Grazing is occurring in some portions of the site, however many areas are too dense in willow growth for livestock to penetrate. CO Highway 17 parallels the site along its eastern edge and could potentially contribute excess heavy metals and sediment to the site. Presence of non-native species is minimal.

Biodiversity Rank Justification: The site supports a good example of a montane willow carr community (*Salix monticola*/Mesic forb). This plant community appears to only occur in Colorado where mountain willow (*Salix monticola*) appears to be at the center of its distribution. In addition, the site supports a good example of a subalpine riparian willow carr (*Salix planifolia*/*Caltha leptosepala*).

Table 32. Natural Heritage element occurrences at La Manga Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Salix monticola</i> /Mesic forb	Montane riparian willow carr	G3	S3		B
<i>Salix planifolia</i> / <i>Caltha leptosepala</i>	Subalpine riparian willow carr	G4	S4		B

*EO=Element Occurrence

Location: The La Manga Creek site is approximately 1 ½ miles north of the La Manga Pass along CO Highway 17 in Conejos County.

U.S.G.S. 7.5-min. quadrangle: Cumbres

Legal Description: T33N R05E S 13, 14

Elevation: 9,960 ft. Approximate Size: 220 acres

General Description: The site is located along La Manga Creek and supports a high diversity of willows and understory species. For example, mountain willow (*Salix monticola*), Drummond willow (*S. drummondiana*), planeleaf willow (*S. planifolia*), Booth willow (*S. boothii*), and wolf willow (*S. wolfii*) are found growing along the stream bank. The understory in these areas is dominated by bluejoint reedgrass (*Calamagrostis canadensis*), water sedge (*Carex aquatilis*), marsh marigold (*Caltha leptosepala*), and heart-leaved bittercress (*Cardamine cordifolia*) along with many other forbs. On the west side of the creek, there are many small seeps that support dense stands of planeleaf willow and marsh marigold. These seeps drain into La Manga Creek and are an important factor in supporting the diverse assemblage of species at this site.

Boundary Justification: The numerous seeps on the west side of the creek are encompassed within the site because the hydrological contribution is necessary for the long-term viability of the elements.

Protection and Management Comments: The entire site is managed by the Rio Grande National Forest but has no formal protection.

Grazing is occurring in some portions of the site, however many areas are too dense in willow growth for livestock to penetrate. CO Highway 17 parallels the site along its eastern edge and could potentially contribute excess heavy metals and sediment to the site. The highway might also serve as a corridor for non-native species. The amount of non-native species on the site is minimal but Kentucky bluegrass (*Poa pratensis*) and dandelion (*Taraxacum officinale*) are present.

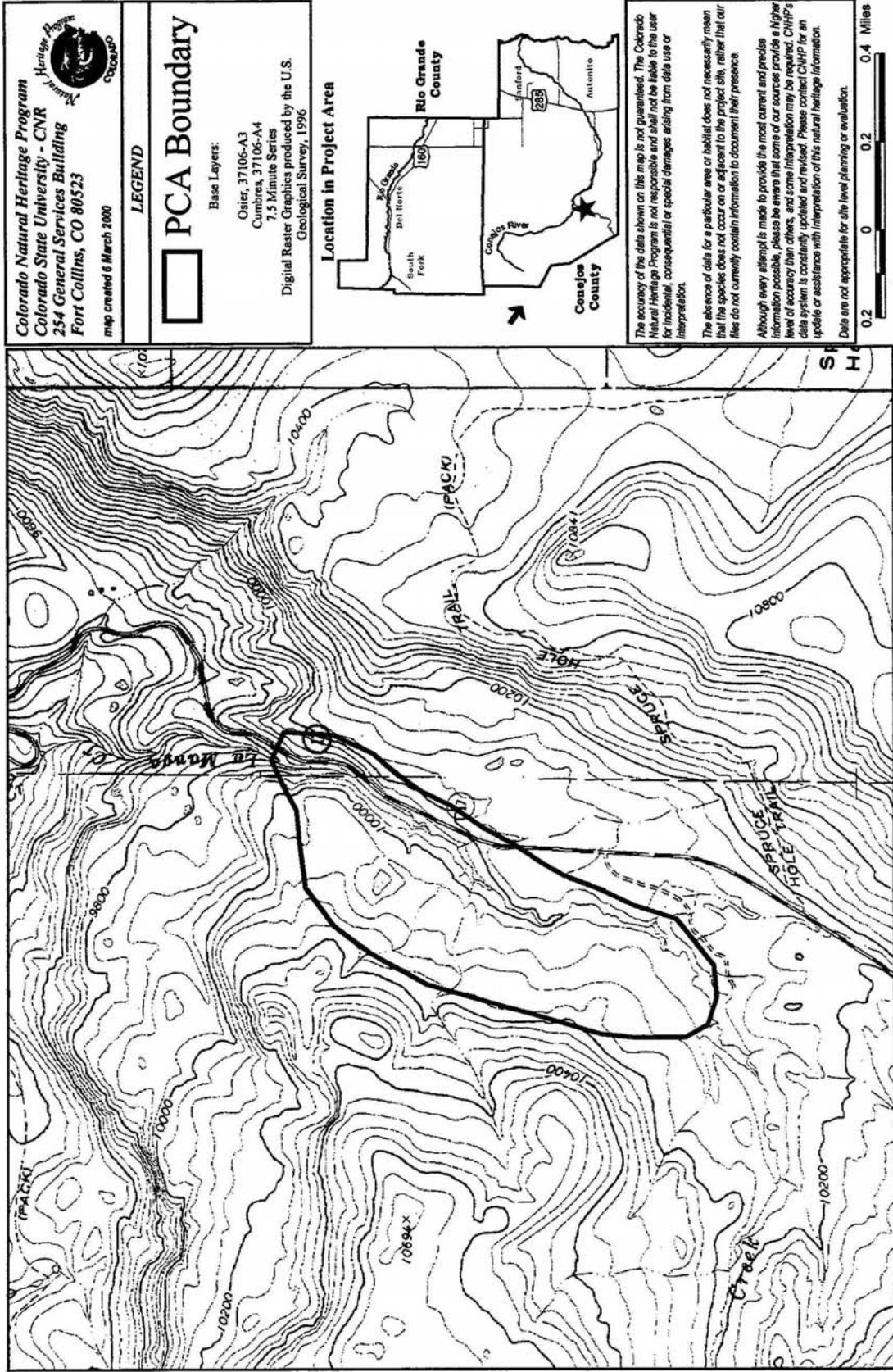


Figure 34. La Manga Creek

Lower Rock Creek Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The Lower Rock Creek site supports one fair example of a plant species imperiled on a global scale, one good example of a wetland plant community vulnerable on a global scale, and one fair example of a wetland plant community vulnerable in Colorado.

Protection and Management Issues: The entire site is privately owned. However, most of the site is owned by a single landowner that has shown a strong interest in placing a conservation easement on the property. Management concerns include alteration of current hydrology (a portion of which is believed to be derived from irrigation) and runoff and barrier functions of CO Highway 15. Current grazing management does not appear to be affecting the elements, however long-term effects should be monitored.

Biodiversity Rank Justification: This site contains three elements of concern. The scattered population of the globally imperiled slender spiderflower (*Cleome multicaulis*) is the primary reason for the high biodiversity rank. The slender spiderflower has a global range from southern Wyoming to central Mexico. The San Luis Valley contains the most numerous, largest, and healthiest populations in the world. Slender spiderflower has a limited distribution due to its requirement of moist alkaline soil along with periodic soil disturbance, such as pocket gopher (*Thomomys* sp.) diggings. These habitat requirements limit the slender spiderflower to the edges of alkaline wet meadows and playas. The site also supports two types of wet meadows (*Carex atherodes* and *C. lanuginosa*). The woolly sedge wet meadow (*C. lanuginosa*) located at this site is the largest and best occurrence of this community found in both Rio Grande and Conejos county during this survey.

Table 33. Natural Heritage element occurrences at Lower Rock Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Cleome multicaulis</i>	Slender spiderflower	G2G3	S2S3	BLM	C
Plant Communities					
<i>Carex atherodes</i>	Awned sedge wet meadow	G4	S2?		C
<i>Carex lanuginosa</i>	Montane wet meadows	G3?	S3		B

*EO=Element Occurrence

Location: This site is located approximately 3.5 miles south of Monte Vista and east of Colorado Highway 15 in Rio Grande County. The site is adjacent (northwest) to the Monte Vista National Wildlife Refuge.

U.S.G.S. 7.5-min. quadrangle: Homelake and Monte Vista

Legal Description: T38N, R08E S 17, 18, 19, 20, 29, 30

Elevation: 7,625-7,640 ft. Approximate Size: 2,050 acres

General Description: This site contains an extensive stand of native wet meadows, emergent marshes, and saline bottomland shrublands. Hay meadows and pasture surround the site in all directions except south, where the site abuts the Monte Vista National Wildlife Refuge. Colorado Highway 15 skirts the west side of the site.

Aerial photographs and National Wetland Inventory (NWI) maps indicate that Rock Creek contributes much to the hydrology of this site. The broad alluvial fan associated with Rock Creek appears to funnel groundwater into the valley sediments where it discharges and supports native wet meadows, emergent marshes, and saline wetlands. It is assumed that a substantial amount of irrigation water supplements natural groundwater discharge to support the wetlands found at this site. The combination of these two hydrologic sources has given rise to very extensive stands of native wetland vegetation.

It is estimated that approximately 300 acres of this site are dominated by woolly sedge (*Carex lanuginosa*), with species such as small beaked sedge (*C. simulata*), beaked sedge (*C. utriculata*), awned sedge (*C. atherodes*), and spikerush (*Eleocharis palustris*) forming smaller stands. Sloughgrass (*Beckmannia syzigachne*) and Baltic rush (*Juncus balticus*) are also fairly common throughout the area. Most of the site had at least four inches of standing water present at the time of the site visit in mid-September. Some areas had deeper water where cattail (*Typha latifolia*) dominated the edges of open water wetlands. Small knolls are interspersed throughout the area, these being dominated by greasewood (*Sarcobatus vermiculatus*), saltgrass (*Distichlis spicata*), Baltic rush, and alkali sacaton (*Sporobolus airoides*) while broom seepweed (*Suaeda calceoliformis*) was found growing in highly saline areas where salt crusts on the soil surface were evident. Slender spiderflower (*Cleome multicaulis*) was found growing on every knoll that was visited. The size of the population on any given knoll was never very large, however the consistent occurrence of this species on the knolls put the total number of individuals near 2,000. It is estimated that many more individuals occur on nearby knolls that were not visited.

Due to persistent inundation and abundance of food sources, this site has high potential value for migrating waterbirds. During the site visit, approximately 100 Greater Sandhill Cranes (*Grus canadensis tabida*) were observed.

Boundary Justification: The site boundary encompasses the area in which groundwater discharge appears to be the greatest. Areas on the periphery of the site, where groundwater discharge and irrigation are not as prevalent, were also included to provide a buffer from non-native species and intense grazing. The buffer may also provide a filter for surface water runoff from nearby hay meadows and pastures that might contain heavy nutrient and sediment loads. Although Rock Creek was not captured within the site boundaries, actions affecting the volume and timing of water from this drainage would likely affect the elements at this site.


Protection and Management Comments: The entire site is privately owned, most of it by a single landowner. This particular landowner has shown much interest in placing a

conservation easement on this site. An easement on this particular property would be very beneficial toward the conservation of the elements, especially the slender spiderflower.


Grazing does occur in the area and cattle were observed within the site, however impacts appear to be minimal and limited to the knolls. The remaining portion of the site appears to be too wet for livestock to congregate. Some portions of the site are managed for native hay production but many areas appear to be too wet for mowing. Most of the site had not been cut by mid-September. The fact that the site is inundated for much of the growing season has kept non-native species from establishing. Non-native and aggressive weedy species were only observed along the access road to the site. The periphery of the site, where groundwater discharge and irrigation are not as prevalent, are under more intense grazing management than the rest of the site.

Current management concerns also include a change in hydrology and Colorado Highway 15. Any changes to the current hydrology of the site could potentially lead to the establishment of unwanted species. Management of upstream lands along Rock Creek could have a large impact on hydrology, water quality, and species composition. Highway 15 serves as an artificial boundary on the west side. This road is a barrier to surface water movement from the Rock Creek drainage and may affect groundwater movement near the soil surface. The road also provides a corridor for non-native species that could potentially invade the site if hydrological conditions change. In addition, runoff from the road may carry excess sediment, nutrients, and heavy metals into the area.

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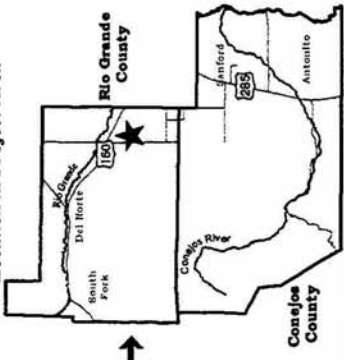


LEGEND

 **PCA Boundary**

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Location in Project Area



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Projection: UTM, Zone 13, NAD27

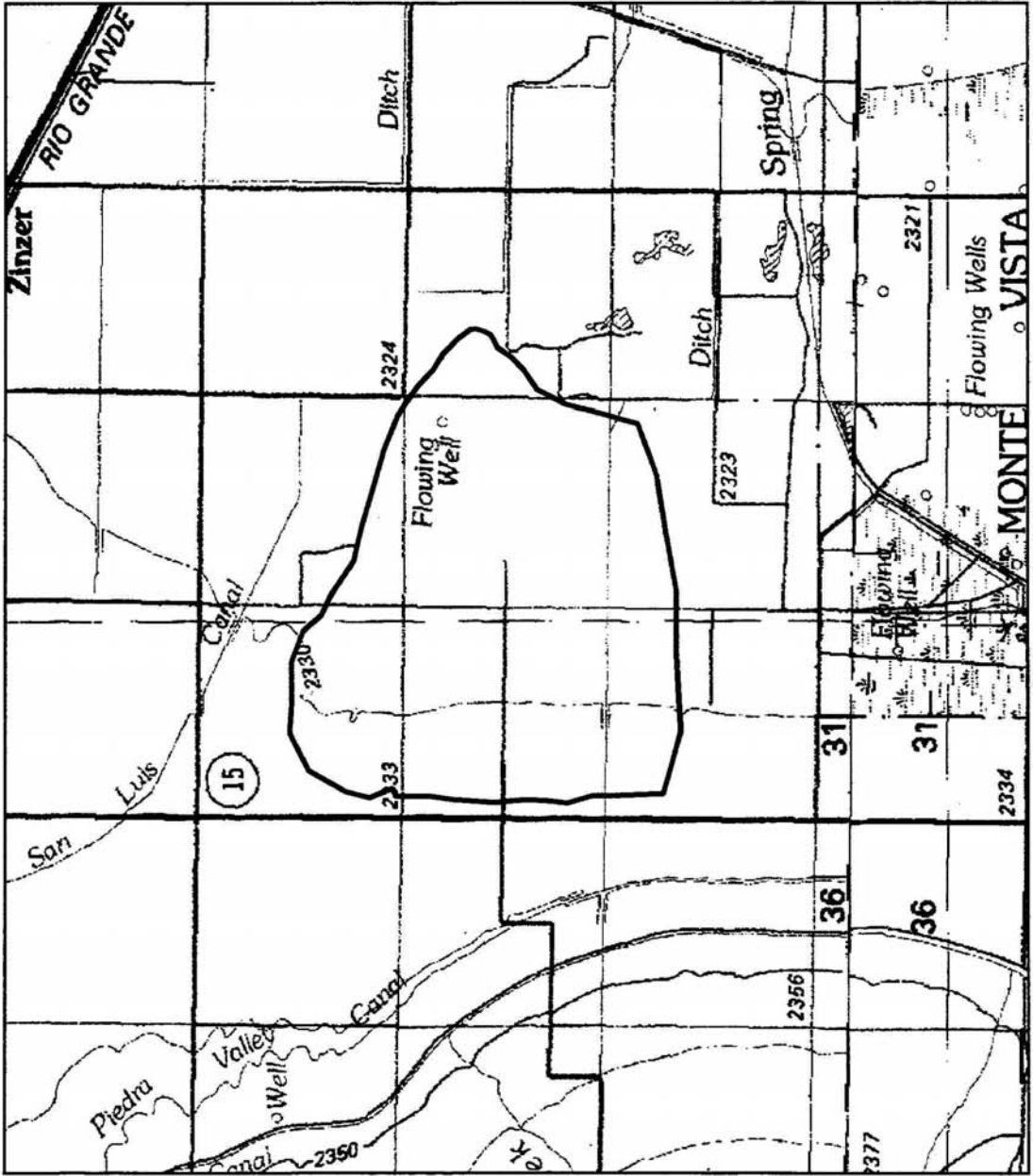


Figure 35. Lower Rock Creek

McIntire Springs Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The McIntire Springs site supports two good occurrences of a fish vulnerable on a global scale and critically imperiled in Colorado, one fair example of a wetland plant community imperiled in Colorado, and two good examples of widespread plant communities.

Protection and Management Issues: The majority of land in this site is publicly owned and managed by the Bureau of Land Management. A small parcel on the northern end is owned by the State of Colorado (Pikes Stockade Historic Site) and there may also be some private land encompassed in the site. This site currently has adequate protection.

No grazing has occurred on the site in the past five years and irrigation has not been conducted since 1988. Although the site still contains a fair number of non-native species (especially in the wet meadows), the area is recovering. The BLM intends to manage the site specifically for cultural and natural resources allowing only non-motorized recreational opportunities, which are compatible with the management objectives, to occur.

Biodiversity Rank Justification: The two populations of the Rio Grande chub (*Gila pandora*) found at this site are the primary reason for the site's high biodiversity rank. The Rio Grande chub was once widespread in creeks of the upper Rio Grande and Pecos watersheds of New Mexico and the upper Rio Grande watershed of southern Colorado. Populations are reported to be stable in New Mexico but are declining in Colorado. The site also supports a fair example of the state vulnerable giant bur-reed (*Sparganium eurycarpum*) plant community (which is also considered a state imperiled plant), a good example of the widespread beaked sedge (*Carex utriculata*) wet meadow, and a good example of the widespread narrowleaf cottonwood riparian forest (*Populus angustifolia*/*Salix exigua*). The riparian communities at this site are thought to be the best remaining riparian habitat along the Conejos River (Mike Cassell - pers. comm.).

Table 34. Natural Heritage element occurrences at McIntire Springs PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Sparganium eurycarpum</i>	Giant bur-reed	G5	S2?		
Plants Communities					
<i>Carex utriculata</i>	Beaked sedge wet meadow	G5	S4		B
<i>Populus angustifolia/Salix exigua</i>	Narrowleaf cottonwood riparian forest	G4	S4		B
<i>Sparganium eurycarpum</i>	Foothills submergent wetland	G5	S2S3		C
Fish					
<i>Gila pandora</i>	Rio Grande chub	G3	S1?	SC	B
<i>Gila pandora</i>	Rio Grande chub	G3	S1?	SC	B

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: The McIntire Springs site is located 9 miles east of La Jara in Conejos County and is adjacent to the Conejos River.

U.S.G.S. 7.5 min. quadrangle: Pikes Stockade

Legal Description: T35N R10E S 12,13
T35N R11E S 5, 6, 7, 8, 17, 18

Elevation: 7,525-8,000 ft. Approximate Size: 450 acres

General Description: The McIntire Springs site is located along the Conejos River approximately six miles upstream from the confluence with the Rio Grande River. The Pikes Stockade historic site is located on the northern edge of the site. The wetlands on the site are supported by the Conejos River and a series of perennial warm springs located at the base of Sierró Del Ojito. The area is highly diverse in terms of species, habitat types (at least five wetland types plus adjacent upland habitat), and vegetation structure. The Conejos River supports a healthy riparian system, with all age classes of trees and shrubs represented. Narrowleaf cottonwood (*Populus angustifolia*) and coyote willow (*Salix exigua*) are common along the riverbanks and in the floodplain. Beaked sedge (*Carex utriculata*), small fruited bulrush (*Scirpus microcarpus*), and giant bur-reed (*Sparganium eurycarpum*) occupy old oxbows within the floodplain. Monkeyflower (*Mimulus* spp.) is found growing in areas where the springs surface. Overall, habitat diversity at the site is extremely high in comparison to other sites visited during this study. Five wetland types are represented including open water (warm springs and river), wet meadows, scrub-shrub, forested, and emergent wetlands, in addition to nearby upland habitats that are dominated by rabbitbrush (*Chrysothamnus* spp.), greasewood (*Sarcobatus vermiculatus*), ring muhly (*Muhlenbergia torreyi*), and Indian ricegrass (*Oryzopsis hymenoides*). There are some meadows to the north and south of the Conejos River that were irrigated prior to 1988. These are currently dominated by smooth brome (*Bromus inermis*) a non-native grass, western wheatgrass (*Pascopyron smithii*), baltic rush (*Juncus balticus*), wild iris (*Iris missouriensis*), and patches of the invasive non-native whitetop (*Cardaria* spp.) (Bureau of Land Management 1994).

Two populations of the Rio Grande chub were located in pools near the springs. Northern leopard frogs (*Rana pipiens*) were observed near the edges of the spring pools and in backwater areas along the river. McIntire Springs contributes a large volume of warm water creating 20 or more acres of open water during the winter months. These warm water pools provide wintering habitat for a large concentration of waterbirds (Bureau of Land Management 1994). The congregation of waterbirds also provides a forage base for wintering raptors such as bald and golden eagles. Communal roost of bald eagles (20 or more have been documented) have been observed in nearby cottonwood forests (Bureau of Land Management 1994). In addition, the diverse riparian/wetland complex found at this site provides roosting, resting, foraging habitat, escape routes, and thermal and nesting cover for many migratory bird species (Bureau of Land Management 1994).

Willow Flycatchers (*Empidonax trailii*) were seen at this site in June of 1997 and 1998. It is possible that these willow flycatchers are the subspecies *Empidonax trailii extimus*, which ranges from California through Arizona and New Mexico, and possibly into southern Colorado. This subspecies was listed as endangered by the U.S. Fish and Wildlife Service in 1995 and is ranked G5T2 by the Natural Heritage Program. Range-wide populations are estimated at 300-500 breeding pairs (Sogge et al. 1997). Six individuals were banded at the site in 1997, including one female with a brood patch, confirming breeding in the area. Genetic material was taken from all six individuals. In 1998, four individuals were identified from the area. Should the individuals at McIntyre Springs be confirmed as the Southwestern Willow Flycatcher this would be the only confirmed location of this subspecies in Colorado and the significance of this conservation area could increase.

The site also contains a few significant cultural resources, including the ruins of Governor McIntire's Mansion and Pikes Stockade. The mansion is one of the few territorial structures left in southern Colorado (Bureau of Land Management 1994).

Hay meadows and rangeland are adjacent to the site to the north and west. Approximately two miles downstream, there are another series of springs (Dexter Springs) that may potentially support similar elements as this site. These springs were not visited and are located on private land.

Boundary Justification: The boundary encompasses the entire series of springs and their associated drainages that feed into the Conejos River to include one of the hydrological sources of the site. The other hydrological source (Conejos River) is not fully included in these boundaries. Upstream activities along the Conejos River have the potential to adversely affect the elements. The area within the boundaries should allow natural fluvial processes to continually establish new riparian and wetland habitats in which the elements could establish. The southeastern boundary extends to the top of Sierró Del Ojito to address excessive sediment loads that could potentially come from the steep slopes.

Protection and Management Comments: The Bureau of Land Management (BLM) manages the majority of the site. Pikes Stockade Historic Site is located on the northern end

and is owned by the State of Colorado. There may also be some private land encompassed in the site. This site currently has adequate protection.

No grazing has occurred on the site in the past five years and irrigation has not been conducted since 1988. Although the site still contains a fair number of non-native species (especially in the wet meadows), the area is recovering nicely from past disturbances. The BLM intends to manage the site specifically for cultural and natural resources allowing only non-motorized recreational opportunities, which are compatible with the management objectives, to occur (Bureau of Land Management 1994). However, during the site visit, signs or other means of discouraging vehicular access were not observed and private vehicles were seen at the site. Until implementation of the BLM's McIntire Springs Integrated Activity Plan has been completed, it can be expected that vehicular access and hunting and fishing activities may occur along with their unintentional negative impacts.

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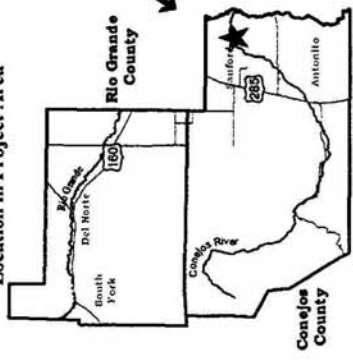


LEGEND

PCA Boundary

Base Layer:
 Alamosa, 37105-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

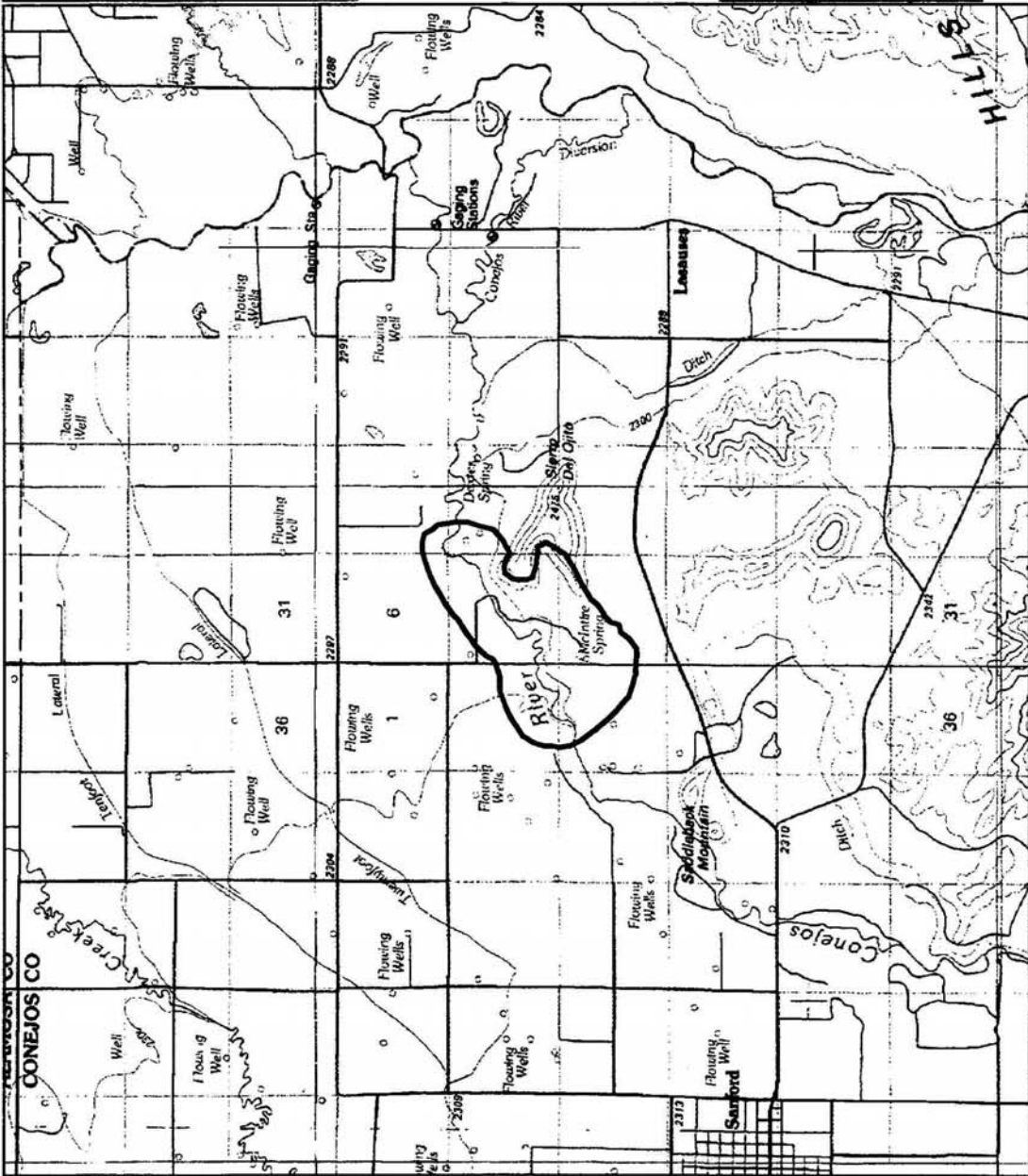


Figure 36. McIntire Springs

Rio Grande at Monte Vista Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The Rio Grande at Monte Vista site supports two fair examples of a plant that is imperiled on a global scale, two fair examples of wetland plant communities vulnerable on a global scale, one good example of a wetland plant community vulnerable in Colorado, a fair example of a riparian plant community imperiled on a global scale, and two good examples of widespread wetland plant communities.

Protection and Management Issues: Although the entire Rio Grande State Wildlife Area is located within the site, most of the site is privately owned. One landowner holds the majority of these lands and has shown interest in placing a conservation easement on the property. Non-native species, mainly Canada thistle (*Cirsium arvense*), are an important management issue. Efforts are underway to control Canada thistle and the success of these efforts should be monitored and management assessed thereafter.

Biodiversity Rank Justification: This site contains eight elements of concern at nine locations. The scattered population of the globally imperiled slender spiderflower found at the site is the primary reason for the high biodiversity rank. The slender spiderflower (*Cleome multicaulis*) has a global range from southern Wyoming to central Mexico. The San Luis Valley contains the most numerous, largest, and healthiest populations in the world. Slender spiderflower has a limited distribution due to its requirement of moist alkaline soil along with periodic soil disturbance, such as pocket gopher (*Thomomys talpoides*) diggings. These habitat requirements limit the slender spiderflower to the edges of alkaline wet meadows and playas. The San Luis Valley contains the most numerous, largest, and healthiest populations in the world.

