

Assessment of Critical Biological Resources La Plata County, Colorado



Colorado Natural Heritage Program
Colorado State University
8002 Campus Delivery
Fort Collins, CO 80523-8002
May 2004



**Colorado
State**
University
Knowledge to Go Places

Prepared for
La Plata County
Durango, Colorado

By
Peggy Lyon, Janis Huggins, Joseph Lucht,
Denise Culver, Maggie March and Julia Hanson
Colorado Natural Heritage Program
Colorado State University
8002 Campus Delivery
Fort Collins, CO 80523-8002
heritage@lamar.colostate.edu
<http://www.cnhp.colostate.edu>

©2004 by Colorado Natural Heritage Program

EXECUTIVE SUMMARY

Major assets of La Plata County, both economic and aesthetic, are its spectacular scenery and its natural and cultural heritage. La Plata County possesses its own unique plants, animals and natural communities, as well as geologic and cultural features that deserve to be cherished and protected. A first step in preserving the county's biological diversity is to identify what features are present and where they are located. Then, determining which are of highest biodiversity significance and highest quality can lead to understanding how they may be protected or managed so that La Plata County will continue to be a place like no other in the world.

This project was undertaken to determine the elements of biological diversity in La Plata County, and to systematically evaluate their relative significance in order to help local governments, private landowners, federal and state agencies, tribes and other organizations to appreciate and safeguard them. The project was sponsored by the La Plata County Board of County Commissioners and was funded by Great Outdoors Colorado! (GOCO), with additional funding supplied by the San Juan National Forest, La Plata County and the City of Durango. A companion survey of wetlands funded by the Colorado Department of Natural Resources was conducted by the Colorado Natural Heritage Program (CNHP) simultaneously. Results of that survey are also included in this report.

CNHP began work in the spring of 2003, by compiling existing data and selecting areas to be inventoried during the field season. Fieldwork was completed from mid-June through September 2003. One hundred thirty new or updated occurrences of plants, animals and natural communities were documented and evaluated, leading to the identification of 68 Potential Conservation Areas (PCAs). Biodiversity significance of the PCAs is as follows:

- B1 (Outstanding Significance): 1
- B2 (Very High Significance): 8
- B3 (High Significance): 25
- B4 (Moderate Significance): 8
- B5 (General Significance): 26

A profile of each PCA is included here, with a map, brief description, and ranks and comments regarding urgency of protection and management. This report is accompanied by a GIS coverage of the Potential Conservation Areas.

ACKNOWLEDGEMENTS

We owe the existence of this project to many organizations and individuals. The La Plata County Board of County Commissioners and Planning Department encouraged us to undertake the survey, and worked to secure funding from Great Outdoors Colorado (GOCO).

We thank GOCO for providing the necessary funds, and the San Juan National Forest and U. S. Bureau of Land Management for contributing additional funds for work on public lands. Jeff Redders (San Juan National Forest) and Gary Thrash (BLM) have continued to be major supporters of our projects. La Plata County and the City of Durango also contributed funds and support. Colorado State University donated the use of a house at the Fort Lewis Research Station as a field base camp.

We appreciate the interest and encouragement of local organizations such as Southwest Riparian and Wetland Focus Area, Durango Nature Center and La Plata Open Space. We are grateful for the support of the Southern Ute Indian Tribe, and thank them for giving permission to survey certain areas within the Reservation.

We received valuable information and suggestions from the Colorado Division of Wildlife, especially from Tony Gurzick, Brent Bibles and Mike Japhet.

Our staff in Fort Collins, including Jill Handwerk, Jodie Bell, Jeremy Siemers, Dave Anderson, John Sovell, Amy Lavender, Alison Loar, and Barbara Brayfield all worked with us patiently.

Finally, we thank the landowners who allowed us to survey their land, and in some cases accompanied us in the field.

Table of Contents

EXECUTIVE SUMMARY	<i>i</i>
ACKNOWLEDGEMENTS.....	<i>ii</i>
CHAPTER 1. THE NATURAL HERITAGE NETWORK AND BIODIVERSITY.....	1
WHAT IS BIOLOGICAL DIVERSITY?.....	2
THE COLORADO NATURAL HERITAGE PROGRAM.....	3
THE NATURAL HERITAGE RANKING SYSTEM.....	4
LEGAL DESIGNATIONS FOR RARE SPECIES	6
ELEMENT OCCURRENCES AND THEIR RANKING.....	6
POTENTIAL CONSERVATION AREAS AND THEIR RANKING	6
OFF-SITE CONSIDERATIONS	8
RANKING OF POTENTIAL CONSERVATION AREAS.....	7
PROTECTION URGENCY RANKS	8
MANAGEMENT URGENCY RANKS.....	8
CHAPTER II. ASSESSMENT OF CRITICAL BIOLOGICAL RESOURCES OF LA PLATA COUNTY	9
INTRODUCTION.....	9
PURPOSE OF STUDY	9
INVENTORY METHODS	10
COLLECTING INFORMATION	10
IDENTIFYING RARE OR IMPERILED SPECIES AND SIGNIFICANT PLANT COMMUNITIES POTENTIALLY OCCURRING IN THE COUNTY	10
IDENTIFYING TARGETED INVENTORY AREAS	10
CONTACTING LANDOWNERS	13
CONDUCTING FIELD SURVEYS.....	13
RESULTS OF BIOLOGICAL INVENTORY.....	13
DELINEATING POTENTIAL CONSERVATION AREAS.....	14
CHAPTER III. DESCRIPTION OF STUDY AREA.....	15
LOCATION AND ECOREGION	15
SIZE AND ELEVATION.....	15
POPULATION AND OWNERSHIP	15
HYDROLOGIC UNITS	16
CLIMATE	16
GEOLOGY	16
SOILS.....	18
CHAPTER IV. ELEMENTS OF BIOLOGICAL DIVERSITY OF LA PLATA COUNTY.....	19
VEGETATION/PLANT COMMUNITIES	19
CLIMATIC ZONES.....	22
ALPINE.....	22
SUBALPINE	22
UPPER MONTANE.....	22
LOWER MONTANE.....	22
ECOLOGICAL SYSTEMS OF LA PLATA COUNTY	22

ALPINE.....	24
SUBALPINE.....	25
UPPER MONTANE.....	25
LOWER MONTANE.....	27
RIPARIAN AND WETLAND VEGETATION.....	31
RARE AND IMPERILED PLANTS OF LA PLATA COUNTY.....	32
ALETES SESSILIFLORUS (NEW MEXICO FALSE CARROT).....	33
ARALIA RACEMEOSA (AMERICAN SPIKENARD).....	34
ASTRAGALUS MISSOURIENSIS VAT. HUMISTRATA (MISSOURI MILKVETCH).....	35
ASTRAGALUS PROXIMUS (AZTEC MILKVETCH).....	37
BESSEYA RITTERIANA (KITTENTAILS).....	38
BOTRYCHIUM PINNATUM (NORTHERN MOONWORT).....	39
CAREX VIRIDULA (GREEN SEDGE).....	40
COLLOMIA GRANDIFLORA (SHOWY COLLOMIA).....	41
COMMELINA DIANTHIFOLIA (IRIS BIRD BILL DAYFLOWER).....	42
CYPRIPEDIUM CALCEOLUS SSP. PARVIFLORUM (YELLOW LADY'S-SLIPPER).....	43
DRABA GRAMINEA (SAN JUAN WHITLOW-GRASS).....	44
DRABA SPECTABILIS VAR. OXYLOBA (SHOWY WHITLOW-GRASS).....	45
DRABA STREPTOBRACHIA.....	46
ERIOPHORUM ALTAICUM SSP. NEOGAEUM (ALTAI COTTONGRASS).....	47
ERIOPHORUM CHAMISSONIS (RUSSET COTTONGRASS).....	48
GILIA HAYDENII (SAN JUAN GILIA).....	49
HIPPOCHAETE VARIEGATA (VARIEGATED SCOURING RUSH).....	50
MACHAERANTHERA COLORADOENSIS (COLORADO TANSY-ASTER).....	51
PEDIOCACTUS KNOWLTONII (KNOWLTON'S CACTUS).....	52
PENSTEMON LENTUS (ABAJO PENSTEMON).....	53
PHLOX CARYOPHYLLA (PAGOSA PHLOX).....	54
POLYPODIUM HESPERIUM (WESTERN POLYPODY).....	55
SALIX CANDIDA (HOARY WILLOW).....	56
STELLARIA IRRIGUA (ALTAI CHICKWEED).....	57
TOWNSENDIA GLABELLA (GRAY'S TOWNSEND-DAISY).....	58
TOWNSENDIA ROTHROCKII (ROTHROCK'S EASTER DAISY).....	59
WOODSIA NEOMEXICANA (NEW MEXICO CLIFF FERN).....	60
NON-NATIVE PLANTS (WEEDS).....	65
CIRSIIUM ARVENSE (CANADA THISTLE).....	61
CYNOGLOSSUM OFFICINALE (HOUNDSTONGUE).....	62
LEUCANTHEMUM VULGARE (OXEYE DAISY).....	62
CONVOLVULUS ARVENSIS (BINDWEED).....	63
ACROPTILON REPENS (RUSSIAN Knapweed).....	63
CIRSIIUM VULGARE (BULL THISTLE).....	63
LINARIA VULGARIS (YELLOW TOADFLAX).....	63
ONOPORDUM ACANTHIUM (SCOTCH THISTLE).....	64
CENTAUREA MACULOSA (SPOTTED Knapweed).....	64
RARE AND IMPERILED ANIMALS OF LA PLATA COUNTY.....	65
BIRDS	
DENDROICA GRACIAE (GRACE'S WARBLER).....	66
EGETTA THULA (SNOWY EGRET).....	68
FALCO PEREGRINUS ANATUM (AMERICAN PEREGRINE FALCON).....	69
HALIAEETUS LEUCOCEPHALUS (BALD EAGLE).....	71
HIMANTOPUS MEXICANUS (BLACK-NECKED STILT).....	73
PHALAROPUS TRICOLOR (WILSON'S PHALAROPE).....	74
STERNA FORSTERI (FORSTER'S TERN).....	75

VIREO VICINIOR (GRAY VIREO)	76
FISH	
GILA ROBUSTA(ROUNDTAIL CHUB)	78
ONCORHYNCHUS CLARKI PLEURITICUS (COLORADO RIVER CUTTHROAT TROUT).....	79
MAMMALS	
CYNOMYS GUNNISONI (GUNNISON'S PRAIRIE DOG)	80
HISTORIC OCCURRENCES	83
CHAPTER V. THREATS TO BIODIVERSITY AND CONSERVATION STRATEGIES	85
HYDROLOGICAL MODIFICATIONS	85
DEVELOPMENT	85
MINING, OIL AND GAS DEVELOPMENT	86
LIVESTOCK GRAZING	86
LOGGING	86
RECREATION	86
ROADS	86
NON-NATIVE SPECIES	87
FRAGMENTATION AND EDGE EFFECTS	87
NATURAL PROCESSES.....	87
POTENTIAL CONSERVATION STRATEGIES	88
CHAPTER VI. POTENTIAL CONSERVATION AREAS.....	91
PCA PROFILE EXPLANATION.....	91
POTENTIAL CONSERVATION AREA PROFILES: B1 PCAS	95
CEMETERY CANYON.....	95
POTENTIAL CONSERVATION AREA PROFILES: B2 PCAS.....	98
ANIMAS RIVER CANYON	98
COLUMBINE PASS-CHICAGO BASIN	101
ENDLICH MESA	104
JUNCTION CREEK.....	107
LIGHTNER CREEK	111
LIME MESA	115
LOWER HERMOSA CREEK.....	118
MADDEN CREEK	122
POTENTIAL CONSERVATION AREA PROFILES: B3 PCAS.....	126
ANIMAS RIVER AT LA POSTA	126
ANIMAS RIVER AT ROCKWOOD	130
BONDAD	133
CAVE BASIN TRAIL	136
CINDER GULCH	139
CUMBERLAND BASIN	141
ELBERT CREEK	144
FALLS CREEK	149
FLORIDA RIVER AT BURNT TIMBER CREEK	153
HAVILAND LAKE	157
HIGHLINE TRAIL.....	161
INDIAN CREEK AT TUCKERVILLE	164
LOS PINOS AT BAYFIELD NORTH.....	168
LOS PINOS AT RATTLESNAKE HILL.....	172
LOWER FLORIDA RIVER	176
MIDDLE FLORIDA RIVER	180

MIDDLE HERMOSA CREEK	184
MORGAN CANYON	187
SAULS CREEK	190
SHEEPHEAD BASIN	193
SMELTER MOUNTAIN	196
SPRING CREEK NORTH	199
UPPER ELBERT CREEK.....	203
UPPER HERMOSA CREEK	207
VALLECITO CREEK-JOHNSON CREEK	211
POTENTIAL CONSERVATION AREA PROFILES: B4 PCAS.....	216
CASCADE CREEK.....	216
ENDLICH MESA BASIN.....	219
LOS PINOS AT BAYFIELD SOUTH	221
LOWER LA PLATA RIVER.....	225
MITCHELL LAKES.....	227
ORPHAN BUTTE	231
POTENTIAL CONSERVATION AREA PROFILES: B5 PCAS.....
ANIMAS CITY MOUNTAIN	234
ANIMAS RIVER AT GOAT CANYON	237
BAYFIELD NORTHEAST.....	239
BIG BEND CREEK	242
CHERRY CREEK.....	244
CLEAR CREEK LA PLATA	246
COAL GULCH.....	248
DURANGO WEST	250
EAST FORK HERMOSA CREEK	252
ELECTRA LAKE	254
FLORIDA RIVER UPLANDS	257
GAINES CANYON.....	259
HERMOSA CLIFFS	261
LAKE MARIE	264
LANGE CANYON	268
LOMA LINDA	271
MIDDLE LA PLATA RIVER	273
NEEDLE CREEK AT EMERALD LAKE	277
PASTORIUS RESERVOIR	280
PINE RIVER CANAL	282
RED MESA.....	284
ROAD 136	286
SPRING CREEK AT IGNACIO	289
SUNLIGHT BASIN.....	291
TUCKERVILLE.....	294
WEST VIRGINIA GULCH.....	296
MISSIONARY RIDGE BURN PCAS	299
LOWER COON CREEK	300
VALLECITO RESERVOIR TRIBUTARY	303
SITES OF LOCAL SIGNIFICANCE AND OTHER AREAS OF INTEREST	306
ANIMAS OVERLOOK	307
ANIMAS RIVER AT DURANGO.....	307
BARNES MOUNTAIN	308
BODO STATE WILDLIFE AREA	309
CLEAR CREEK TRAIL.....	310

DURANGO NATURE CENTER.....	310
HESPERUS.....	311
LA BOCA	311
LOST LAKE	312
MIDDLE MOUNTAIN ROAD	313
MILLER CREEK.....	313
SOUTH FLORIDA MESA.....	314
STUMP LAKES	314

LITERATURE CITED AND OTHER REFERENCES

APPENDIX . PLANT SPECIES LISTS FROM SELECTED SITES

List of Figures	Page
Figure 1. Targeted Inventory Areas	11
Figure 2. Ecoregions of Colorado	15
Figure 3. Land ownership in La Plata County	15
Figure 4. Major river drainages of La Plata County	16
Figure 5. Annual precipitation in La Plata County	16
Figure 6. Purple and gray clays of the San Jose Formation	18
Figure 7. Vegetation types of La Plata County	20
Figure 8. Alpine landscape at Lime Mesa	21
Figure 9. Distribution of alpine vegetation	23
Figure 10. Alpine/Subalpine wet meadow at Kennebec Pass	23
Figure 11. Alpine substrate ecological system	24
Figure 12. Alpine tundra fell-field	24
Figure 13. Distribution of spruce-fir forests	25
Figure 14. Spruce-fir forest and meadows.	25
Figure 15. Distribution of mixed conifer forests	25
Figure 16. Distribution of aspen forests	26
Figure 17. Aspen clearcut near Madden Peak	26
Figure 18. Thurber fescue meadow	26
Figure 19. Distribution of ponderosa pine forests	27
Figure 20. Gambel oak resprouting	27
Figure 21. Distribution of mountain shrublands	28
Figure 22. Pinyon and juniper covered hillsides	28
Figure 23. Distribution of pinyon-juniper woodlands	29
Figure 24. Distribution of sagebrush shrublands	29
Figure 25. Cinder Gulch	30
Figure 26. <i>Aletes sessiliflorus</i>	33
Figure 27. <i>Aralia racemosa</i>	34
Figure 28. <i>Astragalus missouriensis</i> var. <i>humistratus</i>	35
Figure 29. <i>Astragalus proximus</i>	37
Figure 30. <i>Besseyia ritteriana</i>	38
Figure 31. <i>Botrychium pinnatum</i>	39
Figure 32. <i>Carex viridula</i>	40
Figure 33. <i>Collomia grandiflora</i>	41
Figure 34. <i>Commelina dianthifolia</i>	42
Figure 35. <i>Cypripedium parviflorum</i>	43
Figure 36. <i>Draba graminea</i>	44
Figure 37. <i>Draba spectabilis</i> var. <i>oxyloba</i>	45
Figure 38. <i>Draba streptobrachia</i>	46
Figure 39. <i>Eriophorum altaicum</i> var. <i>neogaena</i>	47

Figure 40. <i>Eriophorum chamissonis</i>	48
Figure 41. <i>Gilia haydenii</i>	49
Figure 42. <i>Hippochaete variegata</i>	50
Figure 43. <i>Machaeranthera coloradoensis</i>	51
Figure 44. <i>Pediocactus knowltonii</i>	52
Figure 45. <i>Penstemon lentus</i>	53
Figure 46. <i>Phlox caryophylla</i>	54
Figure 47. <i>Polypodium hesperium</i>	55
Figure 48. <i>Salix candida</i>	56
Figure 49. <i>Stellaria irrigua</i>	57
Figure 50. <i>Townsendia glabella</i>	58
Figure 51. <i>Townsendia rothrockii</i>	59
Figure 52. <i>Woodsia neomexicana</i>	60
Figure 53. <i>Cirsium arvense</i> in seed	61
Figure 54. <i>Cirsium arvense</i> flower	61
Figure 55. <i>Carduus nutans</i>	62
Figure 56. <i>Cynoglossum officinale</i>	62
Figure 57. <i>Leucanthemum vulgare</i>	62
Figure 58. <i>Convolvulus arvensis</i>	63
Figure 59. <i>Acroptilon repens</i>	63
Figure 60. <i>Cirsium vulgare</i>	63
Figure 61. <i>Linaria vulgaris</i>	64
Figure 62. <i>Onopordum acanthium</i>	64
Figure 63. <i>Centaurea maculosa</i>	64
Figure 64. Grace's warbler	66
Figure 65. Distribution of Grace's warbler	66
Figure 66. Snowy egret	68
Figure 67. Peregrine falcon	69
Figure 68. Bald eagle	71
Figure 69. Black-necked stilt	73
Figure 70. Wilson's phalarope	74
Figure 71. Forster's tern	75
Figure 72. Gray vireo	76
Figure 73. Distribution of gray vireo in La Plata County	76
Figure 74. Roundtail chub	78
Figure 75. Gunnison's prairie dog	81
Figure 76. Distribution of Gunnison's prairie dog	81
Figure 77. Western yellow-billed cuckoo	83
Figure 78. Columbian sharp-tailed grouse	83
Figure 79. <i>Nokomis fritillary</i>	83
Figure 80. Wolverine	83
Figure 81. Lynx	84
Figure 82. Black-footed ferret	84
Figure 83. Townsend's big-eared bat	84
Figure 84. Potential Conservation Areas Map	92
Figure 85. Perimeter of Missionary Ridge Burn	299
Figure 86. Other Areas of Interest	306

List of Tables

Table 1. Definition of Colorado Natural Heritage Imperilment Ranks	4
Table 2. Federal and State Agency Special Designations.	5
Table 3. Natural Heritage Program Biological Diversity Ranks and their Definitions	7
Table 4. Natural Heritage Program Protection Urgency Ranks and their Definitions	8
Table 5. Natural Heritage Program Management Urgency Ranks and their Definitions	8
Table 6. Targeted Inventory Areas Surveyed	12
Table 7. Upland Plant Associations Recorded In La Plata County	19
Table 8. Major vegetation types of La Plata County	22
Table 9. Rare and Imperiled Plants of La Plata County	32
Table 10. Non-native plants	61
Table 11. Rare and Imperiled Animals of La Plata County	65
Table 12. Potential Conservation Areas legend	92

Chapter I. Introduction

Colorado Natural Heritage Program performed a survey of critical biological resources of La Plata County in 2003. Support for the project came from a Great Outdoors Colorado! trust fund planning grant awarded to La Plata County, San Juan National Forest, U. S. Bureau of Land Management and the City of Durango. This report presents the results of that survey.

The Natural Heritage Network and Biodiversity

Colorado is well known for its rich diversity of landscape, wildlife, plants, and plant communities. However, like many other states, it is experiencing a loss of much of its flora and fauna. This decline in biodiversity is a global trend resulting from human population growth, land development, and subsequent habitat loss. Globally, the loss in species diversity has become so rapid and severe that it has been compared to the great natural catastrophes at the end of the Paleozoic and Mesozoic eras (Wilson 1988). The need to address this loss in biodiversity has been recognized for decades in the scientific community. However, many conservation efforts made in this country have not been based upon preserving biodiversity; instead, they have primarily focused on preserving game animals, striking scenery, and locally favorite open spaces. To address the absence of a methodical, science-based approach to preserving biodiversity, The Nature Conservancy developed the Natural Heritage Methodology in 1978.

Recognizing that rare and imperiled species are more likely to become extinct than common ones, the Natural Heritage Methodology ranks species according to their rarity or degree of imperilment. The ranking system is based upon the number of known locations of the species as well as its biology and known threats. By ranking the relative rarity or imperilment of a species, the quality of its populations, and the importance of associated conservation sites, the methodology can facilitate the prioritization of conservation efforts so the most rare and imperiled species may be preserved first. As the scientific community began to realize that plant communities are equally important as individual species, this methodology has also been applied to ranking and preserving rare plant communities as well as the best examples of common communities. Preserving representative plant communities provides a “coarse filter” for attending to species that depend on a particular ecosystem, but may be insufficiently known to be addressed as individual species, in addition to the “fine filter” of preserving rare plants and animals.

The Natural Heritage Methodology is used by Natural Heritage Programs throughout North, Central, and South America, forming an international database network under the umbrella of NatureServe (www.natureserve.org). Natural Heritage Network data centers are located in each of the 50 U.S. states, five provinces of Canada, and 13 countries in South and Central America and the Caribbean. This network enables scientists to monitor the status of species from a state, national, and global perspective. It also enables conservationists and natural resource managers to make informed objective decisions in prioritizing and focusing conservation efforts.

What is Biological Diversity?

Protecting biological diversity has become an important management issue for many natural resource professionals. Biological diversity at its most basic level includes the full range of species on earth, from unicellular bacteria and protists, through multicellular plants, animals, and fungi. At finer levels of organization, biological diversity includes the genetic variation within species, both among geographically separated populations and among individuals within a single population. On a wider scale, diversity includes variations in the biological communities in which species live, the ecosystems in which communities exist, and the interactions among these levels. All levels are necessary for the continued survival of species and plant communities, and all are important for the well being of humans. It is clear that biological diversity should be of concern to all people.

The biological diversity of an area can be described at four levels:

1. **Genetic Diversity** -- the genetic variation within a population and among populations of a plant or animal species. The genetic makeup of a species is variable between populations within its geographic range. Loss of a population results in a loss of genetic diversity for that species and a reduction of total biological diversity for the region. This unique genetic information cannot be reclaimed.
2. **Species Diversity** -- the total number and abundance of plant and animal species and subspecies in an area.
3. **Community Diversity** -- the variety of plant communities within an area that represent the range of species relationships and inter-dependence. These communities may be diagnostic or even endemic to an area. It is within communities that all life dwells.
4. **Landscape Diversity** -- the type, condition, pattern, and connectedness of plant communities. A landscape consisting of a mosaic of plant communities may contain one multifaceted ecosystem, such as a wetland ecosystem. A landscape also may contain several distinct ecosystems, such as a riparian corridor meandering through shortgrass prairie. Fragmentation of landscapes, loss of connections and migratory corridors, and loss of natural communities all result in a loss of biological diversity for a region. Humans and the results of their activities are integral parts of most landscapes.

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

The Colorado Natural Heritage Program

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

CNHP is the state's primary comprehensive biological diversity data center, gathering information and field observations to help develop statewide conservation priorities. After operating in the Colorado Division of Parks and Outdoor Recreation for 14 years, the Program was relocated to the University of Colorado Museum in 1992, and then to the College of Natural Resources at Colorado State University in 1994, where it has operated since.

The multi-disciplinary team of scientists, planners, and information managers at CNHP gathers comprehensive information on the rare, threatened, and endangered species and significant plant communities of Colorado. Life history, status, and locational data are incorporated into a continually updated data system. Sources include published and unpublished literature, museum and herbaria labels, and field surveys conducted by knowledgeable naturalists, experts, agency personnel, and our own staff of botanists, ecologists, and zoologists.