The site also supports three types of wet meadows (*Carex atherodes*, *C. simulata*, and *C. lanuginosa*), a water ladysthumb emergent wetland (*Polygonum amphibium*), one floating/submergent wetland (*Potamogeton gramineus*), and a globally imperiled montane willow carr (*Salix eriocephala* var. *ligulifolia*).

Table 35. Natural Heritage element occurrences at Rio Grande at Monte Vista PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Cleome multicaulis</i>	Slender spiderflower	G2G3	S2S3	BLM	C
<i>Cleome multicaulis</i>	Slender spiderflower	G2G3	S2S3	BLM	C
Plant Communities					
<i>Carex atherodes</i>	Wet meadows	G4	S2?		C
<i>Carex lanuginosa</i>	Montane wet meadows	G3?	S3		C
<i>Carex simulata</i>	Wet meadows	G3	S3		C
<i>Polygonum amphibium</i>	Water ladysthumb emergent wetland	G4	S3		B
<i>Potamogeton gramineus</i>	Montane floating/submergent wetland	G4?	S4?		B
<i>Salix eriocephala</i> var. <i>ligulifolia</i>	Montane willow carr	G2G3	S2S3		C

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: This site includes the Rio Grande State Wildlife Area and adjacent parcels to the northeast and is located approximately 1 mile east of Monte Vista in Rio Grande County.

U.S.G.S. 7.5-min. quadrangle: Homelake and Monte Vista

Legal Description: T38N, R08E S 1, 2, 3, 12
T38N, R09E S 6, 7
T39N, R08E S 20-36
T39N, R09E S 31

Elevation: 7,650-7,590 ft. Approximate Size: 9,200 acres

General Description: This site contains open water, submergent, emergent, wet meadow, and riparian habitats along the Rio Grande River just east of Monte Vista. The Rio Grande State Wildlife Area (RGSWA) is included within the site boundaries in addition to some private land northwest of RGSWA.

The site encompasses a segment of the Rio Grande River and also occurs within the Rio Grande's historical floodplain. Natural overbank flooding still occurs, however the frequency and volume has been altered due to upstream water diversions and water control structures. Irrigation, via numerous ditches, is evident in areas northwest of RGSWA while water control structures and levees control movement and impoundment of water within RGSWA to benefit some wildlife. Although the natural hydrology of the site has been severely altered, many of the site's wetlands are associated with old river bottoms and sloughs where natural hydrological processes are still intact. Undoubtedly, irrigation water likely contributes to local groundwater tables and thus the hydrology of many local wetlands. The old river bottoms are permanently saturated and in a few places a deep accumulation of peat can be found. Hardstem bulrush (*Scirpus acutus*), cattail (*Typha latifolia*), arrowhead (*Sagittaria cuneata*), mare's tail (*Hippuris vulgaris*), and American mannagrass (*Glyceria*

grandis) are dominant in these areas. The sloughs have permanent standing water and are lined with various species of willow (*Salix exigua*, *S. monticola*, and *S. eriocephala* var. *ligulifolia*). In open water areas, species such as water ladysthumb (*Polygonum amphibium*), floating pondweed (*Potamogeton gramineus*), mare's tail (*Hippuris vulgaris*), duckweed (*Lemna minor*), greater duckweed (*Spirodela polyrhiza*), an aquatic liverwort (*Ricciocarpus natans*), and bur-reed (*Sparganium angustifolium*) dominate. Wet meadows occur in low-lying areas where awned sedge (*Carex atherodes*), woolly sedge (*C. lanuginosa*), short-beaked sedge (*C. simulata*), and beaked sedge (*C. utriculata*) are the predominate species.

Northwest of RGSWA, saline bottomland shrublands dominate in areas that are not heavily irrigated or under cultivation. Species such as greasewood (*Sarcobatus vermiculatus*), saltgrass (*Distichlis spicata*), and Baltic rush (*Juncus balticus*) are predominant. Scattered throughout this area is a population of the globally imperiled slender spiderflower (*Cleome multicaulis*). The slender spiderflower appears to be taking advantage of the soil disturbance caused by livestock grazing. For example, in areas that would appear to be too moist for this species, it has established on the rims of livestock "pits." These pits are formed when livestock hoofs push soil up above the surrounding soil surface, due to their heavy weight and very moist soil. This microtopography appears to be very beneficial for slender spiderflower at this site. It is not clear how palatable or preferred slender spiderflower is to livestock as feed, but the population at this site appears to be tolerant of current grazing management. The current landowner grazes this area in the early spring and late summer. This rotation may allow slender spiderflower to flower and set seed prior to being subjected to grazing impacts in late summer. More information is needed to determine seed viability when passing through ungulates and the general mechanisms for pollination and dispersal for slender spiderflower.

Irrigated pastures are dominated by many wet meadow species such as spikerush (*Eleocharis palustris*), arrowgrass (*Triglochin maritima*), and Baltic rush (*Juncus balticus*). Grazing does not appear to be intense within RGSWA, however there is a conspicuous presence of non-native species, especially in well-drained floodplain areas. Most notable are Canada thistle (*Cirsium arvense*) and buyan (*Sphaerophysa salsula*).

Boundary Justification: The site boundary encompasses a large portion of the Rio Grande's floodplain east of Monte Vista. Topography within the site is very flat. Important hydrologic inputs include local groundwater tables that are associated with water levels in the river, surface water runoff from rain events, and periodic overbank flooding of the Rio Grande. The site boundary was drawn to incorporate an area where these natural processes function in a manner that would maintain viable populations of the elements. The boundary provides a buffer from nearby agriculture fields and roads where surface runoff may contribute excess nutrients and/or herbicides/pesticides that could be detrimental to the elements. The site contains many old oxbows and sloughs that could provide a source for recruitment for species associated with the elements. It should be noted that the hydrological processes necessary to the elements are not fully contained by the boundaries established for this site. Given that the elements are closely tied to natural processes associated with the Rio Grande, any upstream activities could detrimentally affect the elements.

Protection and Management Comments: Most of the site lies within the RGSWA and as such has adequate protection. Recreation (mostly hunting and fishing) appears to be the dominant use of the RGSWA however, some areas are likely grazed. The portion of the site northwest of RGSWA is under private ownership. The landowner is currently exploring the possibility of establishing a conservation easement on the property.

Non-native plant species control is an issue for this site. There are current efforts underway to control Canada thistle (*Cirsium arvense*) populations (both within the RGSWA and on the private parcel). The success of such efforts should be monitored and management should change if current methods are not successful. Any changes in upstream water use from the Rio Grande have the potential to affect the integrity of the elements at this site. Alterations of current water management at the RGSWA may also affect the elements.

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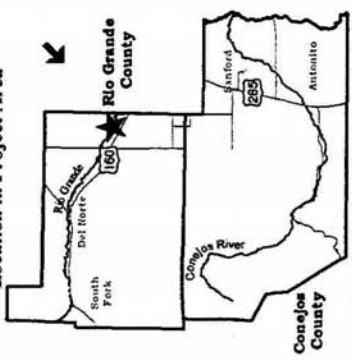


LEGEND

 **PCA Boundary**

Base Layer:
 Del Norte, 37106-E1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

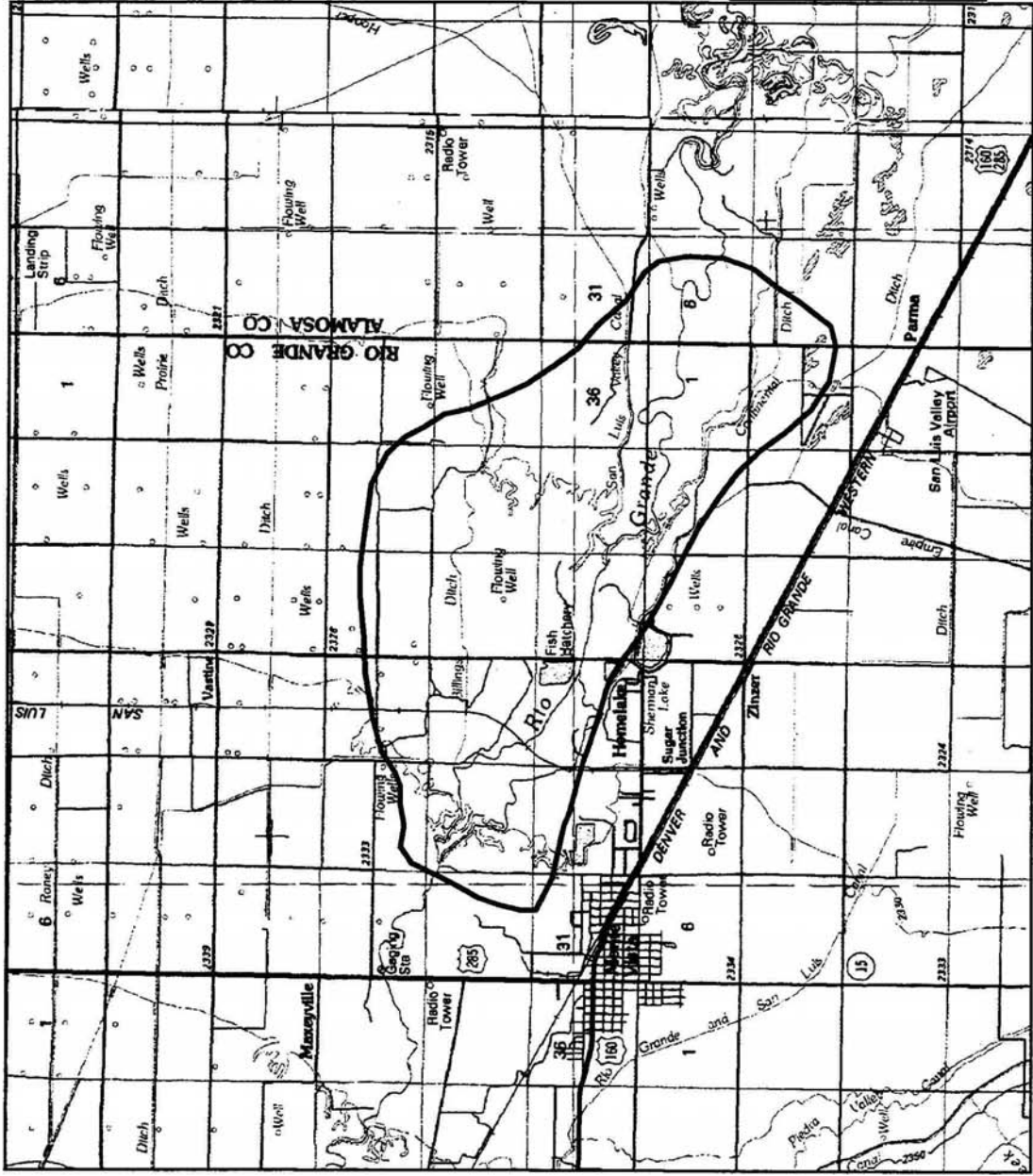


Figure 37. Rio Grande at Monte Vista

Rito Hondo Creek Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site contains two good occurrences of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is on public land managed by the Forest Service but has no formal protection.

Biodiversity Rank Justification: The site contains two good occurrences of a plant species vulnerable on a global scale, Ripley milkvetch (*Astragalus ripleyi*). Ripley milkvetch is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species. There are numerous subpopulations at the site and the total population size is nearly 1000 plants.

Table 36. Natural Heritage element occurrences at Rito Hondo Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	B
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	B

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: This site is located approximately two miles southwest of Fox Creek in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Fox Creek

Legal Description: T32N, R7E S 4, 5, 6, 7, 8, 9, 17, 18
T33N, R7E S 32, 33

Elevation: 8,380-9,350 ft. Approximate Size: 2,335 acres

General Description: The site is predominantly characterized by open grasslands with scattered woodlands, and forests with grassland openings. Ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), piñon pine (*Pinus edulis*), juniper (*Juniperus* spp.), and aspen (*Populus tremuloides*) mainly occur at the higher parts of the site or along rock outcrops or drainages that dissect the hills. Some sagebrush (*Artemisia tridentata*) also occurs on the site. The grasslands are somewhat degraded and actively eroding. Weedy forbs such as Richardson hymenoxys (*Hymenoxys richardsonii*) and hairy golden-aster (*Heterotheca villosa*) are common and native grasses such as Arizona fescue (*Festuca arizonica*) and mountain muhly (*Muhlenbergia montana*) are uncommon.

Boundary Justification: The boundary also encompasses the Ripley milkvetch locations and enough adjacent habitat to include open grasslands or savanna-like vegetation and the numerous small drainages downstream from known Ripley milkvetch locations. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms

considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.). A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.

Protection and Management Comments: The site is within the Rio Grande National Forest but has no formal protection.

Some parts of the site were apparently heavily grazed in the past. A few consecutive years of heavy grazing do not appear to significantly impact the plants, but over the long-term this may eventually degrade the population. Altering the timing of the grazing from year to year may help the population recover, set seed, and establish seedlings. Although the species appears to be long-lived, seedling establishment may be a limiting factor for the populations. Near normal to above average April - June precipitation may allow for better seedling survival (Julie Burt – pers. comm.). If flexibility exists with grazing management, reducing or delaying grazing until later in the summer during wet years may allow more seedling establishment.

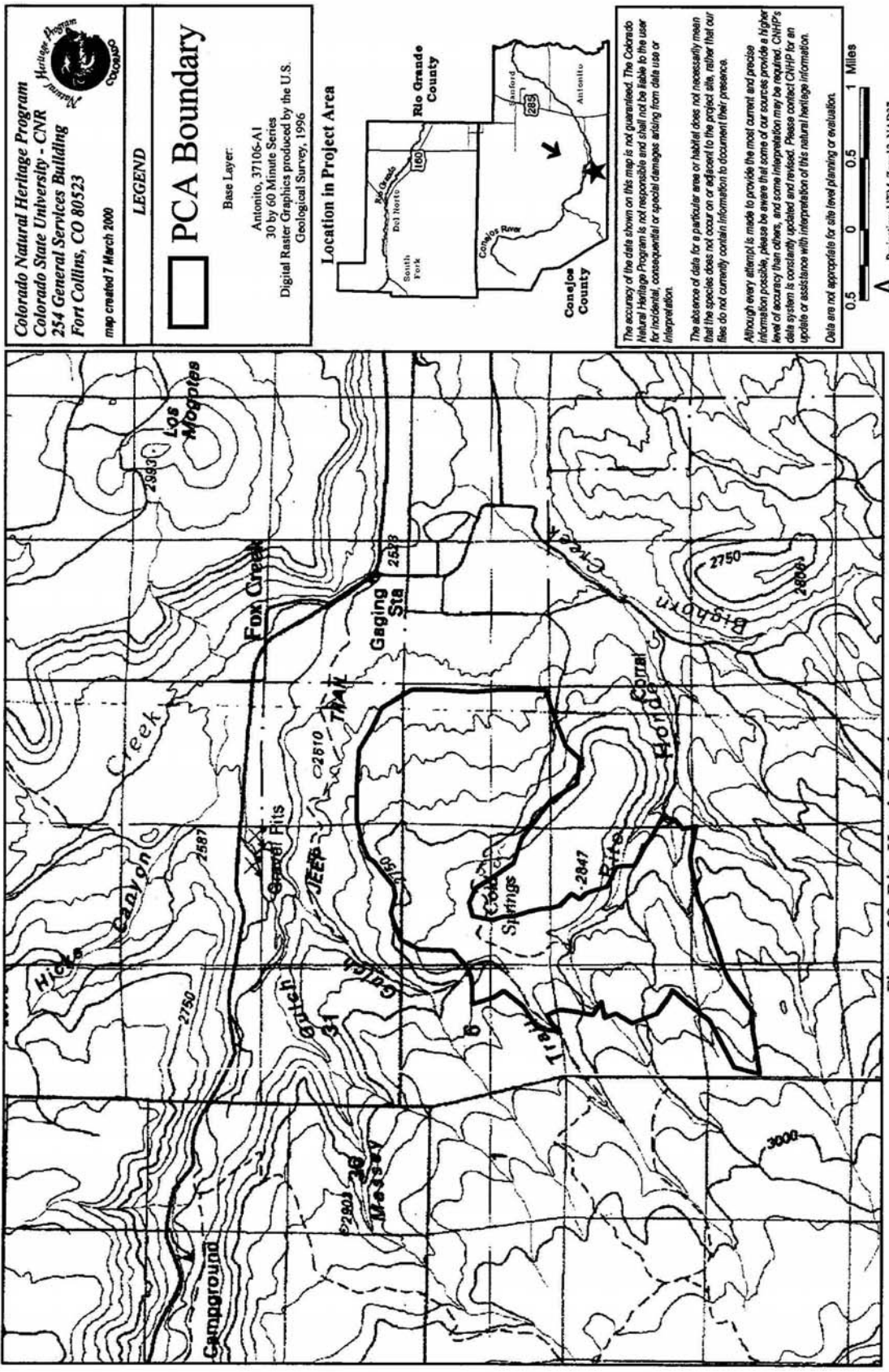


Figure 38. Rito Hondo Creek

Rock Creek Gaging Station Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site contains a good occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on private lands and public land managed by the State of Colorado.

Biodiversity Rank Justification: The site contains a good occurrence of a plant species vulnerable on a global scale, rock-loving neoparrya (*Neoparrya lithophila*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Rio Grande and Conejos counties have some of the largest populations of this species. This particular population is fairly large and to some extent naturally protected by the extremely steep topography between it and the access road.

Table 37. Natural Heritage element occurrences at Rock Creek Gaging Station PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	B

*EO=Element Occurrence

Location: This site is located along Rock Creek due north of Greenie Mountain in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Greenie Mountain

Legal Description: T38N, R6E S 36
T38N, R7E S 31

Elevation: 8,300-8,600 ft. Approximate Size: 57 acres


General Description: The site includes a steep, southwest facing cliff above Rock Creek. Scattered ponderosa pine (*Pinus ponderosa*) trees are present but the site is mostly dominated by blue grama (*Bouteloua gracilis*) grasslands with scattered shrubs along the cliffs. A gaging station occurs along the creek below and numerous recreational trails and unofficial campgrounds are present.


Boundary Justification: The main threat to the rock-loving neoparrya would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya may also require other types of habitat. The pollinators are unknown, consequently we are uncertain if the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on land owned by the State of Colorado and a private landowner.

Recreation use along the creek may impact some of the plants but the majority of the plants are naturally protected on steep cliffs that don't receive much recreational use. If recreational use increases to the point that hikers frequent the cliff top and face, it could impact the rock-loving neoparrya population.

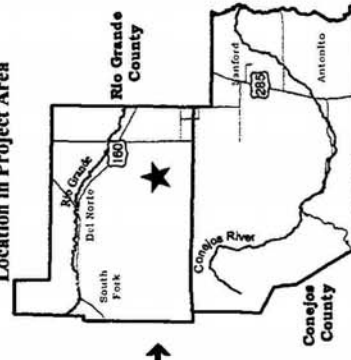
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 map created 7 March 2000



LEGEND

PCA Boundary

Base Layer:
 Greenlee Mountain, 37106-D3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



Rio Grande
 Conejos County
 Conejos River
 South Fork
 Antelope

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Data are not appropriate for site level planning or evaluation.

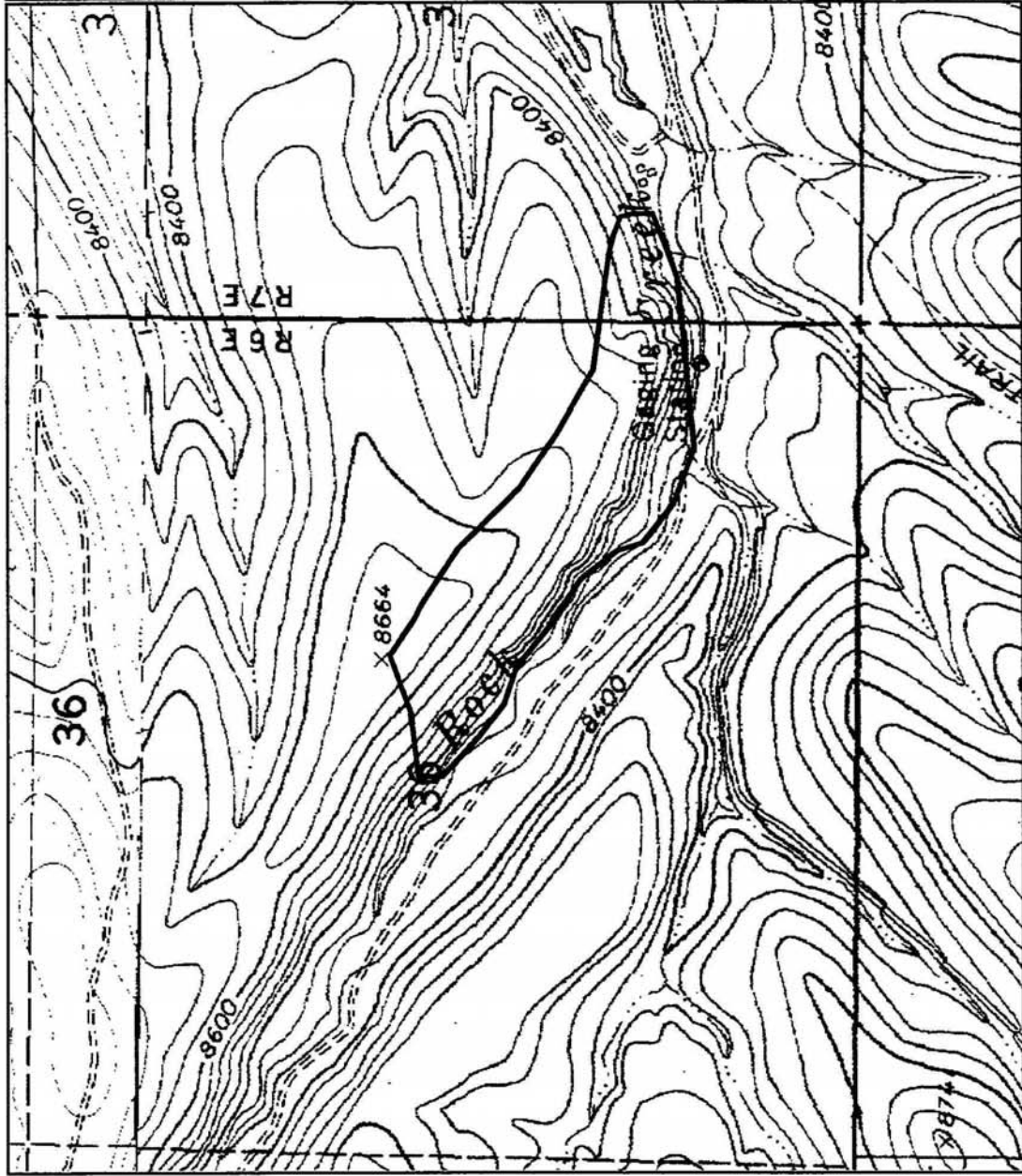


Figure 39. Rock Creek Gaging Station

South Fork of the Conejos River and Hansen Creek Potential Conservation Area

Biodiversity Rank: B3 (High significance)

This site contains a good occurrence of a willow carr plant community imperiled on a global scale. Also, there is a good occurrence of a cottonwood/alder plant community vulnerable on a global scale and two occurrences of a native trout vulnerable on a global scale.

Protection and Management Issues:

This site is found within the South San Juan Wilderness Area in the Rio Grande National Forest. Management and protection of the elements found within this site should address prevention of introduced fish stock and reduction of impacts from grazing.

Biodiversity Rank Justification: This site contains three elements of concern at four locations. The quality of the riparian-associated communities and the healthy population of reintroduced Rio Grande cutthroat trout contribute to the rank of this site. The strapleaf willow (*Salix eriocephala* var. *ligulifolia*) plant community is not well documented in Colorado. At least ten locations are known and an additional 20-50 are expected to occur within its habitat. The narrowleaf cottonwood/thinleaf alder (*Populus angustifolia*/*Alnus incana*) plant community is known from New Mexico and Colorado. Although not well documented from other states, it is expected to occur throughout the range of narrowleaf cottonwood in the Rocky Mountains. The question mark in the Global Rank indicates the community is probably more abundant, but new locations have not been documented.

In addition to the imperiled riparian communities, this site supports several healthy populations of transplanted Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*). As of the early 1990's, it was estimated that there were only approximately 60-70 relatively pure populations of the Rio Grande cutthroat trout from New Mexico and another 30-40 in Colorado (Rinne 1995). This fish is considered "sensitive" by the U.S. Forest Service and is on the State list of species of concern.

Table 38. Natural Heritage element occurrences at South Fork of the Conejos River and Hansen Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Salix eriocephala</i> var. <i>ligulifolia</i>	Montane willow carr	G2G3	S2S3		B
<i>Populus angustifolia</i> / <i>Alnus incana</i>	Narrowleaf cottonwood/ alder montane riparian forest	G3?	S3?		C
Fish					
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	G4T3	S3	SC	E
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	G4T3	S3	SC	E

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: This site is located in the South San Juan Wilderness Area of the Rio Grande National Forest in Conejos County.

U.S.G.S. 7.5 minute quadrangles: Victoria Lake

Legal Description: T34N, R4E S 1-4
T34N, R4.5E S 1
T34N, R5E S 6
T35N, R3E S 24, 25, 26, 35, 36
T35N, R4E S 8, 9, 16, 17, 19-21, 31-36
T35N, R4.5E S 35, 36

Elevation: 9,000-12,000 ft Approximate Size: 4,973 acres

General Description: This site encompasses the riparian floodplain of the South Fork of Conejos River downstream to Conejos River, and Hansen Creek nearly to its headwaters. The site encompasses approximately 21 miles of the South Fork of Conejos River and Hanson Creek.

The montane willow carr is fairly large and dense, but the possibility of encroachment from non-native plant species is high. The surrounding meadow near here has a history of heavy grazing and may have contributed to the presence of non-native plant species. The narrowleaf cottonwood/thinleaf alder plant community occurs in a large mosaic, but is interrupted by heavily grazed meadows.

The total population of transplanted cutthroat trout exceeds 1500. In 1996, the Colorado Division of Wildlife imported trout to two locations within this site. Based on description of hydrology and invertebrate components, the two waterways within this site should provide adequate habitat for the transplanted fish.

Boundary Justification: The site boundaries are drawn to provide habitat for the two occurrences of imperiled montane riparian communities and the two occurrences of cutthroat trout. The boundary of this site is limited to 300 meters on either side of the stream system to provide adequate riparian vegetation for cover and possible prey (insect) needs, yet this potential conservation area, in and of itself, may not be sufficient to ensure the persistence of the population. Ecological processes or environmental impacts that originate upstream of the site may affect the viability of the occurrences.

Protection and Management Comments: This site is completely within the South San Juan Wilderness Area, and is relatively protected from human impacts.

Little information is available on conservation strategies for native cutthroat trout (Young 1995). However, the primary threats that have been identified for the Rio Grande cutthroat are management issues, specifically grazing of domestic livestock and water diversion for irrigation (Behnke and Zarn 1976, Behnke 1992, Stumpff and Cooper 1996). To adequately plan for the conservation of the cutthroat trout population identified in this site, biologists and planners should address land management within the immediate watershed. Stumpff and Cooper (1996) recognize that all too frequently management plans focus directly on the riparian area and try to limit impacts in those areas, yet land management in the entire watershed needs to be considered to adequately protect cutthroat trout.

Historic grazing may have contributed to the present abundance of non-native plants in this system. Plant community species composition has been altered. To ensure the long-term conservation of the plant communities and fish that are found here, measures may be necessary to limit cattle grazing impacts to the system. Also, exclusion of non-native fish species is vital to the persistence of cutthroat trout populations.