All Natural Heritage Programs that house data about imperiled species are implementing use of the Biotics 4 data system developed by NatureServe. This database includes taxonomic group, global and state rarity rank, federal and state legal status, observation source, observation date, county, township, range, watershed, and other relevant facts and observations. Biotics 4 also has an ArcView based mapping program for digitizing and mapping occurrences of rare plants, animals, and plant communities. These rare species and plant communities are referred to as "elements of natural diversity" or simply "elements."

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

To assist in biological diversity conservation efforts, CNHP scientists strive to answer questions like the following:

- What species and ecological communities exist in the area of interest?
- Which are at greatest risk of extinction or are otherwise significant from a conservation perspective?
- What are their biological and ecological characteristics, and where are these priority species or communities found?
- What is the species' condition at these locations, and what processes or activities are sustaining or threatening them?
- Where are the most important sites to protect?
- Who owns or manages those places deemed most important to protect, and what is threatening those places?
- What actions are needed for the protection of those sites and the significant elements of biological diversity they contain?
- How can we measure our progress toward conservation goals?

CNHP has effective working relationships with several state and federal agencies, including the Colorado Department of Natural Resources, the Colorado Division of Wildlife, the Bureau of Land Management, and the U.S. Forest Service. Numerous local governments and private entities, such as consulting firms, educators, landowners, county commissioners, and non-profit organizations, also work closely with CNHP. Use of the data by many different individuals and organizations encourages a cooperative and proactive approach to conservation, thereby reducing the potential for conflict.

The Natural Heritage Ranking System

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

Element imperilment ranks are assigned both in terms of the element's degree of imperilment within Colorado (its State or S-rank) and the element's imperilment over its entire range (its Global or G-rank). Taken together, these two ranks give an instant picture of the degree of imperilment of an element. For example, the lynx, which is thought to be secure in northern North America but is known from less than 5 current locations in Colorado, is ranked G5S1. Naturita milkvetch (*Astragalus naturitensis*), which is known from 43 locations in western Colorado, is ranked G3S3. Further, a tiger beetle that is only known from one location in the world at the Great Sand Dunes National Monument is ranked G1S1. CNHP actively collects, maps, and electronically processes specific occurrence information for elements considered extremely imperiled to vulnerable (S1 - S3). Those with a ranking of S3S4 are "watchlisted," meaning that specific occurrence data are collected and periodically analyzed to determine whether more active tracking is warranted. A complete description of each of the Natural Heritage ranks is provided in Table 1.

This single rank system works readily for all species except those that are migratory. Those animals that migrate may spend only a portion of their life cycles within the state. In these cases, it is necessary to distinguish between breeding, non-breeding, and resident species. As noted in Table 1, ranks followed by a "B", e.g., S1B, indicate that the rank applies only to the status of breeding occurrences. Similarly, ranks followed by an "N", e.g., S4N, refer to non-breeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state.

Table 1. Definition of Colorado Natural Heritage Imperilment Ranks.

Global imperilment ranks are based on the range-wide status of a species. State imperilment ranks are based on the status of a species in an individual state. State and Global ranks are denoted, respectively, with an "S" or a "G" followed by a character. These ranks should not be interpreted as legal designations.	
G/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.
G/S2	Imperiled globally/state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range.
G/S3	Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences).
G/S4	Apparently secure globally/state, though it might be quite rare in parts of its range, especially at the periphery.
G/S5	Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
GX	Presumed extinct.
G#?	Indicates uncertainty about an assigned global rank.
G/SU	Unable to assign rank due to lack of available information.
GQ	Indicates uncertainty about taxonomic status.
G/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.	

Legal Designations for Rare Species

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

Table 2. 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	Potential Endangered or Threatened; species or subspecies formally Potential for listing as endangered or threatened.
PD	Potential for delisting
C	Candidate: species or subspecies for which the U.S. Fish and Wildlife 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: <ol style="list-style-type: none"> Significant current or predicted downward trends in population numbers or density. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.
3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as "S")	
BLM	Sensitive: those species found on public lands, designated by a State Director that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species. This list does not include species that are listed endangered (LE) or threatened (LT).
State Status:	
1. Colorado Division of Wildlife	
	CO-E Endangered
	CO-T Threatened
	CO-SC Special Concern

Element Occurrence Ranking

Actual locations of elements, whether they are single organisms, populations, or plant communities, are referred to as element occurrences. The element occurrence is considered the most fundamental unit of conservation interest and is at the heart of the Natural Heritage Methodology. 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 (whenever sufficient information is available). This ranking system is designed to indicate which occurrences are the healthiest and ecologically the most viable, thus focusing conservation efforts where they will be most successful. The EO-Rank is based on 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, 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 is rated on a scale of A through D, with A representing an excellent grade and D representing a poor grade. These grades are then considered 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.
H	Historically known, but not verified for an extended period of time
X	Extirpated

Potential Conservation Areas and Their Ranking

In order to successfully protect populations or occurrences, it is helpful to delineate Potential Conservation Areas (PCAs). These PCAs focus on capturing the ecological processes that are necessary to support the continued existence of a particular element occurrence of natural heritage significance. Potential Conservation Areas may include a single occurrence of a rare element, or a suite of rare element occurrences or significant features.

The goal of the PCA process is to identify a land area that can provide the habitat and ecological processes upon which a particular element occurrence, or suite of element occurrences, depends for its continued existence. The best available knowledge about each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features; vegetative cover; and current and potential land uses. In developing the boundaries of a Potential Conservation Area, CNHP scientists consider a number of factors that include, but are not limited to:

- ecological processes necessary to maintain or improve existing conditions;
- species movement and migration corridors;
- maintenance of surface water quality within the PCA and the surrounding watershed;
- maintenance of the hydrologic integrity of the groundwater;
- land intended to buffer the PCA against future changes in the use of surrounding lands;
- exclusion or control of invasive exotic species;
- land necessary for management or monitoring activities.

The boundaries presented are meant to be used for conservation planning purposes and have no legal status. The proposed boundary does not automatically recommend exclusion of all activity. Rather, the boundaries designate ecologically significant areas in which land managers may wish to consider how specific activities or land use changes within or near the PCA affect the natural heritage resources and sensitive species on which the PCA is based. Please note that these boundaries are based on our best estimate of the primary area supporting the long-term survival of targeted species and plant communities. A thorough analysis of the human context and potential stresses has not been conducted. However,

CNHP’s conservation planning staff is available to assist with these types of analyses where conservation priority and local interest warrant additional research.

Off-Site Considerations

Frequently, all relevant ecological processes cannot be contained within a Potential Conservation Area of reasonable size. For instance, while a PCA for Colorado River cutthroat trout may be drawn to include only the riparian zone of a river or creek, it should be remembered that activities in the entire watershed can affect water quality, which will in turn affect the trout population. The boundaries illustrated in this report signify the immediate, and therefore most important, area in need of protection. Continued landscape level conservation efforts are needed. This will involve countywide efforts as well as coordination and cooperation with private landowners, neighboring land planners, and state and federal agencies.

Ranking of Potential Conservation Areas

CNHP uses element and element occurrence ranks to assess the overall biological diversity significance of a PCA, which may include one or many element occurrences. Based on these ranks, each PCA is assigned a biological diversity rank (or B-rank). See Table 3 for a summary of these B-ranks.

Table 3. Natural Heritage Program Biological Diversity Ranks and their Definitions.

B1	<p>Outstanding Significance (irreplaceable): only known occurrence of an element A-ranked occurrence of a G1 element (or at least C-ranked if best available occurrence) concentration of A- or B-ranked occurrences of G1 or G2 elements (four or more)</p>
B2	<p>Very High Significance (nearly irreplaceable): B- or C-ranked occurrence of a G1 element A- or B-ranked occurrence of a G2 element One of the most outstanding (for example, among the five best) occurrences rangewide (at least A- or B-ranked) of a G3 element. Concentration of A- or B-ranked G3 elements (four or more) Concentration of C-ranked G2 elements (four or more)</p>
B3	<p>High Significance: C-ranked occurrence of a G2 element A- or B-ranked occurrence of a G3 element D-ranked occurrence of a G1 element (if best available occurrence) Up to five of the best occurrences of a G4 or G5 community (at least A- or B-ranked) in an ecoregion (requires consultation with other experts)</p>
B4	<p>Moderate Significance: Other A- or B-ranked occurrences of a G4 or G5 community C-ranked occurrence of a G3 element A- or B-ranked occurrence of a G4 or G5 S1 species (or at least C-ranked if it is the only state, provincial, national, or ecoregional occurrence) Concentration of A- or B-ranked occurrences of G4 or G5 N1-N2, S1-S2 elements (four or more) D-ranked occurrence of a G2 element At least C-ranked occurrence of a disjunct G4 or G5 element Concentration of excellent or good occurrences (A- or B-ranked) of G4 S1 or G5 S1 elements (four or more)</p>
B5	<p>General or State-wide Biological Diversity Significance: good or marginal occurrence of common community types and globally secure S1 or S2 species, sites of local interest.</p>

Protection Urgency Ranks

Protection urgency ranks (P-ranks) refer to the timeframe in which it is recommended that conservation protection occur. In most cases, this rank refers to the need for a major change of protective status (for example agency special area designations or ownership). The urgency for protection rating reflects the need to take legal, political, or other administrative measures to protect the area. Table 4 summarizes the P-ranks and their definitions.

Table 4. Natural Heritage Program Protection Urgency Ranks and their Definitions.

P1	Protection actions needed immediately. It is estimated that current stresses may reduce the viability of the elements in the PCA within 1 year.
P2	Protection actions may be needed within 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA within this approximate timeframe.
P3	Protection actions may be needed, but probably not within the next 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA if protection action is not taken.
P4	No protection actions are needed in the foreseeable future.
P5	Land protection is complete and no protection actions are needed.

A protection action involves increasing the current level of protection accorded one or more tracts within a potential conservation area. It may also include activities such as educational or public relations campaigns, or collaborative planning efforts with public or private entities, to minimize adverse impacts to element occurrences at a site. It does not include management actions. Situations that may require a protection action are as follows:

- Forces that threaten the existence of one or more element occurrences at a PCA. For example, development that would destroy, degrade or seriously compromise the long-term viability of an element occurrence; or timber, range, recreational, or hydrologic management that is incompatible with an element occurrence's existence;
- The inability to undertake a management action in the absence of a protection action; for example, obtaining a management agreement;
- In extraordinary circumstances, a prospective change in ownership or management that will make future protection actions more difficult.

Management Urgency Ranks

Management urgency ranks (M-ranks) indicate the timeframe in which it is recommended that a change occur in management of the element or PCA. This rank refers to the need for management in contrast to protection (for example, increased fire frequency, decreased grazing, weed control, etc.). The urgency for management rating focuses on land use management or land stewardship action required to maintain element occurrences at the potential conservation area.

A management action may include biological management (prescribed burning, removal of exotics, mowing, etc.) or people and site management (building barriers, rerouting trails, patrolling for collectors, hunters, or trespassers, etc.). Management action does not include legal, political, or administrative measures taken to protect a potential conservation area. Table 5 summarizes M-ranks and their definitions.

Table 5. Natural Heritage Program Management Urgency Ranks and their Definitions.

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

Chapter II.

Assessment of Critical Biological Resources of La Plata County— Project Information

Introduction

La Plata County is home to a vast array of plants, animals and plant communities; however the numbers and diversity of these organisms are not fully understood. Federal, state, and local landowners of the county have a good understanding of the ecology of their specific lands, but no attempt to document the diversity and abundance of rare species or plant communities has been conducted for the entire county. In order to assist all landowners in managing their lands, the Colorado Natural Heritage Program (CNHP) conducted a countywide survey of the rare and imperiled species and both rare and common plant communities of La Plata County in the summer of 2003.

Purpose of the Study

Citizens of La Plata County are concerned about rapid growth and development, resulting in loss of open space, wildlife habitat, and unique natural surroundings. The population of the county is expanding rapidly, yet the county finds itself ill prepared for this growth with zoning regulations that are lacking or inadequate. This has created the potential for sporadic residential development that threatens natural resources, wildlife habitat, open space and the agricultural qualities of the region. Citizens recognize the need to preserve the areas natural resources, the plants and animals and the ranching and agricultural traditions of the area through conservation. They also recognize that with limited resources it is important to prioritize their efforts. The need for information on the locations of the most significant biological resources of the area is urgent.

Rare plants, animals, and plant communities are usually the least understood organisms in a landscape. Some of these organisms are only understood after their rarity is recognized, as in the case of federal threatened and endangered species. However, conservation of these organisms can often be accomplished more quickly and less expensively if there is a clear understanding of their distribution and abundance prior to federal listing. Furthermore, the likelihood for human conflicts is minimized if there is the opportunity to proactively plan for managing human activity or managing the species or habitat of interest. The purpose of this inventory is to provide a data resource for all citizens of La Plata County interested in conducting such proactive planning. This document should be considered a tool for managing lands that support rare species and communities within the county. With this information conservation planning efforts and conservation easements can be most effectively utilized to both preserve the county's biological diversity.

Although this report is intended to be a "tool" for the counties and its citizens, there are limitations to the information within it. In particular, a majority of the survey work was conducted in one summer. The distribution and abundance of all organisms change with time, and the authors of this report anticipate that the conservation areas described in the report will change with time. Also, all areas of the county were not surveyed. Due to limitations of resources, time and land access, this report only includes information from readily observed species or from areas that biologists received permission to visit. Finally, this report does not include all species or communities found within the basin. This project specifically targeted the organisms that are tracked by the CNHP. As described in Chapter 1, CNHP has a methodology specific to Natural Heritage Programs and this study was intended to survey for those species believed to be the most rare or the least known.

Inventory Methods

The methods for assessing and prioritizing conservation needs are diverse. CNHP follows a general method that is continuously being developed specifically for this purpose. The Natural Heritage Inventory described in this report was conducted in several steps summarized below.

Collecting Information

CNHP biological conservation databases were updated with information regarding the known locations of species and significant plant communities within La Plata County. A variety of information sources were searched for this information. The Colorado State University museums and herbarium were searched, as were plant and animal collections at the University of Colorado and Fort Lewis College. The Colorado Division of Wildlife provided extensive data on a range of species. Both general and specific literature sources were incorporated into CNHP databases, either in the form of locational information or as biological data pertaining to a species in general. Other information was gathered to help locate additional occurrences of natural heritage elements. Such information covers basic species and community biology including range, habitat, phenology (reproductive timing), food sources, and substrates. This information was also entered into CNHP databases.

Identifying Rare or Imperiled Species and Significant Plant Communities Potentially Occurring in the Project Area

The information collected in the previous step was used to refine a list of potential species and natural plant communities and to refine our search areas. In general, species and plant communities that have been recorded from La Plata County or from adjacent areas are included in this list. Species or plant communities preferring habitats that are not included in this study area were removed from the list. Over 100 rare species and significant plant communities were targeted in these surveys. Given a limited amount of time and funding for this research, a specific subset of species and communities were the priority of our inventory efforts. These elements were considered to be a priority because of their high level of biological significance (critically imperiled to vulnerable, G1-G3) and/or because they are known to occur in areas that are subject to various development pressures such as hydrological alterations and residential development.

The amount of effort given to the inventory for each of these elements is prioritized according to the element's rank. Globally imperiled to vulnerable (G1-G3) elements are given highest priority, while state-rare (S1-S3) elements are of a lower priority.

Identifying Targeted Inventory Areas

Sites to survey in the field were chosen based on their likelihood of harboring rare or imperiled species or significant plant communities. Previously documented locations were targeted, and additional potential areas were chosen using available information sources. Element occurrences with precisely known locations were always included so that they could be verified and updated. Many locations were not known due to ambiguities in the original data. In such cases, sites to survey for that element were chosen in likely areas in the general vicinity. Areas with potentially high natural values were selected using aerial photographs, geology maps, vegetation surveys, personal recommendations from knowledgeable local residents, and numerous roadside surveys by our field scientists. Using the biological information stored in the CNHP database, areas having the highest potential for supporting specific elements were identified. Those chosen for survey sites appeared to be in the most natural condition. In general, this means those sites that are the largest, least fragmented, and relatively free of visible disturbances such as roads, trails, fences, and quarries were identified.

The above information was used to delineate over 100 targeted inventory areas (TIAs) that were believed to have relatively high probability of harboring significant natural resources (Fig. 1). These areas vary in size from 51 acres to over 10,000 acres and include all major habitat types in the study area. Because there were limited resources to address an overwhelming number of potential sites, surveys for all elements were prioritized by the degree of imperilment. For example, the species with Natural Heritage ranks of G1-G3 were the primary target of our inventory efforts. Inventory efforts resulted in visitation of nearly 100 targeted inventory areas, not including those visited by the wetland crew. Although species with lower Natural Heritage ranks were not the main focus of inventory efforts, many of these species occupy similar habitats as the targeted species, and were documented as they were encountered.

Table 6.
 La Plata County Targeted Inventory Areas Surveyed 2003. (01 to 77 were surveyed for plants and upland plant communities; Z01-Z50 for animals)

01	Bondad	66	Endlich Mesa	Z26	Vallecito Creek
04	La Posta Road	67	Highline Trail	Z27	Johnson Creek
06	Smelter Mountain	68	Tuckerville	Z28	Tirbircio Creek
08	Hermosa	69	Lost Lake	Z29	Silver Mountain
10	Barnes Mountain	70	Miller Creek	Z30	Electra Lake
11	Chicago Basin	71	Spring Creek	Z31	Lower Hermosa Creek
12	Lime Mesa	72	Johnson Creek	Z32	Lower Cox Canyon
14	Electra Lake	73	Vallecito Creek	Z33	Pastorius Reservoir
19	Historic Durango	74	Vallecito Campground	Z34	Lewis Mountain
23	Hermosa Cliffs	75	Electra Lake	Z35	Haviland Lake
25	Vallecito Reservoir	76	Dry Fork Lightner Creek	Z36	Lime Mesa
27	La Boca	77	CSU Research Station	Z37	Missionary Ridge Road
29	Lightner Creek	Z01	Red Mesa	Z38	Hermosa Park
30	Ignacio	Z02	Lightner Creek-Coal Gulch	Z39	Durango Nature Center
33	Animas City Mountain	Z03	Long Hollow	Z40	Bondad
35	Kennebec Pass	Z04	Florida River	Z41	Madden Peak
38	Lone Spruce Draw	Z05	Loma Linda	Z42	Junction Creek Road
40	Zabel Canyon	Z06	Gem Village	Z43	Lemon Reservoir
41	Pine River Canal	Z07	Beaver Creek	Z44	Big Bend Creek
43	Cox Canyon	Z08	Buck Highway	Z45	Elbert Creek
45	Cinder Bluffs	Z09	South Fork Los Pinos River	Z46	Cumberland Mountain
46	Maverick Canyon	Z10	Wallace Gulch	Z47	Goulding Creek Trail
48	Perins Peak	Z11	Hay Gulch, Rattlesnake Gulch	Z48	South of Bayfield
49	Above Florida	Z12	Animas from Trimble to Falls Cr.	Z49	Lower Los Pinos River
50	Red Mesa	Z13	Florida River	Z50	Falls Creek Meadows
52	La Plata Creek	Z14	Thompson Park		
53	Junction Creek	Z15	Cottonwood Creek		
54	Lower Coon Creek	Z16	Cherry Creek North		
55	Pinkerton Mesa	Z17	Cherry Creek South		
57	Animas Overlook	Z18	Swampy Creek		
59	Bodo SWA	Z19	Perins Peak SWA		
60	Cascade Creek	Z2	Silva Draw		
61	Upper Elbert Creek	Z21	Animas City Mountain		
62	Cave Basin	Z22	Saul's Creek		
63	East of Kennebec	Z23	Shamrock Mines		
64	Columbine Lake	Z24	Smelter Mountain		
65	Haviland Lake	Z25	Needle Creek		

Contacting Landowners

Obtaining permission to conduct surveys on private property was essential to this project. Once survey sites were chosen, land ownership of these areas was determined using records at local assessors' offices. Landowners were then either contacted by phone or in person. If landowners could not be contacted, or if permission to access the property was denied, this was recorded and the site was not visited. Under no circumstances were properties surveyed without landowner permission. However, some species were readily visible, such as prairie dog colonies, without having to be on the private land.

Conducting Field Surveys

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

The methods used in the surveys vary according to the elements that were being targeted (Appendix). 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 to document their presence. These are summarized below:

- Amphibians: visual observation and capture using aquatic dip nets
- Reptiles: visual observation
- Mammals: live traps, pitfall traps and mist nets
- Birds: visual observation or identification by song or call
- Insects: aerial net and visual observation
- Plants: visual observation
- Plant communities: visual observation

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

When a rare species or significant plant community was discovered, its precise location and known extent was determined by GPS and recorded on 1:24,000 scale topographic maps. Other data recorded at each occurrence include numbers observed, breeding status, habitat description, disturbance features, observable threats, and potential protection and management needs. The overall significance of each occurrence, relative to others of the same element, was estimated by rating the size of the population or community, the condition or naturalness of the habitat, and the landscape context (ease or difficulty of protecting) of the occurrence. These factors are combined into an element occurrence rank, useful in refining conservation priorities. See the previous section on Natural Heritage Methodology for more about element occurrence ranking.

Results of Biological Inventory

Results of the survey confirm that there are many areas with high biological significance in La Plata County. There are several extremely rare plants and animals that depend on these areas for survival. Altogether, 27 rare or imperiled plant species, 19 rare or imperiled animal species, and 44 plant communities of concern have been recently documented in La Plata County (Appendix I). A total of 216 records of elements tracked by CNHP now exist in the CNHP database for the project area. One hundred four of these are new and 26 are updated records that were added in 2003. They include 35 animals, 29 plants, 38 wetland communities and 28 upland communities.

Delineating Potential Conservation Areas

As the objective for this inventory is to prioritize specific areas for conservation efforts, Potential Conservation Area (PCA) boundaries were delineated. Such a boundary is an estimation of the minimum area needed to ensure persistence of the element (species or plant community). In order to ensure the preservation of an element, the ecological processes that support that element must be preserved. The preliminary conservation planning boundary is meant to include features on the surrounding landscape that provide these functions. Data collected in the field are essential to delineating such a boundary, but other sources of information such as aerial photography are also used. These boundaries are considered preliminary and additional information about the PCA or the element may call for alterations to the boundaries.

The Colorado Natural Heritage Program identified 66 Potential Conservation Areas (PCAs) in La Plata County. Each PCA was ranked according to its biodiversity significance. Of the 68 PCAs identified, one is of outstanding significance (B1), 8 are of very high significance (B2), 25 are of high significance (B3), 8 are of moderate significance (B4), and 26 are of general significance (B5). The Potential Conservation Areas are profiled in Chapter VI.

Chapter III. Description of Study Area

Location and Ecoregion

La Plata County is located in southwestern Colorado, in the San Juan and La Plata Mountain ranges. The northern half of the county falls within the Colorado Rocky Mountains Ecoregion, and the southern half in the Colorado Plateau Ecoregion, as defined by Bailey (1994), (Figure 2). It is bordered by Montezuma, Dolores, San Juan, Hinsdale and Archuleta counties in Colorado, and San Juan County, New Mexico. On the northwest, the boundary follows the divide between the Hermosa Creek and Mancos River drainages; on the southwest, the divide between the Dolores River and La Plata River drainages. The northern, western and southern boundaries are straight political boundaries.

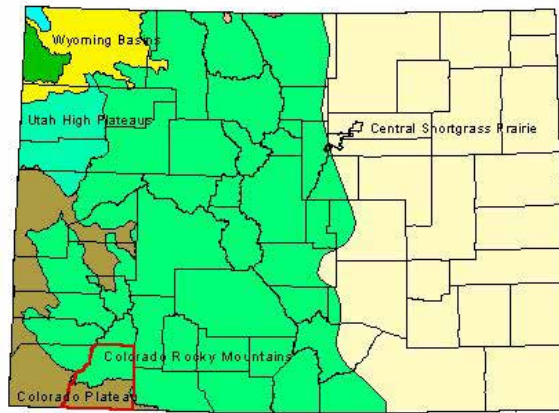


Figure 2. Ecoregions of Colorado. La Plata County is located in the Colorado Rocky Mountains and Colorado Plateau Ecoregions, and is outlined in red.

Size and Elevation

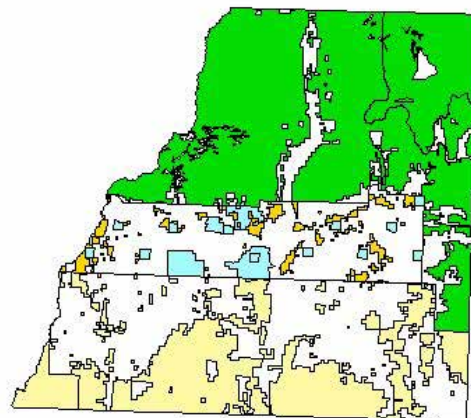
La Plata County encompasses 1,690 square miles or 1,081,616 acres (La Plata County 2003). Elevations in the county generally decline from north to south. They range from nearly 14,000 feet in the Needle Mountains (Pigeon Peak 13,972 ft.) to just under 6000 ft. on the Animas River at the New Mexico border.