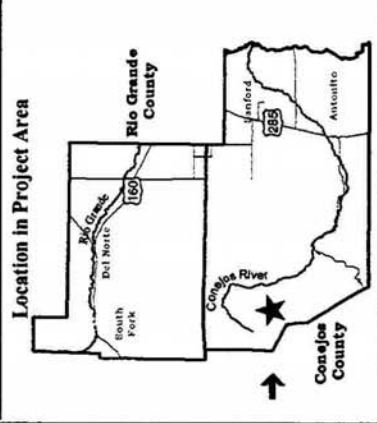
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LEGEND

PCA Boundary

Base Layer:
 Antonic, 37106-A1
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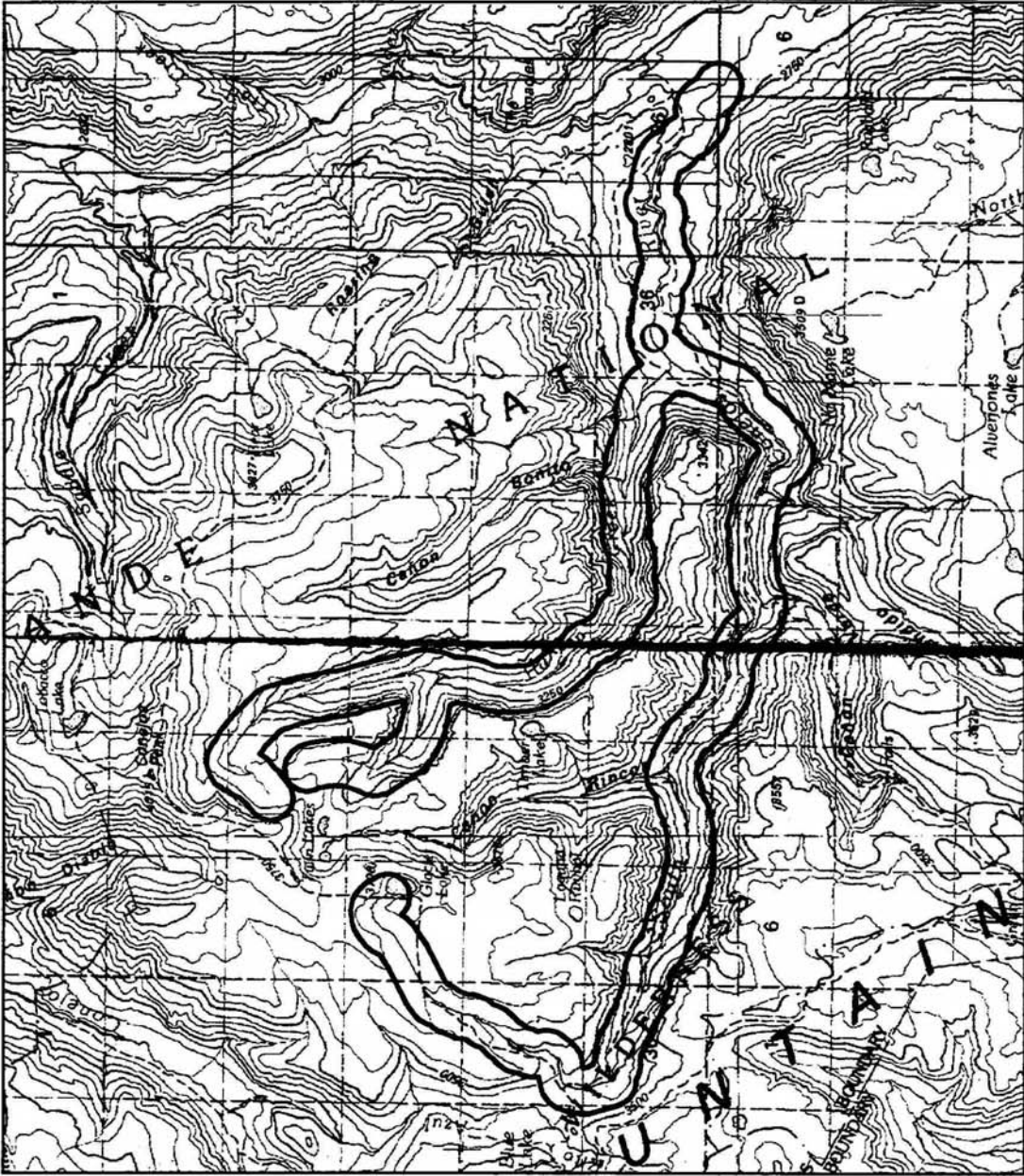


Figure 40. South Fork of the Conejos River and Hansen Creek

Terrace Reservoir North Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site contains a good occurrence of a plant species that is vulnerable on a global scale.

Protection and Management Issues: The majority of the land within the site is publicly owned and managed by the Forest Service. Small parcels of land managed by the Bureau of Land Management exist along the southern part of the site.

Biodiversity Rank Justification: The site contains a good occurrence of a plant species that is vulnerable on a global scale, Ripley milkvetch (*Astragalus ripleyi*). The occurrence of the Ripley milkvetch is large but some parts of the population may be degraded by impacts along the road and reservoir. Ripley milkvetch is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM lists of sensitive species.

Table 39. Natural Heritage element occurrences at Terrace Reservoir North PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	B

*EO=Element Occurrence

Location: This site is located immediately north of Terrace Reservoir in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Terrace Reservoir

Legal Description: T36N, R6E S 11, 12, 13, 14, 15

Elevation: 9,492-8,400 ft. Approximate Size: 1,770 acres

General Description: The site includes open grasslands dominated by blue grama (*Bouteloua gracilis*), Arizona fescue (*Festuca arizonica*), and Richardson’s hymenoxys (*Hymenoxys richardsonii*) and partially wooded areas with ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), piñon pine (*Pinus edulis*), and juniper (*Juniperus* spp.). A well-used Forest Service Road runs through the site, as do several two-track roads. The area is grazed for a short period in the spring and fall as livestock are moved to and from Forest Service grazing allotments.

Boundary Justification: The boundary also encompasses the Ripley milkvetch locations and enough adjacent habitat to include open grasslands or savanna-like vegetation and the numerous small drainages downstream from known Ripley milkvetch locations. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.).

A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.

Protection and Management Comments: The majority of the land within the site is publicly owned and managed by the Forest Service. Small parcels of land owned by the Bureau of Land Management exist along the southern part of the site.

The Forest Service Road and two-track roads may serve as corridors for invasion of non-native species or other impacts in the future. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control.

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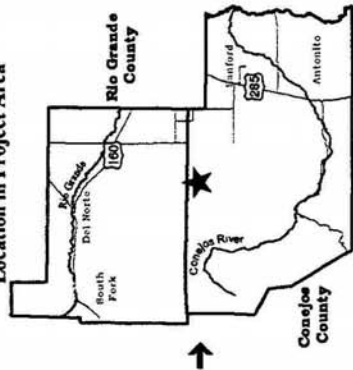
LEGEND

 **PCA Boundary**

Base Layer:

Antonito, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area

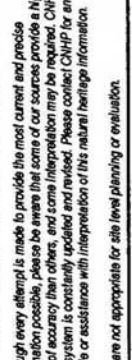


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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

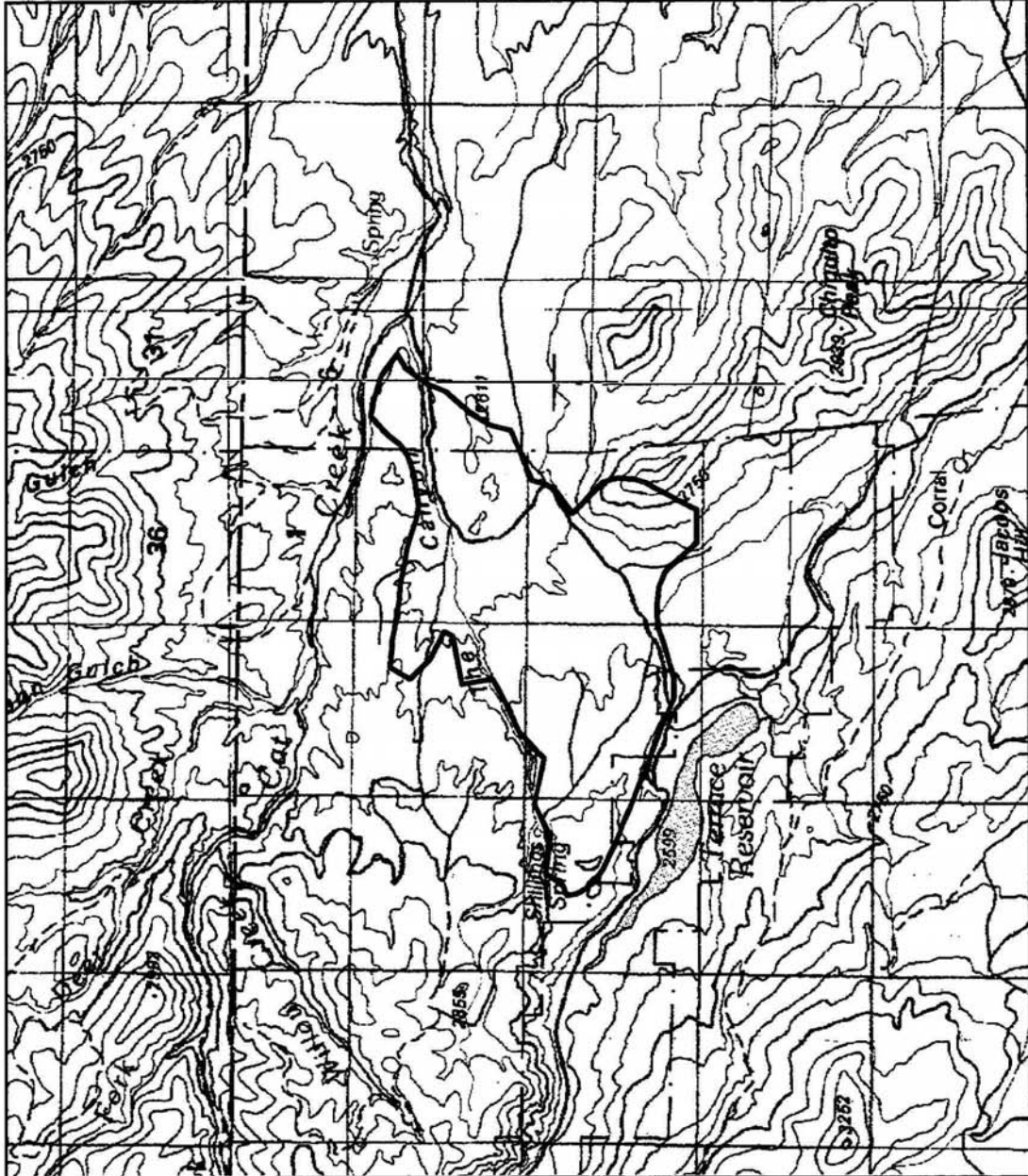


Figure 4.1. Terrace Reservoir North

Tower Hill Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site contains good occurrences of two plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land Management.

Biodiversity Rank Justification: The site contains good occurrences of a two plant species vulnerable on a global scale, rock-loving neoparrya (*Neoparrya lithophila*) and Weber’s catseye (*Cryptantha weberi*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Rio Grande and Conejos counties have some of the largest populations of this species. The population at this site contains over 1500 plants. Weber’s catseye is only known from south-central Colorado. The population here has hundreds of plants and occurs in good habitat.

Table 40. Natural Heritage element occurrences at Tower Hill PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	B
<i>Cryptantha weberi</i>	Weber’s catseye	G3	S3		B

*EO=Element Occurrence

Location: This site is located approximately 2 miles south of Sevenmile Plaza in Rio Grande County immediately west of Highway 160.

U.S.G.S. 7.5 minute quadrangle: Dog Mountain

Legal Description: T39N, R6E S 13, 24

T39N, R7E S 18, 19

Elevation: 7,940-8,080 ft. Approximate Size: 125 acres

General Description: The site encompasses a small mesa near Highway 160. Rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) shrublands dominate the area around the mesa in small drainages. Two-track roads occur adjacent to the site and are used frequently by people recreating in the area. The west end of the site is used for target shooting; clay pigeons and trash are common here. A radio tower facility has been built on top of the mesa to the northwest.

Boundary Justification: The main threat to these two species would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that the plant pollinators may also require other types of habitat. The pollinators are unknown, consequently we are

uncertain if the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.


Protection and Management Comments: The site is located on land managed by the BLM.

Some two-track roads occur near the plants but do not seem to impact the species at this time. The roads may serve as corridors for invasion of non-native species or other impacts in the future. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control. Increased recreation (i.e. trampling) in the area could impact the plants.

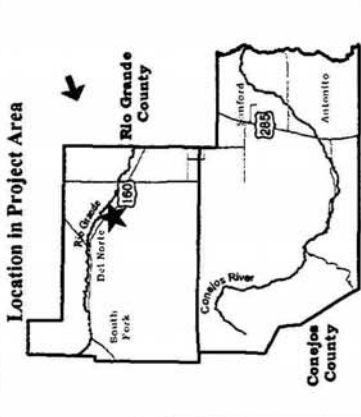
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 map created 9 March 2000



LEGEND

 **PCA Boundary**

Base Layer:
 Monte Vista, 37106-E2
 Dog Mountain, 37106-E3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Data are not appropriate for site level planning or evaluation.



4 Projection: UTM, Zone13, NAD27

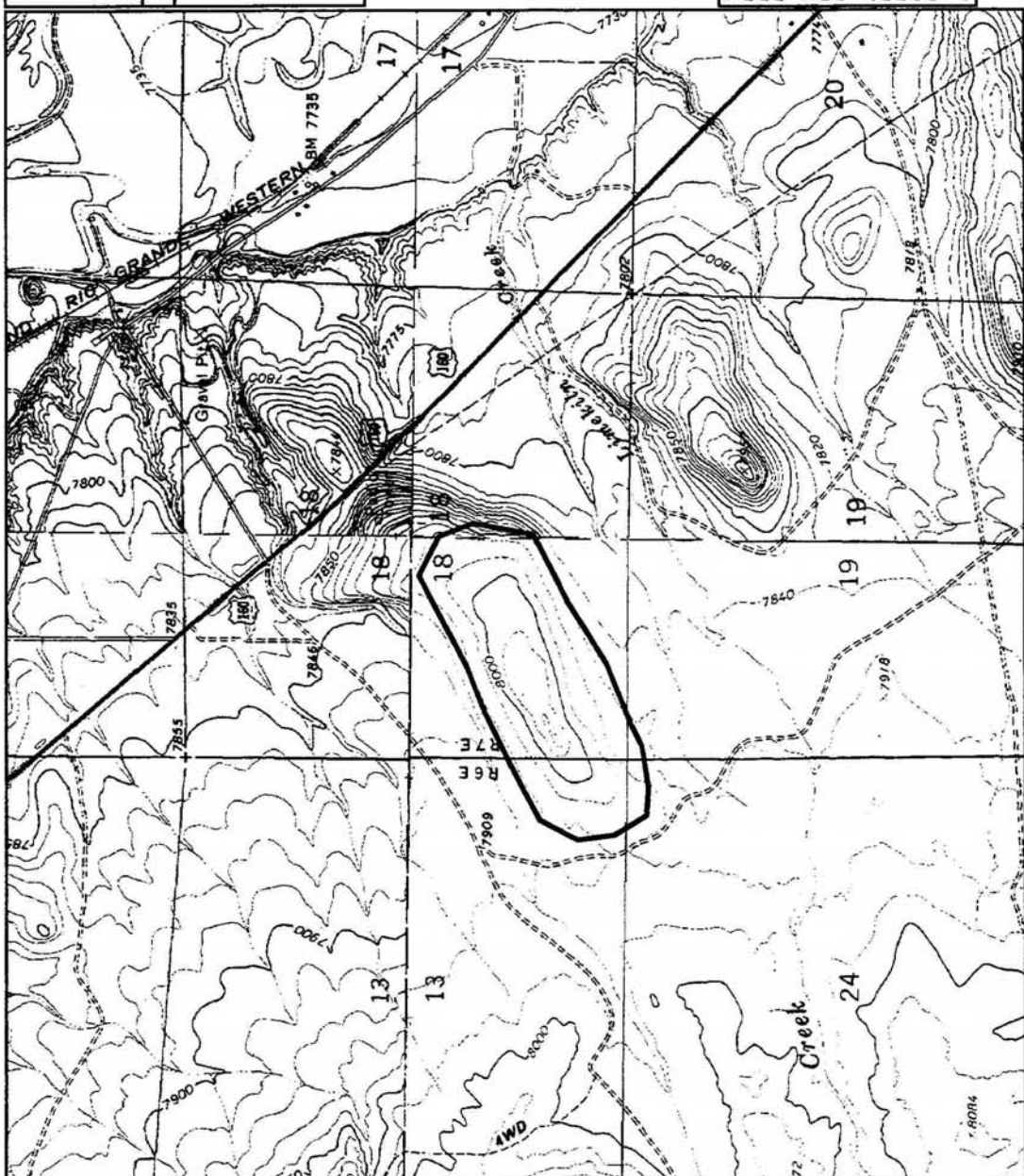


Figure 42. Tower Hill

West Alder Creek Potential Conservation Area

Biodiversity Rank: B3 (High significance)

The site supports a good example of a plant community vulnerable on a global scale.

Protection and Management Issues: The site is entirely within the Rio Grande National Forest but has no formal protection. No signs of grazing or recreational impacts were observed. No disruption of hydrology upstream was observed and access to the site is very difficult. However, non-native species are present.

Biodiversity Rank Justification: The site supports a good example of a globally vulnerable montane riparian shrubland (*Alnus incana/Salix drummondiana*). This plant community is found in the southern half of Colorado. Although, this plant community is expected to occur in other Rocky Mountain States, it has not been documented outside of Colorado. There is also an historical record for an occurrence of the Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) at this site.

Table 41. Natural Heritage element occurrences at West Alder Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Alnus incana/Salix drummondiana</i>	Montane riparian shrubland	G3	S3		B

*EO=Element Occurrence

Location: The West Alder Creek site is located approximately 4 miles north-northwest of South Fork in Rio Grande County.

U.S.G.S. 7.5-min. quadrangle: South Fork West

Legal Description: T40N R03E S 17

Elevation: 8,400-8,700 ft. Approximate Size: 190 acres

General Description: The site is located along West Alder Creek, which is a small tributary to the Rio Grande. The site is a narrow riparian area with a high diversity of shrubs and evidence of regeneration. Thinleaf alder (*Alnus incana*), whiplash willow (*Salix lucida* var. *caudata*), Drummond willow (*Salix drummondiana*), mountain maple (*Acer glabrum*), and red-osier dogwood (*Cornus sericea*) are the dominant shrubs. A diverse assemblage of herbaceous species is also found at the site including bluejoint reedgrass (*Calamagrostis canadensis*), woolly sedge (*Carex lanuginosa*), black-eyed Susan (*Rudbeckia* sp.), yarrow (*Achillea lanulosa*), western willow aster (*Aster hesperius*) and cow parsnip (*Heracleum sphondylium*). The surrounding slopes are steep and dry. The dominant trees on these slopes include piñon pine (*Pinus edulis*), one-seed juniper (*Juniperus monosperma*), ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*). Beaver activity is evident and small beaver ponds are scattered along this stretch of the creek. At times the creek is constricted by steep canyon walls and in some areas a small floodplain exists.

Boundary Justification: The boundary includes all of the floodplain along this stretch of the creek to allow the effects of fluvial processes and beaver activity to continue to create additional habitat where the element could potentially establish. Ecological processes or environmental impacts that originate upstream of the site may affect the viability of this occurrence.

Protection and Management Comments: The site is entirely within the Rio Grande National Forest but has no formal protection.

Grazing is occurring downstream along private land but no signs of grazing or recreational impacts were observed at this site. However, non-native species such as timothy (*Phleum pratense*), Kentucky bluegrass (*Poa pratensis*), Canada thistle (*Cirsium arvense*), and dandelion (*Taraxacum officinale*) are present. There is little upstream disruption of hydrology and there are no marked access routes to the site.

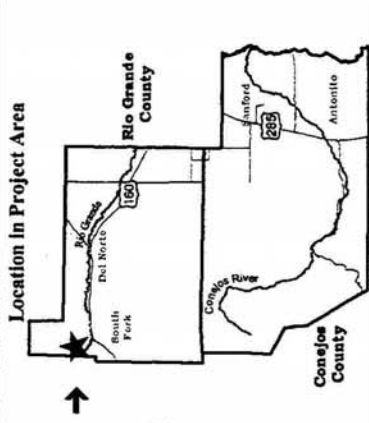
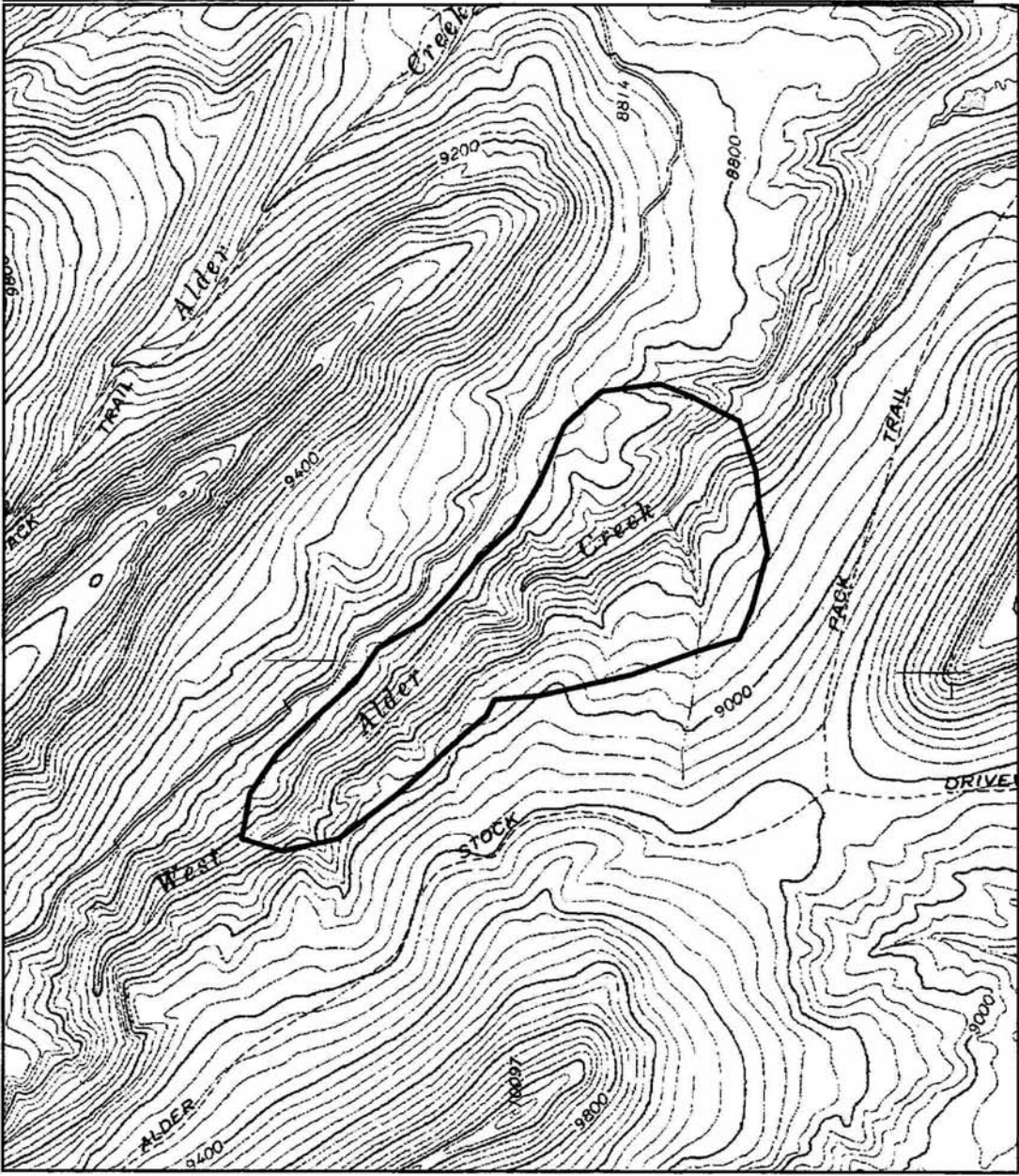
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LEGEND

PCA Boundary

Base Layer:
 South Fork West, 37106-F6
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 Geological Survey, 1996



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone13, NAD27

Figure 43. West Alder Creek

B4 Potential Conservation Areas

Adams Fork of Conejos River Potential Conservation Area

Biodiversity Rank: B4 (Moderate Significance)

This site contains a good occurrence of a fish that is vulnerable on a global scale.

Protection and Management Issues:

This site is located on public land managed by the Rio Grande National Forest. Management and protection of the elements found within this site would require prevention of introduced fish stock and minimization of negative grazing impacts.

Biodiversity Rank Justification: This site contains one element of concern at one location. The good quality of the population of Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) contributes to the rank of this site. As of the early 1990's, it was estimated that there were only approximately 60-70 relatively pure populations of Rio Grande cutthroat trout from New Mexico and another 30-40 in Colorado (Rinne 1995). This fish is considered "sensitive" by the U.S. Forest Service and is on the State list of species of concern.

Table 42. Natural Heritage element occurrences at Adams Fork of Conejos River PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Fish					
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	G4T3	S3	FS, BLM, SC	B

*EO=Element Occurrence

Location: This site is located approximately 1 mile southwest of Platoro Reservoir in Conejos County.

U.S.G.S. 7.5 minute quadrangles: Summit Peak and Platoro

Legal Description: T35N, R3E S 1, 2
 T36N, R2E S 25, 26, 36
 T36N, R3E S 27-29, 32-36
 T36N, R4E S 31

Elevation: 10,000-11,950 ft. Approximate Size: 1,583 acres

General Description: This site encompasses the riparian floodplain of the Adams Fork of the Conejos River from the intersection of Conejos River to the headwaters. The site encompasses approximately 6.4 miles of the Adams Fork.

This site was drawn to ensure the Rio Grande cutthroat trout population inhabiting the Adams Fork has sufficient habitat at the known location and further upstream. Rio Grande cutthroat trout thrive in waters with a matrix of pools and riffles, in-stream boulders and other structure, good riparian vegetation cover, and mild slopes (Trotter 1987).

Boundary Justification: The boundaries are drawn to provide habitat for the occurrence of cutthroat trout. The boundary of this site is limited to 300 meters on either side of the creek to provide adequate riparian vegetation for cover and possible prey (insect) needs, yet this potential conservation area, in and of itself, may not be sufficient to ensure the persistence of the population. Ecological processes or environmental impacts that originate upstream of the site may affect the viability of this occurrence.

Protection and Management Comments: This site is within the Rio Grande National Forest.

Exclusion of non-native fish species is vital to the persistence of cutthroat trout populations. Little information is available on the development of conservation strategies for native cutthroat trout (Young 1995). However, the primary threats that have been identified for the Rio Grande cutthroat are management issues, specifically grazing of domestic livestock and water diversion for irrigation (Behnke and Zarn 1976, Behnke 1992, Stumpff and Cooper 1996). To adequately plan for the conservation of the cutthroat trout population identified in this site, biologists and planners should address land management within the immediate watershed. Stumpff and Cooper (1996) recognize that all too frequently management plans focus directly on the riparian area and try to limit impacts in those areas, yet land management in the entire watershed needs to be considered to adequately protect cutthroat trout.

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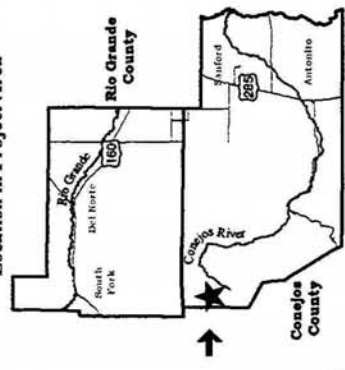


LEGEND

□ PCA Boundary

Base Layer:
 Antonio, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

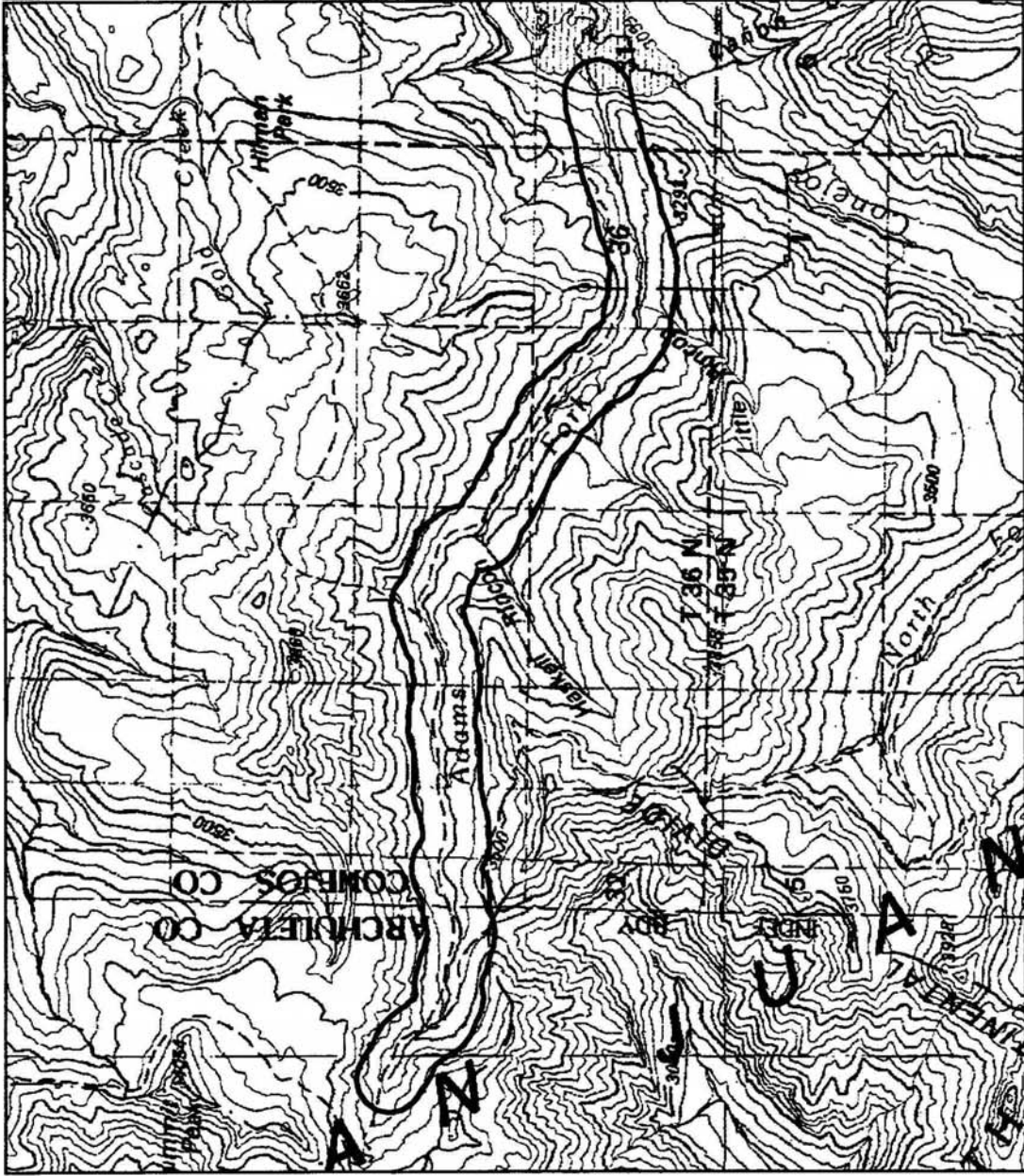


Figure 44. Adams Fork of Conejos River

Bighorn Creek Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Rio Grande National Forest and is within a Special Interest Area (SIA).

Biodiversity Rank Justification: The site contains a fair occurrence of Ripley milkvetch (*Astragalus ripleyi*). This plant is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species. The population documented here is small when compared to others known in Conejos counties and heavy livestock grazing has impacted the area.

Table 43. Natural Heritage element occurrences at Bighorn Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	C

*EO=Element Occurrence

Location: This site is located approximately 4 miles west south of Fox Creek in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Fox Creek

Legal Description: T32N, R7E S 10, 13, 14, 15, 16, 20, 21, 22, 23

Elevation: 7,580-9,160 ft. Approximate Size: 2,500 acres

General Description: The site is characterized by open montane meadows with scattered ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*), especially along several mesas in the surrounding area. The area generally slopes from the south to the north and northeast and is traversed by numerous small drainages. Piñon (*Pinus edulis*) and juniper (*Juniperus* spp.) are scattered in pockets throughout the site. Cottonwood (*Populus angustifolia*) trees and willows (*Salix* spp.) are present along some of the drainages. The open grasslands appear to have been heavily grazed in the past and some have been reseeded with the non-native crested wheatgrass (*Agropyron cristatum*). Numerous weedy forbs are also present and native grasses have been reduced in abundance. A heavily used road goes through the site.

Boundary Justification: The boundary encompasses the Ripley milkvetch location and enough adjacent habitat to include open grasslands or savanna-like vegetation and the numerous small drainages downstream from known Ripley milkvetch locations. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching

the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.). A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.

Protection and Management Comments: The site is located on land managed by the Forest Service and is within the Ripley Milkvetch Special Interest Area (SIA).

The Rio Grande National Forest will allow grazing on the site and plans to develop a monitoring plan for the species (USDA Forest Service 1996). A few consecutive years of heavy grazing do not appear to significantly impact the plants, but over the long-term this may eventually degrade the population. Altering the timing of the grazing from year to year may help the population recover, set seed, and establish seedlings. Although the species appears to be long-lived, seedling establishment may be a limiting factor for the populations. Near normal to above average April - June precipitation may allow for better seedling survival (Julie Burt – pers. comm.). If flexibility exists with grazing management, reducing or delaying grazing until later in the summer during wet years may allow more seedling establishment. In some parts of the site terracing has been done. At other Ripley milkvetch sites the non-native yellow sweetclover (*Melilotus officinalis*) has become common in terraces and ditches and seems to reduce the abundance of the Ripley milkvetch (Julie Burt – pers. comm.).

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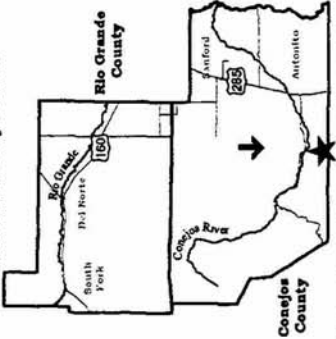


LEGEND

□ PCA Boundary

Base Layer:
 Antonio, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Projection: UTM, Zone 13, NAD27

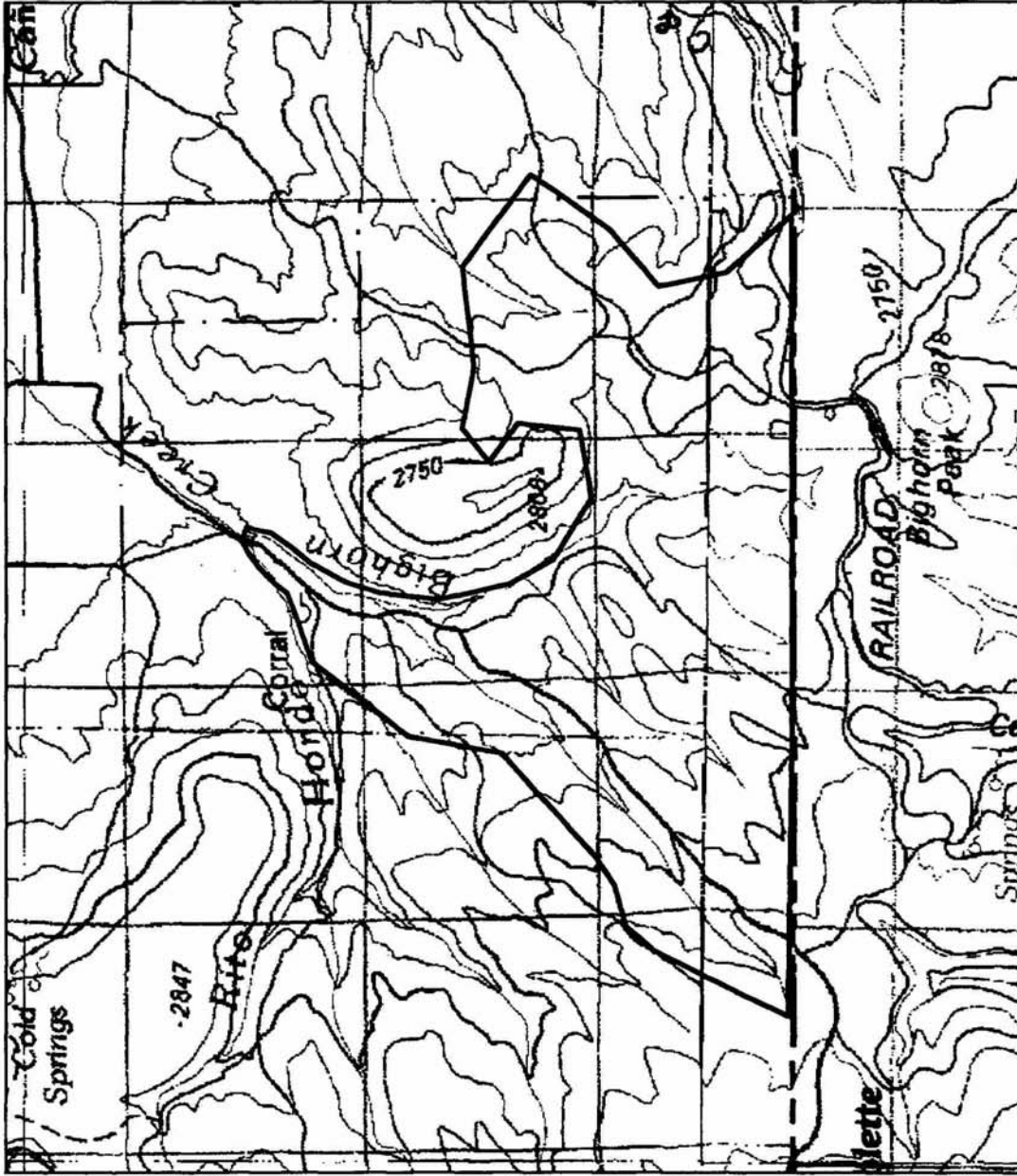


Figure 45. Bighorn Creek

Bishop Rock Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land Management but has no formal protection. Recreational use may be impacting the Weber’s catseye plants.

Biodiversity Rank Justification: The site contains a fair occurrence of a plant species vulnerable on a global scale, Weber’s catseye (*Cryptantha weberi*). Weber’s catseye is only known from south-central Colorado. This population is small compared to others known in Rio Grande and Conejos counties and the site is heavily impacted by recreational use.

Table 44. Natural Heritage element occurrences at Bishop Rock PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Cryptantha weberi</i>	Weber’s catseye	G3	S3		C

*EO=Element Occurrence

Location: This site is located at the west end of Bishop in the Rock Creek drainage in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Greenie Mountain

Legal Description: T37N, R6E S 2

Elevation: 8,560-8,720 ft. Approximate Size: 10 acres

General Description: The site occurs at the west end of Bishop Rock on a sparsely vegetated southwest slope. Blue grama (*Bouteloua gracilis*) and Richardson’s hymenoxys (*Hymenoxys richardsonii*) are very common. Two-track roads and recreational trails run through the site. There is a lot of trash and broken glass around Bishop Rock from recreational use.

Boundary Justification: The main threat to Weber’s catseye would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of Weber’s catseye may also require other types of habitat. The pollinators are unknown, consequently we are not certain that the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on land managed by the BLM but has no formal protection.

The heavy recreational use at the site may impact the plant population by trampling and killing some plants.

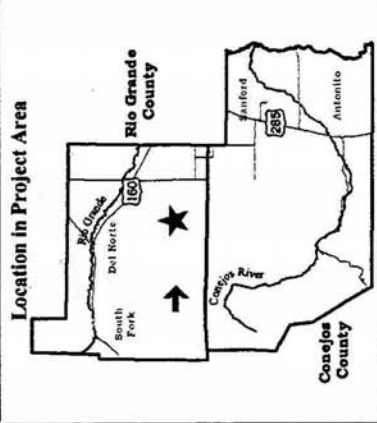
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 Colorado State University - CNR
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 map created 29 February 2000



LEGEND

□ PCA Boundary

Base Layer:
 Greenlee Mountain, 37106-D3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

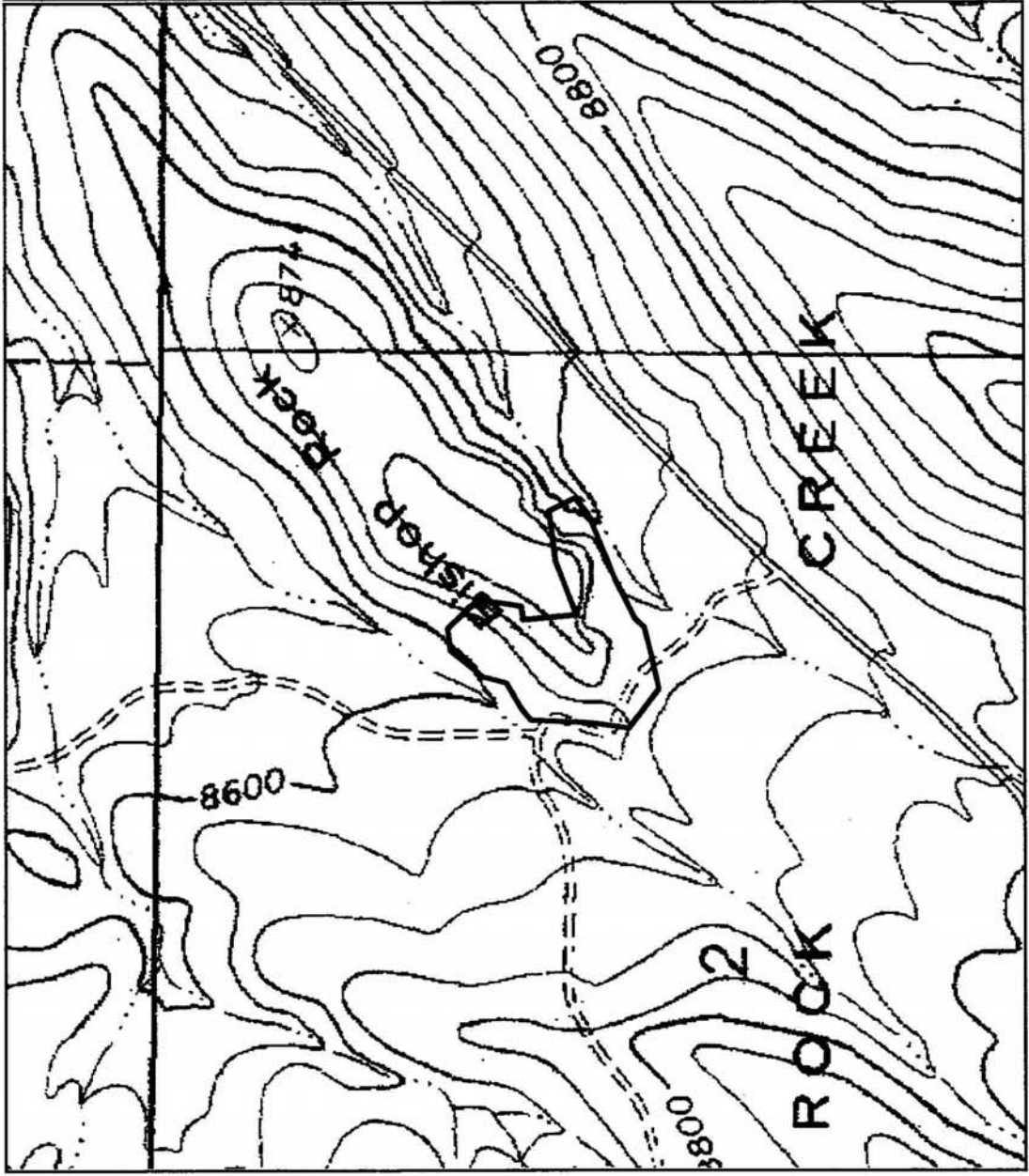


Figure 46. Bishop Rock

Cascade Creek at Osier Potential Conservation Area

Biodiversity Rank: B4 (Moderate Significance)

This site contains a good occurrence of a fish that is vulnerable on a global scale.

Protection and Management Issues:

This site occurs on public land managed by the Rio Grande National Forest.

Biodiversity Rank Justification: This site contains one element of concern at one location. The quality of the population of Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) contributes to the rank of this site. As of the early 1990's, it is estimated that there are approximately 60-70 relatively pure populations of Rio Grande cutthroat trout from New Mexico and another 30-40 in Colorado (Rinne 1995). This fish is considered "sensitive" by the U.S. Forest Service and is on the State list of species of concern.

Table 45. Natural Heritage element occurrences at Cascade Creek at Osier PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Fish					
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	G4T3	S3	FS, BLM, SC	B

*EO=Element Occurrence

Location: This site is located approximately 1 mile west of the town of Osier in Conejos County.

U.S.G.S. 7.5 minute quadrangles: Cumbres and Osier

Legal Description: T32N, R6E S 18, 19
T32N, R5E S 1, 2, 12, 13
T33N, R5E S 36

Elevation: 9,600-10,800 ft. Approximate Size: 840 acres

General Description: This site includes the floodplain of Cascade Creek from the intersection of the Rio de los Pinos to the headwaters. The site encompasses approximately 3.3 miles of Cascade Creek.

This site was drawn to ensure the Rio Grande cutthroat trout population inhabiting Cascade Creek has sufficient habitat at the known location and further upstream. Rio Grande cutthroat trout thrive in waters with a matrix of pools and riffles, in-stream boulders and other structure, good riparian vegetation cover, and mild slopes (Trotter 1987).

Boundary Justification: The boundaries are drawn to provide habitat for the occurrence of cutthroat trout. The boundary of this site is limited to 300 meters on either side of the creek to provide adequate riparian vegetation for cover and possible prey (insect) needs, yet this potential conservation area, in and of itself, may not be sufficient to ensure the persistence of

the population. Ecological processes or environmental impacts that originate upstream of the site may affect the viability of this occurrence.

Protection and Management Comments: This site is within the Rio Grande National Forest.

Little information is available on the development of conservation strategies for native cutthroat trout (Young 1995). However, the primary threats that have been identified for the Rio Grande cutthroat are management issues, specifically grazing of domestic livestock and water diversion for irrigation (Behnke and Zarn 1976, Behnke 1992, Stumpff and Cooper 1996). To adequately plan for the conservation of the cutthroat trout population identified in this site, biologists and planners should address land management within the immediate watershed. Stumpff and Cooper (1996) recognize that all too frequently management plans focus directly on the riparian area and try to limit impacts in those areas, yet land management in the entire watershed needs to be considered to adequately protect cutthroat trout. Also, exclusion of non-native fish species is vital to the persistence of cutthroat trout populations.

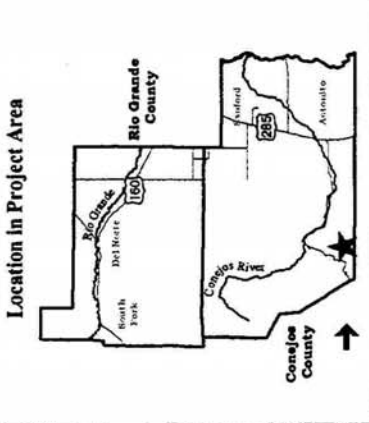
Colorado Natural Heritage Program
 Colorado State University - CNR
 254 General Services Building
 Fort Collins, CO 80523
 map created 29 February 2000



LEGEND

□ PCA Boundary

Base Layer:
 Antoino, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Projection: UTM, Zone13, NAD27

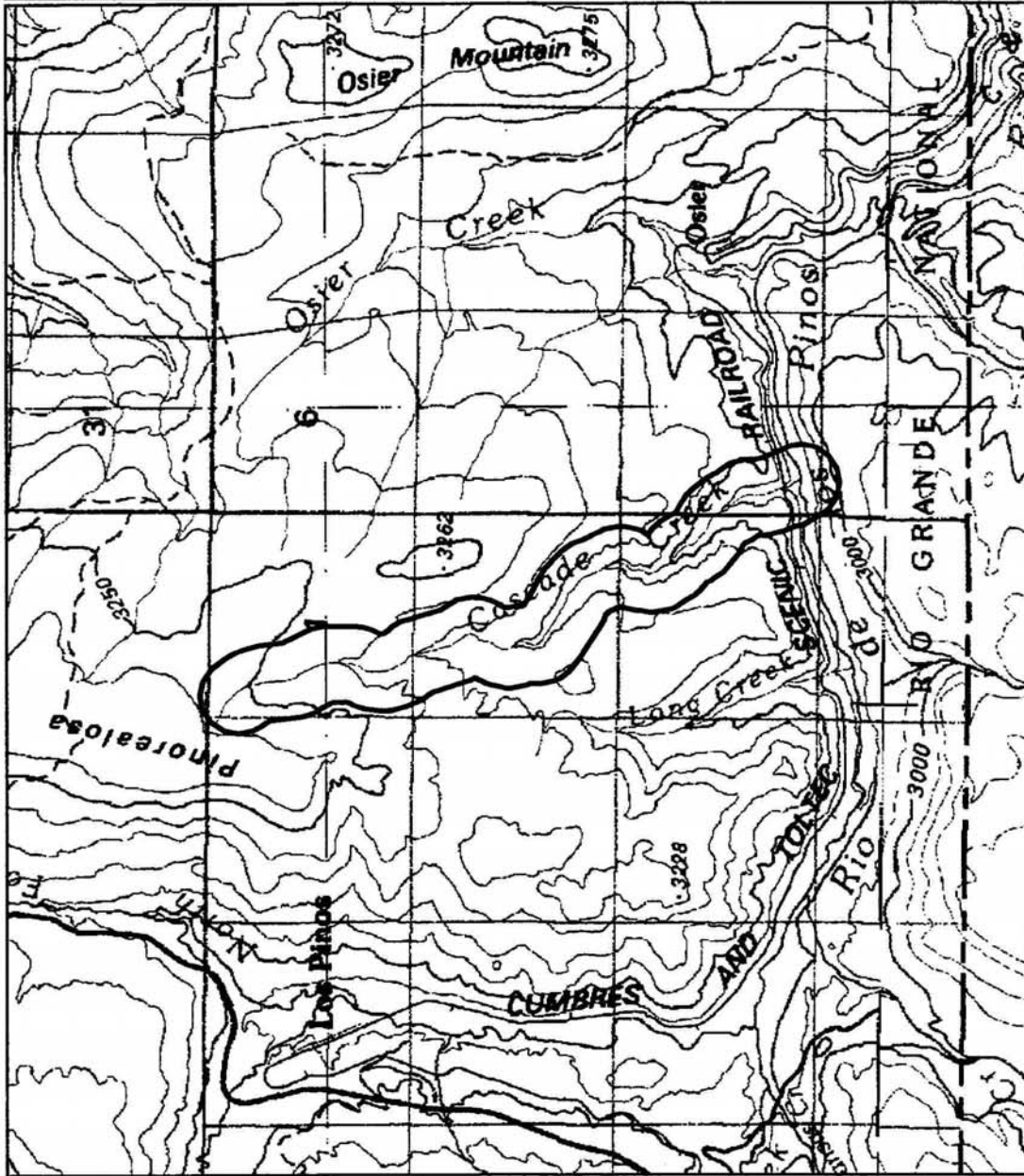


Figure 47. Cascade Creek at Osier

Conejos River Springs Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: Land within the site is publicly owned and managed by the Rio Grande National Forest. Colorado Highway 17 runs through the site and a Forest Service campground occurs directly upstream.

Biodiversity Rank Justification: The site contains one fair occurrence of a plant species vulnerable on a global scale, Ripley milkvetch (*Astragalus ripleyi*). Ripley milkvetch is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species. The population at this site is small and the long-term viability is questionable due to the amount of human caused disturbance in the area.

Table 46. Natural Heritage element occurrences at Conejos River Springs PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	C

*EO=Element Occurrence

Location: This site is located just downstream from the Aspen Glade campground in Conejos County along the Conejos River.

U.S.G.S. 7.5 minute quadrangle: Osier

Legal Description: T33N, R6E S 25, 26

Elevation: 8,440-8,600 ft. Approximate Size: 65 acres

General Description: The site is located along the Conejos River just below a Forest Service campground on the lower slopes and river floodplain. Colorado Highway 17 runs through the site. Scattered ponderosa pine (*Pinus ponderosa*) occur on the site and many of the Ripley milkvetch plants occur under the outside edge of the tree canopy. Numerous non-native species including smooth brome (*Bromus inermis*), toadflax (*Linaria* sp.), Kentucky bluegrass (*Poa pratensis*), crested wheatgrass (*Agropyron cristatum*), and sweetclover (*Melilotus officinalis*) have invaded the understory.

Boundary Justification: The boundary also encompasses the Ripley milkvetch location and a small amount of adjacent habitat to include open grasslands or savanna-like vegetation. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt -

pers. comm.). A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.

Protection and Management Comments: Land within the site is publicly owned and managed by the Forest Service.

Colorado Highway 17 runs through the site and a Forest Service campground occurs directly upstream. Smooth brome, Kentucky bluegrass, crested wheatgrass, and toadflax are present and can be invasive. Control of these species may help reduce impacts to the Ripley milkvetch population. New trails associated with the campground may serve as corridors for invasion of non-native plant species which could impact the Ripley milkvetch. Disturbance from road maintenance activities could also allow invasion by non-native plant species. A few consecutive years of heavy grazing do not appear to significantly impact the plants, but over the long-term this may eventually degrade the population. Altering the timing of the grazing from year to year may help the population recover, set seed, and establish seedlings. Although the species appears to be long-lived, seedling establishment may be a limiting factor for the populations. Near normal to above average April - June precipitation may allow for better seedling survival (Julie Burt – pers. comm.). If flexibility exists with grazing management, reducing or delaying grazing until later in the summer during wet years may allow more seedling establishment.

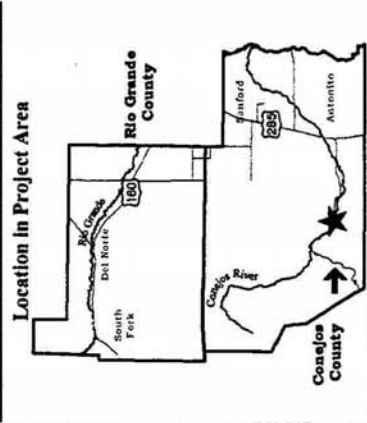
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 254 General Services Building
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 map created 28 February 2000



LEGEND

□ PCA Boundary

Base Layer:
 Osler, 37106-A3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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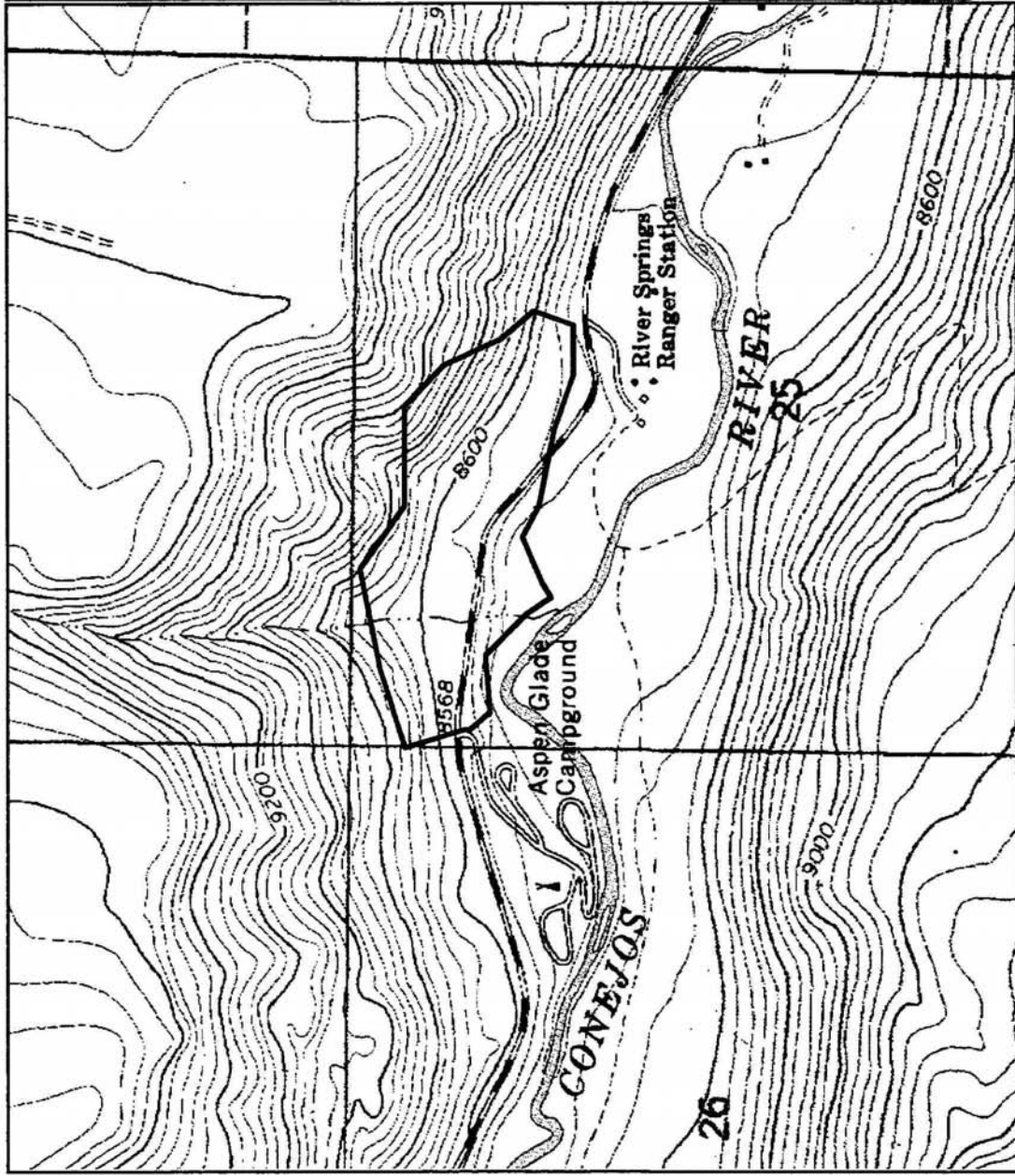


Figure 48. Conejos River Springs

Fairy Hills Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant species vulnerable on a global scale and a poor occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land Management and is within the Rio Grande Corridor Area of Critical Environmental Concern.

Biodiversity Rank Justification: The site contains a fair occurrence of a plant species vulnerable on a global scale, Weber’s catseye (*Cryptantha weberi*) and a poor occurrence of a plant species vulnerable on a global scale, rock-loving neoparrya (*Neoparrya lithophila*). Weber’s catseye is only known from the south-central Colorado. This population is relatively small compared to others known in Rio Grande and Conejos counties. The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Rio Grande and Conejos counties have some of the largest populations of this species. The rock-loving neoparrya occurrence is very small for that species.

Table 47. Natural Heritage element occurrences at Fairy Hills PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Cryptantha weberi</i>	Weber’s catseye	G3	S3		C
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	D

*EO=Element Occurrence

Location: This site is located approximately two miles north of Highway 142 adjacent to the Rio Grande in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Manassa NE

Legal Description: T34N, R11E S 3, 10

Elevation: 7,700-7,800 ft. Approximate Size: 21 acres

General Description: The site occurs on a small rock outcrop west of the Rio Grande. Rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) shrublands with blue grama (*Bouteloua gracilis*) in the understory dominate the area surrounding the rock outcrop. A county road occurs to the west of the site and several two-track roads run from there into the site.

Boundary Justification: The main threat to these two species would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant populations and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the Weber’s

catseye and rock-loving neoparrya may also require other types of habitat. The pollinators are unknown, consequently we are uncertain if the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on public land managed by the Bureau of Land Management and is within the Rio Grande Corridor Area of Critical Environmental Concern.

Some two-track roads occur near the plants but do not seem to impact the species at this time.