Population and Ownership

Population of La Plata County was estimated at 47,467 in 2003 (La Plata County 2003). Major population centers are Durango, the county seat and largest city, Bayfield, and Ignacio. Other smaller unincorporated communities include Hesperus, Kline, Bondad, Hermosa and Breen. A large part of the population lives in rural areas.

La Plata County consists primarily of San Juan National Forest, private lands and Southern Ute Indian tribal lands. (Figure 3). National Forest lands dominate the northern section of the county, while Southern Ute tribal lands comprise the southern section, and private lands are found primarily in the central part. BLM parcels and State Wildlife Areas are scattered throughout the central part.

Figure 3. Land ownership in La Plata County. Green areas are San Juan National Forest; light yellow are Southern Ute Indian Reservation; blue are Colorado State lands; and white areas are private.



Hydrologic units

La Plata County has four major drainages running north to south. They are, from west to east, the La Plata River, Animas River, including Hermosa Creek, Florida River and Los Pinos, or Pine River (Figure 4). All four eventually flow into the San Juan River in New Mexico, and thence to the Colorado River.

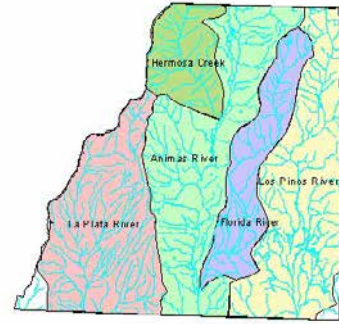


Figure 4. Major river drainages of La Plata County

Climate

The climate of the Southern Rocky Mountain Province is a temperate semiarid steppe regime with average monthly low temperatures in January of 25.3F and average monthly high temperatures in July of 67.0F. Daily maximum temperatures can reach 83.1F in July and daily lows are 14.4F in January.

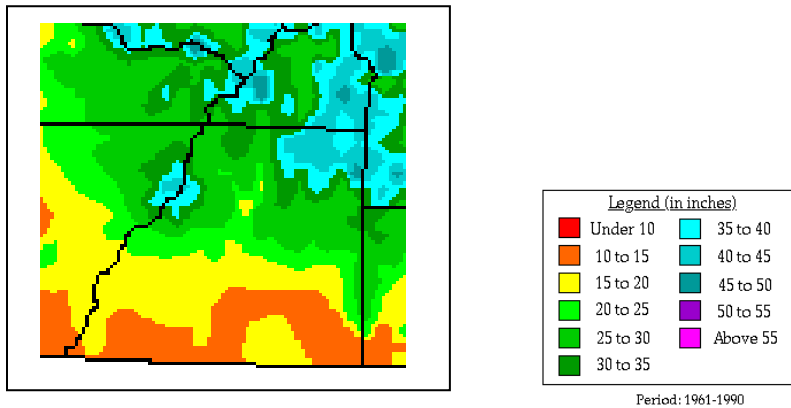


Figure 5. Annual precipitation in La Plata County. From Western Regional Climate Center, www.wrcc.dri.edu/pcp

The average number of days of sunshine is 300 and with four distinct seasons, temperatures are generally moderate. The mean freeze-free period is 99 days, from approximately June 13 to September 20. Humidity is minimal. The southern and lower elevations of La Plata County (6,460 ft.) receive 14.8 inches of rainfall annually as compared to the Northern and higher elevations (8,405 ft.) of La Plata County, which receive between 25.0 inches and 31.2 inches of annual rainfall. The driest month is June and the wettest is August. The climate is influenced by prevailing west winds. Occasionally moisture from decayed Pacific hurricanes fuel widespread heavy rains. Winter precipitation varies with altitude as does snow and rain fall. Melting snow accumulated from higher elevations as well as annual rainfall are measured in cubic feet per second on the Animas River in Durango.

The last three years (2001-2003) have seen extreme drought condition. During the summer of 2002, on-going drought conditions culminated where people in the region commonly reported turning off irrigation ditches early, closing farm operations, or selling cattle to reduce herd demands.

Geology

La Plata County's varied geology ranges from Precambrian metamorphic and granitic rocks, through Triassic, Jurassic and Cretaceous sedimentary shales, limestones and sandstones, Tertiary uplifts and glaciated valleys to the Quaternary alluvium deposits. The northern part of the county lies in the

Southern Rocky Mountains Ecoregion -- locally the San Juan uplift and volcanic dome. This jagged and rolling country is comprised of a mosaic of geologic features, primarily of volcanic tuff, sedimentary sandstones, limestones and uplifted Precambrian rock (exposed on Needle Mountains) with evidence of glacial and riverine erosion (Animas River Canyon; Lake Marie). The Ignacio Formation, Ouray-Leadville limestone, and Mississippian karst are examples of some specific geologic formations encountered in these higher elevations.

Exposed geologic formations from the Cambrian period, 570 million years old, to the Cretaceous period, 66 million years old, can easily be seen in the many layered rock walls of the county. Older sedimentary rocks and more recent volcanics have been re-shaped by glaciation in the Pleistocene. There have been 15 or more glacial advances in the past 2 million years. De-glaciation took place 18,000 to 15,000 years ago when the ongoing processes of stream erosion, mass wasting, and freeze-thaw modified the once glaciated landscape.

While the San Juan Mountains in the northeastern part of the county originated from volcanic activity in the Tertiary Period, the La Plata mountains west of Durango formed from multiple intrusions of magma from a point source 65 million to 67 million years ago (Cunningham et al. 1977). The magma invaded the near-surface sedimentary layers to produce a complex of dikes, sills, and laccoliths. These laccolith mountains principally eroded from a complex of interfingering plutons and sedimentary layers. The approximately 15,000 ft. (4,550-m.) of strata found in the vicinity of Durango record at least 11 erosion events (Blair 1996). These episodes are preserved as unconformities, four of which are known to record focal uplift in the early Cambrian 570 million, Permian 286 million, late Cretaceous 66 million, and late Tertiary 1.5 million. The last two events together produced the tilting of sedimentary strata that form hogback formations at Durango.

North of Durango in Hermosa the 300 million-year-old Hermosa Formation can be seen in the valley walls in three units. The lower unit is sandstone interbedded with marine sandstone and shales, the middle unit is gypsum and limestone, and the upper unit is comprised of sandstone, shales and limestone. The Rico formation, the fourth unit and upper part of the Hermosa Formation, which is about 2500 ft. thick, can also be found there. The Cutler formation, 280 million years old, which consists of oxidized sandstone and shales, can be seen as the bright red color resting on top of the gray Hermosa Formation. Prominent cliff forming layers in the upper Animas valley also include the Leadville - Ouray Limestone formed 340 million years ago, the Entrada Sandstone called "slick rim" 180 million years old, the Easter egg colors of the Morrison Formation and above the Morrison is the Cretaceous Dakota Sandstone 120 million years old forming the valley rim (Chronic 1980). The red colored upper valley walls consist of the Triassic Dolores Formation (220 million years old) and the lower slopes comprise rock beds of the Permian Cutler Formation (286 million years old). The sand that was cemented together is called the Entrada Formation, 200 million years old, and can be seen as the lowest white layer in the Animas Valley. The Wanaka Formation, 190 million years old, which overlies the Entrada, is comprised of shales, siltstones, sandstones and limestones. The Junction Creek formation, 165 million years old, is composed of sand dunes cemented together from the Jurassic desert that can be seen in the white layer of the cliffs on both sides of the Animas Valley.

In the Animas Valley, glaciers left deposits of lateral and end moraines, which line parts of both sides of the Animas. The best-developed end moraines in La Plata County occur in Durango. When the ice left the Animas valley it left U-shaped troughs that formed the pre-glacial lakes and the flat-floored valley filled with sediment, which is what you see today. Sheepback Rocks, north of C.R. 250, are glacially rounded granitic bedrock knobs, formed by the abrasive action of the moving Animas valley glaciers that were 1,500 ft thick in its last occupation of the valley 18,000 years ago. Hot springs also occur in the Animas valley just west of highway 550 and produce yellow calcareous tuff mounds made of travertine. In Durango, two common slope-forming layers are the Morrison formation, 145 million years old, which yields more dinosaur fossils than any other geologic layer, and the Mancos Shale, formed 120 million years ago. The Durango area rests on late Cretaceous sedimentary rock 144 million years old, principally the Mancos shale. Perins Peak and Raider Ridge are capped by Point Lookout sandstone and Animas City Mountain is capped by Dakota sandstone associated with shales of the Morrison formation. All formations in this area dip south toward the center of San Juan basin of sedimentary thickness of 12,000ft (3,700 m). The Hogback Monocline can be seen south of Durango forming steep 35-degree hogbacks, which further south become horizontal. This is one of the major natural gas producers in southern Colorado. Durango is on the edge of the Plateau country where sedimentary layers flatten out, forming cuestas, mesas, and plateaus (Chronic 1980).



Figure 6. Purple and gray clays of the San Jose Formation at Bondad PCA, site of *Aletes sessiliflorus* and *Gilia haydenii*.

East of Durango lies a cuesta of Mesaverde sandstone and the Dakota Hogback occurs as you enter the Durango area where the Animas River crosses the valley forming Mancos Shale. Rivers cut deep canyons and built flights of terraces here. Along the western perimeter of the San Juan Mountains stand four structural domes created by the intrusion of the mushroom- shaped plutons called laccoliths. The La Plata Mountains are one of these. Also, west of Durango lies a canyon between buttes and hills capped with the lowest of the Mesa verde Group sandstones. Landslides are a common occurrence in this area where blocky well-jointed Mesaverde sandstone beds lie on top of weak and easily eroded Mancos Shale, which is silvery because of tiny mica flakes (Chronic 1980). For more detailed information about the geology of La Plata County, some excellent sources are [The Western San Juan Mountains, Their Geology, Ecology, and Human History](#) by Blair et al. (1996) and [Roadside Ecology of Colorado](#) by Chronic (1980)

Soils

Soils of the area may be alluvial, wind deposited, or weathered in place. Soil orders occur in zones corresponding to vegetation. Soils in the spruce-fir zone are acidic, and often shallow and infertile, due to their recent origin, leaching and the acidic foliage. There is little bacterial activity at the low temperatures of this zone, and much of the carbon in the ecosystem is locked up in humus (Blair 1996). Alpine soils tend to be shallow, poorly developed mineral soils with very limited organic matter. Soils derived from volcanic tuff are highly erodable, and may provide habitat for some of the area's rare plants by continually opening up bare areas that are free from competition of other plants. For more specific information, see "Soil Survey of La Plata County Area, Colorado" (1988).

Chapter IV. Elements of Biological Diversity of La Plata County

Vegetation/Plant Communities

Vegetation in La Plata County varies primarily with elevation. It is also influenced by soils, moisture, slope, and aspect. It can be classified hierarchically by Climatic Zone (e.g. alpine, upper montane); then subdivided into Ecological Systems (e.g. ponderosa pine forest); and then by plant associations described by the dominant overstory and understory species (e.g. Ponderosa pine/Gambel oak). Each zone also has corresponding riparian and wetland vegetation, described in the companion report by CNHP: Survey of Critical Wetlands and Riparian Areas in La Plata County (March et al. 2004). Zones, ecological systems and upland plant associations documented in the county are shown in Table 7. Some ecological systems may occur in more than one zone.

Table 7. UPLAND PLANT ASSOCIATIONS RECORDED IN LA PLATA COUNTY

Zone	Ecological System	Plant Association	Common Name	PCA or Area of Interest
Alpine/ Subalpine	Alpine/subalpine meadow	<i>Festuca thurberi</i>	Thurber fescue grassland	Indian Creek at Tuckerville, Highline Trail
Alpine/ Subalpine	Alpine/subalpine wet meadow	<i>Cardamine cordifolia-Senecio triangularis-Mertensia ciliata</i>	Bittercress-Triangle leaf ragwort-Chiming bells	Sheephead Basin
Alpine/ Subalpine	Alpine/subalpine wet meadow	<i>Caltha leptosepala</i>	Wet meadow	Cumberland Basin
Alpine/ Subalpine	Alpine/subalpine wet meadow	<i>Geum rossii-Polygonum bistortoides</i>	Alpine meadows	Cumberland Basin
Subalpine	Subalpine spruce-fir forest	<i>Abies lasiocarpa/Erigeron eximius</i>	Subalpine fir/spruce-fir fleabane	Clear Creek Trail
Subalpine	Subalpine spruce-fir forest	<i>Abies lasiocarpa (Picea engelmannii) /Trautvetteria caroliniensis</i>	Subalpine fir/Carolina tasselrue	Sunlight Creek, Vallecito Creek-Johnson Creek, Cave Basin Trail
Subalpine	Subalpine spruce-fir forest	<i>Abies lasiocarpa-Picea engelmannii/Calamagrostis canadensis</i>	Subalpine fir-Engelmann spruce-Canada wildrye	Hermosa Creek
Subalpine	Subalpine spruce-fir forest	<i>Picea engelmannii/Polemonium pulcherrimum</i>	Engelmann spruce/Jacob's ladder	Stump Lakes
Upper Montane	Mixed conifer forest	<i>Abies concolor/Acer glabrum</i>	White fir/Rocky Mountain maple	Middle Mountain Road, Electra Lake
Upper Montane	Mixed conifer forest	<i>Abies concolor/Symphoricarpos oreophilus</i>	White fir/Snowberry	Barnes Mountain
Upper Montane	Douglas fir forest	<i>Pseudotsuga menziesii/Acer glabrum</i>	Douglas fir/Rocky Mountain maple	Hermosa Cliffs, Lost Lake
Upper Montane	Douglas fir forest	<i>Pseudotsuga menziesii/Paxistima myrsinites</i>	Douglas fir/Mountain-lover	Vallecito Creek-Johnson Creek
Upper Montane	Douglas fir forest	<i>Pseudotsuga menziesii/Symphoricarpos oreophilus</i>	Douglas fir/Snowberry	Miller Creek
Upper Montane	Aspen forest	<i>Populus tremuloides/Cornus sericea</i>	Aspen/red-osier dogwood	Ute Creek, Vallecito Creek

Zone	Ecological System	Plant Association	Common Name	PCA or Area of Interest
Upper Montane	Aspen forest	<i>Populus tremuloides</i> /tall forbs	Aspen/tall forbs	Hermosa cliffs
Lower Montane	Desert grassland and shrub steppe	<i>Sporobolus airoides</i>	Alkali sacaton grassland	Cinder Gulch
Lower Montane	Desert grassland and shrub steppe	<i>Stipa comata</i> West		Hesperus
Lower Montane	Lower montane shrubland	<i>Quercus gambellii</i> / <i>Cercocarpus montanus</i>	Gambel oak/Mountain mahogany	Smelter Mt.
Lower Montane	Pinyon-juniper woodland	<i>Juniperus osteosperma</i> / <i>Cercocarpus montanus</i>	Utah juniper/Mountain mahogany	Pine River Canal
Lower Montane	Pinyon-juniper woodland	<i>Juniperus scopulorum</i> / <i>Artemisia tridentata</i> ssp. <i>tridentata</i>	Rocky mountain juniper/Big sagebrush	South Florida Mesa
Lower Montane	Pinyon-juniper woodland	<i>Pinus edulis</i> / <i>Cercocarpus montanus</i>	Colorado pinyon/Mountain mahogany	Bondad
Lower Montane	Pinyon-juniper woodland	<i>Pinus edulis</i> / <i>Purshia tridentata</i>	Colorado pinyon/Bitterbrush	La Boca, BODO SWA
Lower Montane	Ponderosa pine forest	<i>Pinus ponderosa</i> / <i>Quercus gambellii</i>	Ponderosa pine/Gambel oak	Animas Overlook, Missionary Ridge

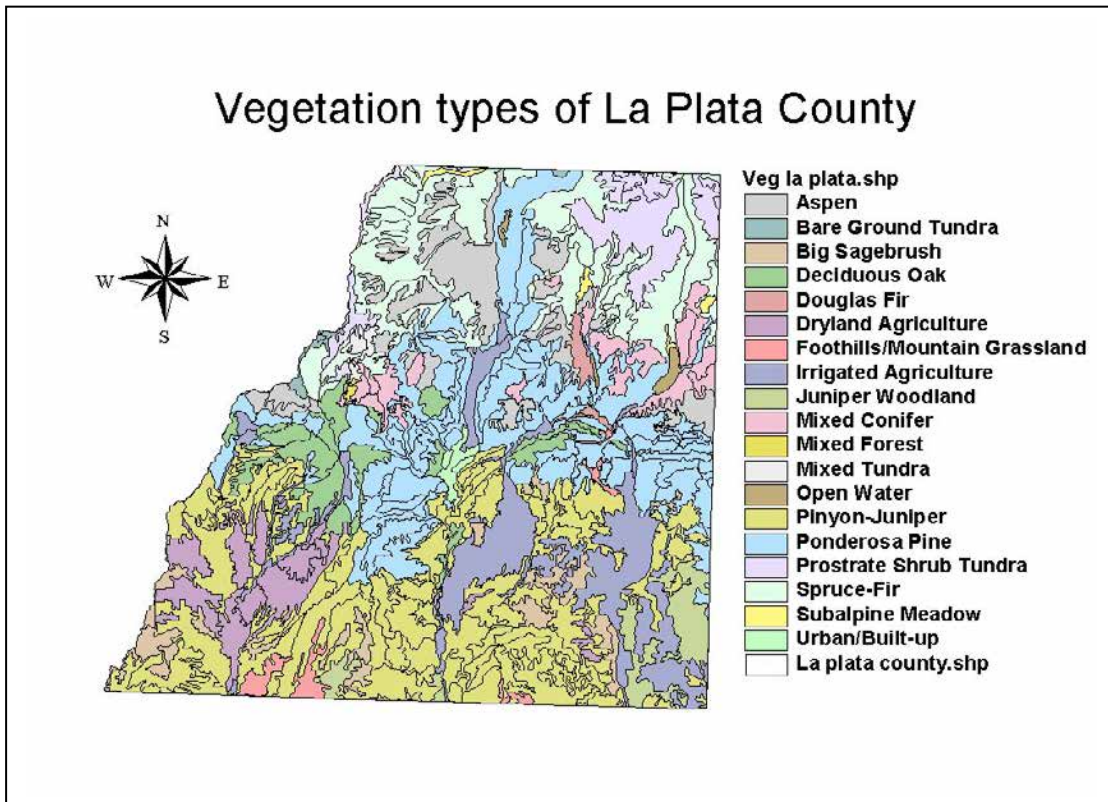


Figure 7. Vegetation types of La Plata County

Climatic Zones

Alpine zone. Typically this zone is located above 11,500 ft. in La Plata County. It includes the highest peaks of the San Juan and La Plata Mountains. Snow and ice fields, fellfields, dry alpine tundra, moist to wet alpine meadows, cold alpine streams and small cirque lakes characterize the alpine zone. It is subject to cold and wind most of the year, and receives intense ultra-violet radiation. Many of the plants and animals found in the alpine zone have special adaptations to this harsh environment, such as the cushion form of plants that resists desiccation, large root systems to store nutrients, and very short flowering seasons. Common alpine plant species in La Plata County are Ross's avens (*Geum rossii*), arctic willow (*Salix arctica*), false strawberry (*Sibbaldia procumbens*), Colorado columbine (*Aquilegia coerulea*), and marsh marigold (*Caltha leptosepala*). Rare plants found in the alpine include San Juan whitlow-grass (*Draba graminea*), Colorado Divide whitlow-grass (*Draba streptobrachia*), and Altai chickweed (*Stellaria irrigua*). Rothrock's Easter daisy (*Townsendia rothrockii*), Colorado tansy-aster (*Machaeranthera coloradoensis*), and Altai cottongrass (*Eriophorum altaicum* var. *neogaeum*) are often found near timberline, overlapping this and the subalpine zone. Mammals that inhabit the alpine include bighorn sheep, pika, and yellow-bellied marmot. Birds include American pipit, horned lark and brown-capped rosy finch.



Figure 8. Alpine landscape at Lime Mesa, with a mosaic of ecological systems, including wet meadow, dwarf shrublands and rock substrate.

Subalpine zone. This zone occurs roughly between 9000 and 11,500 ft. in La Plata County, and includes large areas of forest dominated by Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*), interspersed with subalpine meadows and grasslands. Douglas fir (*Pseudotsuga menziesii*) and aspen (*Populus tremuloides*) may also be found in this zone, as well as in the Upper Montane zone. Common understory species include mountain lover (*Paxistima myrsinites*), currants (*Ribes* sp.), heartleaf arnica (*Arnica cordifolia*), Jacob's ladder (*Polemonium pulcherrimum*), dwarf blueberry (*Vaccinium myrtilus*), spruce-fir fleabane (*Erigeron eximius*) and Parry's goldenrod (*Oreochrysum parryi*). Rare plants found in this zone include kittentails (*Besseyia ritteriana*), Showy whitlow-grass (*Draba spectabilis* var. *oxyloba*), and moonworts (*Botrychium* spp). Hoary willow (*Salix candida*) has been documented from wetlands in this zone. Grasslands of the subalpine zone in La Plata County are usually dominated by Thurber fescue (*Festuca thurberi*), while wet meadows may contain false hellebore (*Veratrum tenuipetalum*) and a rich mixture of sedges and forb species. Common mammals of this zone include Rocky Mountain elk, snowshoe hare, pine marten and yellow-bellied marmot. Rare mammals include lynx and wolverine. Streams that support Colorado River cutthroat trout are most often found in this zone.

Upper montane zone. Generally between 7,500 and 9000 ft., the upper montane zone includes forests dominated by mixed conifers and aspen. Conifers include white fir (*Abies concolor*), ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*), New Mexico white pine (*Pinus strobiformis*) and Rocky mountain juniper (*Juniperus scopulorum*). Lodgepole pine (*Pinus contorta*), which is characteristic of the Upper Montane zone in Colorado from the Gunnison Basin north and east, is absent from La Plata County, except in a few places where it was planted after fires. Aspen forests are often a seral or pioneering community following disturbance such as fire, and are rich in species of both plants and animals. They may also be a stable community with multi-aged trees. Common understory species in this zone include mountain lover (*Paxistima myrsinites*), serviceberry (*Amelanchier utahensis*), snowberry (*Symphoricarpos oreophilus*), Rocky Mountain maple (*Acer glabrum*), Thurber fescue (*Festuca thurberi*) and elk sedge (*Carex geyeri*). Rare plants found in the upper montane zone of La Plata County include American spikenard (*Aralia racemosa*), birdbill dayflower (*Commelina dianthifolia*), green sedge (*Carex*

viridula), variegated scouring-rush (*Hippochaete variegata*), yellow lady's slipper (*Cypripedium calceolus* ssp. *parviflorus*), and the ferns western polypody (*Polypodium hesperium*) and New Mexico cliff fern (*Woodsia neomexicana*).

Lower Montane Zone: This zone is found below 7,500 ft. in La Plata County. Characteristic communities of this zone are lower elevation ponderosa pine forests, Gambel oak shrubland, and pinyon-juniper (*Pinus edulis* and *Juniperus osteosperma*) woodlands. Common shrub species are Gambel oak (*Quercus gambellii*), snowberry (*Symphoricarpos oreophilus*), mountain mahogany (*Cercocarpus montanus*), bitterbrush (*Purshia tridentata*), squaw-apple (*Peraphyllum ramosissimum*) and sagebrush (*Artemisia tridentata* ssp. *tridentata*). Rare plants of the lower montane zone in La Plata County include New Mexico false carrot (*Aletes sessiliflorus*), Missouri milkvetch (*Astragalus missouriensis* var. *humistratus*), Aztec milkvetch (*Astragalus proximus*), showy collomia (*Collomia grandiflora*), San Juan gilia (*Gilia haydenii*), Knowlton cactus (*Pediocactus knowltonii*), Abajo penstemon (*Penstemon lentus*), Pagosa phlox (*Phlox caryophylla*), and Gray's townsend-daisy (*Townsendia glabella*).

Ecological Systems of La Plata County

Within each climatic zone, vegetation can be classified into ecological systems. Several systems that occur in La Plata County are described below. Systems are classified as matrix, large patch, small patch and linear (riparian communities). Some systems span more than one climatic zone, e.g. alpine/subalpine wet meadows that are similar above and below treeline. Areas and percentages of the total county area covered by each major vegetation type are shown in Table 8.

Table 8. Major upland vegetation types of La Plata County, acres and percent of county.