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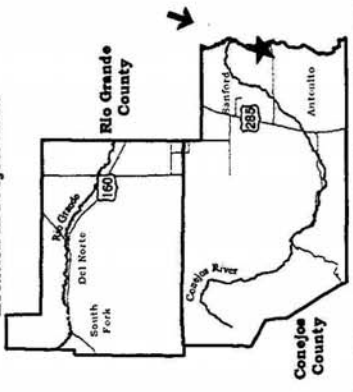


LEGEND

PCA Boundary

Base Layer:
 Mesito Reservoir, 37105-B6
 Manassa NE, 37105-B7
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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A Projection: UTM, Zone13, NAD27

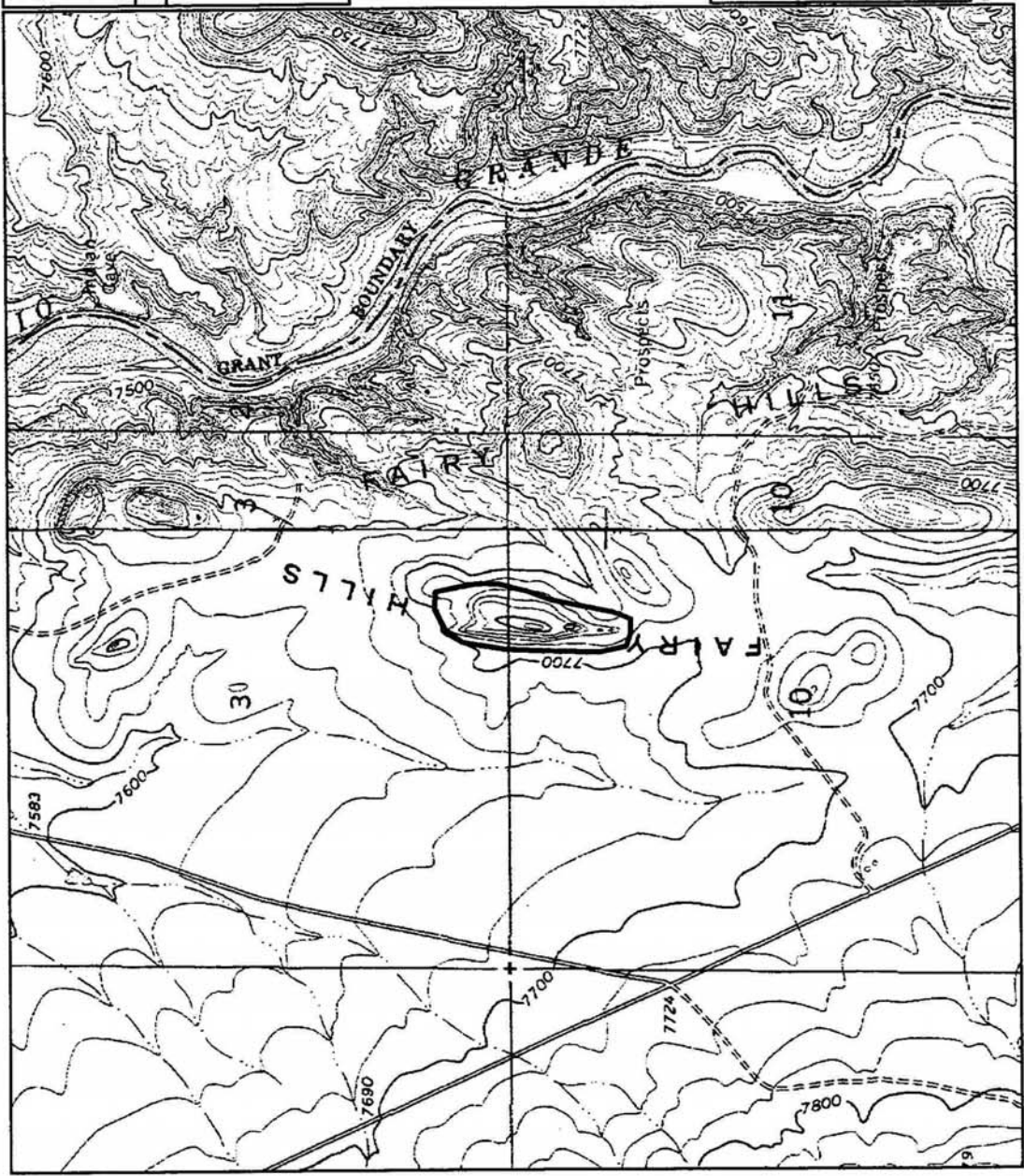


Figure 49. Fairy Hills

Greenie Mountain Foothills Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a good occurrence of an animal subspecies vulnerable on a global scale, an excellent occurrence of another animal subspecies vulnerable on a global scale, and a good occurrence of a plant community apparently secure on a global scale.

Protection and Management Issues: The site is located mainly on public land managed by the Bureau of Land Management land with smaller amounts of land managed or owned by the Forest Service, Fish and Wildlife Service, and private landowners. Numerous two-track roads occur in the area.

Biodiversity Rank Justification: The site contains an excellent occurrence of an animal subspecies vulnerable on a global scale, silky pocket mouse subspecies (*Perognathus flavus sanluisi*), a good occurrence of another animal subspecies vulnerable on a global scale, thirteen-lined ground squirrel (*Spermophilus tridecemlineatus blanca*), and a good occurrence of a plant community apparently secure on a global scale, winterfat/indian ricegrass (*Krascheninnikovia lanata/Oryzopsis hymenoides*). The silky pocket mouse subspecies and the Thirteen-lined ground squirrel subspecies are restricted to the San Luis Valley. This site provides excellent habitat for both. The winterfat/Indian ricegrass plant community is apparently secure across its range. Normally this would exclude it from being tracked by CNHP, but this occurrence is documented because it is one of the best found in Rio Grande and Conejos counties during the 1999 field season. Strictly following the guidelines in assigning B-ranks would result in a rank of B5, but because the plant community occurrence is the best found of its type in the two counties the rank is elevated to B4.

Table 48. Natural Heritage element occurrences at Greenie Mountain Foothills PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Mammals					
<i>Perognathus flavus sanluisi</i>	Silky pocket mouse subsp.	G5T3	S3		A
<i>Spermophilus tridecemlineatus blanca</i>	Thirteen-lined ground squirrel subsp.	G5T3	S3		B
Plant communities					
<i>Krascheninnikovia lanata/Oryzopsis hymenoides</i>	Winter fat shrubland	G4	S3?		B

*EO=Element Occurrence

Location: This site is located southwest of the Monte Vista National Wildlife Refuge in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Fulcher Gulch

Legal Description: T37N, R7E S 2, 3, 4, 9, 10, 11, 13, 14, 15, 16, 21, 22, 23,
24, 26, 27, 28, 33, 34, 35
T36N, R7E S 3, 4

Elevation: 7,700-8,500 ft. Approximate Size: 7,815 acres

General Description: The site encompasses the lower slopes of Greenie Mountain, below the lower tree line, east to near the Monte Vista Canal. At higher elevations scattered piñon pine (*Pinus edulis*) and juniper are scattered along rocky outcrops. Just below the tree line, winterfat (*Krascheninnikovia lanata*) shrublands dominate with good cover of Indian ricegrass (*Oryzopsis hymenoides*). Near to the valley floor the shrublands appear to be more degraded with more abundant rabbitbrush (*Chrysothamnus Greenei*) and snakeweed (*Gutierrezia sarothrae*). Here, Indian ricegrass is sparse and blue grama (*Bouteloua gracilis*) is much more common, probably from past grazing practices.

Boundary Justification: The boundary was drawn to include the known extent of the high quality plant community on the upper slopes and down to the irrigated part of the Valley Floor to provide habitat for large populations of the thirteen-lined ground squirrel and silky pocket mouse subspecies.

Protection and Management Comments: The site is located mainly on public land managed by the Bureau of Land Management with smaller amounts of managed or owned by the Forest Service, Fish and Wildlife Service, and private landowners. No special protection status is provided.

Numerous two-track roads occur throughout the area. The roads may serve as corridors for invasion of non-native species or other impacts in the future. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control. The area appears to be only lightly grazed or not grazed at all by livestock. If grazing is conducted in the area it should be managed to allow some rest so that the area is not grazed the entire growing season. Spring grazing for many consecutive years would probably reduce the abundance of the cool season grasses, especially Indian ricegrass.

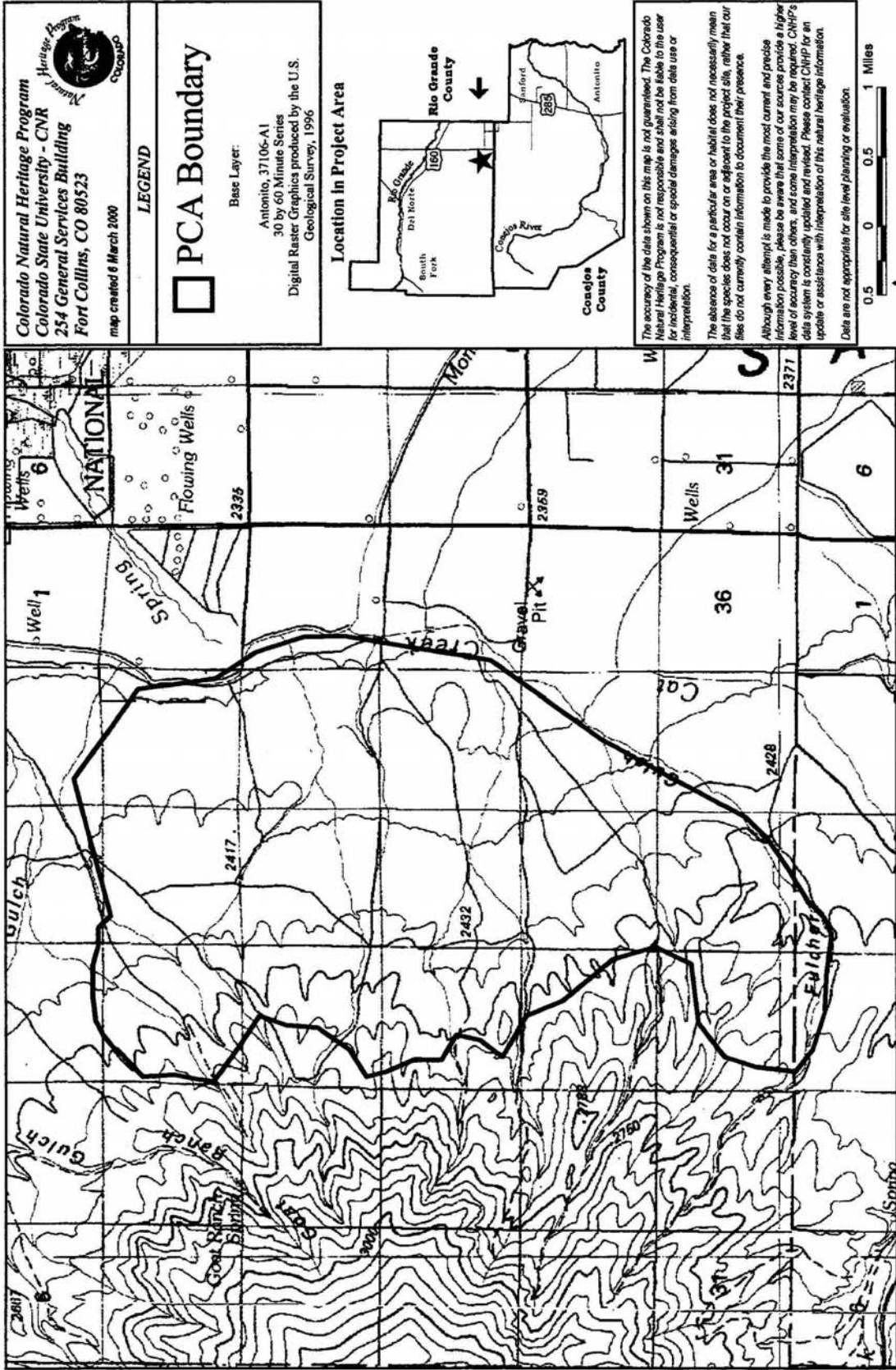


Figure 50. Greenie Mountain Foothills

Limekiln Point Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant community vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land Management and is in a popular recreation area.

Biodiversity Rank Justification: The site contains a fair occurrence of a New Mexico feathergrass (*Stipa neomexicana*) plant community vulnerable on a global scale. This particular population is relatively small and somewhat naturally protected by the extremely steep topography on which it occurs. The community is naturally limited and rare and has been impacted in some areas by residential development, mining, and overgrazing. It is estimated that rangewide there are only 30-50 occurrences of this community totaling less than 5000 acres.

Table 49. Natural Heritage element occurrences at Limekiln Point PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Stipa neomexicana</i>	New Mexico feathergrass grassland	G3	S3		C

*EO=Element Occurrence

Location: This site is located approximately 3 miles southwest of Sevenmile Plaza in Rio Grande County.

U.S.G.S. 7.5 minute quadrangle: Dog Mountain

Legal Description: T39N, R6E S 13, 14, 23, 24

Elevation: 8,040-8,431 ft. Approximate Size: 125 acres

General Description: The site encompasses a steep butte at the east end of a relatively flat mesa. On the south side a steep cliff separates it from the adjacent lowlands. The north side does not have the cliff but is still very steep. Basalt boulders outcrop near the top of the butte. Grasslands dominated by blue grama (*Bouteloua gracilis*) and shrublands dominated by rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) surround the site. An old mine exists on the top of the outcrop but does not appear to be active. The road to the mine leads up the north side of the butte but attempts have been made to close it. Four wheel drive vehicles still drive at least part way to the top. Adjacent areas are heavily used for recreation and numerous two-track roads and a county road occur near the site.

Boundary Justification: The main threat to this plant community would be physical disturbance of the habitat or heavy grazing. The boundary was delineated to include the known extent of the plant community and a small amount of the adjacent habitat on the steep butte.

Protection and Management Comments: The site is located on land owned by the Bureau of Land Management and is in a popular recreation area.

Some two-track roads occur near the plant community but do not seem to impact it at this time. The roads may serve as corridors for invasion of non-native species or other impacts in the future. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control. Management within this boundary that mimics natural fire and grazing regimes of the area would help protect this plant community.

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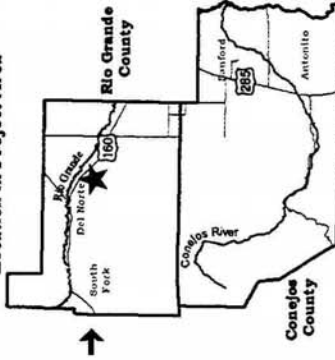


LEGEND

 **PCA Boundary**

Base Layer:
 Dog Mountain, 37106-E3
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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A Projection: UTM, Zone13, NAD27

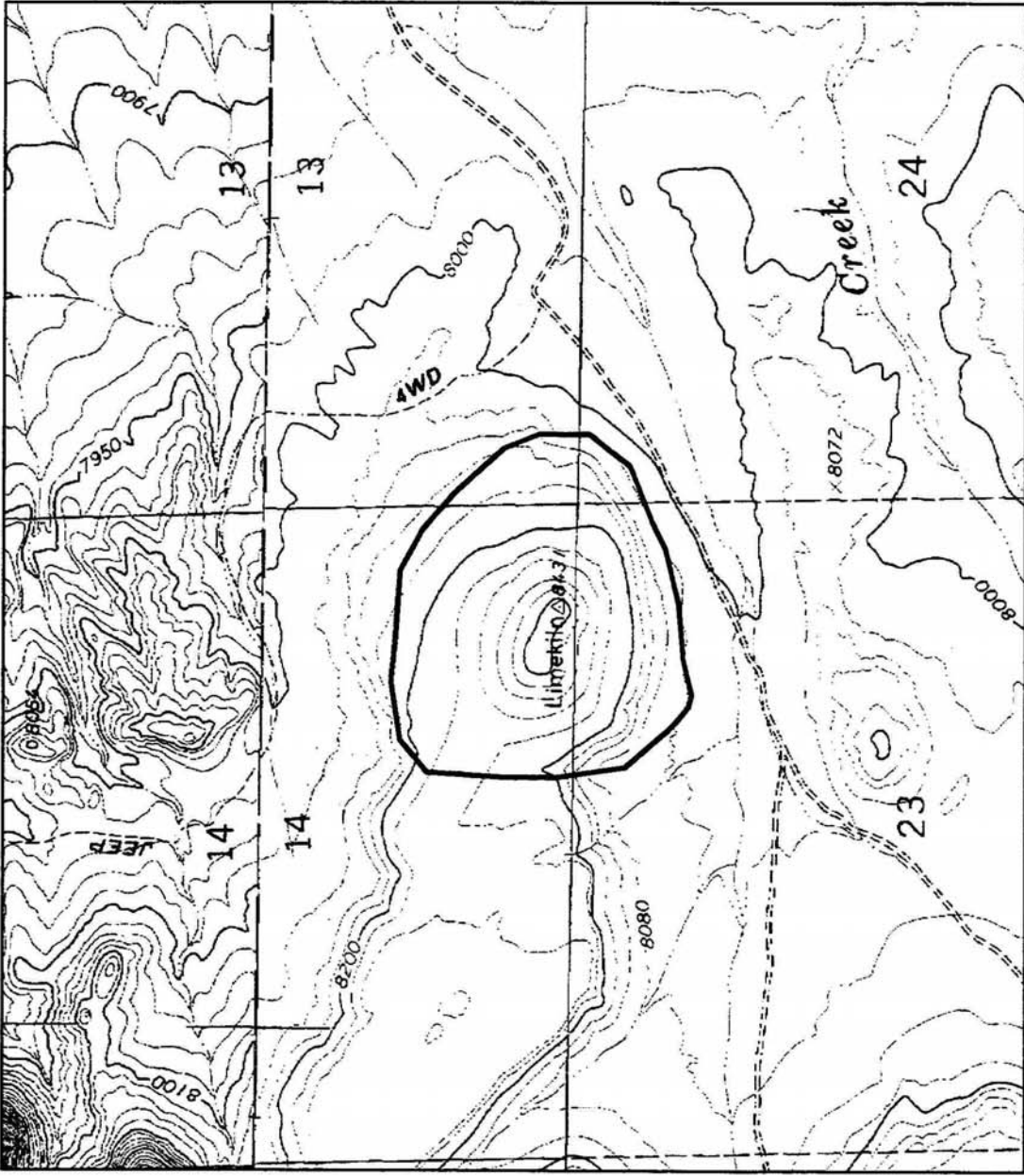


Figure 51. Limekiln Point

Osier Creek Potential Conservation Area

Biodiversity Rank: B4 (Moderate Significance)

This site contains a good occurrence of a fish that is vulnerable on a global scale.

Protection and Management Issues:

This site occurs on both public and private lands.

Biodiversity Rank Justification: This site contains one element of concern at one location. The quality of the population of Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) contributes to the rank of this site. As of the early 1990's, it was estimated that there were only approximately 60-70 relatively pure populations of Rio Grande cutthroat trout from New Mexico and another 30-40 in Colorado (Rinne 1995). This fish is considered "sensitive" by the U.S. Forest Service and is on the State list of species of concern.

Table 50. Natural Heritage element occurrences at Osier Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Fish					
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	G4T3	S3	FS, BLM, SC	B

*EO=Element Occurrence

Location: This site is located north of the town of Osier in Conejos County.

U.S.G.S. 7.5 minute quadrangles: Osier

Legal Description: T32N, R6E S 5-8, 17
 T32N, R5E S 1
 T33N, R5E S 31

Elevation: 9,630-10,600 ft. Approximate Size: 1,314 acres

General Description: This site encompasses the riparian floodplain of Osier Creek from where Osier Creek meets an unnamed drainage near the town of Osier to the headwaters. The site encompasses approximately 5.3 miles of Osier Creek.

This site was drawn to ensure the Rio Grande cutthroat trout population inhabiting Osier Creek has sufficient habitat at the known location and further upstream. Rio Grande cutthroat trout thrive in waters with a mixture of pools and riffles, in-stream boulders and other structure, good riparian vegetation cover, and mild slopes (Trotter 1987).


Boundary Justification: The site boundaries are drawn to provide habitat for the occurrence of cutthroat trout. The boundary of this site is limited to 300 meters on either side of the creek system to provide adequate riparian vegetation for cover and possible prey (insect) needs, yet this potential conservation area, in and of itself, may not be sufficient to ensure the

persistence of the population. Ecological processes or environmental impacts that originate upstream of the site may affect the viability of this occurrence.


Protection and Management Comments: This site is within private lands and public lands.

Little information is available on the development of conservation strategies for native cutthroat trout (Young 1995). However, the primary threats that have been identified for the Rio Grande cutthroat are management issues, specifically grazing of domestic livestock and water diversion for irrigation (Behnke and Zarn 1976, Behnke 1992, Stumpff and Cooper 1996). To adequately plan for the conservation of the cutthroat trout population identified in this site, biologists and planners should address land management within the immediate watershed. Stumpff and Cooper (1996) recognize that all too frequently management plans focus directly on the riparian area and try to limit impacts in those areas, yet land management in the entire watershed needs to be considered to adequately protect cutthroat trout. Also, exclusion of non-native fish species is vital to the persistence of cutthroat trout populations.

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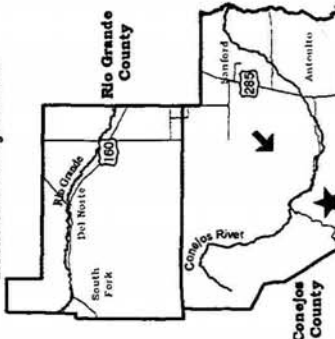


LEGEND

 **PCA Boundary**

Base Layer:
 Antoino, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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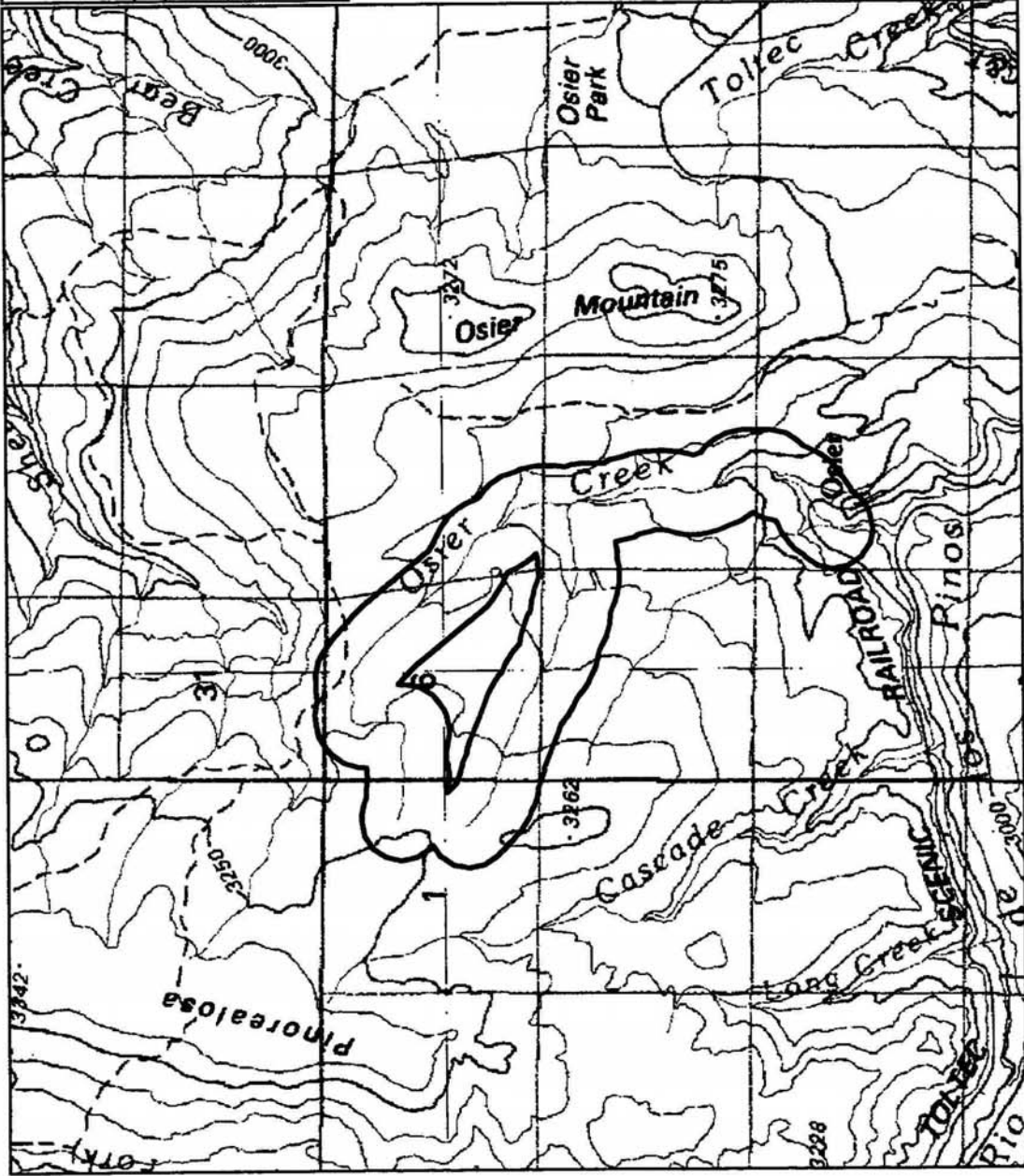
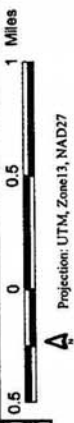


Figure 52. Osier Creek

Poso Creek Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant species that is vulnerable on a global scale.

Protection and Management Issues: Land within the site is mainly publicly owned and managed by the Bureau of Land Management and the Colorado Division of Wildlife. Non-native plant species are abundant and may impact the Ripley milkvetch.

Biodiversity Rank Justification: The site contains a fair occurrence of a plant species vulnerable on a global scale, Ripley milkvetch (*Astragalus ripleyi*). The occurrence of the Ripley milkvetch is small and the area has been impacted by past livestock grazing. Ripley milkvetch is only known from foothills of the San Juan Mountains in Conejos County and Taos and Rio Arriba counties, New Mexico. It is on the Forest Service and BLM list of sensitive species.

Table 51. Natural Heritage element occurrences at Poso Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus ripleyi</i>	Ripley milkvetch	G3	S3	FS, BLM	C

*EO=Element Occurrence

Location: This site is located approximately 5 miles southwest of Centro in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Centro

Legal Description: T35N, R7E S 19, 20

Elevation: 8,200-8,600 ft. Approximate Size: 140 acres

General Description: The site includes a narrow canyon and steep slopes which rise to the adjacent mesas and rolling foothills. Some ponderosa pine (*Pinus ponderosa*), piñon pine (*Pinus edulis*), and juniper (*Juniperus monosperma*) occur along the slopes but the site is characterized by open grasslands and desert shrublands dominated by winterfat (*Krascheninnikovia lanata*), snakeweed (*Gutierrezia sarothrae*), and rabbitbrush (*Chrysothamnus* spp.). The riparian area has some patches of cottonwood (*Populus angustifolia*) and willows (*Salix* spp.). The creek has been dammed to form several stock ponds and a two-track road follows the stream.

Boundary Justification: The boundary also encompasses the Ripley milkvetch location and enough adjacent habitat to include open grasslands or savanna-like vegetation. This boundary is intended to allow some seed dispersal into currently unoccupied but apparently suitable habitat and provide habitat for plant pollinators. Seed dispersal mechanisms considered important for this species are small mammals (presumably kangaroo rats) caching the seed pods and precipitation events washing the seeds downhill (Julie Burt - pers. comm.).

A suspected pollinator of this plant is a common bee that could nectar on species other than Ripley milkvetch in the same habitat.

Protection and Management Comments: Land within the site is publicly owned and managed by the Bureau of Land Management and the Colorado Division of Wildlife.

Numerous non-native plant species are present in the riparian area including crested wheatgrass (*Agropyron cristatum*), Kentucky bluegrass (*Poa pratensis*), Canada thistle (*Cirsium arvense*), and clover (*Trifolium* sp.). Currently these species do not seem to impact the Ripley milkvetch population. The two-track road may serve as a corridor for invasion of non-native species or other impacts in the future, especially if use of the road increases significantly. Occasional monitoring in the future would help alert land managers to non-native species before they became widespread and more difficult to control. Some parts of the site appear to have been heavily grazed in the past. A few consecutive years of heavy grazing do not appear to significantly impact the plants, but over the long-term this may eventually degrade the population. Altering the timing of the grazing from year to year may help the population recover, set seed, and establish seedlings. Although the species appears to be long-lived, seedling establishment may be a limiting factor for the populations. Near normal to above average April - June precipitation may allow for better seedling survival (Julie Burt – pers. comm.). If flexibility exists with grazing management, reducing or delaying grazing until later in the summer during wet years may allow more seedling establishment.

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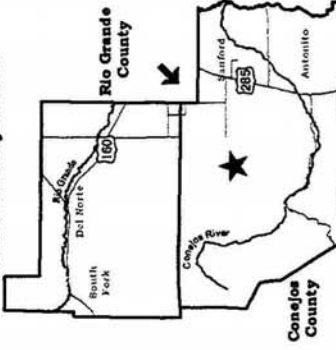


LEGEND

 **PCA Boundary**

Base Layer:
 Antonito, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.