Vegetation type	Acres covered	Percent of county
Pinyon-Juniper woodlands	300,643	27.6
Ponderosa Pine forest and woodland	216,236	19.8
Agricultural (irrigated and dry)	155,362	14.3
Spruce-fir forest	139,290	12.8
Aspen forest	72,015	6.6
Alpine tundra and meadows	54,658	5
Mountain shrub	47,681	4.3
Mixed conifer	47,887	4.4
Sagebrush	39,448	3.6
Grassland	11,739	1
Urban	5,200	0.4
Open water	3,732	0.3

Alpine zone:

Alpine tundra dry meadow

The Alpine Tundra Dry Meadow ecological system occurs between 10,000 and 14,000 feet in elevation on gentle to moderate slopes, flat ridges, valleys, and basins, where the soil has become relatively stabilized and the water supply is more or less constant (Rondeau 2000). The system is commonly comprised of a mosaic of plant communities that are dominated by sedges, grasses, and forbs. Dominant species include blackroot sedge (*Carex elynoides*), tufted hairgrass (*Deschampsia cespitosa*), alpine fescue (*Festuca*

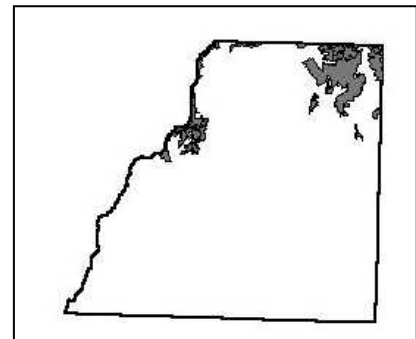


Figure 9. Distribution of alpine vegetation (all systems) in La Plata County

brachyphylla), alpine avens (*Geum rossii*), and alpine clover (*Trifolium dasyphyllum*). Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season. Alpine tundra dry meadow typically intermingles with smaller systems such as alpine/subalpine wet meadow, alpine substrate ice field, tundra fell-field, and alpine dwarf shrubland ecological systems. Viable populations of American pipits and brown-capped rosy finches may be an indicator of a large, healthy occurrence. In addition, Ptarmigan may use this system at different times in their life cycle and have been chosen as an additional indicator of a healthy occurrence of alpine systems. The major threats to this system are surface disturbances such as roads, mining, and degradation from current and historic sheep grazing (Rondeau 2000). Plant communities typical of this system in La Plata County include *Geum rossii*/*Polygonum bistortoides* alpine meadows, *Deschampsia cespitosa* - *Geum rossii* Herbaceous Vegetation; *Festuca brachyphylla* - *Geum rossii* Herbaceous Vegetation; and *Geum rossii* - *Trifolium* spp. Herbaceous Vegetation.

Alpine/subalpine wet meadows (small patch)

The alpine/subalpine wet meadow ecological system is confined to specific environments defined primarily by hydrology. Water levels are at or near the surface for much or all of the growing season, although some fluctuation may also occur as a function of precipitation and temperature patterns. Alpine/subalpine wet meadows may have surface water for part of the year, but depths rarely exceed a few centimeters. Soils of this system may be mineral or organic. In either case, soils show typical hydric soil characteristics, including high organic content. This system often occurs as a mosaic of several plant associations with varying dominant herbaceous species that may include *Caltha leptosepala*, *Cardamine cordifolia*, *Veratrum tenuipetalum*, *Frasera speciosa*, *Carex microptera*, *C. scopulorum*, *C. vernacula*, *Deschampsia cespitosa*, *Eleocharis quinqueflora*, *Glyceria borealis* and *Trifolium parryi*. Some typical plant associations in La Plata County are *Caltha leptosepala* - *Polygonum bistortoides* Herbaceous Vegetation; *Caltha leptosepala* - *Sedum rhodanthum* Herbaceous Vegetation; *Carex microptera* Herbaceous Vegetation; *Cardamine cordifolia* - *Mertensia ciliata* Herbaceous Vegetation; *Deschampsia cespitosa* Herbaceous Vegetation; *Sibbaldia procumbens* - *Polygonum bistortoides* Herbaceous Vegetation; and *Trifolium parryi* Herbaceous Vegetation. Often alpine dwarf shrublands, especially those dominated by shortleaf willow (*Salix brachycarpa*) and planeleaf willow (*S. planifolia*), are immediately adjacent to the wet meadows. Wet meadows are closely associated with snowmelt and typically not subjected to high disturbance events such as



Figure 10. Alpine/Subalpine wet meadow at Kennebec Pass. Dominant species is marsh marigold (*Caltha leptosepala*).

flooding. This system is widely distributed within the Southern Rocky Mountains Ecoregion, although usually limited to small areas. In La Plata County, the system is frequent in the alpine and subalpine areas of the San Juan and La Plata Mountains. A good example can be found in Cumberland Basin along the trail to Taylor Lake (figure 10).

Dry alpine dwarf shrubland (large patch)

Alpine dwarf shrubland is found only at the highest elevations of the county, usually above 12,000 feet. The system is commonly comprised of a mosaic of “large patch” plant communities, especially *Salix arctica*, *S. reticulata*, and *Vaccinium* spp. Representative plant associations are *Salix arctica* - *Salix reticulata* ssp. *nivalis* Dwarf-shrubland; *Salix arctica* / *Geum rossii* Dwarf-shrubland; and *Vaccinium (cespitosum or scoparium)* Dwarf-shrubland. The system occurs primarily on gentle slopes and depressions where the snow lingers and the soil has become relatively stabilized and the water supply is more or less constant. Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season. These large late-season snowfields are often found in the upper reaches of large bowls with coarser soils than the surrounding alpine tundra dry-meadow. Fell-fields often intermingle with the alpine dwarf shrubland. An excellent occurrence of this system would be characterized as having a continuous mat of mulch in sheltered places with no sod breaks, scalped areas,

trailing, hummocking, or gravel fans. Natural micro-relief would be undisturbed and soil erosion not accelerated by anthropogenic activities. Sheep would not have grazed the area in the last ten years. Surficial disturbance such as mines, ranch activities and buildings and off-road vehicle use, would be limited to small, isolated areas and of less than 1%. There would be few or no roads or trails found within the occurrence. Ptarmigan, Rosy finches, and American pipit may use this system at different times in their life cycle and have been chosen as indicators of a healthy occurrence of alpine systems (Rondeau 2000).

Alpine substrate/ice field (small patch)

This system occupies small patches in the alpine zone, and includes rocky areas with only mosses and lichens, snowfields, glaciers and talus slopes with sparse vegetation. Good examples of the latter can be found at Kennebec Pass (Figure 10). Common plant species found in this system in La Plata County include Colorado columbine (*Aquilegia coerulea*), Holmes ragwort (*Ligularia holmii*), Fremont's ragwort (*Senecio fremontii*), Colorado ragwort (*Senecio soldanella*), thickroot Claytonia (*Claytonia megarhiza*), sky pilot (*Polemonium viscosum*), silky Phacelia (*Phacelia sericea*), American rockbrake (*Cryptogramma acrostichoides*) and brittle fern (*Cystopteris fragilis*). Rare plants include Altai chickweed (*Stellaria irrigua*) and San Juan whitlow-grass (*Draba graminea*).



Figure 11. Alpine substrate ecological system at Kennebec Pass

Alpine tundra fell-field (small patch)

The Alpine tundra fell-field ecological system is a small patch system scattered throughout the alpine zone of the Southern



Figure 12. Alpine tundra fell-field ecological system at Lime Mesa.

Rocky Mountains Ecoregion, usually between 11,000 to 14,000 feet. This system is characterized by immature soils with nearly imperceptible horizon layers. Gravel and sand dominate the top horizons. This system may be found on gentle to steep slopes with varying aspects. The primary factor dictating the sparse character of a fell-field is wind. Wind scours fell-fields free of snow in the winter, exposing the plants to the severest environmental stress on the tundra. During the summer, wind also blasts across the open surface and the fell-

fields broil under the intense solar radiation of high altitudes. The soil drains so rapidly and retains so little moisture that fell-field plants must be specifically adapted for survival in low moisture, high desiccation regions. Most fell-field plants

are cushioned or matted, frequently succulent, flat to the ground in rosettes and often densely haired and thickly cutinized. Plants cover 15-50%, while exposed rocks make up the rest. A true fell-field remains stable for hundreds, maybe thousands, of years until the soil builds up. Fell-fields are usually within or adjacent to alpine tundra dry meadows. In La Plata County, this system can be found at treeline on Endlich Mesa and Lime Mesa. It is the site of two rare plants, Rothrock's Easter daisy (*Townsendia rothrockii*) and Colorado tansy-aster (*Machaeranthera coloradoensis*), both of which exhibit the characteristic forms of fellfield plants in having basal rosettes low to the ground. Major threats to this system are fragmentation by roads and degradation through mining and ski development.

Subalpine zone:

Spruce fir forests

Spruce-fir dry-mesic forest and spruce-fir moist-mesic forest (matrix) ecological systems form the primary matrix systems of the subalpine zone in La Plata County. Dominant species are Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*). Most community types within the system occur

in a mosaic of large patches. Spruce-fir dominated stands occur on all but the most xeric sites above 9000 ft. and in cool, sheltered valleys at lower elevations. The relative dominance of the two canopy tree species and the understory composition vary substantially over a gradient from excessively moist to xeric sites (Peet 1981). Fire, spruce-beetle outbreaks, avalanches, and windthrow all play an important role in shaping the dynamics of spruce-fir forests. Fires in the subalpine forest are typically of high intensity and low frequency, with return intervals of 300 to 400 years. They are usually stand replacing, resulting in the extensive exposure of mineral soil and initiating the development of new forests (Rondeau 2000). Pine martens (*Martes americana*) spruce-fir obligates that require a healthy and sizeable occurrence of mature forest. Therefore a viable population of pine martens has been chosen as an indicator of a healthy and viable occurrence of the spruce-fir system.



Figure 13. Distribution of spruce-fir forests in La Plata County

Subalpine wet meadows (see alpine-subalpine wet meadow)

Subalpine grasslands (see montane-subalpine grasslands below)

Upper Montane zone:

Mixed conifer forests

Mixed conifer mesic-dry forest ecological system is a matrix system that occurs primarily in the southern portion of the Southern Rocky Mountain Ecoregion. In La Plata County it covers approximately 48,000 acres. *Abies concolor*, *Picea pungens*, *Pinus ponderosa*, and *Pseudotsuga menziesii* and *Pinus strobiformis* are the common conifer trees. White fir is the primary dominant species on moist sites such as northern exposures while ponderosa pine, Douglas-fir, or juniper tend to dominate warm and dry sites. On intermediate sites, white fir may co-dominate at climax with these conifers (www.fs.fed.us/database/feis/).

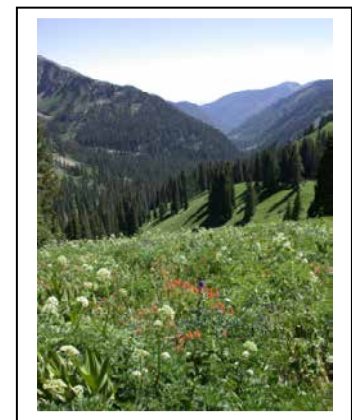


Figure 14. Spruce-fir forest and meadows

White fir will eventually dominate if the fire-free interval is sufficiently long to allow trees to grow to a fire-resistant size. Each one of these species has a slightly different reaction to the presence of fires and therefore fire history helps to determine the cover of each species. *Pinus ponderosa* and *Pseudotsuga menziesii* are the most fire tolerant, while *Picea pungens* is fire intolerant. *Abies concolor* sapling and pole-sized classes are fire sensitive (Hopkins 1982 in www.fs.fed.us/database/feis/). Trees progressively become more fire resistant as they attain 8 to 10 inch inches in diameter (Hopkins 1982 in www.fs.fed.us/database/feis/). Presettlement fire frequency in mixed conifer forest of the southern Rocky Mountains was from 7 to 22 years (Alexander et al. 1984, Dieterich 1983 in www.fs.fed.us/database/feis/). As a result of fire suppression since the turn of the century, white fir density has greatly increased in mixed conifer forests (Parson and DeBenedetti 1979 in www.fs.fed.us/database/feis/).

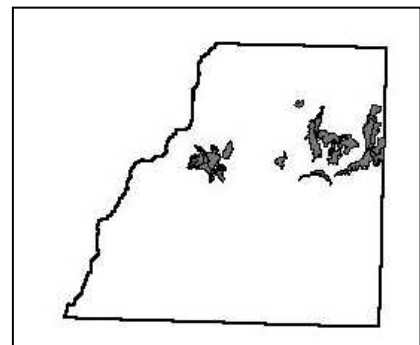


Figure 15. Distribution of mixed conifer forests in La Plata County.

Douglas fir – ponderosa pine

Douglas fir – ponderosa pine ecological system is a large patch system that occurs in approximately 5,000 acres of La Plata County. Its distribution is included on the map above with mixed conifer forests. Although Douglas fir is a very frequent component of forested areas in La Plata County, including ponderosa pine, mixed conifer and spruce-fir forests, it is usually not the dominant species. Douglas fir has a rather large elevation range from 6,000 to 10,000 feet, and is found over a wide range of

aspects, slopes, landforms, and soils. Often, Douglas fir occurs on north-facing slopes while ponderosa pine occupies south-facing slopes. Douglas fir is more shade tolerant than pine and aspen but less tolerant than Engelmann spruce or subalpine fir (Mehl 1992). When growing in association with Engelmann spruce and subalpine fir, Douglas fir will eventually give way to the more shade tolerant spruce and fir (Mehl 1992).

Aspen forests

Aspen Forests are matrix communities usually maintained by fires. They usually occur as a mosaic of many plant associations and may be surrounded by a diverse array of other systems, including grasslands, wetlands, coniferous forests, etc. Within the Southern Rocky Mountains Ecoregion, this system is extremely prevalent on the West Slope, with smaller stands represented on the East slope. Aspen forests cover approximately 6.6 percent of the land of La Plata County.

Quaking aspen is the most widely distributed native North American tree species and can be found from eastern to western U.S. (Little 1971). Although widespread it often is not a dominant. In the Colorado Plateau and the Southern Rocky Mountains Ecoregion aspen reaches its highest abundance and develops expansive forests, with over 3.2 million acres in the Southern Rocky Mountains Ecoregion, including 72,000 acres in La Plata County.



Figure 17. Aspen clearcut near Madden Peak. Newly regenerated trees form dense “doghair” thickets. There are also some extremely large trees in the area.

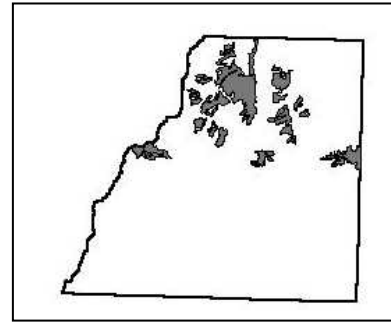


Figure 16. Distribution of aspen forests in La Plata

Aspen commonly reaches its lowest elevations in canyons and ravines and may be found as low as 5,500 feet. In the Southern Rocky Mountain Ecoregion aspen is confined to relatively moist sites (16 to 40 plus inches annual precipitation) that have cold winters and a reasonably long growing season. Aspen grows at progressively higher elevations southward along the Rocky Mountains.

Aspen is usually a seral tree in climax sub-alpine fir associations at the higher elevations. In such situations it may dominate the forest community for many decades following severe disturbance, such as fire or clear-cutting, but will gradually decline as the conifers become reestablished. At lower elevations aspen can occur either as a temporarily dominant seral species in a variety of

climax conifer associations, or it can achieve permanent dominance as the climax forest type. The environmental conditions related to aspen’s role as a seral and as a climax species remain ill-defined (Mueggler and Campbell 1986).

The aspen ecosystem is rich in number and species of both plants and animals, especially in comparison to associated coniferous forest types. The high value of the aspen type as a forage resource for livestock and as forage and cover for wildlife makes the subject of animal impacts important to understanding and management of this ecosystem (DeByle and Winokur 1985). (Figure 16.)

Montane grasslands (large patch)

The montane/subalpine grassland ecological system is a large patch system that occupies less than 3% of the Southern Rocky Mountains Ecoregion. Although the largest occurrences are primarily within Colorado it is scattered throughout the region from Wyoming to New Mexico. This system is usually between 8,000 and 10,000 feet on flat to rolling plains or lower side slopes that are dry. Generally in the Southern Rocky Mountains an occurrence consists of



Figure 18. Thurber fescue meadow in La Plata Canyon.

a mosaic of two or three plant associations with one of the several dominant bunch grasses.

In La Plata County, the dominant grass in this zone is Thurber fescue (*Festuca thurberi*). It occurs as large patches within mixed conifer, aspen and spruce-forests, often occupying ridges and south facing slopes (Figure 17). Thurber fescue is a robust, cool-season, native, perennial bunchgrass. It is densely tufted and produces thick mats of persistent, dried sheath and culm bases (Cronquist et al 1977). Thurber fescue is more restricted in distribution than most western fescues. It occurs from southern Wyoming southward through Colorado, southeastern Utah, and northern New Mexico (Cronquist et al 1977). Its greatest development occurs on the Colorado Plateau, usually at elevations between 8,000 and 12,000 feet. Typical associated plants of Thurber fescue meadows in La Plata County are Parry's oatgrass (*Danthonia parryi*), yarrow (*Achillea lanulosa*), white peavine (*Lathyrus leucanthus*), orange sneezeweed (*Dugaldia hoopesii*), meadowrue (*Thalictrum fendleri*), aspen daisy (*Erigeron speciosus*), and harebells (*Campanula rotundifolia*). Excellent examples of this community type can be seen in the Highline Trail and Indian Creek at Tuckerville PCAs.

Lower Montane zone:

Ponderosa pine forests and woodlands

The ponderosa pine ecological system is a matrix system that occupies 10% of the Southern Rocky Mountains Ecoregion and is found throughout the area. It is a major vegetation type of La Plata County, occupying over 216,000 acres, or about 19.8 percent of the land area. This ecological system occurs in the foothills and montane zones from approximately 6,000 to 9,000 feet on rolling plains or dry slopes with both north and south aspect. The northerly aspects may have a mixture of ponderosa pine and Douglas fir, while the southerly aspects tend to be dominated by ponderosa pine.

Unlike the open park-like ponderosa pine woodlands of Arizona, where the understory is primarily grass, the forests of La Plata County typically have an understory of shrubs, most importantly Gambel oak (*Quercus gambellii*). According to Romme (pers. comm.), these communities probably had an oak understory historically, and are not a degraded form of the savanna-like woodlands. However, absence of the frequent fires for which the community is adapted may have resulted in a taller and denser shrub layer. Associated species in La Plata County include the shrubs snowberry (*Symphoricarpos oreophilus*), serviceberry (*Amelanchier utahensis*), Fender's buckbrush (*Ceanothus fendleri*), Oregon grape (*Mahonia repens*), chokecherry (*Prunus virginiana* var. *melanocarpa*), and wild rose (*Rosa woodsii*). Graminoids include Thurber fescue (*Festuca thurberi*), elk sedge (*Carex geyeri*), junegrass (*Koeleria macrantha*), Indian rice grass (*Oryzopsis hymenoides*), and muttongrass (*Poa fendleriana*). Some common forbs are pussytoes (*Antennaria marginata*), Louisiana sagewort (*Artemisia ludoviciana*), orange sneezeweed (*Dugaldia hoopesii*), strawberry (*Fragaria virginiana*), lupines (*Lupinus* sp.), toadflax penstemon (*Penstemon linarioides*) and mule's ears (*Wyethia arizonica*).

Large areas of ponderosa pine forest were burned in 2002 in La Plata County. In 2003, many of these areas were beginning to recover, with Gambel oak sprouting vigorously (Fig. 20).

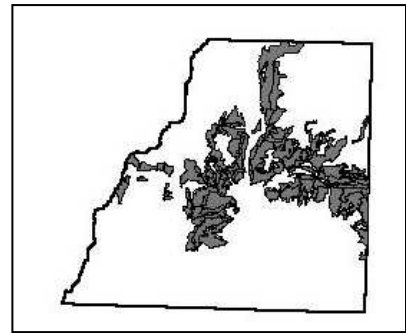


Figure 19. Distribution of ponderosa pine forests and woodlands in La Plata County



Figure 20. Gambel oak sprouting in burned ponderosa pine forest on Missionary Ridge, 2003.

Lower montane foothills shrublands

Oak / serviceberry shrubland ecological system is a large patch system that occurs in approximately 3% of the Southern Rocky Mountains Ecoregion, primarily on the lower elevations of the western slope. It is most commonly found along canyon walls, dry foothills, lower mountain slopes, and at the edge of the plains from approximately 5,000 to 9,500 feet in the Southern Rocky Mountains Ecoregion. In La Plata County, Gambel oak shrublands cover approximately 47,681 acres, or about 4.3 percent of the land area. Gambel oak sprouts vigorously after fire, and has replaced former ponderosa pine forests in some areas (Figure 19).

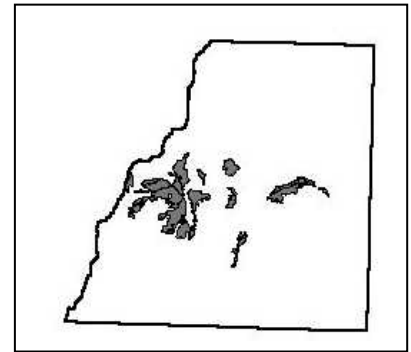


Figure 21. Distribution of mountain shrublands (primarily Gambel oak) in La Plata County

Pinyon-juniper woodlands

Pinyon-juniper woodland ecological system is a matrix system that occupies approximately 270,218 acres, or 27.6 percent of La Plata County, primarily in the southern



Figure 22. Pinyon and juniper covered hillsides at Pine River Canal PCA.

half. Woodlands dominated by a mix of Colorado pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) or pure stands of juniper comprise the pinyon-juniper woodland ecological group. This system occupies the lower and warmest elevations in the county. It grows best just below the lower elevation range of ponderosa pine and above the grassland/shrublands of the foothills. The stands exhibit considerable diversity in appearance and composition. Stands may consist of all ages or one age (Mehl 1992). Dominant trees are often 400 years old, and trees 800 to 1000 years old have been recorded (Mehl 1992). Some stands may have closed canopies with single or both tree species, with little or no understory, but many stands are open with widely scattered trees of one or both species with a wide variety of understory vegetation. Pinyon-juniper woodlands are shade

intolerant. They are a climax cover type remaining on the site until disturbed by fire. Fires in pinyon-juniper woodlands tend to be infrequent and intense with a historic interval of about 300 years between fires. Following a stand replacing fire, the site will revert to grasses and shrubs. Today a risk is that the site will be invaded by cheatgrass (*Bromus tectorum*).

Although pinyon-juniper woodlands are a natural system, the extent and quality has been severely altered since the early 1900's. Numerous studies have shown that pinyon-juniper, and especially juniper, have encroached on shrublands and grasslands (e.g., Blackburn and Tueller 1970, West 1999). Numerous processes influence pinyon-juniper woodlands, including climate, grazing, fires, tree harvest, and insect-pathogen outbreaks (West 1999; Eager 1999). Within a given region, the density of woodland, both historically and currently, is strongly related to topo-edaphic gradients. The trees persisted throughout past centuries on steeper, rockier, and thus less burned sites (West 1999). Less steep sites, especially those with finer textured soils are where savannas, grasslands, and shrub steppes have occurred in the past. Pinyon-juniper stands on these gentler slopes may have been large, but more savanna-like with very open upper canopy and high grass production. Due to alteration of fires and grazing that reduce competition from grasses, there are now various densities of younger trees occurring on sites that were once shrublands or grasslands (West 1999, Commons et al. 1999).

In 2003, an outbreak of the native Ips beetle, exacerbated by drought and warmer temperatures, has severely reduced the number of pinyon pines in the southwest. Projects that were planned to thin the trees to reduce fire danger may now be inappropriate, and efforts should be made to preserve surviving trees (Romme 2004).

The pinyon-juniper system contains the most rare plant species of any system in La Plata County. Rare plants include New Mexico false carrot (*Aletes sessiliflorus*), Missouri milkvetch (*Astragalus missouriensis* var. *humistratus*), Aztec milkvetch (*Astragalus proximus*), showy collomia (*Collomia grandiflora*), San Juan gilia (*Gilia haydenii*), Knowlton cactus (*Pediocactus knowltonii*), Abajo penstemon (*Penstemon lentus*), Pagosa phlox (*Phlox caryophylla*), and Gray's townsend-daisy (*Townsendia glabella*).

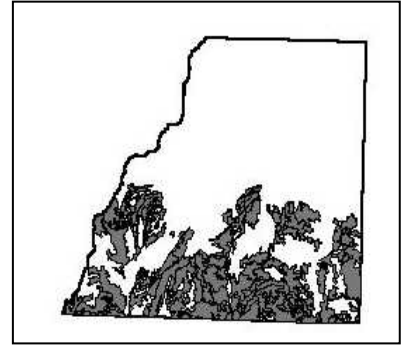


Figure 22. Distribution of Pinyon-Juniper and Juniper woodlands in La Plata County

Juniper savannas

Juniper savanna ecological system is a large patch system that occurs in approximately 2% of the Southern Rocky Mountains Ecoregion, primarily in the Mew Mexico portion. It occupies the lower and warmest elevations growing from 4,500 to 6,000 feet in a semiarid climate. It grows best just below the lower elevation range of pinyon-juniper woodlands and often intermingles with grasslands and shrublands. This system is best described as a savanna that has widely spaced mature (>150 years old) juniper trees and occasionally *Pinus edulis*. On the west slope of the Southern Rocky Mountains Ecoregion *Juniperus osteosperma* or *J. scopulorum* are the dominant junipers, while on the east slope *J. monosperma* and *J. scopulorum* are the dominants. It is mapped above with pinyon-juniper woodlands. However, in La Plata County it occupies the southernmost part of the pinyon-juniper range. Gray vireos were noted to prefer the warmer juniper savanna below the range of pinyon.