0.5 0 0.5 Miles

A Projection: UTM, Zone13, NAD27

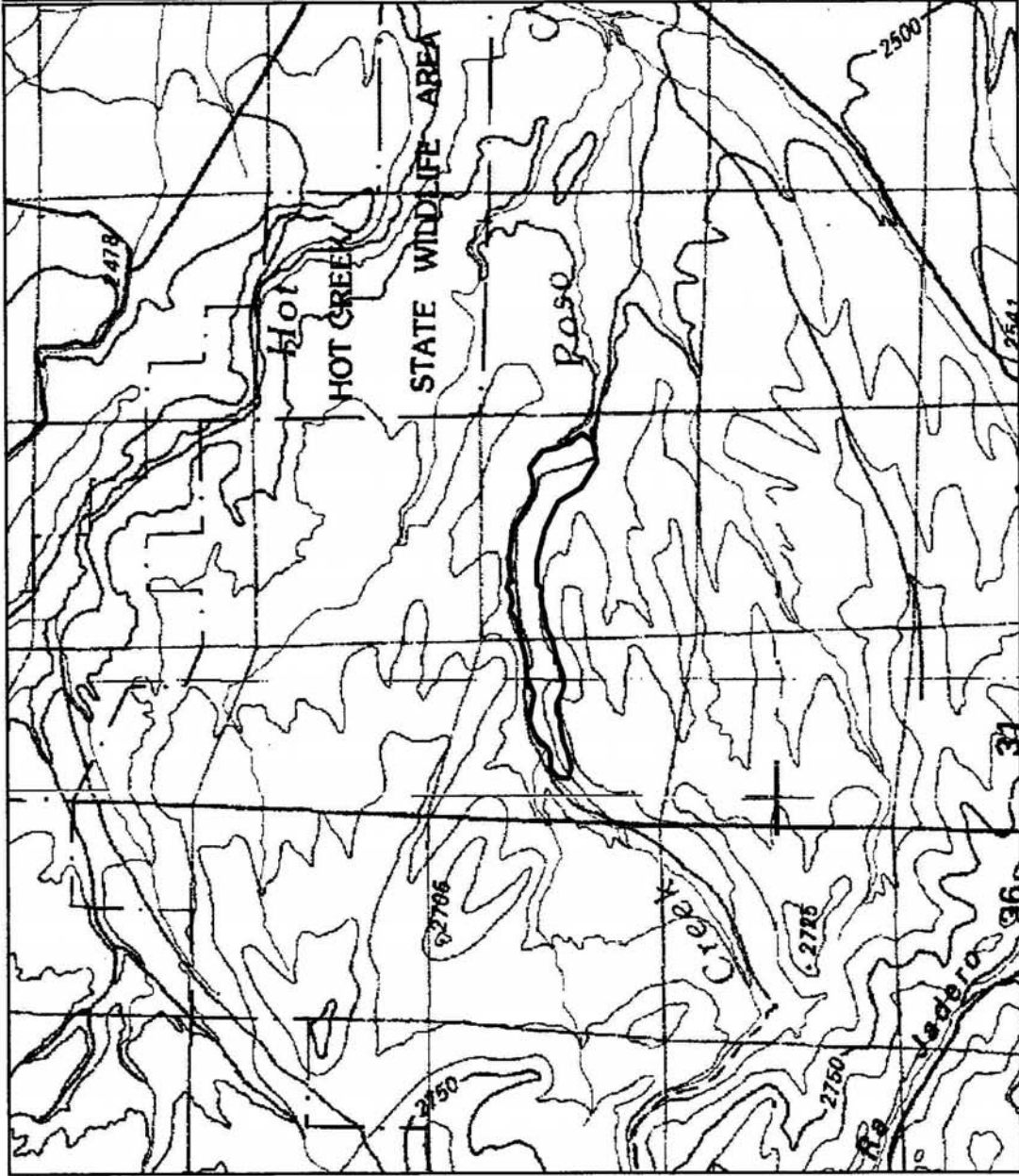


Figure 53. Poso Creek

Rio Grande at Embargo Creek Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site supports a fair example of a plant community vulnerable on a global scale.

Protection and Management Issues: The site is entirely privately owned and has no formal protection. The Colorado Division of Wildlife maintains a fishing access easement with private landowners along much of this stretch of the Rio Grande, including most of this site. Some grazing occurs in the area and there is an abundance of non-native species.

Biodiversity Rank Justification: The site supports a fair example of a montane riparian shrubland (*Salix lucida* var. *caudata*). This community is documented from Montana to Colorado. In Colorado, it is highly threatened by stream channelization.

Table 52. Natural Heritage element occurrences at Rio Grande at Embargo Creek PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Salix lucida</i> var. <i>caudata</i>	Montane riparian shrubland	G3Q	S3		C

*EO=Element Occurrence

Location: The Rio Grande at Embargo Creek site is located approximately 2.5 miles east southeast of Agua Ramon in Rio Grande County along a back channel of the Rio Grande.

U.S.G.S. 7.5-min. quadrangle: South Fork East, Indian Head

Legal Description: T40N R04E S 21, 22, 23, 24, 25, 26, 27, 28

Elevation: 8,010 to 8,080 ft. Approximate Size: 1,176 acres

General Description: The site is located along the Rio Grande and includes the broad floodplain in the area along with oxbows and a few back channels. Whiplash willow (*Salix lucida* var. *caudata*), coyote willow (*Salix exigua*), and thinleaf alder (*Alnus incana*) occur around the edges of back channels and beaked sedge (*Carex utriculata*) is found in very wet areas. Narrowleaf cottonwood (*Populus angustifolia*) and a diverse number of mixed forbs occur on the floodplain between the main stem of the Rio Grande and the back channel. Coyote willow lines the banks of the main channel.


Boundary Justification: The boundary encompasses a large portion of the Rio Grande's floodplain to protect potential habitat in which the element may establish.

Protection and Management Comments: The site is entirely privately owned and has no formal protection. The Colorado Division of Wildlife maintains a fishing access easement with private landowners along much of this stretch of the Rio Grande, including most of this site.

Some livestock grazing occurs in the area. Hay meadows border natural riparian vegetation to the north and south of the river. Non-native species such as smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), clover (*Trifolium* spp.), dandelion (*Taraxacum officinale*), and yellow sweetclover (*Melilotus officinalis*) are abundant.

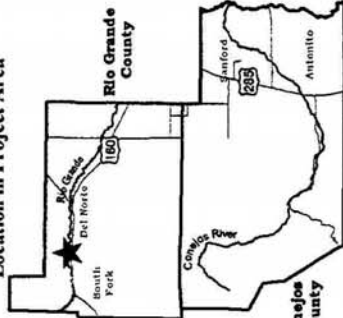
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LEGEND

 **PCA Boundary**

Base Layer:
 Del Norte, 37106-E1
 30 by 60 Minute Series
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 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.

0.5 0 0.5 1 Miles

A Projection: UTM, Zone13, NAD27

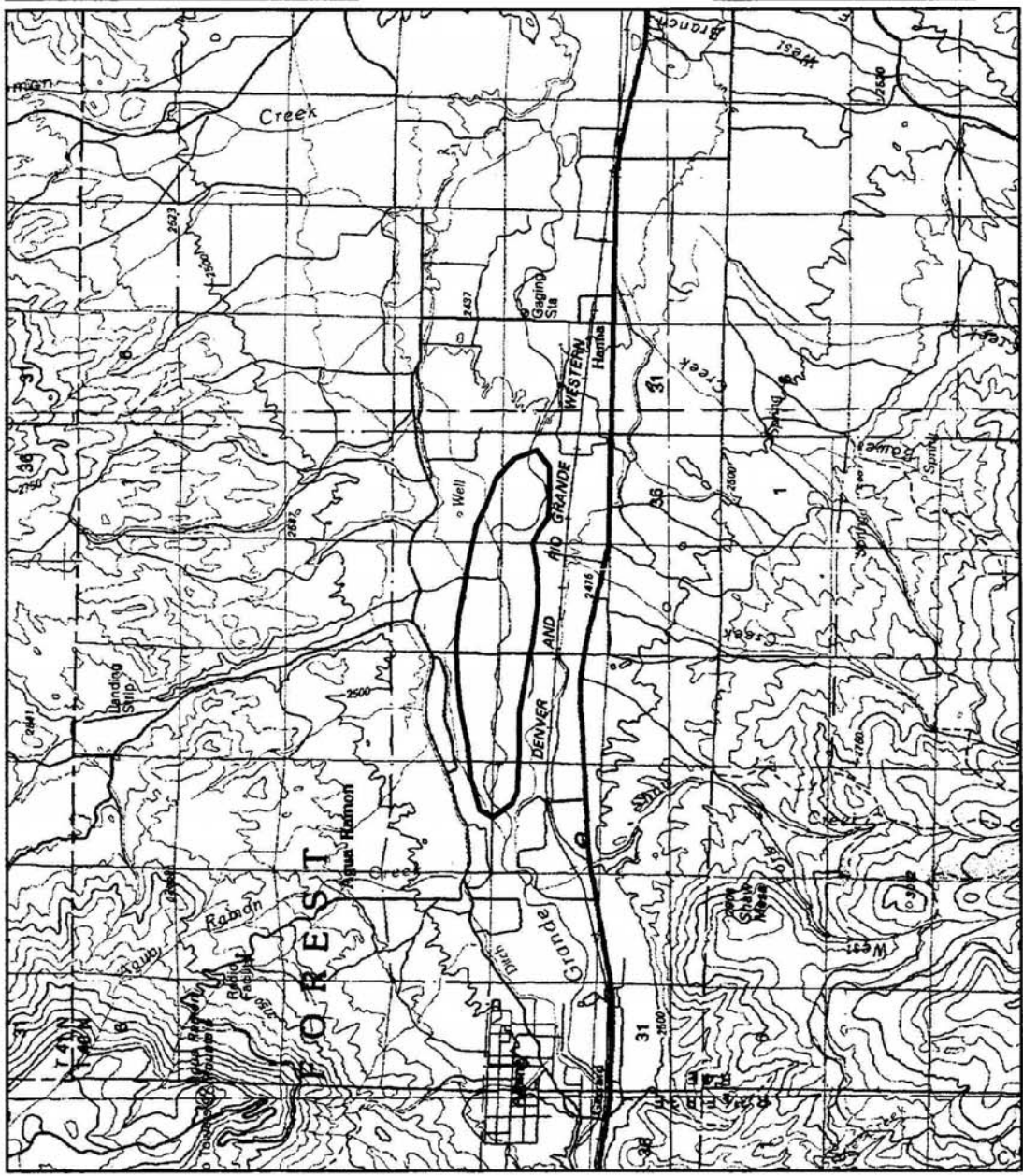


Figure 54. Rio Grande at Embargo Creek

Rio San Antonio Potential Conservation Area

Biodiversity Rank: B4 (Moderate Significance)

This site contains two fair occurrences of a fish that is vulnerable on a global scale.

Protection and Management Issues: This site is within private lands.

Biodiversity Rank Justification: This site contains one element of concern at two locations. The quality of the population of Rio Grande chub (*Gila pandora*) contributes to the rank of this site. The Rio Grande chub was once widespread in creeks of the upper Rio Grande and Pecos watersheds of New Mexico and the upper Rio Grande watershed of southern Colorado. Populations are reported to be stable in New Mexico but are declining in Colorado.

Table 53. Natural Heritage element occurrences at Rio San Antonio PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Fish					
<i>Gila pandora</i>	Rio Grande chub	G3	S1?	SC	C
	Rio Grande chub	G3	S1?	SC	C

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: This site is located east of Antonito and south of Los Cerritos in Conejos County.

U.S.G.S. 7.5 minute quadrangles: Lobatos

Legal Description: T33N, R10E S 17, 19, 20

T33N, R9E S 24-27, 34, 35

Elevation: 7,770-7,790 ft. Approximate Size: 505 acres

General Description: This site encompasses the riparian floodplain of the Rio San Antonio from two miles east of Antonito to three miles south of Los Cerritos. The site encompasses approximately 6.5 miles of the Rio San Antonio.

The habitat along this stretch of the Rio San Antonio includes intermittent, dense willow stands and some significant woody debris in the stream channel. The Rio Grande chub uses debris, woody cover, and other substrate as refugia. It is commonly found in pools of small to moderate streams near areas of current and in association with undercut banks and overhanging vegetation (Woodling 1985). Some sections of the stream have limited willow shrub cover. Other stretches still have substantial cover and refugia.

Boundary Justification: The site boundaries are drawn to provide habitat for the two occurrences of chub. The boundary of this site is limited to 300 meters on either side of the creek system to provide adequate riparian vegetation for cover and possible prey (insect) needs, yet this potential conservation area, in and of itself, may not be sufficient to ensure the persistence of the population.

Protection and Management Comments: This site is within private lands.

Many of the surrounding ranches use the land for grazing or haying and some erosion impacts are evident. To provide sufficient habitat for the chub population, grazing and haying may need to be managed to minimize erosion in and around the creek or restrict such impacts to particular sections of the Rio San Antonio. Also, limiting introduction of non-native fishes would benefit the existing chub population.

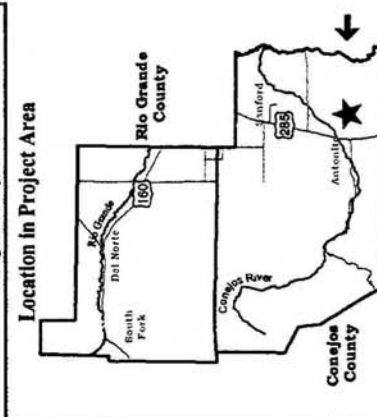
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LEGEND

PCA Boundary

Base Layer:
 Alamosa, 37105-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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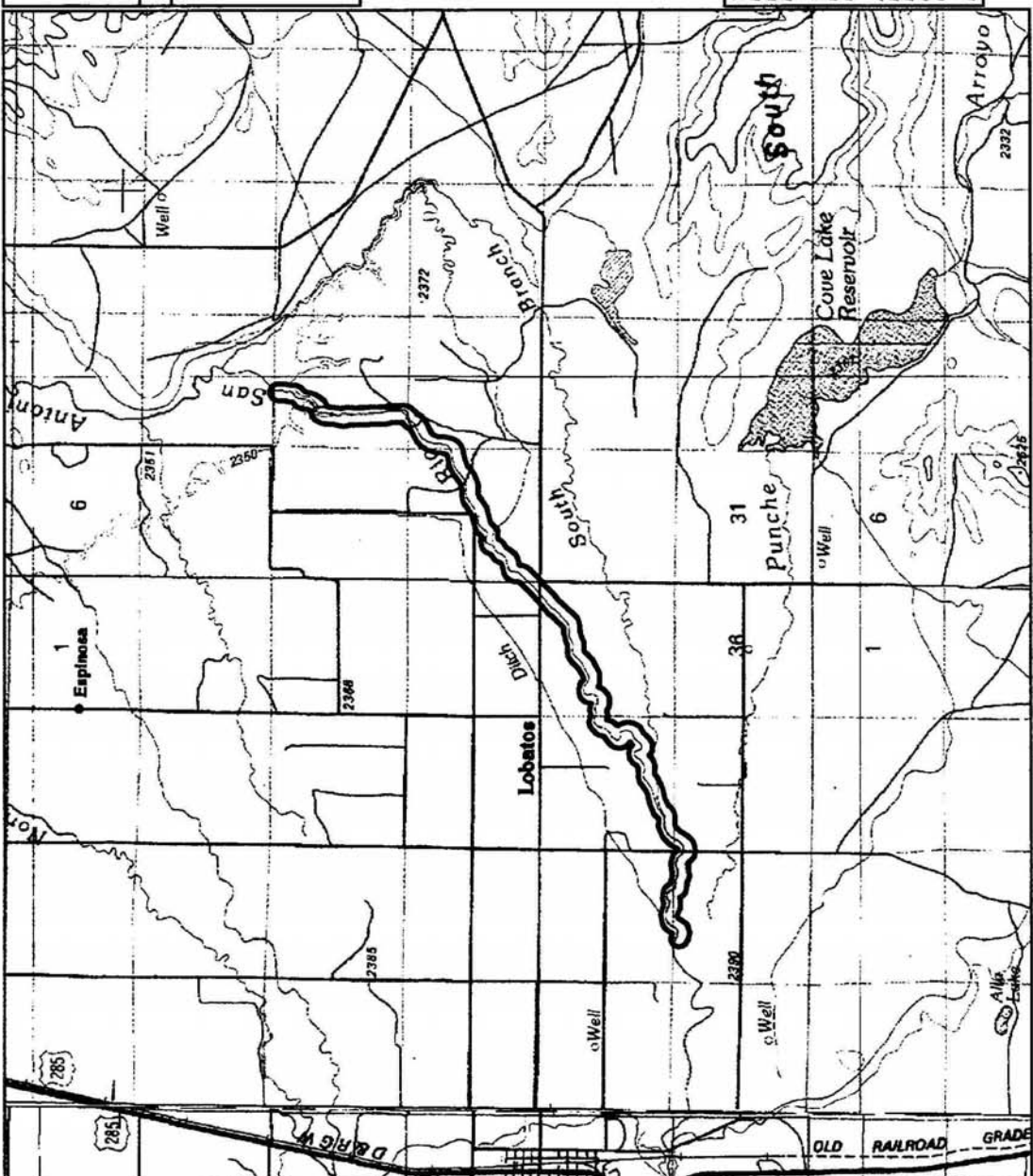


Figure 55. Rio San Antonio

Rito Gato Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site supports an excellent example of a widespread plant community.

Protection and Management Issues: The site is within the Rio Grande National Forest and has no formal protection. However, the steep character of this site potentially precludes it from most management activities. No signs of grazing or recreation use were observed. Grazing likely occurs upstream in Hillman Park.

Biodiversity Rank Justification: The site supports an excellent example of a montane riparian forest (*Abies lasiocarpa*-*Picea engelmannii*/*Salix drummondiana*).

Table 54. Natural Heritage element occurrences at Rito Gato PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Salix drummondiana</i>	Montane riparian forest	G5	S4		A

*EO=Element Occurrence

Location: The Rito Gato site is located near the upstream end of Platoro Reservoir in Conejos County.

U.S.G.S. 7.5-min. quadrangle: Platoro

Legal Description: T36N R04E S 29

Elevation: 10,200-10,600 ft. Approximate Size: 44 acres

General Description: The site is a steep narrow canyon with a very narrow riparian area dominated by Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), Drummond willow (*Salix drummondiana*), and mountain willow (*Salix monticola*). There is also a 30-foot waterfall within the site. Upstream from the waterfall is a small stand of shortfruit willow (*Salix brachycarpa*). The site ends where Rito Gato crosses Forest Service Road 247 and drains into Platoro Reservoir. The upstream end of the site is Hillman Park.

Boundary Justification: The boundary encompasses the known extent of the element at this location. Upstream activities in Hillman Park could potentially affect the element.

Protection and Management Comments: The site is entirely within the Rio Grande National Forest and has no formal protection. However, the steep character of this site potentially precludes it from most management activities.

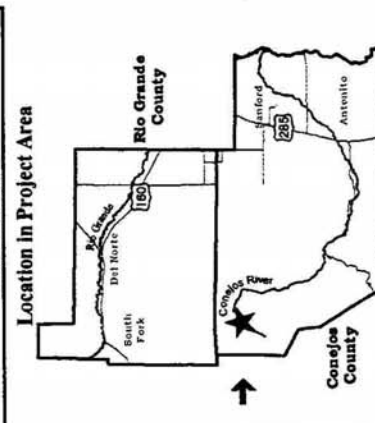
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 map created 7 March 2000



LEGEND

PCA Boundary

Base Layer:
 Platino, 37106-C5
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



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Data are not appropriate for site level planning or evaluation.

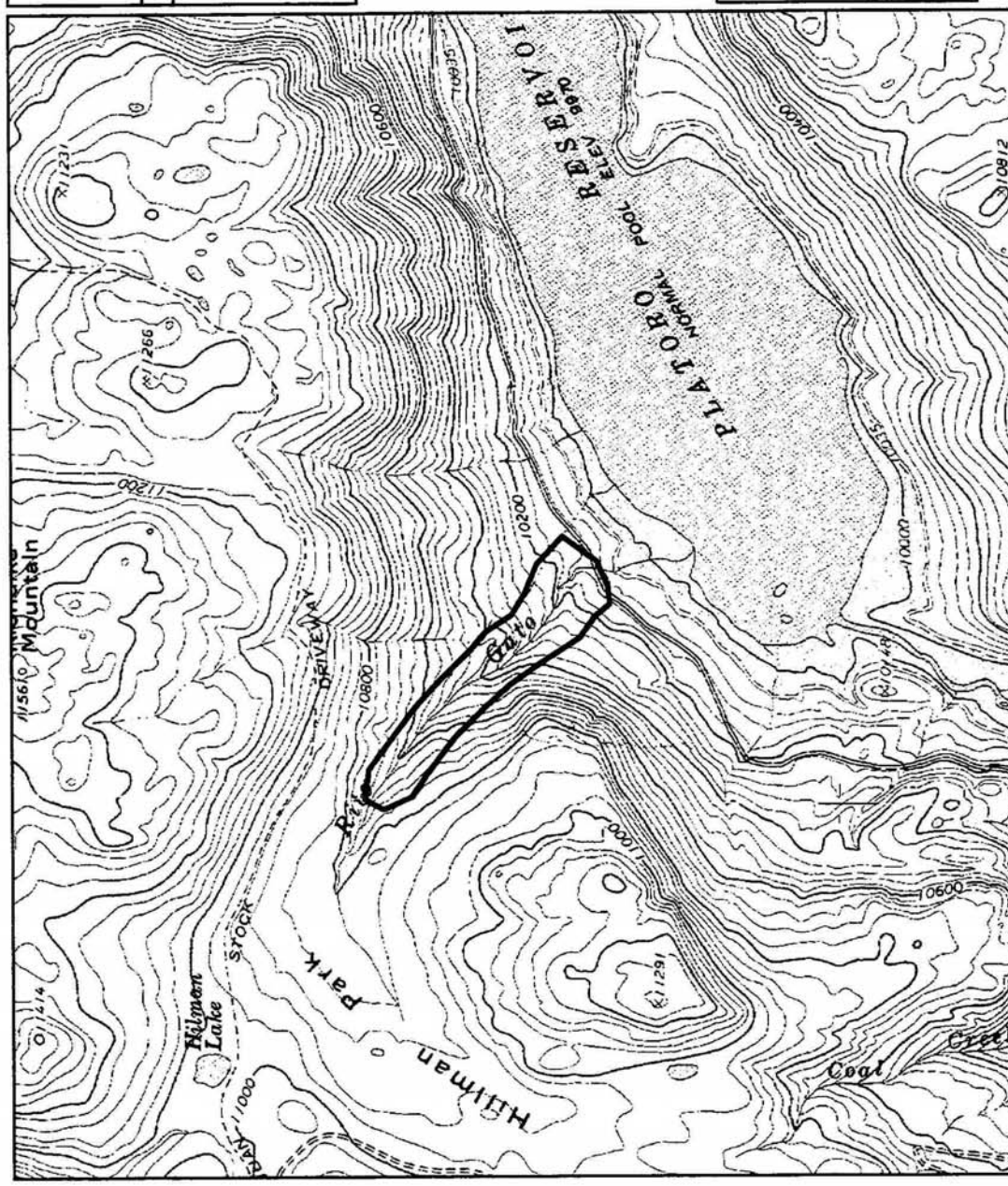


Figure 56. Rito Gato

San Francisco Lakes Potential Conservation Area

Biodiversity Rank: B4 (Moderate Significance)

This site contains an excellent and a good occurrence of a fish that is vulnerable on a global scale.

Protection and Management Issues: This site is within public and private land.

Biodiversity Rank Justification: This site contains one element of concern at two locations. The quality of the reintroduced population of Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) determines the rank of this site. As of the early 1990's, it was estimated that there were approximately 60-70 relatively pure populations of Rio Grande cutthroat trout from New Mexico and another 30-40 in Colorado (Rinne 1995). This fish is considered "sensitive" by the U.S. Forest Service and is on the State list of species of concern.

Table 55. Natural Heritage element occurrences at San Francisco Lakes PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	G4T3	S3	FS, BLM, SC	A
<i>Oncorhynchus clarki virginalis</i>	trout	G4T3	S3	FS, BLM, SC	B

*EO=Element Occurrence. Multiple listings represent separate locations.

Location: This site is south of Del Norte in Rio Grande County.

U.S.G.S. 7.5 minute quadrangles: Del Norte, Dog Mountain, Horseshoe Mountain, Jasper

Legal Description: T40N, R6E S 32, 33
 T39N, R6E S 5, 6, 7, 18, 19, 30
 T39N, R5E S 25, 31, 36
 T38N, R5E S 1, 2, 10, 11, 12, 14, 15, 22, 27, 33, 34
 T37N, R5E S 3

Elevation: 9,600-10,800 ft. Approximate Size: 3,432 acres

General Description: This site encompasses the riparian floodplain of the Middle Fork of San Francisco Creek and San Francisco Creek from the headwaters to the town of Del Norte. The site encompasses approximately 21 miles of these creeks.

Boundary Justification: This site is drawn to delineate populations of trout within areas that are distinguished by insurmountable boundaries to movement. The lateral boundary of this site is limited to 300 meters on either side of the creek to provide adequate riparian vegetation for cover and possible prey (insect) needs, yet this potential conservation area, in and of itself, may not be sufficient to ensure the persistence of the population. Ecological

processes or environmental impacts that originate upstream of the site may affect the viability of the trout.

Protection and Management Comments: This site is within public and private land.

Little information is available on the development of conservation strategies for native cutthroat trout (Young 1995). However, the primary threats that have been identified for the Rio Grande cutthroat are management issues, specifically grazing of domestic livestock and water diversion for irrigation (Behnke and Zarn 1976, Behnke 1992, Stumpff and Cooper 1996). To adequately plan for the conservation of the cutthroat trout population identified in this site, biologists and planners should address land management within the immediate watershed. Stumpff and Cooper (1996) recognize that all too frequently management plans focus directly on the riparian area and try to limit impacts in those areas, yet land management in the entire watershed needs to be considered to adequately protect cutthroat trout. Rio Grande cutthroat trout thrive in waters with a matrix of pools and riffles, in-stream boulders and other structure, good riparian vegetation cover, and mild slopes (Trotter 1987). Exclusion of non-native fish species is vital to the persistence of cutthroat trout populations.

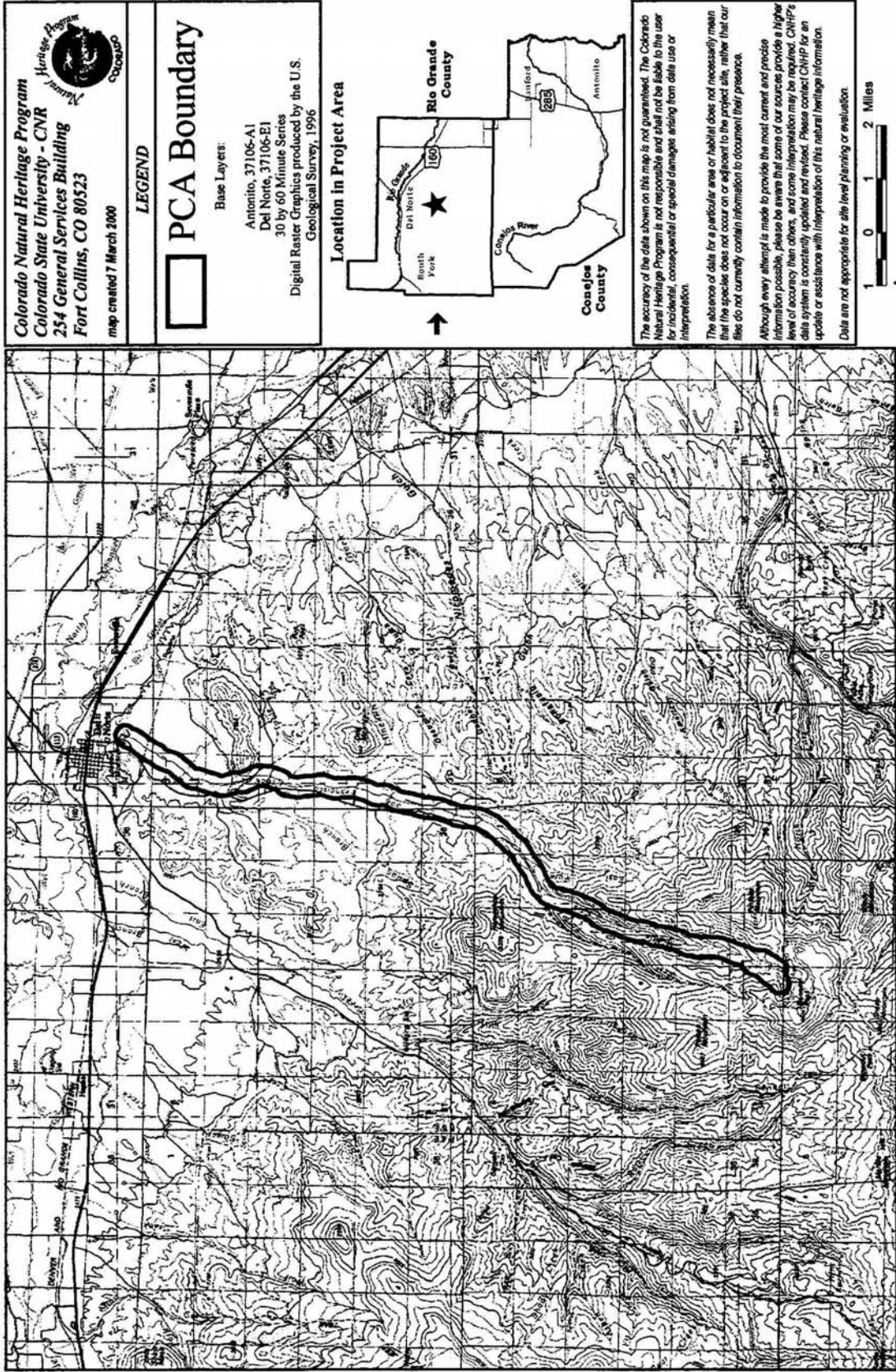


Figure 57. San Francisco Lakes

San Luis Hills At Emory Orr Spring Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land management and is within the San Luis Hills Area of Critical Environmental Concern (ACEC).

Biodiversity Rank Justification: The site contains a fair occurrence of a plant species vulnerable on a global scale, rock-loving neoparrya (*Neoparrya lithophila*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Rio Grande and Conejos counties have some of the largest populations of this species. The population here is relatively small but somewhat naturally protected by the extremely steep topography on which it occurs.

Table 56. Natural Heritage element occurrences at San Luis Hills at Emory Orr Spring PCA.