Sagebrush shrublands

Sagebrush shrubland ecological system is a matrix system that occupies nearly 10% of the Southern Rocky Mountains Ecoregion. It is relatively scarce in La Plata County, occupying only 39,448 acres, or about 3.6 percent of the county, primarily in the southern part on Ute Tribal lands. This system is usually found on flat to rolling hills with well-drained clay soils. In La Plata County, it typically occupies valleys with deeper soils while adjacent hillsides are clothed with pinyon and juniper. The dominant shrub species is *Artemisia tridentata* ssp. *tridentata*. Other common associates are rabbit brush (*Chrysothamnus nauseosus*) and bitterbrush (*Purshia tridentata*). The understory is often depleted, but may contain needle and thread (*Stipa comata*), Indian rice grass (*Oryzopsis hymenoides*), galleta (*Hilaria jamesii*), blue grama (*Bouteloua gracilis*) or alkali sacaton (*Sporobolus airoides*), and a variety of forbs.

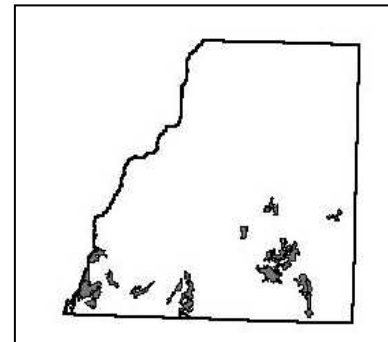


Figure 24. Distribution of sagebrush shrublands in La Plata County.

Presettlement stand-replacing fire frequency was 40-60 years, with smaller fires every 20-25 years (Wright et al. 1979 as cited in Johnston 1997). Repeated burning every few years or burning in summer will deplete a stand of perennial grasses and allow weeds, invasive forbs, and cheatgrass to increase (Wright et al. 1979 as cited in Johnston 1997). Cheatgrass (*Bromus tectorum*) increases the likelihood of fire in mixed sagebrush-cheatgrass sites, but burning may produce dominance by cheatgrass and weeds (Bunting et al. 1987 as cited in Johnston 1997). Following a fire, since sagebrush must reestablish itself by seeds, growth and recovery are slow (Bunting et al. 1997 as cited in Johnston 1997). Fire favors shrubs like *Chrysothamnus nauseosus* that can re-sprout after fire (Wambolt et al. 1999).

Heavy grazing increases soil water losses, so heavily grazed sites are dryer; grazing also reduces the biomass of deep (>40 cm) roots and reduces the depth and cover of litter. Trampling from livestock grazing significantly decreases the number of sagebrush and grass seedlings (Eckert et al. 1978, Pearson 1965 as cited in Johnston 1997).

Foothills grasslands

Low elevation grasslands occupy a relatively small area of La Plata County: about 11,739 acres, or 1% of the total area. A plant community documented in southern La Plata County at Cinder Gulch was dominated by alkali sacaton (*Sporobolus airoides*) and galleta (*Hilaria jamesii*). However, it had previously been a dense sagebrush shrubland with little understory that was treated with an herbicide to kill the sagebrush (Figure 24).



Figure 25. Cinder Gulch typifies landscapes of Southern La Plata County, with pinyon-juniper woodlands on hills and sagebrush and grasslands in the valleys. At this site, sagebrush was treated with herbicide, increasing the grass component.

Wetland and Riparian Vegetation: Wetland and riparian vegetation is found within all of the zones discussed above. At the lowest elevations, along the major rivers, the dominant native vegetation is narrowleaf cottonwood (*Populus angustifolia*), alder (*Alnus incana* ssp. *tenuifolia*), river birch (*Betula occidentalis*), river hawthorn (*Crataegus rivularis*) and various willows (*Salix monticola*, *S. geyeriana*, *S. bebbiana*, *S. drummondiana*, *S. exigua*, *S. lucida* var. *caudata*, *S. liguifolia*). Associated upland shrubs often encountered at this elevation are silver buffaloberry (*Shepherdia argentea*) and skunkbrush (*Rhus trilobata*). It is common for the understory to contain hay grasses as well as native graminoids, such as fringes of arctic rush (*Juncus balticus*), common horsetail (*Equisetum arvense*) and scouring rush (*Hippochaete* sp.). At higher elevations, narrowleaf cottonwood is replaced by alder, blue spruce (*Picea pungens*), Engelmann spruce (*Picea engelmannii*), aspen (*Populus tremuloides*), bog birch (*Betula glandulosa*), and low stature willows such as Wolf willow (*Salix wolfii*), planeleaf willow (*S. planifolia*) and shortfruit willow (*S. brachycarpa*). Riparian forbs can make a lush thicket with tall growing plants such as osha (*Ligusticum porteri*), cow parsnip (*Heracleum sphondylium* subsp. *montanum*), monks hood (*Aconitum columbianum*), goldenglow (*Rudbeckia ampla*), and many others.

Spring fed wetlands are not common in La Plata County, although many riverine wetlands in the county are supplemented by groundwater, such as the narrowleaf cottonwood / river birch (*Populus angustifolia* / *Betula occidentalis*) association along the La Plata River. The bulrush (*Schoenoplectus acutus* var. *acutus*) wetland at Mitchell Lakes is one example of a groundwater fed wetland not associated with a river channel. In lower elevations, wetlands were observed, though not surveyed, at Marvel spring where cattails thrive, and Chapman (Turtle) Lake where cattails, bulrush and sedges occur.

High elevation emergent wetlands that typically occur on limestone or granite glaciated surfaces are fed by snowmelt and sheetflow, and are occupied by tufted hairgrass (*Deschampsia cespitosa*), several sedges (*Carex canescens*, *Carex vernacula*, *Carex aquatilis*, *Carex chalciolepis*) and cottongrasses (*Eriophorum angustifolium*; *Eriophorum altaicum* var. *neogaeum*). Middle elevation emergent wetlands, such as the wetlands found at Haviland Lake, are fed by surface water, groundwater and sheetflow from the neighboring Hermosa Cliffs. These emergent wetlands form a mosaic with forested wetlands and are dominated by sedges (*Carex viridula*; *Carex scirpoidea*) and bog birch (*Betula glandulosa*) with associated blue spruce (*Picea pungens*). Emergent wetlands occur at lower elevations in patches, greatly influenced by agriculture, residential and commercial development, and irrigation water. Cattails and bulrushes are the most common native plants observed.

Much of the riparian zone in the county has been invaded by non-native species. Russian olive (*Elaeagnus angustifolia*) poses the most immediate threat along the Animas and occurs on most of the main river corridors in the lower elevations. Russian olive becomes dense in some places, though has not formed a contiguous thicket, as is its potential. (It does form more contiguous thickets farther south in New Mexico). Tamarisk (*Tamarix ramosissima*) is becoming more common, especially on the Animas, though no extensive thickets occur at this time. Eradication and monitoring are required to effectively manage for this extremely aggressive species. Common invasive non-native herbaceous species include Canada thistle (*Cirsium arvense*), knapweeds (*Centaurea* spp.), sweet clover (*Melilotus officinalis*; *M. alba*), smooth brome (*Bromus inermis*) and other hay grasses. Reed canary grass (*Phalaroides arundinacea*) is a non-native common grass in lower elevation wetlands fed by either irrigation ditches and tail waters or backwater channels.

Disruption of the natural flood regime of the rivers by dams and alteration of the river channel has severely impacted regeneration of cottonwoods. Large cottonwood trees are important for nesting and roosting of Bald Eagles, Great Blue Herons, and other birds. Protection of young cottonwoods, and planting new trees may be necessary to ensure replacement of older trees for the future. Smaller streams in the canyons and mountains are essential for wildlife. It has been estimated that riparian areas, which account for only 1% of the landscape, are used by greater than 70% of wildlife species (Knopf 1988). In Colorado, 27% of the breeding bird species depend on riparian habitats for their viability (Pague and Carter 1996.) Dense riparian vegetation provides a protected corridor for migration of deer and elk, as well as cover for smaller animals. Riparian areas generally have a greater diversity of plant species than surrounding uplands. Along the smaller streams, grazing has altered much natural riparian vegetation. Protection of some riparian areas by fencing out cattle has improved some formerly degraded areas (e.g. north of Hermosa on the Animas River).

For more discussion on riparian and wetland areas of La Plata County, see the companion to this report, Survey of Critical Wetlands and Riparian Areas in La Plata County by March et al., 2004.

Rare and Imperiled Plants of La Plata County

Plants may be rare for a variety of reasons. They may have a narrow geographic range, or be widespread but sparsely distributed, never forming large populations, or have very specific habitat requirements (e.g. specific soil substrates) that are not often met. Any one or a combination of these factors can describe the rarity of a particular plant species. Some plants were never abundant, while others have suffered major declines due to loss of habitat, climate change, detrimental land uses, and other causes. Likewise, threats to rare species vary. For instance, in Hawaii, where 90% of native plants are considered rare, a major threat is displacement by exotic species. Several of the rare plants of La Plata County, such as San Juan whitlow-grass (*Draba graminea*) are survivors of a former cooler climate and are threatened by global warming. Others, like New Mexico false carrot (*Aletes sessiliflorus*), are restricted to a very specific habitat that is uncommon in Colorado. Much more research is needed to understand all of the reasons for rarity and the ecological needs for most of our rare species. Pollination vectors, seed dispersal mechanisms, relation to soil chemistry, and many other factors remain unknown. Finding the locations of rare plants and assessing their abundance and condition is a prerequisite to further study. This project has contributed to that first step.

Twenty-seven plants tracked by CNHP are currently known from La Plata County (Table 9), and are described below.

Table 9. Rare and Imperiled Plants of La Plata County. (See Table1, Chapter I, for explanation of ranks)

Scientific Name	Common Name	Global Rank	State Rank	Federal Status
<i>Aletes sessiliflorus</i>	New Mexico false carrot	G3	S1	
<i>Aralia racemosa</i>	American spikenard	G4G5	S1	
<i>Astragalus missouriensis</i> var. <i>humistratus</i>	Missouri milkvetch	G5T2	S1?	FS
<i>Astragalus proximus</i>	Aztec milkvetch	G4	S2	FS
<i>Besseyia ritteriana</i>	Kittentails	G3	S3	
<i>Botrychium pinnatum</i>	Northern moonwort	G4?	S1	
<i>Carex viridula</i>	Green sedge	G5	S1	BLM
<i>Collomia grandiflora</i>	Showy collomia	G5	S1	
<i>Commelina dianthifolia</i>	Birdbill dayflower	G5	S1?	
<i>Cypripedium calceolus</i> ssp. <i>parviflorum</i>	Yellow lady's slipper	G5	S2	FS
<i>Draba graminea</i>	San Juan whitlow-grass	G2	S2	
<i>Draba spectabilis</i> var. <i>oxyloba</i>	Showy whitlow-grass	G3?T3Q	S3S4	
<i>Draba streptobrachia</i>	Colorado Divide whitlow-grass	G3	S3	
<i>Eriophorum altaicum</i> var. <i>neogaeum</i>	Altai cottongrass	G4?T3?	S3	FS
<i>Eriophorum chamissonis</i>	Russet cottongrass	G5	S1	
<i>Gilia haydenii</i>	San Juan gilia	G3	S2	FS
<i>Hippochaete variegata</i>	Variegated scouring-rush	G5	S1	
<i>Machaeranthera coloradoensis</i>	Colorado tansy-aster	G2	S2	FS
<i>Pediocactus knowltonii</i>	Knowlton cactus	G1	S1	LE
<i>Penstemon lentus</i>	Abajo penstemon	G4Q	S2	
<i>Phlox caryophylla</i>	Pagosa phlox	G4	S2	
<i>Polypodium hesperium</i>	Western polypody	G5	S1S2	
<i>Salix candida</i>	Hoary or silver willow	G5	S2	FS/BLM
<i>Stellaria irrigua</i>	Altai chickweed	G4?	S2	
<i>Townsendia glabella</i>	Gray's townsend-daisy	G2?	S2?	
<i>Townsendia rothrockii</i>	Rothrock's Easter daisy	G2	S2	
<i>Woodsia neomexicana</i>	New Mexico cliff fern	G4?	S2	

Aletes sessiliflorus (New Mexico false carrot)

Taxonomy

Class: *Dicotyledoneae*

Order: *Apiales*

Family: *Apiaceae*

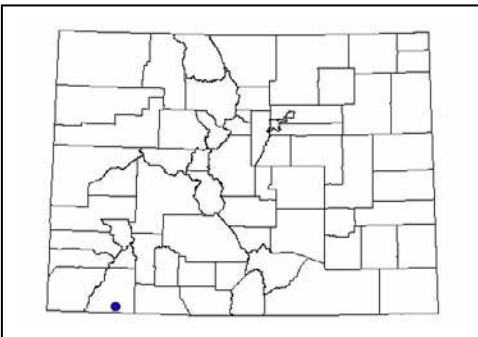
Genus: *Aletes*

Taxonomic Comments: *Aletes sessiliflorus* Theobald and Tseng was described in 1964 (Theobald 1964). It is similar to *A. McDougalli*, which is found in Mesa Verde National Park. *A. sessiliflorus* has larger (3-4 cm. diam.) umbels and narrower leaflets.

CNHP Ranking: G3 S1

State/Federal Status: None

Description and Phenology: *Aletes sessiliflorus* grows in clumps with pinnately compound leaves. Its inflorescence is an umbel, with many small white flowers. It blooms in April.



Distribution in Colorado

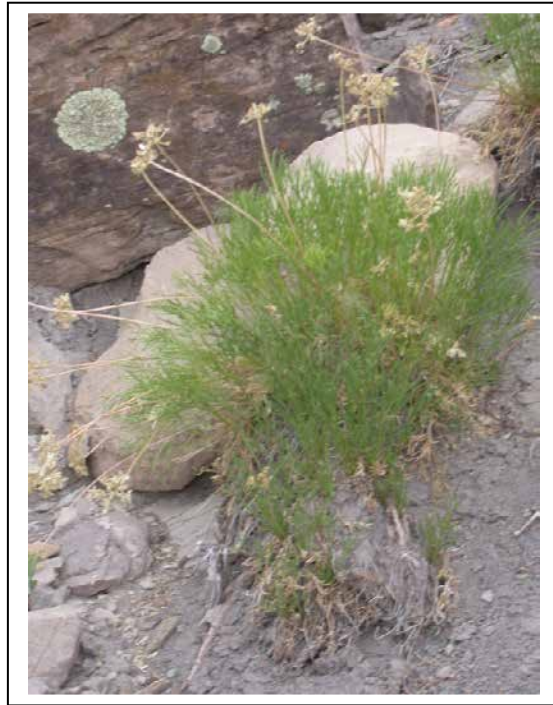


Figure 26. *Aletes sessiliflorus*.
Photograph © CNHP, by M. J. Lyon

Habitat Comments: At the single Colorado location, *Aletes sessiliflorus* was found on barren slopes with clay soils derived from the San Jose formation. It was especially abundant in shallow dry washes, but sometimes was also found on level areas. Associated species at the Bondad site include *Eriogonum lonchophyllum*, *Astragalus lonchocarpus*, *Astragalus flavus*, *Astragalus oocalycis*, *Yucca harrimanniae*, and *Physaria acutifolia*.

Global Range: Colorado, New Mexico and Arizona.

State Range: Known in Colorado only from a single location in La Plata County near Bondad.

Distribution/Abundance: The species is most abundant in New Mexico, where it is ranked S3 (vulnerable). It is very rare (S1) in both Arizona and Colorado. At the single Colorado location it is locally abundant, with many thousands of plants. Areas with similar habitat were searched in 2003, with no additional populations found.

Known Threats and Management Issues: The area in Colorado where the species is located is fragmented by gas wells and access roads. However, the wells are already in place and further disturbance is not anticipated. Although oil and gas development don't appear to be negatively impacting *Aletes* at the Colorado site, it is unclear if this pattern would hold true for other areas that might have additional populations.

Potential Conservation Areas in La Plata County that support *Aletes sessiliflorus*: Bondad

Aralia racemosa ssp. *bicrenata* (American spikenard)

Taxonomy

Class: *Dicotyledoneae*

Order: *Apiales*

Family: *Araliaceae*

Genus: *Aralia*

Taxonomic Comments: *Aralia racemosa* is an eastern U. S. relictual species. Two subspecies of *A. racemosa* are often recognized (e.g., by Kartesz, 1999): subsp. *bicrenata*, found in Texas, New Mexico, Arizona, Colorado, and Utah; and subsp. *racemosa*, found in the remainder of the species' extensive range in eastern North America (Kartesz, 1999; USDA-NRCS 1999, Weber and Wittman 1996a, Weber and Wittman 1996b). The populations in Colorado are likely *A. racemosa* subsp. *bicrenata*.

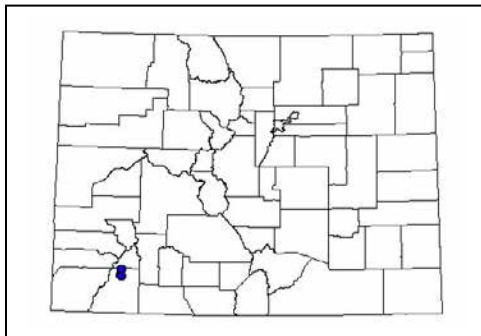
CNHP Ranking: G4G5 S1

State/Federal Status: None

Description: The *Araliaceae* is similar to the *Apiaceae* (parsley family) in the umbellate inflorescence, but with five carpels instead of two. *Aralia racemosa* is a large shrub with pinnate compound leaves and tiny white flowers in numerous umbels arranged in a large compound panicle or raceme.



Figure 27. *Aralia racemosa*. Photo © CNHP by M.J. Lyon



Distribution in Colorado

Habitat Comments: The plants grow in shaded ravines or streamsidess. Elevations in Colorado are between 7000 and 8000 ft.

Global Range: *Aralia racemosa* ssp. *racemosa* is common in the eastern U. S. and Canada. *A. racemosa* ssp. *bicrenata* is known only from the Four Corners states and Texas. The only Colorado locations are in La Plata County north of Durango.

State Range: The species is known in Colorado only from La Plata County, now in three locations, all north of Durango.

Distribution/Abundance: There are three occurrences in Colorado, all in La Plata County. The largest of these, at Elbert Creek had over 60 large, healthy individuals and good reproduction.

Known Threats and Management Issues: Collection for the herbal trade has been an issue in the eastern U. S., and could prove to be here in the future. Any alterations to the hydrology of the streams, such as upstream diversions, could threaten the occurrences.

Potential Conservation Areas in La Plata County that support *Aralia racemosa*: Elbert Creek, Cascade Creek, and East Fork Hermosa Creek.

Astragalus missouriensis var. *humistratus* (Missouri milkvetch)

Taxonomy

Class: *Dicotyledoneae*

Order: *Fabales*

Family: *Fabaceae*

Genus: *Astragalus*

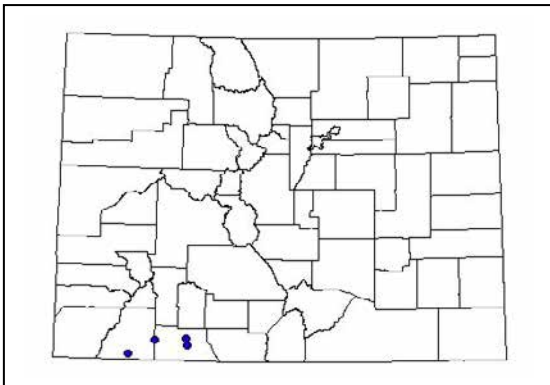
Taxonomic Comments:

Astragalus missouriensis Nuttall var. *humistrata* Isely is closely related to the more common and widespread var. *missouriensis*, and to var. *amphibolus*, which is found in La Plata County and eastern Utah. The type specimen was collected at Pagosa Springs in 1951, and was recognized as a distinct variety by Isely in 1983 (Isely 1983). Isely separates var. *humistratus* from var. *amphibolus* by the stipules, which are free in

var. *amphibolus* but connate or amplexicaul in var. *humistratus*; the beak of the fruit, which is curved or incurved



Figure 28. *Astragalus missouriensis* var. *humistratus*. photo © CNHP by P. Lyon



Distribution in Colorado

at the tip in var. *amphibolus*, but straight in var. *humistratus*; and the usual number of flowers on the stem—4-8 in var. *amphibolus* and 8-12 in var. *humistratus*. The single specimen from La Plata County resides at the University of Colorado herbarium. Its identification is uncertain (Hogan, pers. comm.)

CNHP Ranking: G4T2 S1?

State/Federal Status: Forest Service Sensitive

Description and Phenology: *A. missouriensis* var. *humistrata* is a perennial purple-flowered legume with pinnate basal leaves. Plants flower in May, and

set fruit in June. Mature pods are necessary to distinguish this variety from related species *A. amphioxys* and *A. chameleuce*, as well as other varieties of *A. missouriensis*.

Habitat Comments: This variety of Missouri milkvetch is found in clay soils derived from Mancos Shale in Archuleta County. The historic record from La Plata County is in an area that has soils derived from sandstone or shale of the Tertiary Nacimiento Formation.

Global Range: Although the species *Astragalus missouriensis* is widespread throughout the central U. S. and Canada, the variety *humistrata* is known only from Colorado.

State Range: There are two documented occurrences in Archuleta County and one historic record from La Plata County. The La Plata County specimen was collected in 1963 near Bondad and deposited in the CSU Herbarium. However, this specimen is identified as *A. missouriensis*, with no infra-specific epithet given, and its identification is not certain. Searches of the Bondad area in 2003 were unsuccessful. However, due

to drought, many plants did not appear during this year. Further searches in a wetter year are still needed to determine the range and rarity of this species, and whether it is present in La Plata County.

Distribution/Abundance: The variety is centered in Archuleta County, where three occurrences are known south and west of Pagosa Springs. The single record from La Plata County has no indication of its abundance on the herbarium label. There is abundant potential habitat for the species in La Plata County, and continued investigation is warranted.

Known Threats and Management Issues: Little is known about the effects of grazing or other disturbance on this species. Further survey is needed in both Archuleta and southern La Plata County during years with more precipitation. In Archuleta County, the species was found in areas with some disturbance, along a road and horse trails. Climate change? Many milkvetches seem to have decreased with drought during the past two years (pers. obs).

Potential Conservation Areas supporting *Astragalus missouriensis* var. *humistrata*: Piedra Stock Trail and Turkey Mountain in Archuleta County. None in La Plata County, as the historic record has not been recently updated.

Astragalus proximus (Aztec milkvetch)

Taxonomy

Class: *Dicotyledoneae*

Order: *Fabales*

Family: *Fabaceae*

Genus: *Astragalus*

Taxonomic Comments:

Astragalus proximus (Rydberg)

Wooten and Standley was first described in 1915. The type specimen was collected at Arboles in 1899.



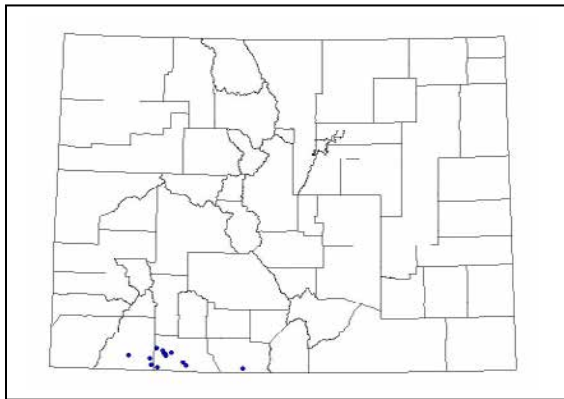
Figure 29. *Astragalus proximus*. Photo copyright © 1999 by B. Jennings

CNHP Ranking: G4 S2

State/Federal Status: Forest Service Sensitive

Description and Phenology: *A. proximus* is a perennial legume with erect stems and small purple flowers. It resembles *A. flexuosus*, a much more common species, but can be distinguished by its smaller (10-15mm) glabrous pods. It flowers in late April to July and produces fruit in June and July.

Habitat Comments: Mesas, bluffs, and low hills in sandy, often alkaline clay soils derived from Lewis Shale or Mancos Shale. It grows among junipers and sometimes ponderosa pine and sagebrush at elevations from 5,400 to 7,300 ft.



Colorado distribution

Global Range: This milkvetch is known from northern New Mexico and southwestern Colorado.

State Range: The Aztec milkvetch has been documented in thirteen locations in Archuleta, Conejos and La Plata counties in Colorado.

Distribution/Abundance: Aztec milkvetch is reported to be quite common in northern New Mexico. There are 13 reported occurrences in Colorado, nine of which are in Archuleta County, one in Conejos and three in La Plata County. One of the La Plata County records is historic, based on a specimen collected in 1939, and precise location

information was not given. One recent occurrence in La Plata County was found in 1991 near Spring Creek. This area was searched in 2003, and no plants were located. The most recent observation in La Plata County was in 1995 about three miles northwest of Allison. This area was not surveyed in 2003. Further searches in a wetter year could result in re-locating this population.

Known Threats and Management Issues: Further survey of the Spring Creek and Allison areas are needed to determine the status of those populations. There is abundant suitable habitat for this species in the southern part of La Plata County. Most of this land is either privately owned or on Southern Ute tribal lands for which a permit is required for access. The 1991 record noted that the site was heavily grazed. The responses of this species to grazing and drought need further research.

Potential Conservation Areas in La Plata County that support *Astragalus proximus*: Spring Creek.

Besseyia ritteriana (Kittentails)

Taxonomy

Class: *Dicotyledoneae*
Order: *Scrophulariales*
Family: *Scrophulariaceae*
Genus: *Besseyia*

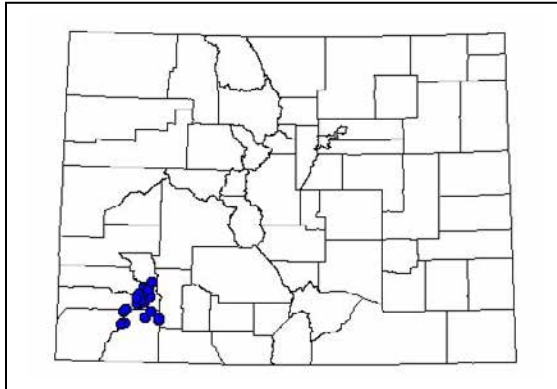
Taxonomic Comments: *Besseyia ritteriana* (Eastwood) Rydberg was first described by Alice Eastwood as *Syntheris reflexa* in the Proceedings of the California Academy of Science (3)1:124.1898. The type specimen was from Cumberland Basin in La Plata County.

CNHP Ranking: G3 S3

State/Federal Status: None

Description: *Besseyia ritteriana* has a basal rosette of dark green leaves with sharply toothed edges. The plant produces a stalk of lemon-yellow flowers with the typical two-lipped shape of the *Scrophulariaceae*. The flowers are striking when fresh, but soon turn brown.

Habitat Comments: *Besseyia ritteriana* may be found both above and below timberline, at elevations from 10,000 to 13,000 ft., mostly in wet meadows, but also under trees in spruce-fir forests. It is often found in eroded openings with little competition from other plants. It frequently occurs in conjunction with showy whitlow-grass (*Draba spectabilis* var. *oxyloba*). Other frequently associated species include false hellebore (*Veratrum tenuipetalum*), Richardson's geranium (*Geranium richardsonii*), alpine avens (*Geum rossii*), paintbrushes (*Castilleja occidentalis* and *C. rhexifolia*), orange sneezeweed (*Dugaldia hoopsii*), Whipple's penstemon (*Penstemon whippleanus*) and bistort (*Bistorta bistortoides*).



Distribution in Colorado



Figure 30. *Besseyia ritteriana*. Photograph copyright© CNHP by P. Lyon

Global Range: Endemic to Colorado.

State Range: San Juan Mountains, La Plata Mountains, in Gunnison, Montrose, San Miguel, Ouray, San Juan, and La Plata counties.

Distribution/Abundance: *Besseyia ritteriana* is locally abundant, often with hundreds of plants at a site. Although there are not yet enough documented occurrences to change the rank of this species, the frequency with which it was found in San Juan and La Plata counties suggests that with another year or two of survey it will be considered secure.

Known Threats and Management Issues: Most occurrences are in the San Juan National Forest. Three of these are in the Weminuche Wilderness. Grazing by sheep occurs at several locations. Effects of grazing are unknown, and if a decline is observed, monitoring to compare grazed and ungrazed areas may be worthwhile.

Potential Conservation Areas in La Plata County that support *Besseyia ritteriana*: Cave Basin Trail, Columbine Pass, Cumberland Basin, Highline Trail, Indian creek at Tuckerville, Lime Mesa and Sheephead Basin.

Botrychium pinnatum (Northern moonwort)

Taxonomy

Class: *Ophioglossopsida*

Order: *Ophioglossales*

Family: *Ophioglossaceae*

Genus: *Botrychium*

Taxonomic Comments: *Botrychium pinnatum* St. John has also been known as *Botrychium boreale* ssp *obtusilobum*. It was described by W. H. Wagner Jr. and F. S. Wagner in 1986 (Wagner 1986).

CNHP Ranking: G4? S1

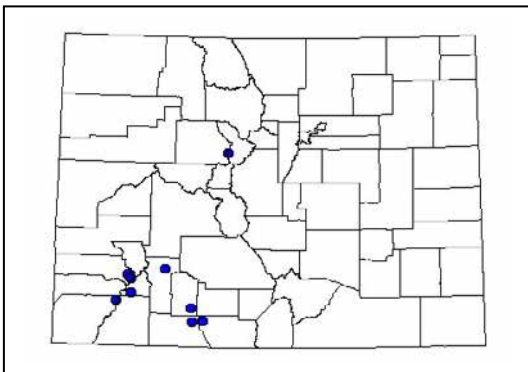
State/Federal Status: None

Description and Phenology: *B. pinnatum* is similar to other *Botrychiums* in having two fronds, one sterile and the other bearing spores. Sterile fronds are bright shiny green, with numerous symmetrical lobes. Moonworts are extremely tiny and inconspicuous, and are often overlooked. Often, two or more species are found growing together. Leaves appear in spring and throughout summer, and spores are produced in July. The aboveground parts may not appear every year, even though the root system is surviving underground, making it difficult to assess the extent of a population in any given year. Several years' observation is recommended.



Figure 31. *Botrychium pinnatum*
Photo © by Robert Mosely

Habitat Comments: *Botrychium pinnatum* shares the same habitat requirements, including some natural disturbance, as several other *Botrychium* species. It is commonly found on grassy slopes, streambanks, forests and clearcut areas. It is often found growing with other *Botrychium* species. The single occurrence known from La Plata County was in a clearcut area with young spruces.



Colorado Distribution

Global Range: *Botrychium pinnatum* is known from Alaska and the Yukon, south to California, Arizona, and Colorado.

State Range: In Colorado, there are eleven occurrences in nine counties. The single occurrence in La Plata County was documented in 1996 by USFS personnel at Orphan Butte, along the border with Montezuma County.

Distribution/Abundance: Although *Botrychium pinnatum* is widespread in North America, it is rare and local over almost its entire range.

Known Threats and Management Issues: Threats to *B. pinnatum* are not well understood. Because this species occurs in both naturally and artificially disturbed sites, it may be displaced by natural plant succession as well as the same human activities (recreation, road and trail maintenance activities, selection of grazing areas) that have also apparently resulted in suitable habitat. Agriculture and forestry activities may also threaten this species in some areas. Strategies for the protection of this species include determining its specific habitat requirements and its sensitivity to disturbance. Long term monitoring would help to determine its life history characteristics, population stability, and dynamics over time.

Potential Conservation Areas that support *Botrychium pinnatum*: Orphan Butte

Carex viridula (Green sedge)

Taxonomy

Class: *Monocotyledoneae*
Order: *Cyperales*
Family: *Cyperaceae*
Genus: *Carex*

Taxonomic Comments: *Carex viridula* Michaux

CNHP Ranking: G5 S1

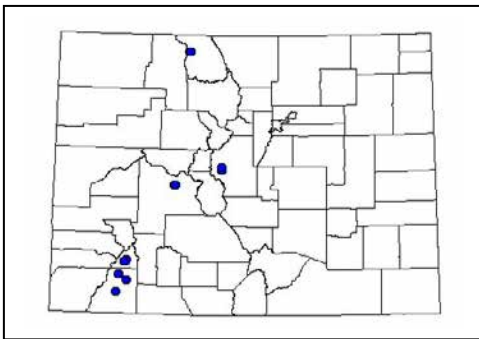
State/Federal Status: BLM sensitive

Description: Green sedge forms small bunches on wet stream banks and the edges of ponds. Its light yellow-green spikes are subtended by a long, slender leaf-like bract. The pistillate scales are shorter and narrower than the perigynium.

Habitat Comments: Wetlands in the montane alpine zone, between 8,000 and 10,000 ft. It is often found in association with peatlands.



Figure 32. *Carex viridula*. Photo © CNHP by P.



Distribution in Colorado

Global Range: *Carex viridula* is found throughout Canada and in northern and western United States. It is rare (S1) in Colorado, Wyoming, South Dakota, Illinois and Pennsylvania.

State Range: *Carex viridula* is known in Colorado from Gunnison, Jackson, La Plata, Park and San Juan counties.

Distribution/Abundance: There are 8 occurrences documented in the CNHP database, of which five are ranked excellent or good. The University of Colorado Herbarium has eight specimens from Colorado. It is reported from the northern and western U. S. and all of Canada, but its abundance is unknown.

Known Threats and Management Issues: Maintenance of the hydrology of occupied sites is critical.

Potential Conservation Areas in La Plata County that support *Carex viridula*: Haviland Lake.

Collomia grandiflora (Showy collomia)

Taxonomy

Class: *Dicotyledoneae*

Order: *Solanales*

Family: *Polemoniaceae*

Genus: *Collomia*

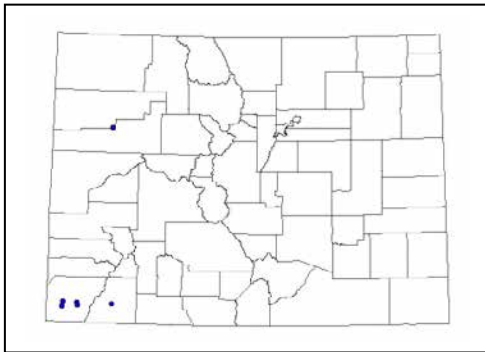
Taxonomic Comments: *Collomia grandiflora* Dougl. ex Lindl. is similar to, but larger than its close relative, *Collomia linearis*, which is common in sagebrush areas in Colorado. It was described in 1828.

CNHP Ranking: G5 S1

State/Federal Status: None

Description: *Collomia grandiflora* is a perennial herb

15 to 70 cm. tall. The stems are unbranched, and leaves are linear to linear-lanceolate. It has white to salmon colored flowers with petals usually over 2 cm long and 1 mm wide. Flowers are aggregated into a dense terminal cluster.



Distribution in Colorado

State Range: In Colorado, it is known from six locations, four in Montezuma County, one in Rio Blanco County and one in La Plata County. The La Plata County site near the TV towers at Smelter Mountain, south of Durango, was searched during this survey, and the plants could not be relocated. However, continued survey early in a wetter year could be more successful.

Distribution/Abundance: No information was given regarding the abundance of the species at any of the Colorado locations. There are five specimens at the University of Colorado Herbarium, four from Montezuma and one from Rio Blanco County.

Known Threats and Management Issues: The site at Smelter Mountain is disturbed and fragmented on the top of the ridge near the TV towers. The steep slopes on the north side are relatively undisturbed. Relocating the plants could help in understanding the effects of disturbance.

Potential Conservation Areas in La Plata County that support *Collomia grandiflora*: Smelter Mountain.



Figure 33. *Collomia grandiflora*. Photos USDA PLANTS Image Gallery <http://plants.usda.gov>

Commelina dianthifolia (Birdbill dayflower)

Taxonomy

Class: *Dicotyledoneae*

Order: *Commelinales*

Family: *Commelinaceae* (Spiderwort family)

Genus: *Commelina*

Taxonomic Comments: *Commelina dianthifolia* Delile.

CNHP Ranking: G5 S1

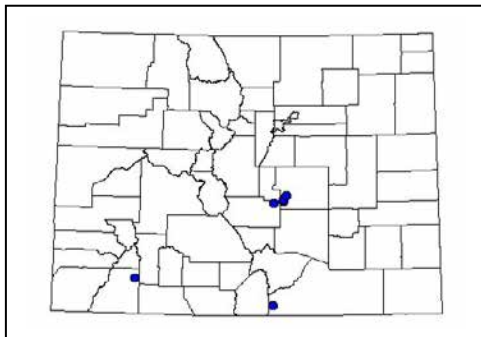
State/Federal Status: None

Description: This distinctive plant is perennial, with thickened roots. Stems may be simple or branched. It has three blue petals. Its leaves are linear, and it has bracts with long acuminate tips.

Habitat Comments: The population in La Plata County was found on steep rocky slopes above Vallecito Creek, in mixed montane forest.



Figure 34. *Commelina dianthifolia*. Photo © CNHP by P. Lvon



Distribution in Colorado

Global Range: Colorado, New Mexico, Arizona, and Texas.

State Range: There are four occurrences in eastern Colorado, in Las Animas, El Paso and Fremont counties. The La Plata County record is the first for the western slope.

Distribution/Abundance: Two occurrences in El Paso County have over 1000 individuals in each. Two others have about 250 plants each. The La Plata County occurrence is estimated at 200. There are ten specimens at the University

of Colorado Herbarium, eight from El Paso County and one each from La Plata and Las Animas counties. The La Plata County occurrence is the only one on the western slope.

Known Threats and Management Issues: No threats are known.

Potential Conservation Areas in La Plata County that support *Commelina dianthifolia*: Vallecito Creek-Johnson Creek PCA.

Cypripedium parviflorum (Yellow lady's slipper)

Taxonomy

Class: *Monocotyledoneae*

Order: *Orchidales*

Family: *Orchidaceae* (*Cypripediaceae*)

Genus: *Cypripedium*

Taxonomic Comments: Traditionally included in the family *Orchidaceae*, Dr. Weber puts it in its own family, the *Cypripediaceae*. It is synonymous with *Cypripedium calceolus* ssp. *parviflorum* (Weber and Wittman 2001).



Figure 35. *Cypripedium parviflorum*.
Photograph copyright CNHP

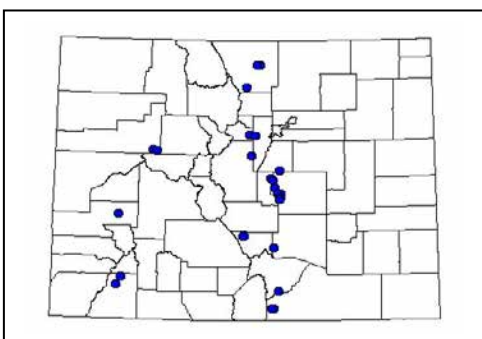
CNHP Ranking: G5 S1

State/Federal Status: Forest Service Sensitive

Description: A striking yellow orchid with a large pouch.

Habitat Comments: Wet areas in the subalpine zone. In La Plata County, it was found under patches of blue spruce (*Picea pungens*) bordering a wetland near Haviland Lake.

Global Range: It is widespread in North America, although it is considered rare in several states.



Distribution in Colorado

State Range: There are 26 occurrences in Colorado, in 11 counties. The University of Colorado Herbarium has 10 specimens.

Distribution/Abundance: Globally, there are thousands of occurrences. In Colorado, only four of the 26 occurrences are ranked B, with the others either unranked or historic. Most of the occurrences that have abundance information have fewer than 100 individuals.

Known Threats and Management Issues: This species may be threatened by collecting, since orchids are prized in the horticultural trade, and are sometimes collected from the wild. However, CNHP is not aware of specific threats at this time.

Potential Conservation Areas in La Plata County that support *Cypripedium parviflorum*: Haviland Lake.

Draba graminea (San Juan whitlow-grass)

Taxonomy

Class: *Dicotyledoneae*

Order: *Capparales*

Family: *Brassicaceae*

Genus: *Draba*

Taxonomic Comments:

CNHP Ranking: G2 S2

State/Federal Status: None. Currently on list of species considered for inclusion on Forest Service sensitive species list for Region 2, but for which more information is needed.

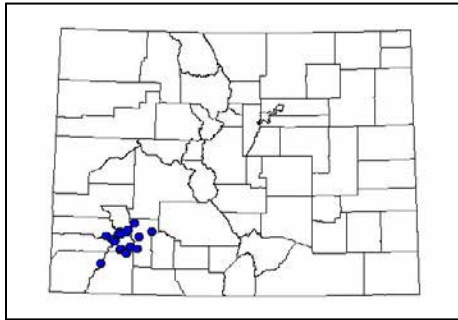
Description and Phenology : San Juan whitlow-grass is a yellow flowered perennial with small green leaflike bracts beneath each flower. Its basal leaves are narrow with ciliate margins and glabrous surfaces. It may have up to two reduced leaves on its flower stem.

Plants are usually flowering and easiest to see in late July and early August. Look for bright yellow, four-petaled flowers nestled in dark green, narrow-leaved rosettes.



Figure 36. *Draba graminea*. Photograph copyright CNHP by P. Lyon

Habitat Comments: gravelly tundra, shaded areas in crevices or base of cliffs, late snowmelt areas, 12,400 to 13,500 ft. San Juan whitlow-grass is nearly always found above 12,000 feet in elevation.



Distribution in Colorado

It often grows near the melting edge of a snow bank, or at the shaded base of cliffs in cold wet tundra. The plants depend on the depth and longevity of the snowpack, stability of the soil, and presence or absence of appropriate pollinators.

Global Range: This species is endemic to Colorado.

State Range: *D. graminea* is endemic to the San Juan Mountains, known from five counties: Ouray, San Miguel, San Juan, Hinsdale, La Plata, and Montezuma.

Distribution/Abundance: There are 21 occurrences of the species, including one found during this survey.

Known Threats and Management Issues: Most occurrences are on National Forest land, at high elevations and in habitats that are not subject to much disturbance. Climate change could cause the extinction of this species, along with other endemic high elevation species, as there is little room for it to move upward if the global climate becomes warmer.

Potential Conservation Areas in La Plata County that support *Draba graminea*: Columbine Pass-Chicago Basin.

Draba spectabilis var. *oxyloba* (Showy whitlow-grass)

Taxonomy

Class: *Dicotyledoneae*

Order: *Capparales*

Family: *Brassicaceae*

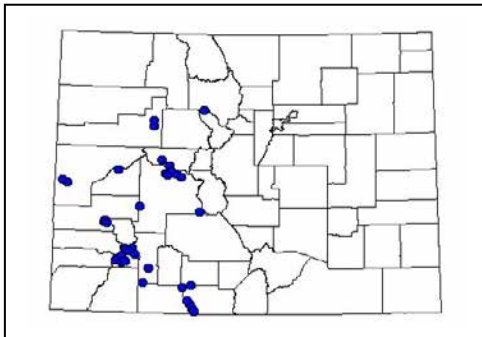
Genus: *Draba*

Taxonomic Comments: *D. spectabilis* var. *oxyloba* (Greene) Gilg and Schulz. Synonyms include *D. oxyloba* E. L. Greene and *D. spectabilis* var. *bella* O. E. Schulz. This variety is not recognized by Weber & Wittman (1992). However, it is recognized by Rollins (1993). Its global rank (G3? T3Q) reflects some uncertainty about the validity of the variety. Rollins distinguishes it from variety *spectabilis* by the presence of appressed cruciform or malpighiaceus hairs on the lower stems, rather than the simple hairs of the var. *spectabilis*.

CNHP Ranking: G3?T3Q S3S4 (watchlisted)

State/Federal Status: None

Description and phenology: *D. spectabilis* var. *oxyloba* is a perennial, sometimes rhizomatous yellow-flowered mustard. Showy whitlow-grass is taller than other La Plata County *Drabas*, and found at generally lower elevations. It has bright green leaves and one to several flowering stems with an elongated inflorescence of 30 to 60 flowers. Plants flower in mid-summer and produce fruit in late summer.



Colorado Distribution

Habitat Comments: *Draba spectabilis* var. *oxyloba* grows in spruce-fir forests and in open meadows, along streams or on wet slopes, often associated with false hellebore (*Veratrum tenuipetalum*) and other wet meadow species. The plants were found to be locally abundant in both La Plata and San Juan Counties, and have now been placed on CNHP's watchlist (state rank S3S4).

Global Range: *Draba spectabilis* var. *oxyloba* occurs from southwestern Colorado north to Wyoming.

State Range: There are 52 known occurrences in Colorado, in 12 counties.

Distribution/Abundance: Eight new occurrences were found in 2003 in La Plata County, in the San Juan Mountains and La Plata mountains. Four of the occurrences were ranked A, with over 500 individuals.

Known Threats and Management Issues: Threats to *Draba spectabilis* var. *oxyloba* include human activities (recreation, road and trail maintenance activities, selection of grazing areas), changes in hydrology and invasion by exotic plant species. Although two of the new A ranked populations found in La Plata County are within the Weminuche Wilderness, they are still subject to the above threats.

Potential Conservation Areas that support *Draba spectabilis* var. *oxyloba*: Cave Basin Trail, Columbine Pass-Chicago Basin, Cumberland Basin, Highline Trail, Indian Creek at Tuckerville, Johnson Creek, Lime Mesa and Sheephead Basin.



Figure 37. *Draba spectabilis* var. *oxyloba*.
Photograph copyright CNHP by P. Lyon

Draba streptobrachia (Colorado Divide whitlow-grass)

Taxonomy

Class: *Dicotyledoneae*

Order: *Capparales*

Family: *Brassicaceae*

Genus: *Draba*

Taxonomic Comments: The species was first described in 1980.

CNHP Ranking: G3 S3

State/Federal Status: None. Currently on list of species considered for inclusion on Forest Service sensitive species list for Region 2, but for which more information is needed.

Description: Colorado Divide whitlow-grass is one of several *Draba* species found in the high mountains of Colorado. All are diminutive yellow or white flowered plants with four petals.

The Colorado Divide whitlow-grass is a tap-rooted perennial plant with a rosette of stellate-pubescent basal leaves and yellow flowers.

It resembles the San Juan whitlow-grass (*Draba graminea*), but can be distinguished from it by the absence of bracts below the flowers, and the presence of stellate hairs on the leaves.

Habitat Comments: Alpine zone, usually in rock outcrops, at elevations from 10,800 to 13,500 ft. The plants grow on weathered rock and loose soil in the alpine tundra, on scree margins and in fell-fields. Associated species often include alpine avens (*Geum rossii*), snow willow (*Salix reticulata*), false strawberry (*Sibbaldia procumbens*), and alpine bistort (*Bistorta bistortoides*).

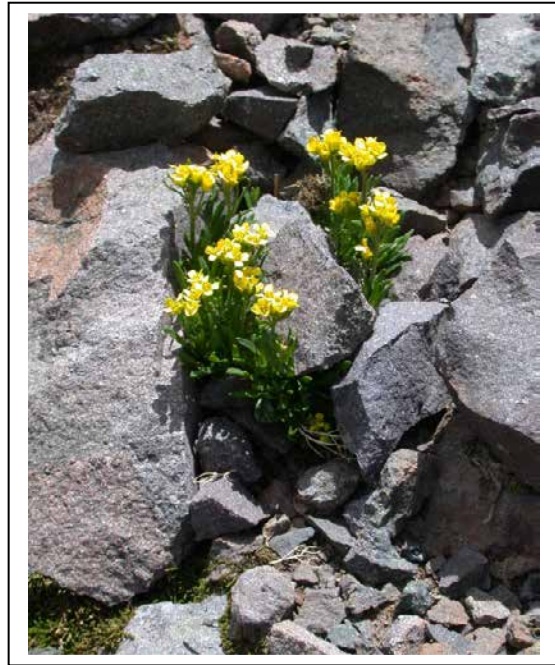
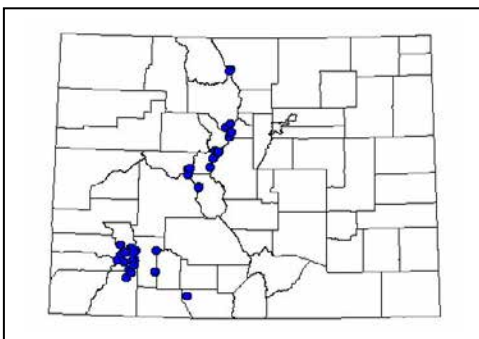


Figure 38. *Draba streptobrachia*. Photo copyright CNHP by P. Lyon



Distribution in Colorado

Global Range: Endemic to Colorado.

State Range: Found in 15 counties, in the San Juan Mountains and also in the Sawatch, Mosquito, and Front Ranges.

Distribution/Abundance: There are 42 known occurrences in Colorado. Several have over 1000 individuals, although a typical location usually has fewer than 200.

Known Threats and Management Issues: Most occurrences are in National Forests, with several in designated wilderness areas. This species is found at high elevations, often in fairly inaccessible locations, and therefore enjoys some natural protection. However, some plants are still vulnerable to direct disturbances such as trampling.

Potential Conservation Areas in La Plata County that support *D. streptobrachia*: Columbine Pass-Chicago Basin.

Eriophorum altaicum ssp. *neogaeum* (Altai cottongrass)

Taxonomy

Class: *Monocotyledoneae*

Order: *Cyperales*

Family: *Cyperaceae*

Genus: *Eriophorum*

Taxonomic Comments: A more common, closely related plant, the narrowleaf cottongrass (*E. angustifolia*), has multiple heads and leaf blades nearly as long as the stems. It is closely related to plants found in Siberia (Weber and Wittman 1986).