Scientific Name	Common Name	Global Rank	Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3		FS, BLM	

*EO=Element Occurrence

Location: This site is located approximately seven miles east of Manassa south of Highway 142 in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Manassa NE

Legal Description: T34N, R10E S 25, 26

Elevation: 7,940-8,670 ft. Approximate Size: 95 acres

General Description: The site encompasses a steep, rocky ridge just west of Emory Orr Spring and some adjacent habitat dominated by rabbitbrush (*Chrysothamnus Greenei*), winterfat (*Krascheninnikovia lanata*), and sagebrush (*Artemisia tridentata*). To the north rabbitbrush (*Chrysothamnus Greenei*) and winterfat (*Krascheninnikovia lanata*) with blue grama (*Bouteloua gracilis*) in the understory generally dominate the lower valley. To the south the Piñon Hills rise above the site to over 9000 feet elevation.

Boundary Justification: The main threat to rock-loving neoparrya would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya may also require other types of habitat. The pollinators are unknown, consequently we are not certain that the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on land managed by the Bureau of Land Management and is within the Rio Grande Corridor Area of Critical Environmental Concern.

Some two-track roads occur near the plants but do not seem to impact the species at this time.

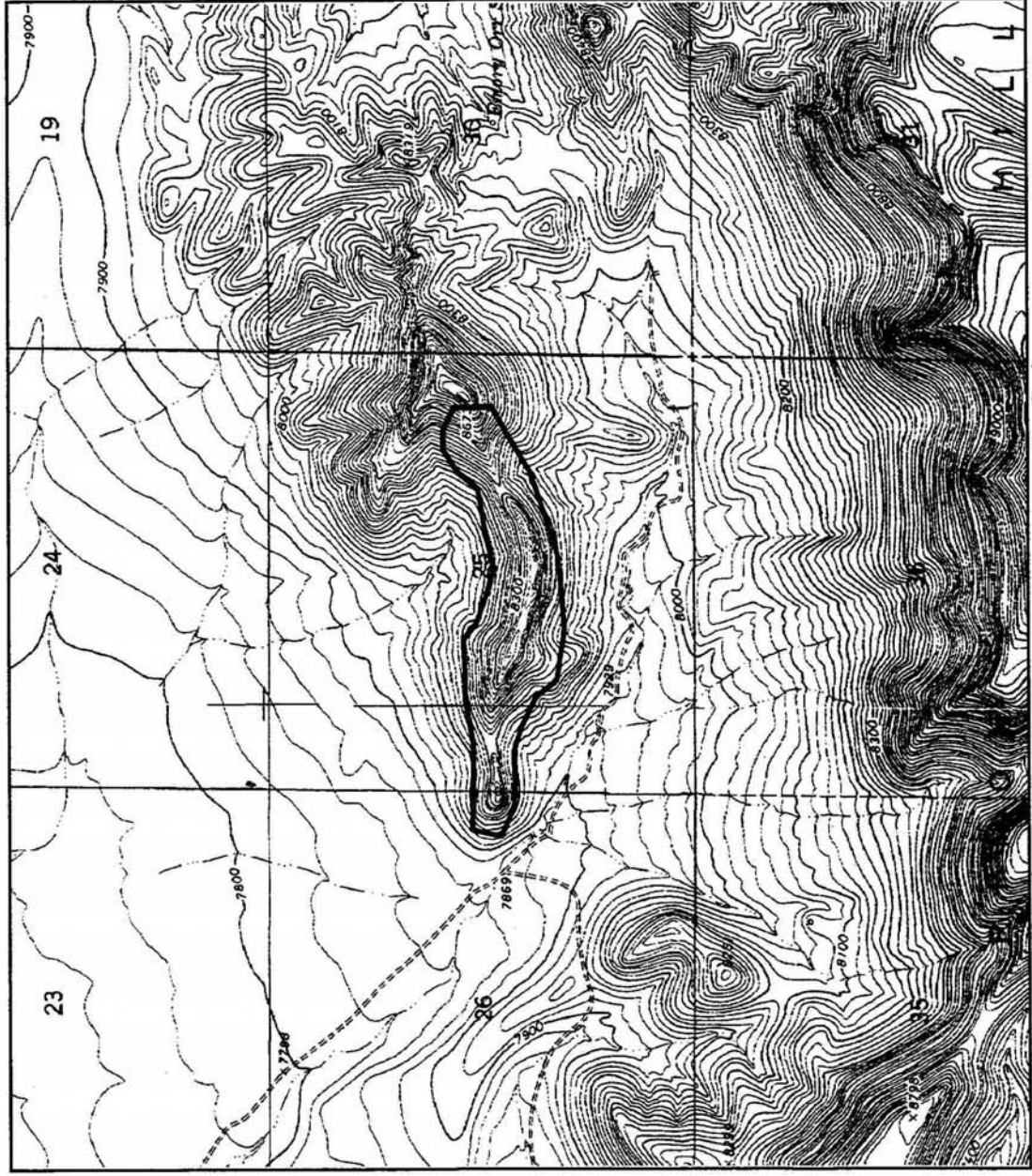
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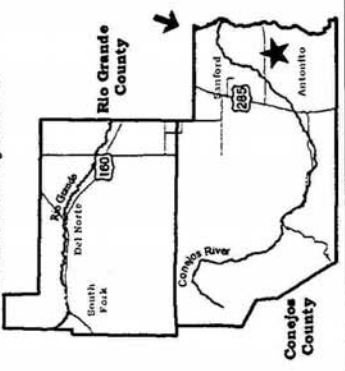
LEGEND

 **PCA Boundary**

Base Layer:
 Minnassa NE, 37105-B7
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



Location in Project Area



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone13, NAD27

Figure 58. San Luis Hills at Emory Orr Spring

San Luis Hills At Lasauses Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land Management and is within the San Luis Hills Area of Critical Environmental Concern (ACEC).

Biodiversity Rank Justification: The site contains a fair occurrence of a plant species vulnerable on a global scale, the rock-loving neoparrya (*Neoparrya lithophila*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. The population documented here was small compared to others known in Rio Grande and Conejos counties. More suitable habitat exists above the occurrence that was not surveyed during 1999. If more plants are located here, the biodiversity significance of this site could be raised.

Table 57. Natural Heritage element occurrences at San Luis Hills at Lasauses PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya	G3	S3	FS, BLM	

*EO=Element Occurrence

Location: This site is located approximately 2 miles west of Lasauses in Conejos County.

U.S.G.S. 7.5 minute quadrangle: Pikes Stockade

Legal Description: T35N, R11E S 16, 17, 20, 21

Elevation: 7,580-7,900 ft. Approximate Size: 38 acres

General Description: The site encompasses steep rocky slopes and small cliffs south of County Road W. The lower land is generally dominated by greasewood (*Sarcobatus vermiculatus*), with sagebrush (*Artemisia tridentata*) on the rocky slopes, and rabbitbrush (*Chrysothamnus Greenei*) on areas intermediate between the two. Irrigated land occurs to the north and east.

Boundary Justification: The main threat to the rock-loving neoparrya would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya may also require other types of habitat. The pollinators are unknown, consequently we are not certain that the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on land managed by the Bureau of Land Management and is within the San Luis Hills Area of Critical Environmental Concern (ACEC).

The site is located adjacent to a well-traveled county road. Roads are often corridors for invasion of non-native plant species. Currently this does not appear to be a problem at this site. Occasional monitoring in the future would help alert land managers to the presence of non-native species before they became widespread and more difficult to control.

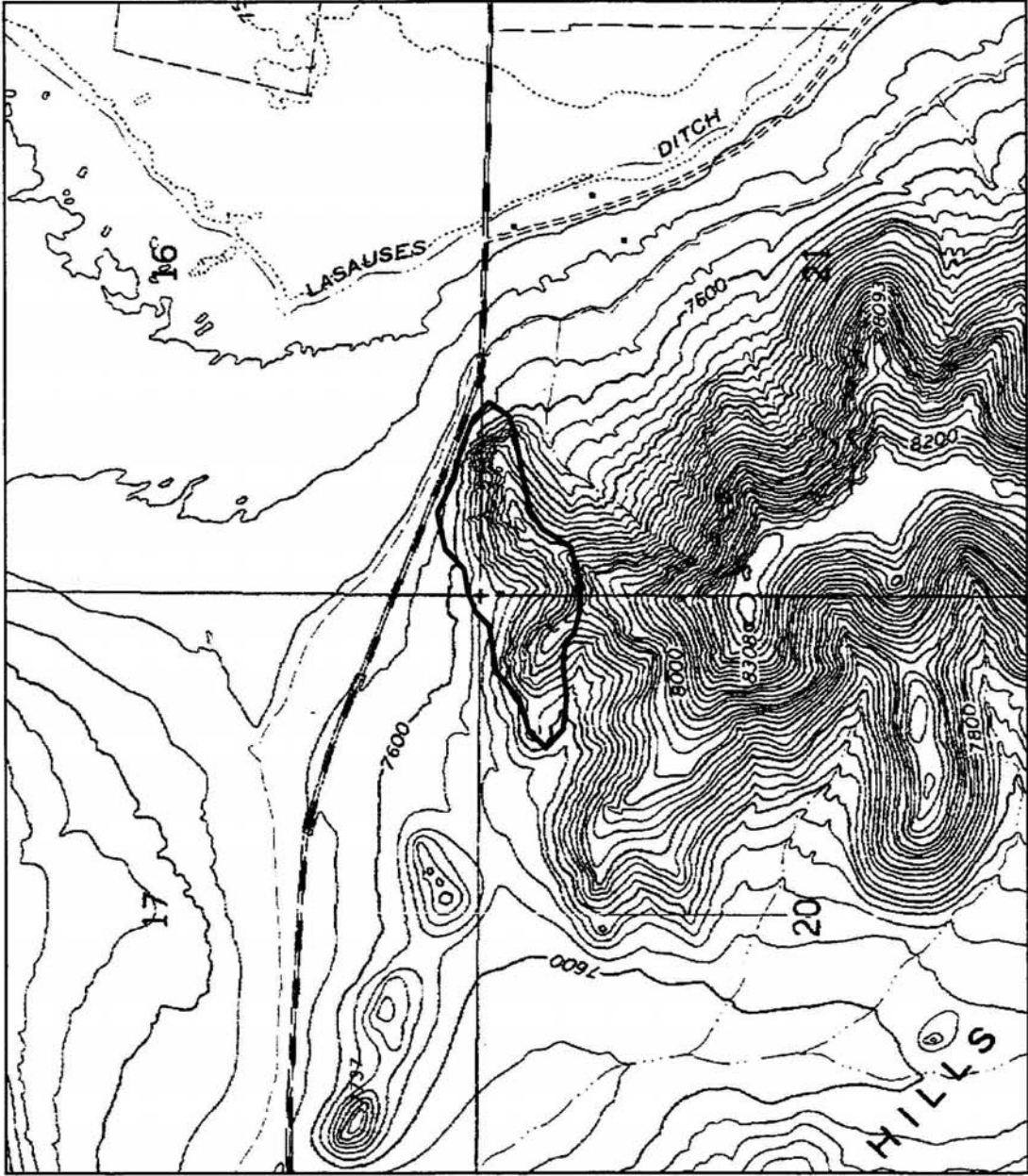
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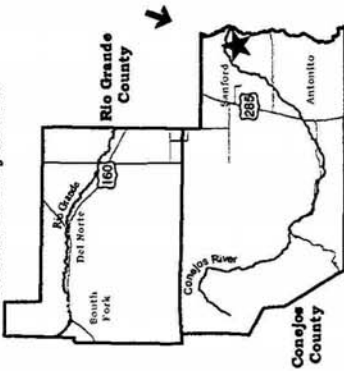
LEGEND

 **PCA Boundary**

Base Layer:
 Pikes Stockade, 37105-C7
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996



Location in Project Area



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Projection: UTM, Zone 13, NAD27

Figure 59. San Luis Hills at Lasauces

Sego Springs Potential Conservation Area

Biodiversity Rank: B4 (Moderate Significance)

This site contains one fair occurrence of a fish that is vulnerable on a global scale.

Protection and Management Issues:

This site is within private and public lands. Management and protection of the elements found within this site might include prevention of introduced fish stock and reduction of erosion inputs to the stream.

Biodiversity Rank Justification: This site contains one element of concern at one location. The quality of the population of Rio Grande chub (*Gila pandora*) contributes to the rank of this site. The Rio Grande chub was once widespread in creeks of the upper Rio Grande and Pecos watersheds of New Mexico and the upper Rio Grande watershed of southern Colorado. Populations are reported to be stable in New Mexico but are declining in Colorado.

Table 58. Natural Heritage element occurrences at Sego Springs PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	Rank
Fish					
<i>Gila pandora</i>	Rio Grande chub	G3	S1?	SC	C

*EO=Element Occurrence

Location: This site is located approximately 2 miles east of Antonito in Conejos County.

U.S.G.S. 7.5 minute quadrangles: Lobatos

Legal Description: T34N, R10E S 16, 17, 21

Elevation: 7,670-7,700 ft. Approximate Size: 133 acres

General Description: This site encompasses the riparian floodplain of the Rio San Antonio from two miles east of Manassa to approximately 1 mile north of Colorado Highway 142. The site encompasses approximately 2 miles of the Rio San Antonio.

The habitat along this stretch of the Rio San Antonio includes intermittent, willow stands and some woody debris in the stream channel. The Rio Grande chub uses debris, woody cover, and other substrate as refugia. It is commonly found in pools of small to moderate streams near areas of current and in association with undercut banks and overhanging vegetation (Woodling 1985).

Boundary Justification: The boundaries are drawn to provide habitat for the occurrence of chub. The boundary of this site is limited to 300 meters on either side of the creek system to provide adequate riparian vegetation for cover and possible prey (insect) needs, yet this potential conservation area, in and of itself, may not be sufficient to ensure the persistence of the population. Also, included in this site are substantial occurrences of northern leopard frog (*Rana pipiens*), which seems to be decreasing in number throughout Colorado.

Protection and Management Comments: This site is within private and public lands.

Many of the surrounding ranches use the land for grazing or haying and some impacts such as erosion are evident. To provide sufficient habitat for the chub population, grazing and haying may need to be managed to minimize erosion in and around the creek or restrict such impacts to particular sections of the Rio San Antonio. In addition, limiting introduction of non-native fishes would benefit the existing chub population.

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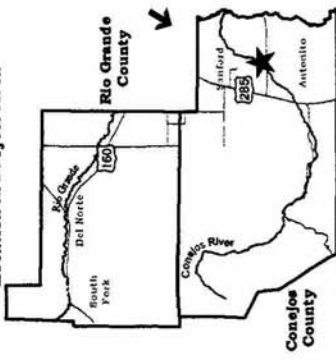


LEGEND

 **PCA Boundary**

Base Layer:
 Manassa, 37105-B8
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

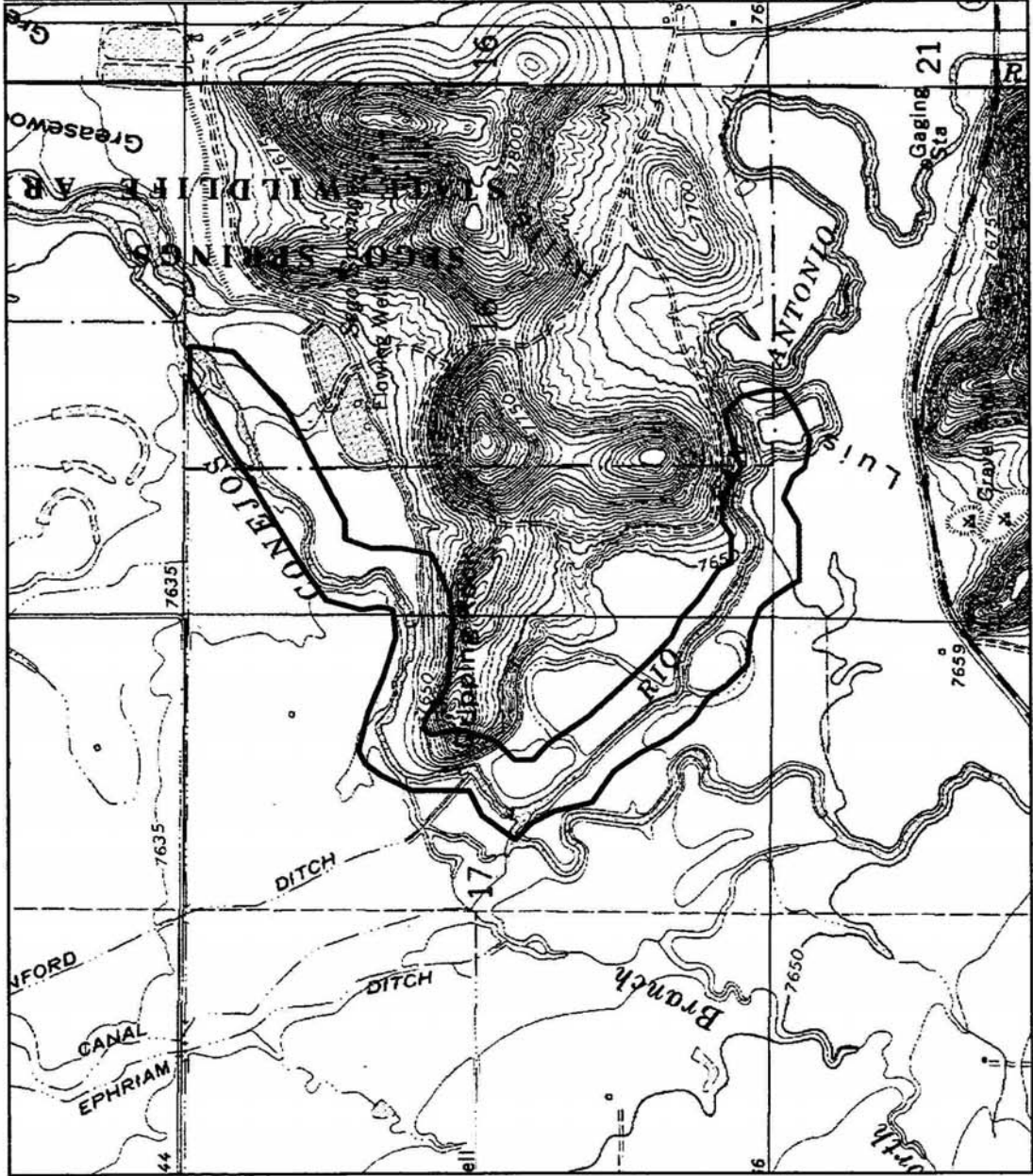


Figure 60. Sego Springs

Southwest Cumbres Pass Potential Conservation Area

Biodiversity Rank: B4 (Moderate Significance)

This site contains a good occurrence of a fish that is vulnerable on a global scale.

Protection and Management Issues:

Management and protection of the elements found within this site might include prevention of introduced fish stock and minimization of negative grazing impacts.

Biodiversity Rank Justification: This site contains a good occurrence of a fish that is vulnerable on a global scale. The quality of the population of Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) contributes to the rank of this site. As of the early 1990's, it was estimated that there were approximately 60-70 relatively pure populations of Rio Grande cutthroat trout from New Mexico and another 30-40 in Colorado (Rinne 1995). This fish is considered "sensitive" by the U.S. Forest Service and is on the State list of species of concern.

A historic record for a boreal owl (*Aegolius funereus*) is known from the area. This site is not drawn to accommodate the expected habitat needs of the boreal owl. If conservation of this imperiled owl in Colorado is desired then further surveys would be recommended to determine current status of owls in this area and their specific protection or management needs.

Table 59. Natural Heritage element occurrences at Southwest Cumbres Pass PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Fish					
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	G4T3		FS, BLM, SC	B
<i>Aegolius funereus</i>	boreal owl	G5			H

*EO=Element Occurrence

Location: This site is approximately 1 mile southwest of Cumbres Pass in Conejos County.

U.S.G.S. 7.5 minute quadrangles: Archuleta Creek and Cumbres

Legal Description: T32N, R4E S 1, 2, 11-13, 24
T32N, R5E S 7, 18, 19

Elevation: 9,320-11,090 ft. Approximate Size: 1,218 acres

General Description: This site encompasses the riparian floodplain of Wolf Creek including a larger extent near Cumbres Pass. The site encompasses approximately 5 miles of Wolf Creek.

Rio Grande cutthroat trout thrive in waters with a matrix of pools and riffles, in-stream boulders and other structure, good riparian vegetation cover, and mild slopes (Trotter 1987).

Boundary Justification: The boundaries are drawn to provide habitat for the occurrence of cutthroat trout within areas that are distinguished by insurmountable boundaries to movement. Within this site, there is a barrier to movement at the Cumbres-Toltec Railroad, but the site boundaries incorporate the two seemingly separate trout populations. The boundary of this site is limited to 300 meters on either side of the creek to provide adequate riparian vegetation for cover and possible prey (insect) needs, yet this potential conservation area, in and of itself, may not be sufficient to ensure the persistence of the population. Ecological processes or environmental impacts that originate upstream of the site may affect the viability of this occurrence.

Protection and Management Comments: This site is within public and private land.

Little information is available on development of conservation strategies for native cutthroat trout (Young 1995). However, the primary threats that have been identified for the Rio Grande cutthroat are management issues, specifically grazing of domestic livestock and water diversion for irrigation (Behnke and Zarn 1976, Behnke 1992, Stumpff and Cooper 1996). To adequately plan for the conservation of the cutthroat trout population identified in this site, biologists and planners should address land management within the immediate watershed. Stumpff and Cooper (1996) recognize that all too frequently management plans focus directly on the riparian area and try to limit impacts in those areas, yet land management in the entire watershed needs to be considered to adequately protect cutthroat trout. Also, exclusion of non-native fish species is vital to the persistence of cutthroat trout populations.

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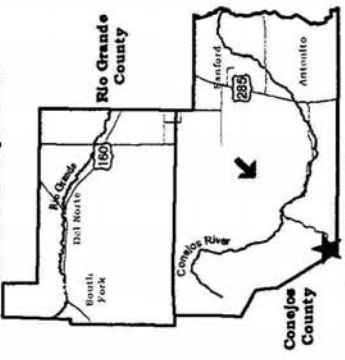


LEGEND

PCA Boundary

Base Layer:
 Antonio, 37106-A1
 30 by 60 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



Projection: UTM, Zone13, NAD27

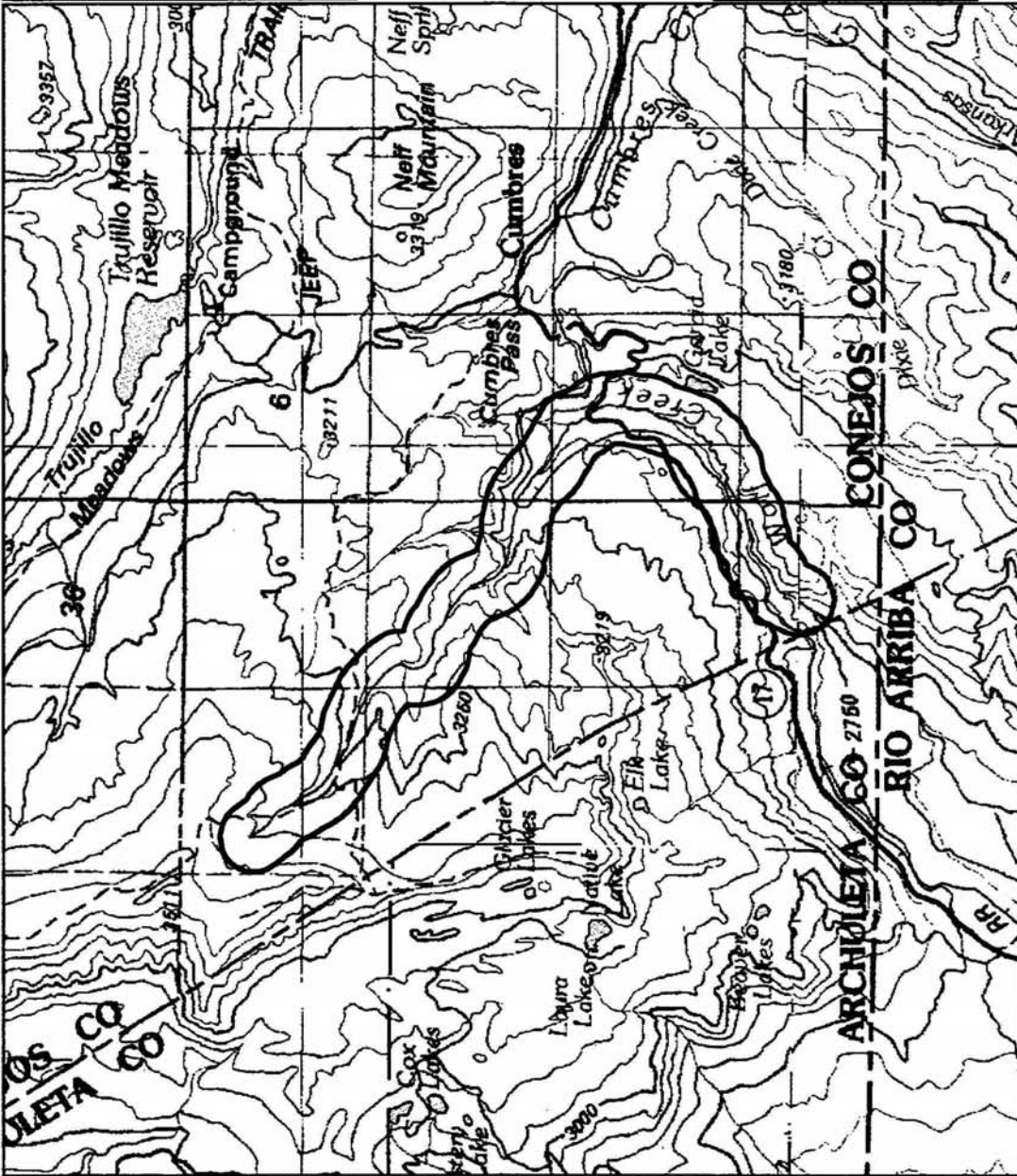


Figure 61. Southwest Cumbres Pass

Sugar Loaf Potential Conservation Area

Biodiversity Rank: B4 (Moderate significance)

The site contains a fair occurrence of a plant species vulnerable on a global scale.

Protection and Management Issues: The site is located on public land managed by the Bureau of Land Management is within the Rio Grande Corridor Area of Critical Environmental Concern.

Biodiversity Rank Justification: The site contains a fair occurrence of a plant species vulnerable on a global scale, rock-loving neoparrya (*Neoparrya lithophila*). The rock-loving neoparrya is only known from south-central Colorado and is on the Forest Service and BLM list of sensitive species. Rio Grande and Conejos counties have some of the largest populations of this species. The population here is relatively small but somewhat naturally protected by the extremely steep topography on which it occurs.

Table 60. Natural Heritage element occurrences at Sugar Loaf PCA.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Neoparrya lithophila</i>	Rock-loving neoparrya		S3	FS, BLM	C

*EO=Element Occurrence

Location: This site is located along the Rio Grande in Conejos County approximately one mile north of Highway 142.

U.S.G.S. 7.5 minute quadrangle: Mesito Reservoir

Legal Description: T34N, R11E S 10, 11, 13, 14

Elevation: 7,500-7,880 ft. Approximate Size: 56 acres

General Description: The site encompasses rock outcrops and steep cliffs adjacent to the Rio Grande. Adjacent areas are less rocky and are dominated by rabbitbrush-winterfat (*Chrysothamnus Greenei-Krascheninnikovia lanata*) shrublands with blue grama (*Bouteloua gracilis*) in the understory. A county road occurs to the west of the site and several two-track roads run from there into the site.

Boundary Justification: The main threat to this species would be physical disturbance of the habitat. The boundary was delineated to include the known extent of the plant population and enough of the adjacent area to incorporate portions of other habitat types. This additional habitat was included based on the assumption that pollinators of the rock-loving neoparrya may also require other types of habitat. The pollinators are unknown, consequently we are uncertain if the amount of adjacent habitat is sufficient to support those species. With more information, these boundaries may change.

Protection and Management Comments: The site is located on land managed by the BLM and is within the Rio Grande Corridor Area of Critical Environmental Concern.

Some two-track roads occur near the plants but do not seem to impact the species at this time.

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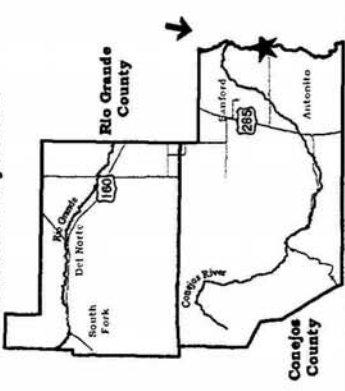


LEGEND

 **PCA Boundary**

Base Layer:
 Mesito Reservoir, 37105-B6
 7.5 Minute Series
 Digital Raster Graphics produced by the U.S.
 Geological Survey, 1996

Location in Project Area



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Data are not appropriate for site level planning or evaluation.



A Projection: UTM, Zone 13, NAD27

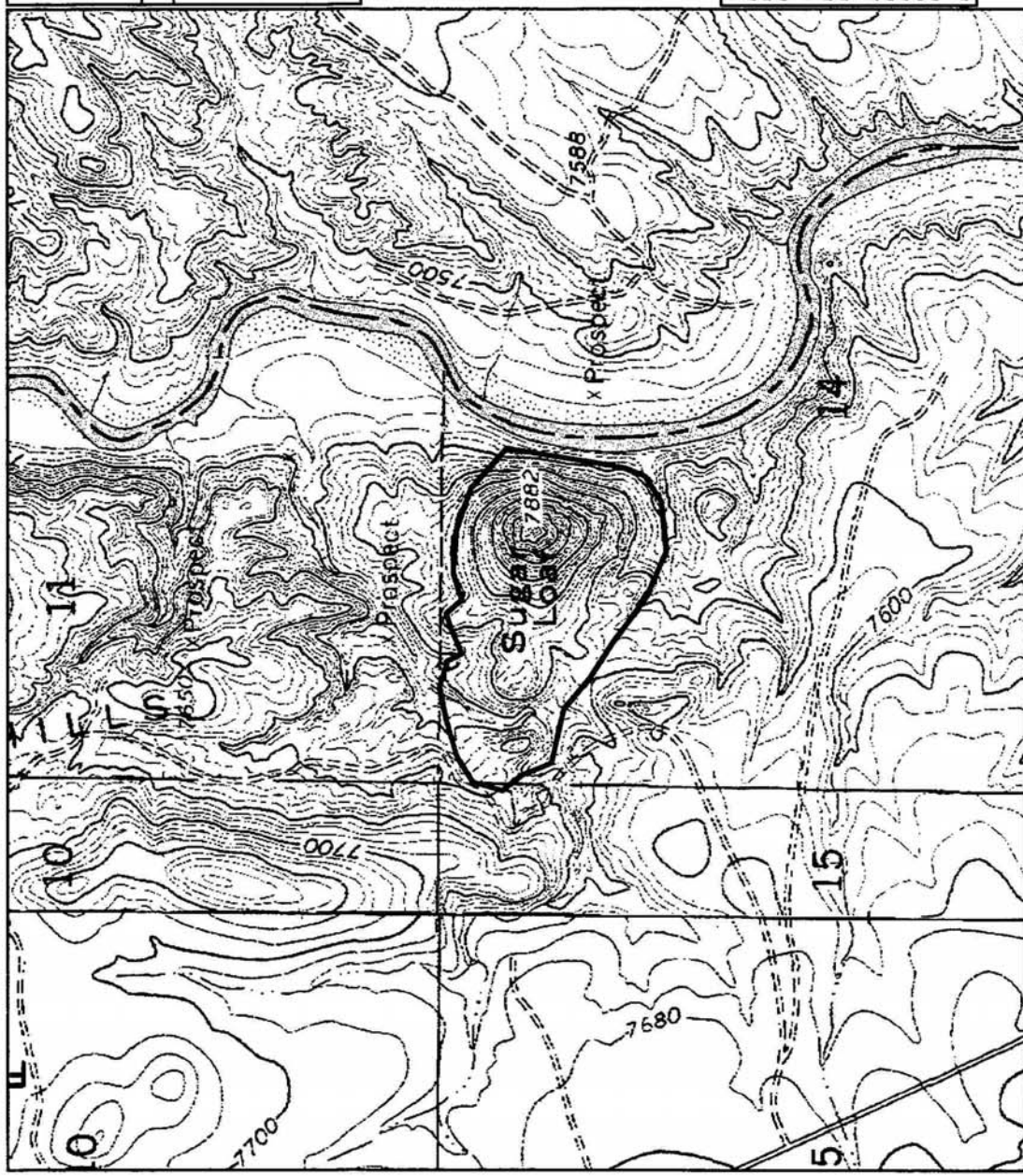


Figure 62. Sugar Loaf

Major Threats to Biodiversity

General threats to a particular species or site are often identified in the Potential Conservation Areas profiles. These threats may not be problematic at the site at this time but could be in the future. The following table lists only those threats that were observed at or near the Potential Conservation Areas and were thought to potentially impact the elements of concern. Some general threats to biodiversity were not observed at PCAs in Rio Grande and Conejos counties. These are omitted from the table but are discussed in the following text.

Table 61. Threats Observed at the Potential Conservation Areas.

Potential Conservation Area	B–rank	Hydrologic Modification	Residential Development	Mining	Grazing	Logging	Fire	Recreation	Roads	Species
Alamosa River at Government Park	B2				X			X		X
Cedar Spring Uplands	B2		X					X		
Dry Creek Uplands			X							
East Butte	B2									
Fivemile Park	B2									
Grayback Mountain	B2									
Hot Creek	B2								X	X
La Jara Creek Uplands	B2				X					
Lasausas	B2				X					X
Limekiln Creek Uplands	B2									
Ojito Creek Uplands	B2									
Park Creek at Summit Pass	B2								X	
Ra Jadero Canyons	B2				X				X	
San Luis Hills – Flat Top	B2									
Spring Creek at Greenie Mountain	B2	X								X
De la Luz Cemetery	B3	X								X
Coal Creek at Platoro Reservoir	B3									
Conejos River at Menkhaven Ranch	B3		X							X
Conejos River at Platoro	B3	X						X		X
Dry Pole Creek Uplands	B3									
Elephant Rocks	B3							X		
Hicks Canyon	B3		X							X
Highway Spring	B3							X		
Hot Creek/La Jara Creek Confluence	B3									X

Potential Conservation Area	B-rank	Hydrologic Modification	Residential Development	Mining	Incompatible Grazing	Logging	Fire	Recreation	Roads	Non-native Species
Indian Head	B3									
Iron Creek	B3			X						
Lake Fork	B3									X
	B3								X	
Lower Rock Creek		X								
McIntire Springs	B3									X
Rio Grande at Monte Vista	B3	X								
Rito Hondo	B3									
Rock Creek Gaging Station	B3							X		
South Fork of the Conejos River and Hansen Creek	B3									X
Terrace Reservoir North										
Tower Hill	B3									
West Alder Creek	B3									X
Adams Fork	B4									X
Bighorn Creek	B4									X
Bishop Rock	B4							X		
Cascade Creek at Osier	B4				X					X
	B4							X	X	X
Springs										
Fairly Hills	B4									
Greenie Mountain	B4									
Limekiln Point	B4							X		
Osier Creek	B4									X
Poso Creek	B4									X
Rio Grande at Embargo Creek	B4									X
Rio San Antonio	B4				X					X
Rito Gato	B4									
San Francisco Lakes	B4									X
	B4									
Emory Orr Spring										
San Luis Hills at Lasaus	B4									
Sego Springs	B4									X
Southwest Cumbres Pass										
Sugar Loaf	B4									

- **Hydrological Modification**

River impoundment in the form of lakes and reservoirs and irrigation ditches or canals can affect aquatic dependent plants and animals (Chien 1985). Annual flooding is a natural ecological process that has been severely altered by the addition of lakes and reservoirs. Alterations have taken out the normal peak high flows that were once a part of the Rio Grande flow regime. The vegetation responds to the natural flows and many plants can only reproduce with flooding events, e.g., cottonwood trees (Rood and Mahoney 1993). As the plant composition changes to reflect changes in the flooding regime, the aquatic and terrestrial fauna composition also changes.

Rivers have also been altered by stream bank stabilization projects (Rosgen 1996). Most streams and rivers are dynamic and inherently move across the floodplain. Stabilizing the banks forces the river to stay in one place and often leads to changes in riparian ecology and more serious destruction downstream. It is also well known that different plant communities require different geomorphologic structures. For instance point bars are required for some species of willows to regenerate, whereas terraces are required for mature cottonwood/shrubland forests. By stabilizing a river, we often stop the creation of point bars and terraces, and other features. The fauna that depends upon the plant communities are affected as well.

- **Residential Development**

Residential development is localized but increasing in Rio Grande and Conejos counties. Although growth rates in the San Luis Valley have been lower than some Colorado regions, it is likely that the Valley may begin to receive “overflow” development pressure. Development creates a number of stresses, including habitat loss and fragmentation, introduction of non-native species, fire suppression, and introduction of domestic predators (dogs and cats) (Oxley and others 1974, Coleman and Temple 1994). Habitat loss to development is considered irreversible and could therefore be channeled to areas with less biological significance. Development also tends to occur adjacent to watercourses in this arid region, with consequent effects on aquatic and riparian habitats.

- **Mining**

Mining has been a traditional industry in Rio Grande and Conejos counties for over a century. Poorly planned or managed mining operations have the potential to impact biodiversity for decades after the activity has ceased. Summitville has been one of the country’s most highly publicized mining mishaps in recent years.

Stresses from mining activities can include habitat loss and fragmentation, water pollution by acid mine drainage and excessive sedimentation of streams. Aquatic systems are the most threatened by these stresses, but riparian communities can be impacted as well.

- **Incompatible Livestock Grazing**

Domestic livestock grazing, another traditional industry of the counties, has left a much broader and often subtle impact on the landscape. Historic livestock grazing probably had a large influence on the composition of nonforested communities on the Rio Grande National Forest (USDA Forest Service 1996). As early as 1820, there were records of cattle being brought into the San Luis Valley. By the close of the century, and through the early part of the 20th century, there were high numbers of livestock. It appears that by 1929, stocking rates started declining dramatically due to documented overuse of the resource (USDA Forest Service 1996).

When repeatedly grazed, many plant species will generally react in predictable manner. As plants that are more palatable are reduced or eliminated from a community over time, other less palatable plants increase in abundance. Often, non-native plants increase in abundance significantly under heavy disturbance such as frequent, high intensity livestock grazing. Depending on grazing practices and local environmental conditions, impacts can be minimal, moderate and largely reversible (slight shifts in species composition), to severe and irreversible (extensive gullying, introduction of non-native forage species). Stresses due to sediment deposition and water quality changes from incompatible grazing practices are more difficult to judge, but they may be detrimental to aquatic biota (Gifford and others 1975).

- **Logging**

For the past 45 years, the annual volume of timber sold from the Rio Grande National Forest, predominantly Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*), has averaged 19.7 million board feet (USDA Forest Service 1996). The volume of live timber sold annually during the 10 years from 1985 to 1994 ranged from 24.9 million board feet to 32.9 million board feet. Most logging operations require a large network of roads. These roads have their own threats to biodiversity (see “Roads” below for more detailed discussion). The Forest Service monitors logging closely, nonetheless, problems can still occur (e.g., a buffer zone intended to protect a pond with boreal toads was logged in 1998 - Husung and Alves 1998). Besides altering habitat and ecological processes (such as runoff, sedimentation, etc.), logging operations that are not carefully planned can also physically destroy imperiled plant populations and plant communities.

- **Fire**

Fire is a natural ecological process that has been suppressed since the turn of the century (USDA Forest Service 1996). Some of the forested zones, especially ponderosa pine (*Pinus ponderosa*) are adapted frequent fires of low-intensity. These fires reduce competition and prepare natural seedbeds (USDA Forest Service 1996). These stands are affected more dramatically, and faster, by suppression of natural fires than are the spruce-fir communities.

Not allowing natural fires to burn in these forests allows the more shade-tolerant, fire-intolerant species such as Douglas-fir (*Pseudotsuga menziesii*) to move into ponderosa pine sites, where it may eventually displace the ponderosa pine. Additionally, the increased fuel

loading from dense regeneration and natural dead-and-down accumulation predisposes the site for high-intensity fires (USDA Forest Service 1996).

- **Recreation**

Recreation, once very local and perhaps even unnoticeable, is on the increase and can impact biodiversity. Like grazing, recreation practices and their stresses differ, mostly between motorized and non-motorized activities. All terrain vehicles (ATV's) are becoming increasingly popular and the Rio Grande National Forest is a favorite area for ATV use (especially for big-game retrieval). ATV's can disrupt migration and breeding patterns, and fragment habitat for native resident species. This activity can also threaten imperiled plants found in non-forested areas. ATV's have also been identified as a vector for the invasion of non-native plant species.

Non-motorized recreation, mostly hiking, but also some mountain biking presents a different set of problems (Cole and Knight 1990, Knight and Cole 1991, Holmes and others 1993). Wildlife behavior can be significantly altered by repeat visits of hikers/bicyclists. Trampling of sensitive plant species, particularly in high alpine areas (among the most popular destinations for hikers), is of concern (Spackman et al. 1996).

- **Roads**

Much of the Rio Grande Basin has road networks from past timber harvest and mining operations. Expansion of the existing road network in some areas will detrimentally affect the natural heritage values of the region. Roads are associated with a wide variety of impacts to natural communities, including invasion by non-native plant species, increased depredation and parasitism of bird nests, increased impacts of pets, fragmentation of habitats, erosion, pollution, and road mortality (Noss and others 1997).

Roads function as conduits, barriers, habitats, sources, and sinks for species and populations of species (Bennett 1991, Forman 1995). Road networks crossing landscapes cause local hydrologic and erosion effects. Chemical effects on the landscape mainly occur near roads. Road networks interrupt horizontal ecological flows, alter landscape spatial pattern, and therefore inhibit important interior species (Forman and Alexander 1998).

The ecological effect of road avoidance caused by traffic disturbance is probably much greater than that of roadkills seen along the road. Traffic noise appears to be the most important factor in road avoidance, although visual disturbance, pollutants, and predators moving along a road are alternative hypotheses as to the cause of avoidance (Forman and Alexander 1998). Some songbirds appear to be sensitive to remarkably low noise levels, even to noise levels similar to that of library reading room (Reijnen and others 1995).

- **Non-native Species**

Although non-native species are mentioned repeatedly as stresses in the above discussions, because they can come from so many activities they are included here as a general threat as well. Non-native plants or animals can have wide-ranging impacts. Non-native plants can increase dramatically under the right conditions and essentially dominate a previously natural area, e.g., scraped roadsides. This can generate secondary effects on animals (particularly invertebrates) that depend on native plant species for forage, cover, or propagation.

Cheatgrass (*Bromus tectorum*), smooth brome (*Bromus inermis*), and crested wheatgrass (*Agropyron cristatum*) are hardy, xeric grasses from Eurasia that are very difficult to control (H. Dixon, pers. comm.). Effects of non-native fishes include competition that can lead to local extinctions of native fishes and hybridization that corrupts the genetic stock of the native fishes.

- **Fragmentation and Edge Effects**

“Edge” areas are zones of sharply contrasting habitats or landscapes (Schwarz et al. 1993).

Edges are often created by naturally occurring processes such as floods or fires and will recover naturally over time. Edges can also be created by human activities, such as a grassland and an agricultural field or a grassland and a road. This type of edge is often dominated by plant species that are adapted to disturbance and are more common and widespread.

These areas often attract high numbers of generalist butterfly species (species that are able to adapt to plant species that are commonly found in disturbed area) (Rathcke and Jules 1993). As our landscape is increasingly fragmented by large-scale, rapid anthropogenic conversion, these edges become increasingly abundant in the remaining open space areas. As a result, many generalist species of butterflies have become increasingly common in these areas, and compete, either directly or indirectly, for food sources with the specialist species (Rathcke and Jules 1993). The specialists, meanwhile, have become increasingly less common as the overall structure of their habitat landscape is dramatically altered, and interspecies competition has increased.

Furthermore, the overall reduction of large landscapes further jeopardizes the existence of some specialists. Specialists that occur in small, patchy populations (like many of the Front Range butterflies) are more likely to be excluded from small fragments or be affected by local disturbance events that could cause the extirpation of the entire population.

Specialists that exploit sparse and/or scattered plant species could be threatened by fragmentation (Rathcke and Jules 1993). Should a large-scale disturbance such as fire, flood, or disease occur, populations that would normally colonize after landscape recovery may actually be extirpated if they exist in an isolated fragment.

They may not be able to travel the distance necessary to colonize suitable habitat (Moffat and McPhillips 1993).

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Appendices

Appendix A. The Natural Heritage Ranking System

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.

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 potential conservation areas, 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 imperiled plant communities as well as the best examples of common communities.

At its most basic level, the Natural Heritage ranking structure is composed of a three-tiered hierarchy: 1) elements, 2) element occurrences, and 3) Potential Conservation Areas (PCAs). For each tier, there is a ranking system which facilitates comparison among the components of that tier. This system is designed to identify and prioritize land-based (or water-based) conservation opportunities with the ultimate goal of protecting all species by targeting the habitats they need to survive. By operating at different scales, the system is useful for assessing conservation needs from a variety of perspectives.

Elements

In order to conserve biodiversity, it is first necessary to identify which biological components must be actively protected to ensure their long-term survival. Species and subspecies (or other infraspecific categories) are obvious places to start. Lists of species known to occur in the area of interest are assembled because they represent key targets for conservation.

This can be problematic for groups of organisms that are poorly known. In some cases, the majority of species have not yet been discovered by science (e.g., nematodes, mites, or in some remote corners of the world, even some vertebrates). For this reason we are interested not only in species, but also in the systems that support them. We use plant communities as surrogate targets for conservation where detailed species information is lacking, or where the communities themselves have unique qualities. Thus, natural heritage programs maintain lists of plant communities as well. Species, subspecies, and plant

communities, then, are the fundamental units of biological diversity which are suitable as targets of conservation and inventory. We refer to these as *elements of natural diversity*, or simply *elements*.

Element Imperilment Ranks

A key feature of Natural Heritage methodology is a ranking system for identifying which elements are more imperiled than others. Recognizing that elements occurring in few places are, in general, more vulnerable to extinction than those occurring in many places, species and natural communities are first evaluated in terms of relative rarity or imperilment. The primary criteria used in this process are estimated number of known locations, number of individuals overall, and size of the range (or abundance of habitat).

Some elements, though, are more vulnerable than others for extrinsic reasons such as loss or degradation of habitat, overcollection, or displacement by exotic species. Species, which are common or widely distributed, may be imperiled by a variety of factors. To address this, assessments of rarity are modified by information on population trends, threats, and number of locations already protected.

All of these factors – number of locations, number of individuals, range, trends, threats, and number of protected locations – taken together result in the overall *conservation rank (rarity or imperilment)*. Two imperilment ranks are assigned for each element to indicate the level of rarity or imperilment: first across its natural geographic range (the *global rank*); and second within the state or sub-national unit (the *state rank*). Global and state imperilment ranks are presented in Tables 5a and 5b, respectively.

Both ranks are based on a scale of 1-5 as follows:

- 1 - critically imperiled or extremely rare (generally five or fewer occurrences);
- 2 - imperiled or very rare (usually six to 20 occurrences);
- 3 - vulnerable, very rare or found in a restricted range (21-100 occurrences);
- 4 - common and apparently secure;
- 5 - demonstrably secure.

Interpreting Imperilment Ranks

Global ranks set the highest conservation priorities, while state ranks are used in discerning state or regional priorities. For example, an element with a rank of G3/S2 should receive higher conservation priority than an element with a rank of G5/S1 because the first element is more vulnerable throughout its range (indicated by its G-rank). Together, the global and state ranks provide an instant picture of an element's relative degree of rarity or imperilment at two scales. 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. A plant known at the rock-loving neoparrya, which is known only from Colorado, from less

than 50 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.

When ranking migratory elements, it is necessary to distinguish between breeding, non-breeding, and resident populations. A "B" following the state rank (e.g., S1B) indicates that the rank applies only to the status of breeding occurrences. An "N" following the state rank (e.g., S1N) refers to the nonbreeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state.

Biological information is extremely dynamic and demands a data system that is continually updated. All element ranks are periodically updated as new information is obtained. A complete listing of the Natural Heritage global and state ranks is provided in Tables 5a and 5b. The most updated lists of ranks for Colorado are published annually and made available on the Internet (address: www.cnhp.colostate.edu).

Table 62. 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 within an individual state. State and Global ranks are denoted, respectively, with an "S" or a "G" followed by a character. These ranks should not be interpreted as legal designations.	
G1/S1	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.
G2/S2	Imperiled globally/state because of rarity (6 to 20 occurrences), or because of other factors making it demonstrably very vulnerable to extinction throughout its range.
G3/S3	Vulnerable through its range/state or found locally in a restricted range (21 to 100 occurrences).
G4/S4	Apparently secure globally/state, though it might be quite rare in parts of its range, especially at the periphery.
G5/S5	Demonstrably secure globally/state, though it may be quite rare in parts of its range, especially at the periphery.
GX	Presumed extinct.
G#?	Indicates uncertainty about an assigned global rank.
GU/SU	Unable to assign rank due to lack of available information.
GQ	Indicates uncertainty about taxonomic status.
GH/SH	Historically known, but not verified for an extended period.
G#T#	Trinomial rank (T) is used for subspecies or varieties. These species or subspecies are ranked on the same criteria as G1-G5.
S#B	Refers to the breeding season imperilment of elements that are not permanent residents.
S#N	Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used
SZ	Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliably identified, mapped, and protected.
SA	Accidental in the state.
SR	Reported to occur in the state, but unverified.
S?	Unranked. Some evidence that species may be imperiled, but awaiting formal rarity ranking.
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. # represents rank (1-5)	

Natural Heritage ranks should not be interpreted as legal designations. Although most species protected under state or federal endangered species laws are extremely rare, not all rare or imperiled species receive legal protection (other than the protection provided to all wildlife). Legal status under the federal Endangered Species Act is designated by the U.S. Fish & Wildlife Service (USFWS). Designations of endangered or threatened species under the Colorado Non-game and Endangered or Threatened Species Conservation Act are made by the Colorado Division of Wildlife. In addition, the U. S. Forest Service and the Bureau of Land Management maintain “sensitive species lists” that provide some legal protection on the lands owned or managed by the respective agencies. CNHP provides information to these and other agencies to aid in the identification of priorities for conservation action, including legal protection. However, it is the intention of the Natural Heritage system to

identify conservation needs and stimulate conservation action before protection under endangered species laws becomes a necessity.

Table 63. Federal and State Agency Special Designations.

Federal Status:	
1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993) and (61 Federal Register 7598, 1996)	
LE	Endangered; species or subspecies formally listed as endangered.
E(S/A)	Endangered due to similarity of appearance with listed species.
LT	Threatened; species or subspecies formally listed as threatened.
P	Proposed Endangered or Threatened; species or subspecies formally proposed for listing as endangered or threatened.
C	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”)	
FS	Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by:
	a. Significant current or predicted downward trends in population numbers or density.
	b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.
3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as “S”)	
BLM	Sensitive: those species found on public lands, designated by a State Director, that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.
State Status:	
1. Colorado Division of Wildlife	
	E Endangered
	T Threatened
	SC Special Concern

Element Occurrences

Once the most vulnerable elements of natural diversity have been identified and ranked, it is important to document where they are located if conservation activities will be pursued. A discrete location where a species or plant community occurs is recognized as an *element occurrence*. The element occurrence is a fundamental building block for targeted conservation action; it represents a conservation unit.

Element Occurrence Ranks

In order to prioritize element occurrences for a given species, an element occurrence rank (EO-Rank) is assigned according to the estimated viability or probability of persistence at that site. These *element occurrence ranks* help prioritize among occurrences of a particular element so that conservation efforts can be focused on the occurrences with the greatest chance of long-term viability, optimizing chances for conservation success.

The EO-Rank is based on 3 factors:

Size – a quantitative measure of the area and/or abundance of an occurrence such as area of occupancy, population abundance, population density, or population fluctuation.

Condition – an integrated measure of the quality of biotic and abiotic factors, structures, and processes within the occurrence, and the degree to which they affect the continued existence of the occurrence. Components may include reproduction and health, development/maturity for communities, ecological processes, species composition and structure, abundance of non-native species, and abiotic physical or chemical factors.

Landscape Context – an integrated measure of the quality of biotic and abiotic factors, and processes surrounding the occurrence, and the degree to which they affect the continued existence of the occurrence. Components may include landscape structure and extent, genetic connectivity, and condition of the surrounding landscape.

Each of these factors are rated on a scale of A through D, with A representing excellent and D representing poor ratings. These factors 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** Excellent estimated viability.
- B** Good estimated viability.
- C** Fair estimated viability.
- D** Poor estimated viability.
- E** Viability has not been assessed but the element is presumed extant.
- F** Failed to find
- H** Historically known, but not verified for an extended period of time.
- X** Extirpated

Potential Conservation Areas

As stated previously, the element occurrence is the fundamental conservation unit. But to accomplish conservation, we must protect the lands and waters that elements need to persist. The occurrence represents the location of a species or natural community, but ecological processes and patterns support the occurrence. To conserve an occurrence then, it is necessary to focus attention on the land area that supports those ecological processes and patterns. We call such an area a *Potential Conservation Area*. Potential Conservation Areas (PCAs) may be designed to encompass suites of species co-occurring in an ecologically connected landscape. In this way, conservation efforts that protect a site are actually

protecting an ecological system containing the targeted elements, not merely an occurrence of a single element.

After the identification of PCAs, some method for prioritization is needed. *Biodiversity significance ranks* are generated primarily from the imperilment of the element(s) contained within the boundaries (i.e., the global and state imperilment ranks), and then modified by the quality of the occurrences (i.e., the element occurrence rank). Biodiversity significance ranks indicate relative significance of the loss should a particular PCA be destroyed or irretrievably degraded. For example, loss of a PCA that contains the only known example of a species or natural community could result in extinction. It would therefore be assigned the highest priority rank (e.g., B1). Another PCA may contain an occurrence of a globally common species that occurs at the margin of its range just inside the state boundary. The loss of such a PCA should be avoided, but conservation practitioners would still be left with many additional sites for the protection of that species, and so the PCA is ranked as a much lower biological priority.

Biodiversity Significance Ranks are based on an inverse scale of 1-5 as outlined below. PCA characteristics, which justify the rank, include, but are not limited to, those listed.

- B1 – Outstanding Significance.** The only known occurrence of any element, the highest quality occurrence of any G1 element, or a concentration of A- or B-ranked G1 or G2 elements.
- B2 – Very High Significance.** One of the only outstanding occurrences of any plant community, lower quality occurrences of any G1 element, good occurrences of a G2 element, excellent occurrences of a G3 element.
- B3 – High Significance.** Lower quality occurrences of a G2 element, good occurrences of a G3 element, excellent occurrence of any plant community.
- B4 – Moderate Significance.** Lower quality occurrences of a G3 element, good occurrences of any plant community, high quality or only known occurrence of a globally common S1 element, excellent occurrence of a globally common S2 element.
- B5 – General or Local Conservation Interest**

Appendix B - Colorado Division Of Wildlife Methods for Determining Significant Wildlife Habitat



The Colorado Division of Wildlife (CDOW) has a responsibility under House Bill 1041 (HB1041) to identify significant wildlife habitats for local governments. The CDOW has developed a system to record and display wildlife distributions; this system is referred to as the **Wildlife Resource Information System (WRIS)**.

Within the WRIS system distribution of many different species are mapped by biologists and district wildlife managers on USGS 1:50,000 scale county series maps. This information is then transferred into a computer mapping system known as a **Geographic Information System (GIS)**, which enables CDOW to reproduce species distribution maps for each county as well as allowing analysis of the distribution data.

Geographic distributions of select wildlife species have been mapped in the Division of Wildlife's Southeast Region. Selection criteria for this list of species were based on several categories. Economically important species, such as big game, were included. Indicator species, those with restricted distributions or highly specific habitat requirements, such as beaver, waterfowl, and osprey were selected because they serve as barometers of change. Threatened and endangered species such as bald eagle were selected to meet legal requirements. Finally, rare, imperiled, and species of concern were included in the hopes that proactive conservation efforts might prevent their potential listing. Availability of adequate information to map the occurrence of species in the Southeast Region was also considered. The CDOW began mapping wildlife distributions in 1977. Since that time, CDOW mapping criteria have been refined and wildlife distributions may have changed, necessitating a mapping update.

The wildlife composite map is a way for CDOW to summarize wildlife information on one map in an easily understood format. This composite map is produced by "stacking" activity areas for each of the individual species mapped for the Southeast Region. Personnel from the CDOW review the individual species maps and rank activity areas based on the potential impact to wildlife from development. Rankings are based on knowledge of the species biology and, in particular, knowledge of its habitat needs. This ranking is known as the **Impact Factor** and ranges from 1 to 5. A ranking of one (1) is assigned to those activity areas with the least potential for impact from development and a ranking of (5) to those activity areas with the greatest potential impact from development. These rankings also reflect the relative importance of an activity area to the species. For example, fall concentration areas (Impact Rank of 4) are more important to the life cycle of black bear than is the more general overall distribution (Impact Rank of 1). Typically, current maps depicting riparian habitat are unavailable and the Division attempts to identify this valuable wildlife habitat indirectly

by mapping species dependent on this habitat type. Due to their importance, these riparian habitat areas, where they have been mapped, are ranked in the Very High Potential Impact category.

A second ranking was also given to each species and is referred to as the Status Factor. The Status Factor is a weight assigned to each species based on a combination of factors related to rarity, such as Federal or State Threatened or Endangered, sensitivity to environmental disturbance, species for which there exists special concern, and whether the species is economically important. Status Factors range in value from 1 to 5 with a one (1) being assigned to species with no weight value and a five (5) being assigned to Federal Endangered Species.

The status factor is a weighting assigned to each species based on the following criteria.

Status Factors	
5	Federal Endangered Species
4	Federal Threatened, State Endangered
3	State Threatened, Federal Candidate
2	State Special Concern, Biological Indicator Species, Species of Economic Importance, Sensitive Wildlife Species
1	All Other Species

The Impact Factor and Status Factor are then combined and an overall ranking is assigned based on their Total Factor Ranking (Table 65). The Total Factor Ranking ranges in value from 1 to 10. The Total Factor Ranking is then subdivided into five (5) categories (Low, Moderately Low, Moderate, High, and Very High) that reflect Potential for Impact to Wildlife from disturbance.

Table 64. Division of Wildlife Total Ranking Values

TOTAL FACTOR RANKING VALUES RARE/IMPERILED/DECLINING/INDICATOR SPECIES		TOTAL FACTOR RANKING VALUES ECONOMIC SPECIES	
NUMERIC RANK	POTENTIAL FOR IMPACT	NUMERIC RANK	POTENTIAL FOR IMPACT
1-3	Low	1-3	Low
4-5	Moderately Low	4	Moderately Low
6	Moderate	5	Moderate
7-8	High	6	High
9-10	Very High	7	Very High

Once each activity area is assigned a Total Ranking Value, the computer then groups the five impact categories and generates the composite map of Significant Wildlife Habitat. The benefit of the composite map is its simplicity; it is much easier to tell what impact a development may have on wildlife by looking at one map instead of numerous individual species maps. One can still find out what individual species are affected from the composite map by utilizing a Wildlife Impacts Worksheet and the individual species maps. Once wildlife maps and a companion process are adopted by the County they then serve as another tool with which County Commissioners, utilizing CDOW expertise, can make a more informed decision regarding development proposals.