CNHP Ranking: G4?T3? S3

State/Federal Status: Forest Service Sensitive

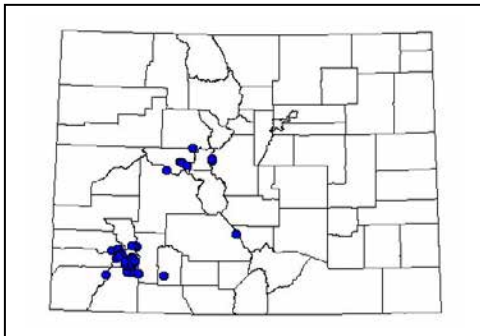
Description: The plants are rhizomatous, with solitary white fleecy heads on the tops of the stems, and lacking well-developed leaf blades (Weber 1996).

Habitat Comments: Altai cottongrass grows in wet meadows, fens, and around ponds, usually above or at treeline. It is often associated with elephant-head Pedicularis (*Pedicularis groenlandica*), tufted hairgrass



Figure 39. *Eriophorum altaicum* var. *neogaeum*.
Photograph copyright © CNHP by P. Lyon

(*Deschampsia cespitosa*), marsh marigold (*Caltha leptosepala*), mosses and sedges. It grows in patches in wetlands at high elevations, often associated with water sedge (*Carex aquatilis*), marsh marigold (*Caltha leptosepala*), elephant head (*Pedicularis groenlandica*) and tufted hairgrass (*Deschampsia cespitosa*). In San Juan County, it is sometimes associated with iron fens.



Distribution in Colorado

Global Range: *Eriophorum altaicum* var. *neogaeum* is the New World variety of a circumpolar species. In North America, it occurs in Colorado, Montana, Utah, Wyoming and British Columbia.

State Range: Altai cottongrass occurs in 10 counties: Eagle, Gunnison, La Plata, Mineral, Park, Pitkin, Saguache, San Juan and San Miguel.

Distribution/Abundance: There are 38 known occurrences in Colorado, in ten counties. Several locations have over a thousand individuals.

Known Threats and Management Issues: Threats appear to be limited for this species; however, local trampling may affect easily accessed occurrences. The primary management issue is maintaining the natural hydrologic regime of the wetlands in which it occurs.

Potential Conservation Areas in La Plata County that support *Eriophorum altaicum*: Lake Marie, Needle Creek at Emerald Lake, West Virginia Gulch.

Eriophorum chamissonis (Russet cottongrass)

Taxonomy

Class: *Monocotyledoneae*

Order: *Cyperales*

Family: *Cyperaceae*

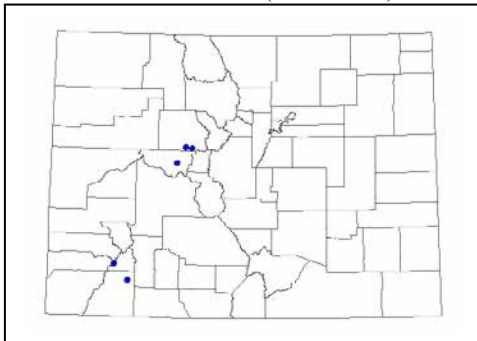
Genus: *Eriophorum*

Taxonomic Comments: Similar to Altai cottongrass, the five specimens at the University of Colorado Herbarium were all originally identified as *E. altaicum* var. *neogaeum*, until they were annotated by R. Hartman in 2001. A more common, closely related plant, the narrowleaf cottongrass (*E. angustifolia*), has multiple heads and leaf blades nearly as long as the stems.

CNHP Ranking: G5 S1

State/Federal Status: Forest Service Sensitive

Description: Like Altai cottongrass, the plants are rhizomatous perennials, with solitary white fleecy heads on the tops of the stems, and lacking well-developed leaf. *E. chamissonis* has anthers about 1 mm. long, and cinnamon colored bracts (Dorn 1984).



Distribution in Colorado

Habitat Comments: Russet cottongrass grows in patches in wetlands at high elevations, often associated with water sedge (*Carex aquatilis*), marsh marigold (*Caltha leptosepala*), elephant head (*Pedicularis groenlandica*), tufted hairgrass (*Deschampsia cespitosa*) and other *Eriophorum* species (*altaicum*, *gracile*, *angustifolia*). In La Plata County, it was found in a peat bog dominated by water sedge in a pristine basin at 11,800 ft.

Global Range: *Eriophorum chamissonis* is a circumpolar species, occurring primarily in Canada, where it is considered secure. In the U.S. it is known from the northern tier of states—Washington, Idaho, Montana North

Dakota and Michigan, extending to Oregon and Wyoming where it is rare (S1), and now known from Colorado, its southernmost location.

State Range: It occurs in 4 counties: Eagle, La Plata, Pitkin, and San Juan. Endlich Mesa in La Plata County is the farthest south location known for the species.

Distribution/Abundance: There are 5 known occurrences in Colorado, in four counties. Each population was estimated at between 50 and 100 individuals.

Known Threats and Management Issues: Threats appear to be limited for this species; however, local trampling may affect easily accessed occurrences. The primary management issue is maintaining the natural hydrologic regime of the wetlands in which it occurs.

Potential Conservation Areas in La Plata County that support *Eriophorum altaicum*: Endlich Mesa Basin



Figure 40. *Eriophorum chamissonis*. Photo Emmet J. Judziewicz, Wisconsin State Herbarium Vascular Plant Database

Gilia haydenii (San Juan gilia)

Taxonomy

Class: Dicotyledoneae
Order: Solanales
Family: *Polemoniaceae*
Genus: *Gilia*

Taxonomic Comments:

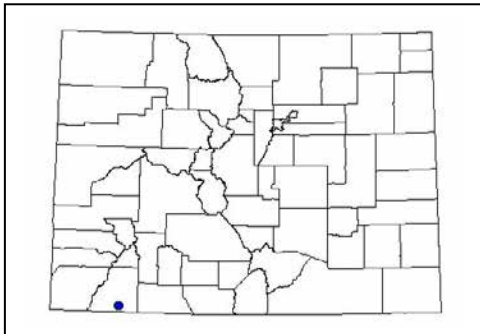
CNHP Ranking: G3 S2

State/Federal Status: None

Description: San Juan gilia has a basal rosette and pink tubular flowers clustered near the ends of the stems. Unlike several other *Gilia* species, the anthers are not exerted.

Habitat Comments: Plants grow in soils derived from sandstone and shale, from 5100 to 8000 ft., in canyonsides, PJ or desert shrub (*Atriplex*) communities.

Global Range: Colorado, New Mexico and Utah



Distribution in Colorado

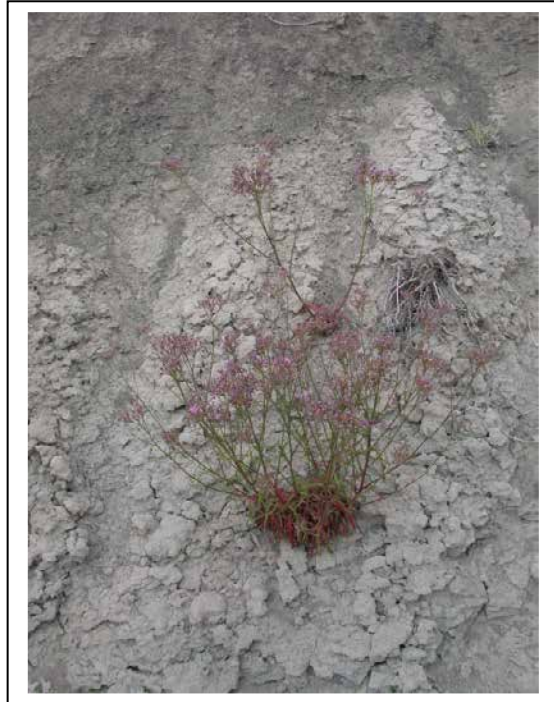


Figure 41. *Gilia haydenii*. Photograph copyright CNHP by P. Lyon

State Range: Dolores, La Plata, Mesa, Montezuma and Montrose counties.

Distribution/Abundance: Only a few plants were found at Bondad in La Plata County. This was the first record of the species in the CNHP database. The University of Colorado has 10 specimens from five counties. One CU label notes "locally abundant". (Note: only the La Plata County occurrence is mapped here.)

Known Threats and Management Issues: This species occurs in areas that are within existing or proposed oil and gas development areas. Although the threats from oil and gas development are unknown at this time, there are certain attributes associated with development that may impact the native species, for example surface disturbance is often associated with a change in floral composition. Any changes in the native flora composition has the potential to impact rare species.

Potential Conservation Areas in La Plata County that support *Gilia haydenii*: Bondad.

Hippochaete variegata (Variegated scouring rush)

Taxonomy

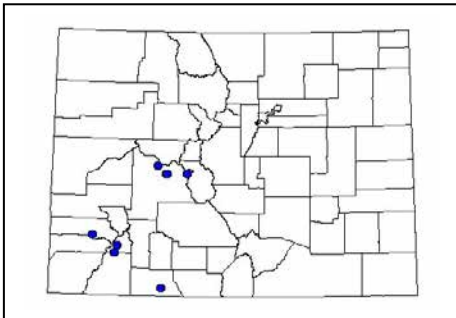
Class: Equisetopsida
Order: Equisetales
Family: Equisetaceae
Genus: *Equisetum*

Taxonomic Comments: *Hippochaete variegata* Schleich. ex Weber & Mohr is also known as *Equisetum variegatum* var. *variegatum* and *Equisetum hyemale* var. *variegatum*. Variegated scouring rush is a member of the primitive horsetail family, *Equisetaceae*. The horsetails are one of the most ancient lineages of land plants, abundantly found in fossils from the Paleozoic era and relatively unchanged since then. CNHP Ranking: G5T5 S1

State/Federal Status: None



Figure 42. *Hippochaete variegata*.
Photograph copyright CNHP by P. Lyon



Distribution in Colorado

Description: *Hippochaete variegatum* var. *variegata* is a perennial herbaceous plant with rough-surfaced evergreen stems. Its cones can mature in late summer, or they can overwinter and shed spores in spring. It is distinguished from the more common *H. hyemalis* by its smaller and more slender stems. This relative of the more common scouring rush is slender, with 5 to 12 angled and grooved stems compared with 16 to 48 grooves in the more stout stems of its relatives. Silica on the surface of the stems gives them their common name, and today, as in Colonial times they are sometimes used for scouring out pots and pans (Weber and Wittman 2001).

Habitat Comments: *Equisetum variegatum* var. *variegatum* is found at lakeshores, riverbanks, and ditches and in wet woods. In La Plata County it was found in a small marshy area within a Colorado blue spruce/Drummond's willow community at 8447 ft. Associated species included *Carex aurea*, *Oxyopolis fendleri*, *Equisetum arvense*, *Habenaria hyperborea*, *Swertia perennis*, *Distegia involucreta* and *Parnassia fimbriata*.

Global Range: The range of *Equisetum variegatum* var. *variegatum* is circumpolar in the North Temperate Zone, extending into the Arctic.

State Range: There are six records of the species in the CNHP database, in Gunnison, Archuleta, San Miguel, San Juan and La Plata counties. Specimens at the University of Colorado Herbarium represent seven additional counties.

Distribution/Abundance: This species may be more common than believed, and merely overlooked.

Known Threats and Management Issues: Threats to the variegated scouring rush include human activities (recreation, road and trail maintenance activities, selection of grazing areas), invasion by exotic plant species, and changes in hydrology.

Potential Conservation Areas that support *Hippochaete variegata*: Cascade Creek

Machaeranthera coloradoensis (Colorado tansy-aster)

Taxonomy

Class: Dicotyledoneae
Order: *Asterales*
Family: *Asteraceae*
Genus: *Townsendia*

Taxonomic Comments: Two formerly recognized varieties, var. *brandegei* and var. *coloradoensis*, are no longer considered distinct by experts (Beatty et al 2004).

Reclassification of the genus to *Xanthisma* has been proposed (Beatty et al. 2004).

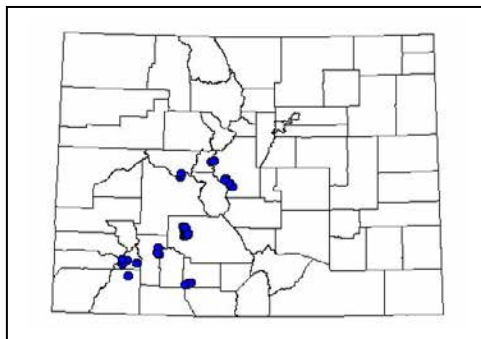
CNHP Ranking: G2 S2

State/Federal Status: Forest Service Sensitive

Description and Phenology: Colorado tansy-aster is a striking member of the sunflower family (*Asteraceae*). It is a low-growing perennial cushion plant with a large taproot, short stems, a large head with rose-colored ray flowers and shallowly to coarsely toothed leaves. The plants flower from early July through mid-August, and set seed from August through September.

Habitat Comments: Colorado tansy aster is found in gravelly places or rock outcrops, often on sandstone or limestone, from ponderosa pine communities to alpine tundra. It is reported from elevations between 7675 to 12,940 ft. (Beatty et al. 2004) in both moist and dry sites, often on gravelly soils with sparse vegetation. In La Plata County it was found on limestone fellfields at 11,500 to 12,000 ft.

Global Range: The species is restricted to the Rocky Mountains in south-central Wyoming and western Colorado. It is ranked very rare (S1) in Wyoming. There is a large gap between the southern Colorado and southern Wyoming populations.



Distribution in Colorado



Figure 43. *Machaeranthera coloradoensis*.
Photograph copyright CNHP by P. Lyon

State Range: Dolores, Gunnison, Hinsdale, Lake, La Plata, Park, Pitkin, Rio Grande, Saguache, and San Juan counties.

Distribution/Abundance: There are 25 known occurrences in Colorado, several with over 1000 individuals. There are 18 specimens at the University of Colorado Herbarium.

Known Threats and Management Issues: No immediate threats are known. Potential threats include trampling and herbivory by domestic sheep or direct disturbance by recreationists. Invasion of non-native species could threaten some habitats. In La Plata County, the single occurrence on Lime Mesa has a foot/horse trail running through it, but no obvious impacts have been observed.

Potential Conservation Areas in La Plata County that support *Machaeranthera coloradoensis*: Lime Mesa.

Pediocactus knowltonii (Knowlton's cactus)

Taxonomy

Class: Dicotyledoneae

Order: *Caryophyllales*

Family: *Cactaceae*

Genus: *Pediocactus*

Taxonomic Comments: *Pediocactus knowltonii* L. Benson

Synonym: *Pediocactus bradyi* L.

Benson var. *knowltonii* Backeberg

[comb. illeg.]

CNHP Ranking: G1 S1

State/Federal Status: Listed
Endangered

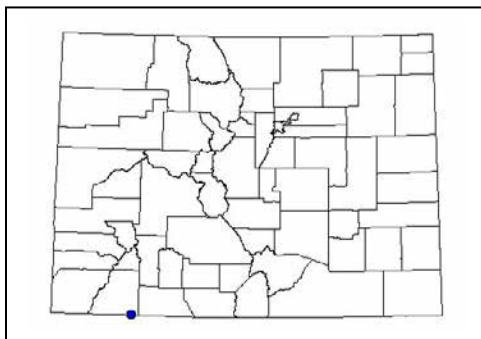


Figure 44. *Pediocactus knowltonii*. Photograph by Ken Heil

Description and Phenology: Knowlton's cactus is very tiny, with stems 1.0-2.5 cm in diameter, solitary or a few in a cluster, barely protruding above ground level. Its tubercles are not grooved. Spines are about 20 per areole, radiating from areole and appressed to the plant. Flowers are about 1.5-2.5 cm across, fragrant, borne from the previous year's areoles near the apex of the plant. Tepals are white to magenta, usually pink, with the stigmata yellowish or pale green. The ovary has a few tiny papery scales. The fruit is barrel-shaped, fleshy, not juicy, dehiscent by a circumscissile split at the top and one or more vertical splits. Seeds are dark gray, 1.5-2.0 mm long, teardrop-shaped. Plants flower in April and May (New Mexico Rare Plant Technical Committee 1999).

Habitat Comments: This cactus is found on rolling, gravelly hills in a piñon-juniper-sagebrush community at about 6,200-6,300 ft.

Global Range: There is only one known location, on the border of La Plata County, Colorado and San Juan County, New Mexico.



Distribution in Colorado

State Range: La Plata County. The single location is on the New Mexico border. Most, or possibly all, plants are in New Mexico. Since the state boundary is unsurveyed, the presence of the species in Colorado is not certain.

Distribution/Abundance: There are estimated to be several thousand plants in the one location, mostly in New Mexico.

Known Threats and Management Issues: The rarity of this species, found in only one site, makes it extremely vulnerable to any threat, including direct disturbance, predation, disease, or climate change.

Potential Conservation Areas in La Plata County that support *Pediocactus knowltonii*: Cemetery Canyon.

***Penstemon lentus* (Abajo penstemon)**

Taxonomy

Class: Dicotyledoneae
Order: Scrophulariales
Family: *Scrophulariaceae*
Genus: *Penstemon*

Taxonomic Comments: Very similar to *Penstemon osterhoutii*, and considered to be synonymous by Weber (2001). Others find that it is distinct, based on its broader leaf shape and geographic separation (Cronquist *et al.* 1984).

CNHP Ranking: G4Q S2

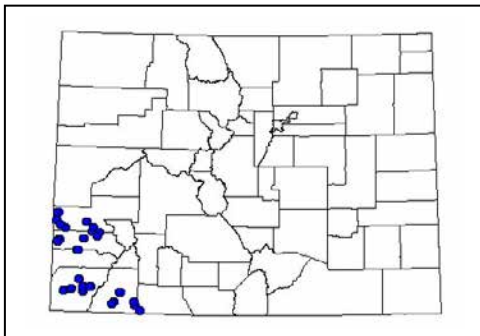
State/Federal Status: None

Description and Phenology: A tall, unbranched plant with broad, glaucous leaves and blue to magenta flowers in a raceme. Its broad, fleshy basal leaves are gray-green, contrasting with the red sandy soils on which it often grows. The plant appears to spread vegetatively, as well as by seed, and we found many basal leaves throughout the summer with no flowering stems. Plants flower in May and June.



Figure 45. *Penstemon lentus*. Photograph copyright CNHP by P. Lyon

Habitat Comments: Abajo penstemon is found in pinyon-juniper woodlands, often on eroded soils. Association species include mountain mahogany, cliff rose, Mormon tea, and Gambel oak. Elevations range from 5,200 to 7,600 feet. The plants we observed were growing on eroding soils, and seem to be well adapted to this situation by their long, elastic roots.



Distribution in Colorado

Global Range: Four Corners states: Colorado, New Mexico, Arizona and Utah. Ranked S3 (vulnerable) in New Mexico and SR (reported) in Arizona and Utah.

State Range: Archuleta, Dolores, La Plata, Montezuma, Montrose and San Miguel counties.

Distribution/Abundance: There are now 27 known occurrences, including six in La Plata County. Several are reported to have over 1000 individuals. Many others are based on herbarium specimens with no abundance information given.

Known Threats and Management Issues: The plants are evidently palatable to cattle and/or wildlife. The tops of many flowering stems observed had been eaten. Whether this has a positive or negative impact on an occurrence is unknown at this time. Direct disturbances associated with roads and oil and gas development may threaten some populations.

Potential Conservation Areas in La Plata County that support *Penstemon lentus*: Florida River Uplands, La Posta, Pine River Canal, and Spring Creek at Ignacio.

***Phlox caryophylla* (Pagosa phlox)**

Taxonomy

Class: Dicotyledoneae
Order: Solanales
Family: Polemoniaceae
Genus: *Phlox*

Taxonomic Comments: *Phlox caryophylla* Wherry differs from its near relative, *P. longifolia*, in the absence of a pleated calyx, and has little or no hyaline membrane separating segments of the calyx.

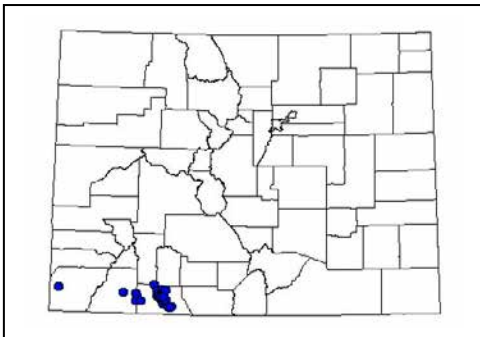
CNHP Ranking: G4 S3

State/Federal Status: None. Currently on list of species considered for inclusion on Forest Service sensitive species list for Region 2, but for which more information is needed.



Phenology: *Phlox caryophylla* blooms in April and May, and plants seen in June were withered and dried up.

Figure 46. *Phlox caryophylla*. Photo copyright © 1999 CNHP by P. Lyon



Colorado Distribution

Habitat Comments: *Phlox caryophylla* grows in open areas within the ponderosa pine zone.

Global Range: Pagosa phlox is known only from Colorado, in Archuleta and La Plata counties, and one county in New Mexico.

State Range: In Colorado the total range of *Phlox caryophylla* is very small, extending from Pagosa Springs to Durango. One historic record in Montezuma County is dubious.

Distribution/Abundance: Although *Phlox caryophylla* has a very limited distribution it is fairly abundant with 35 populations recorded within its limited range. All but four of these are in Archuleta County. There is one historic record from Montezuma County, which is questionable. One record from La Plata County is dated 1935, from Rules Hill area. The other two La Plata County records were found in 2001 by CNHP. They are both very close to the Archuleta County line, at Spring Creek and Lange Canyon. No new populations were found in 2003, a very dry year.

Known Threats and Management Issues: Threats to *Phlox caryophylla* include destruction of individuals due to human activities (residential development, recreation, road and trail maintenance activities, selection of grazing areas) and invasion by exotic plant species.

Potential Conservation Areas in La Plata County that support *Phlox caryophylla*: Lange Canyon, Spring Creek at Ignacio.

Polypodium hesperium (Western polypody)

Taxonomy

Class: Filicopsida

Order: Filicales

Family: *Polypodiaceae*

Genus: *Polypodium*

Taxonomic Comments: None.

CNHP Ranking: G5 S1S2

State/Federal Status: None

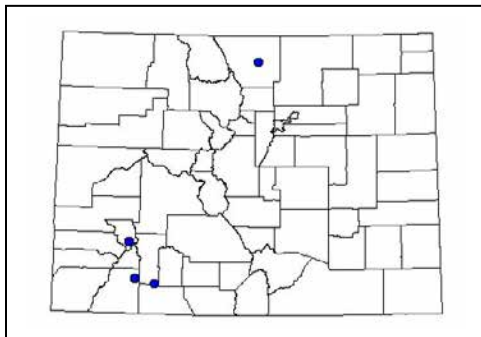
Description: Western polypody is a small fern with evergreen, triangular pinnatifid fronds. Its sori are disk shaped and lack indusia.

Habitat Comments: The ferns are found in crevices of rock outcrops, or at the base of large boulders, in montane or subalpine zones.

Global Range: Western U. S. and Canada. Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington, Wyoming. Alberta, British Columbia.



Figure 47. *Polypodium hesperium*. Photograph copyright CNHP by P. Lyon



Distribution in Colorado

State Range: La Plata, Larimer and Ouray counties.

Distribution/Abundance: There are eight occurrences in Colorado, five of them in Ouray County, and one each in Archuleta, Larimer and La Plata.

Known Threats and Management Issues: Most occurrences are naturally protected from disturbance by their location in rock outcrops.

Potential Conservation Areas in La Plata County that support *Polypodium hesperium*: Vallecito Creek-Johnson Creek

Salix candida (Hoary willow)

Taxonomy

Class: Dicotyledoneae

Order: *Salicales*

Family: *Salicaceae*

Genus: *Salix*

Taxonomic Comments: *Salix candida* Fluggé ex Willd.

CNHP Ranking: G5 S2

State/Federal Status: Forest Service Sensitive

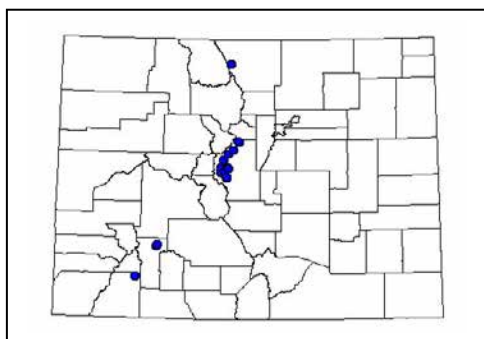
Description: *Salix candida* is an inconspicuous willow, with unbranched stems, except at the apex. Its capsules are hairy. New twigs are tomentose with matted hairs, and the narrowly oblong leaves are white tomentose beneath.

Habitat Comments: This willow grows in wetlands, often with bog birch (*Betula glandulosa*).

Global Range: Widespread in northern U. S. and Canada. Colorado is at the southern extent of its range.



Figure 48. *Salix candida*. Photograph copyright Wisconsin State Herbarium by Eric J. Epstein



Distribution in Colorado

State Range: Gunnison, Hinsdale, La Plata, Larimer and Park counties, most in Park County.

Distribution/Abundance: The majority of occurrences are in Park County, where some have over 5000 individuals. It is considered secure in Canada, becoming more rare in the southern part of its range. Colorado represents the southernmost occurrences. There are 18 occurrences in the CNHP database, centered in Park County.

Known Threats and Management Issues: Maintenance of a natural hydrologic regime is critical to this species.

Potential Conservation Areas in La Plata County that support *Salix candida*: Vallecito Creek-Johnson Creek.

Stellaria irrigua (Altai chickweed)

Taxonomy

Class: Dicotyledoneae

Order: *Caryophyllales*

Family: *Alsiniaceae*

Genus: *Stellaria*

Taxonomic Comments: none.

CNHP Ranking: G4? S2

State/Federal Status: None

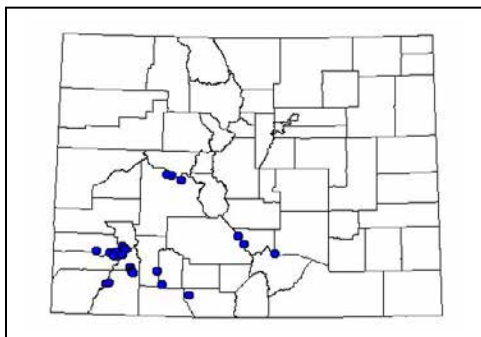
Descriptions: The flowers of *Stellaria irrigua*, only about a quarter of an inch in diameter, are exquisite when viewed closely. Each of its five petals is cleft to the base, and touches its neighboring petal segment at the tip, forming a five-pointed star. The stamens are opposite and nearly as long as the petals. The leaves are purplish green. The roots are long and elastic, allowing the plants to advance along with the downward creep of the rocks in the talus areas where it grows.



Figure 49. *Stellaria irrigua*. Photograph copyright CNHP by P. Lyon

Habitat Comments: talus with some soil. This tiny plant grows in the most inhospitable habitat imaginable: barren scree slopes high in the mountains.

Global Range: Colorado and New Mexico. This plant is found in North America only in Colorado and New Mexico, but is also found in the Altai region of Siberia, where it is rare. It is one of several plants that share this disjunct distribution, suggesting that the two areas were once connected by habitat suitable to those species (Weber 1986).



Distribution in Colorado

State Range: Gunnison, Hinsdale, La Plata, Montezuma, Mineral, Conejos, San Juan and San Miguel counties.

Distribution/Abundance: There are 28 occurrences in the CNHP database. However, only 8 are ranked: 4 as A (excellent) and 4 as B (good). Eleven are historic occurrences. The species may be locally abundant. It is ranked S2 in New Mexico.

Known Threats and Management Issues: *Stellaria irrigua* grows in talus areas, a habitat that is seldom disturbed, except by natural movement of rock, for which the species is well adapted. However, roads and mining could threaten some populations.

Potential Conservation Areas in La Plata County that support *Stellaria irrigua*: Columbine Pass-Chicago Basin, Vallecito Creek-Johnson Creek, and Cumberland Basin.

Townsendia glabella (Gray's townsend-daisy)

Taxonomy

Class: Dicotyledoneae

Order: *Asterales*

Family: *Asteraceae*

Genus: *Townsendia*

Taxonomic Comments: *Townsendia glabella* A. Gray was first described as *T. bakeri* Greene in 1900. The type specimen was collected at Los Pinos in Archuleta County in 1899.

CNHP Ranking: G2 S2

State/Federal Status: None. Currently on list of species considered for inclusion on Forest Service sensitive

species list for Region 2, but for which more information is needed.



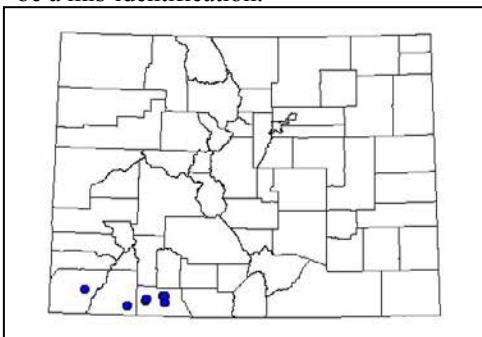
Figure 50. *Townsendia glabella*. Photograph copyright CNHP by P. Lyon

Description and Phenology: *T. glabella* is an herbaceous caespitose perennial, with bluish-white flowers. Leaves are glabrous, distinguishing it from the more common *T. incana*, which has cinereous leaves. Plants flower in May and June.

Habitat Comments: *Townsendia glabella* grows on level to steeply sloping shale slopes with clay soils derived from Mancos Shale in the ponderosa pine zone between 6500 and 8500 ft.

Global Range: This species is endemic to Colorado in Montezuma, La Plata, and Archuleta counties, Colorado, and is known from at most 10 to 20 locations.

State Range: In Colorado the total range of *Townsendia glabella* is very small, extending from Pagosa Springs to Durango, and one occurrence in Mesa Verde N.P. A record from Grand Junction is suspected to be a mis-identification.



Distribution in Colorado

Distribution and Abundance: *Townsendia glabella* has a very limited distribution it is rare throughout its limited range. The center of its distribution appears to be in Archuleta County near Pagosa Springs. Two historic records from La Plata County are represented by specimens at the University of Colorado Herbarium. They are from "east of Mancos Hill" and "west of Hesperus". Although much potential habitat was searched in 2003, no occurrences were found in La Plata County. However, further inventory in a wetter year is recommended.

Known Threats and Management Issues: Threats to *Townsendia glabella* include direct disturbance on individuals from human activities (recreation, road and trail maintenance activities, selection of grazing areas) and invasion by exotic plant species.

Potential Conservation Areas in La Plata County that support *Townsendia glabella*: none (historic records only)

Townsendia rothrockii (Rothrock's Easter daisy)

Taxonomy

Class: Dicotyledoneae

Order: Asterales

Family: Asteraceae

Genus: *Townsendia*

Taxonomic Comments:

CNHP Ranking: G2 S2

State/Federal Status: None.

Currently on list of species considered for inclusion on Forest Service sensitive species list for Region 2, but for which more information is needed.

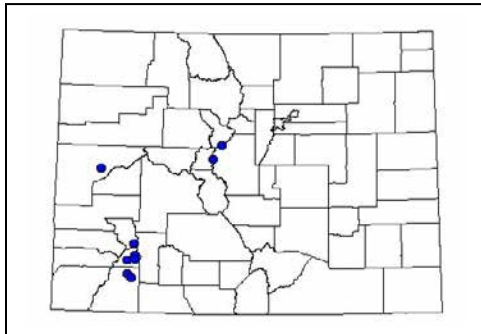
Description and Phenology:

Rothrock's Easter daisy is a perennial herb that forms low tufts of thick leaves, 1-3.5 cm long. Large, showy flower heads with pale blue rays surround a yellow disk. The plants begin to bloom as the snow melts in early summer.



Figure 51. *Townsendia rothrockii*. Photograph copyright CNHP by P. Lyon

Habitat Comments: Rothrock's Easter daisy grows in dry, rocky tundra above timberline in areas that retain snow into the summer, as well as occasionally on high plateau ridgetops and in openings in ponderosa pine forests, between 8,200 and 13,000 ft. The two occurrences in La Plata County, at Endlich Mesa and Lime Mesa, share similar habitats: fellfields, with shallow rocky soils over limestone, between 11,000 and 12,000 ft.



Distribution in Colorado (CNHP records only)

information as to abundance. The two sites found in La Plata County this year each have thousands of individuals.

Known Threats and Management Issues: No immediate threats are known. Trails run through both populations in La Plata County, and direct disturbances may affect certain individuals, but no damage was noted. The rarity of this endemic plant would recommend it for addition to the Forest Service sensitive species list.

Potential Conservation Areas in La Plata County that support *Townsendia rothrockii*: Lime Mesa, Endlich Mesa.

Global Range: Endemic to Colorado

State Range: Park, San Juan, La Plata, Chaffee, Gunnison, Dolores, Lake, Mesa, Pitkin, Summit counties.

Distribution/Abundance: There are eight occurrences in the CNHP database, and 27 specimens at the University of Colorado Herbarium. Most of these occurrences have no

Woodsia neomexicana (New Mexico cliff fern)

Taxonomy

Class: Filicopsida

Order: *Filicales*

Family: *Dryopteridaceae*

Genus: *Woodsia*

Taxonomic Comments: Weber (2001) puts this in the family *Woodsiaceae*.

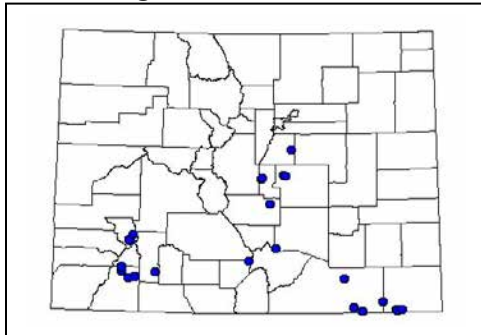
CNHP Ranking: G4? S2

State/Federal Status: None. Currently on list of species considered for inclusion on Forest Service sensitive species list for Region 2, but for which more information is needed.

Description : A fern with pinnately compound fronds. It can be distinguished from the superficially similar common species *Cystopteris fragilis* by the indusium at base of the sorus, which splits evenly all around in a stellate pattern at maturity, as opposed to the one-sided indusium, attached like a hood, of *Cystopteris*. It can be distinguished from other species of *Woodsia* by its light brown or straw-colored stipe and translucent projections on the leaf margins.

Habitat Comments: *Woodsia neomexicana* is always found in crevices of rocks or cliffs, not in soil. Elevations of the species in Colorado range from 4,200 to 9,500 ft.

Global Range: Arizona, Colorado, New Mexico, Oklahoma, South Dakota, Texas and Utah.



Distribution in Colorado

State Range: Nine counties: Alamosa, Baca, Douglas, El Paso, Fremont, La Plata, Las Animas, Ouray and Teller counties.

Distribution/Abundance: There are 28 occurrences in the CNHP database. There are usually fewer than 50 individuals per occurrence, many with only 10 or 12. The La Plata County occurrence found this year east of Electra Lake is among the largest in Colorado with 60 clumps counted.

Known Threats and Management Issues: None. Most occurrences are naturally protected by their location in rock crevices.

Potential Conservation Areas in La Plata County that support *Woodsia neomexicana*: Vallecito Creek, Cascade Creek, Electra Lake, and Lost Lake.

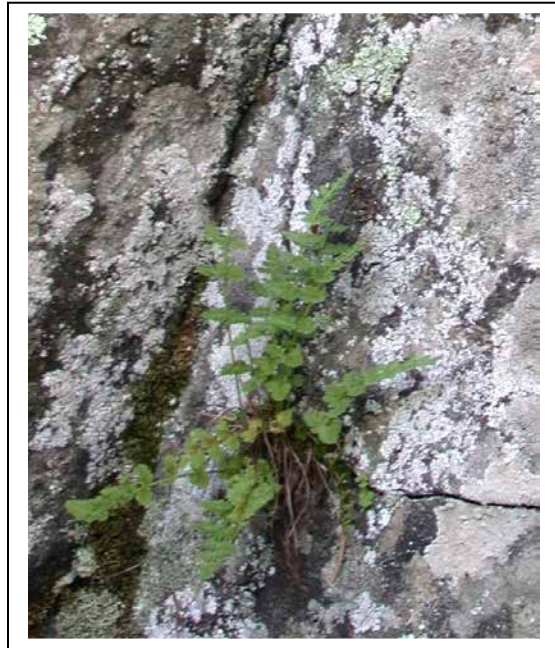


Figure 52. *Woodsia neomexicana*. Photograph copyright CNHP by P. Lyon

Non-Native Plants (Weeds)

Non-native plant species in La Plata County include noxious weeds that were introduced accidentally and have become aggressive invaders, as well as species planted for pasture or soil stabilization or as ornamentals that have become naturalized. There are also a number of less troublesome species that nevertheless are out of place and may replace native species. The most frequently encountered noxious weeds during this survey are listed and described below (Table 10).

The Colorado Department of Agriculture is in the process of revising the rules regarding noxious species in Colorado. The goals of the program are “to prevent the introduction of new invasive plant species, eradicate species with isolated or limited populations, and contain and manage those invasive species that are well established and widespread in Colorado.” The proposed rules list non-native plants in three categories. List A includes species that are not yet established in Colorado and have a chance of being eradicated or prevented from becoming troublesome. List B includes species that are already established and are serious enough that they should be controlled or at least reduced in so far as it is possible. List C includes plants that are not native or desirable, but less threatening than those on List B. Each county will have the option of raising the level of species that are particularly troublesome in their area. No species from List A were encountered in La Plata County during this survey. Species from List B, in order of frequency, are listed in Table 10: These species are described below. See Appendix (Species Lists) for locations where each species was observed in La Plata County.

Table 10. Non-native plants from List B, Colorado Dept. of Agriculture, most frequently encountered in La Plata County

<u>Scientific name</u>	<u>Common name</u>
<i>Cirsium arvense</i>	Canada thistle
<i>Carduus nutans</i>	Musk thistle
<i>Cynoglossum officinale</i>	Houndstongue
<i>Leucanthemum vulgare</i>	Oxeye daisy
<i>Convolvulus arvensis</i>	Field bindweed
<i>Acoptilon repens</i>	Russian knapweed
<i>Cirsium vulgare</i>	Bull thistle
<i>Linaria vulgaris</i>	Yellow toadflax
<i>Onopordum acanthium</i>	Sotch thistle
<i>Centaurea maculosa</i>	Spotted knapweed



Figure 54. Canada thistle (*Cirsium arvense*)

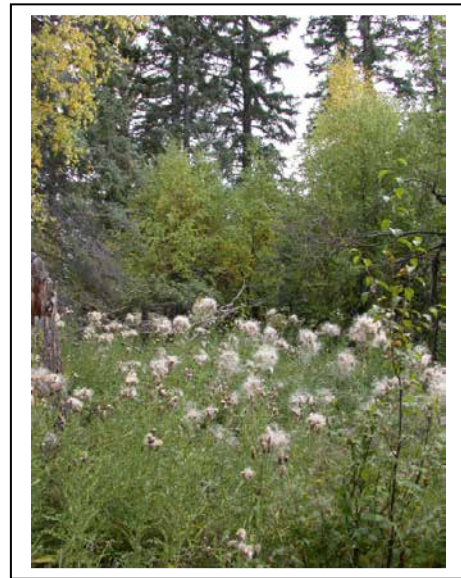


Figure 53. Canada thistle in seed at Haviland Lake. Photo © CNHP, M. J. Lyon

Canada thistle (*Cirsium arvense*): The most frequently encountered noxious weed in La Plata County was Canada thistle. This thistle is rhizomatous, spreading by underground stems as well as by seed, making it very difficult to control. It was found in all parts of La Plata County, particularly in moist disturbed areas. It is common in open meadows, roadsides, fields, pastures, meadows, and other disturbed areas, but also invades native plant communities.

Musk thistle (*Carduus nutans*): Although it spreads by seed, not rhizomes, this thistle can form dense stands. Musk thistle is a problem on range and pastures because it competes with desirable forage, and its sharp spines can limit recreation, hinder movement, and deter livestock, and presumably wildlife, from grazing (FEIS 2004). The key to successful management of musk thistle is to prevent seed production (FEIS 2004).



Figure 55. Musk thistle (*Carduus nutans*). Photo © CNHP by P. Lyon



Figure 56. Houndstongue (*Cynoglossum officinale*) Photo

Houndstongue (*Cynoglossum officinale*), a native of Eurasia, is widespread throughout the United States. Houndstongue is a biennial with a thick woody taproot and reddish purple flowers. The fruits have barbs that cling to animals and allow the seeds to be dispersed. Houndstongue is toxic to horses and cattle. Alkaloids contained within the plant may cause liver cells to stop reproducing.

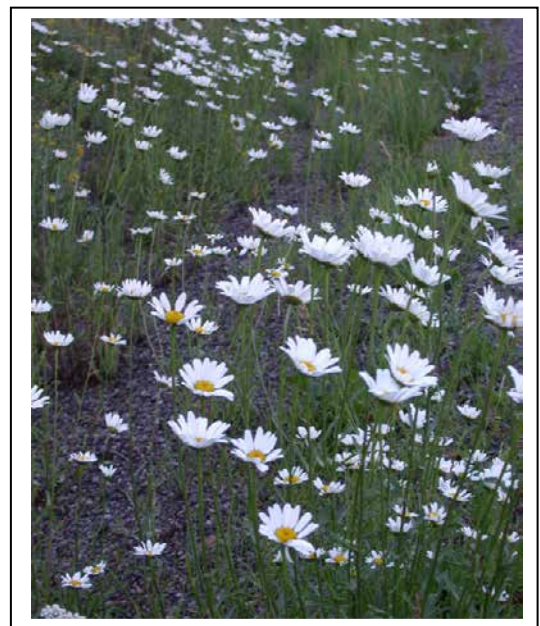


Figure 57. Oxeye daisy (*Leucanthemum vulgare*) Photo © CNHP by P. Lyon

Oxeye daisy (*Leucanthemum vulgare*) is found throughout La Plata County, from the high elevation meadows near Purgatory to pastures south of Ignacio. The admittedly attractive flowers make it difficult to engender public support for controlling this invasive species. However, the rate of increase of this plant has been drastic, and it has displaced native plants in many areas.



Field bindweed (*Convolvulus arvensis*), the familiar pink and white “morning glory” of roadsides, is a perennial vine of disturbed areas. However, in pastures and gardens it becomes an extremely difficult pest to control, winding around the stems of desirable plants.

Convolvulus arvensis

et al.,

Figure 58. Field bindweed (*Convolvulus arvensis*) Photo by The Nature Conservancy, <http://tncweeds.ucdavis.edu/esadocs/convarve.html>

Russian knapweed (*Acroptilon repens*), native to Eurasia, was introduced into North America in the late 1800's. Absent only from southeastern U.S., it has become widespread in other regions. Russian knapweed is a deep-rooted long lived perennial. Some stands have been in existence for 75 years. It forms dense colonies in cultivated fields, orchards, pastures, and roadsides. Once established, it is difficult to eradicate. It is poisonous to horses causing "chewing disease."



Figure 59. Russian knapweed (*Acroptilon repens*) Photo ©Eric Coombs, Oregon Department of Agriculture, www.invasive.org.



Figure 60. Bull thistle (*Cirsium vulgare*)

Bull thistle (*Cirsium vulgare*) is a tall, coarse biennial with stiff spreading spines. The rose to magenta flowers may be up to 2 1/2 inches in diameter. The species can be recognized by the spines that occur on the tops of the leaves. Introduced from Eurasia, it inhabits dry fields, roadsides and waste places.



Figure 61. Yellow toadflax (*Linaria vulgaris*)

Scotch thistle (*Onopordum acanthium*) is a tall, branched, robust biennial with very tomentose foliage. It often grows 8 feet or more in height and 6 feet in width. Upper and lower leaf surfaces are covered with a thick mat of cotton-like or woolly hairs, which give the foliage a gray-green appearance. Infestations of Scotch thistle reduce forage production and virtually prohibit land utilization for livestock. Scotch thistle can spread rapidly, and one plant may produce 8,400 to 40,000 seeds. It thrives in light, well-drained, and sandy or stony soils (Piper 1984).



Figure 62. Scotch thistle (*Onopordum acanthium*) photo © Gary A. Monroe @ USDA-NRCS PLANTS Database



Figure 63. Spotted knapweed (*Centaurea maculosa*)

Spotted knapweed (*Centaurea maculosa*) is a biennial or short-lived perennial composite with a stout taproot. A native of Europe, *C. maculosa* was accidentally introduced to North America. Seeds germinate in fall and early spring. Thirty percent of seeds may be viable after eight years of burial (Davis and Fay 1991 <http://tncweeds.ucdavis.edu/esadocs/centmacu.html>). Up to 146,000 seeds per square meter have been reported.

Rare and Imperiled Animals of La Plata County

Nineteen animals that are tracked by CNHP were documented from La Plata County. They include 10 bird species, one insect, two fish and six mammals. They are listed in Table 11. Species in bold type were documented in 2003 and are included in Potential Conservation Areas. Those species are described below, arranged alphabetically within each major group. Several of the animals listed in Table 11 are known only from historic occurrences (e.g. Nokomis fritillary) or are believed extirpated from the area (e.g. wolverine, black-footed ferret). In addition to the species tracked by CNHP, there were several noteworthy species observed that are on CNHP's watchlist—apparently secure, but will be monitored for any change in status. They include: painted turtle (*Chrysemys picta*), white-faced ibis (*Plegadis chihi*), Lewis's woodpecker (*Melanerpes lewis*), northern leopard frog (*Rana pipiens*) and smooth green snake (*Liochlorophis vernalis*). Other species that were targeted during the field season included rosy finch, ptarmigan, black swift, yellow-bellied cuckoo, boreal toad, several bats, sharp-tailed grouse, plateau striped whiptail and willow fly-catcher.

Table 11. Rare and Imperiled Animals of La Plata County.

Scientific Name	Common Name	Global Rank	State Rank	State/Federal Status	Last documented
Birds					
<i>Coccyzus americanus occidentalis</i>	Western Yellow-billed Cuckoo	G5T3	SNA	FS/BLM	1983
<i>Dendroica graciae</i>	Grace's Warbler	G5	S3B		2003
<i>Egretta thula</i>	Snowy Egret	G5	S2B		2003
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	G4T3	S2B	FS	2003
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B,S3N	LT	2003
<i>Himantopus mexicanus</i>	Black-necked Stilt	G5	S3B		2003
<i>Phalaropus tricolor</i>	Wilson's Phalarope	G5	S4B,S4N		2003
<i>Sterna forsteri</i>	Forster's Tern	G5	S2B,S4N		2003
<i>Tympanuchus phasianellus columbianus</i>	Columbian Sharp-tailed Grouse	G4T3	S2	FS/BLM	1969
<i>Vireo vicinior</i>	Gray Vireo	G4	S2B		2003
Fish					
<i>Gila robusta</i>	Roundtail Chub	G3	S2	BLM	2003
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River Cutthroat Trout	G4T3	S3	BLM	2003
Insects					
<i>Speyeria nokomis nokomis</i>	Nokomis fritillary	G3T1	S1	BLM	1981
Mammals					
<i>Cynomys gunnisoni</i>	Gunnison's Prairie Dog	G5	S5		2003
<i>Gulo gulo</i>	Wolverine	G4	S1	FS	1979
<i>Lynx canadensis</i>	Lynx	G5	S1	LT	1911
<i>Mustela nigripes</i>	Black-footed Ferret	G1	S1	LE	1953
<i>Plecotus townsendii pallescens</i>	Townsend's Big-eared Bat Subsp	G4T4	S2	FS/BLM	1993
<i>Sorex nanus</i>	Dwarf Shrew	G4	S2	FS	1965

Dendroica graciae (Grace's Warbler)

Taxonomy

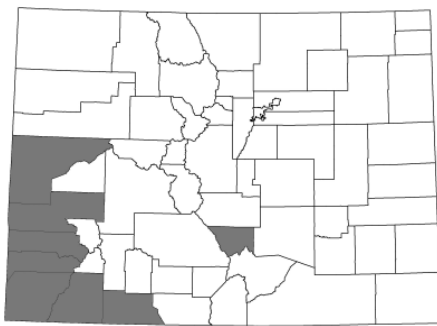
Class: Aves
Order: Passeriformes
Family: Parulidae
Genus: *Dendroica*

Taxonomic Comments: Grace's Warbler may constitute a superspecies with *D. dominica*, *D. adelaidae* and *D. pityphila* (AOU 1998).

CNHP Ranking: G5 S3B, SZN

State/Federal Status: None.

Phenology: Grace's Warblers begin arriving at nesting areas in late-April with mating and nest building taking place in May. Incubation of eggs extends from late-May to early-June and young leave the nest from late-June to mid-July (Levad 1998).



Colorado Distribution
(adapted from Kingery 1999)

Global Range: The Grace's Warblers found in Colorado breed from southern Nevada, southern Utah, southwestern Colorado, northern New Mexico, and western Texas south through eastern Sonora and western Chihuahua

State Range: In Colorado, Grace's Warblers occupy the southwest portion of the state including Mesa, Montrose, San Miguel, Montezuma, La Plata and Archuleta counties. There is a disjunct population in the Wet Mountains of Custer County.

Habitat Comments: Grace's Warbler is found in open pine forest, pine-oak association and pine savanna (Tropical to Temperate zones; AOU 1998). They usually nest on the outer limbs of pine, anywhere from six to 18 meters above ground.

Distribution/Abundance: Grace's Warbler is quite common in the appropriate habitat. The species has expanded its range northward and recent population trends appear stable, but there is some evidence of declines in the southwest. North American Breeding Bird Survey (BBS) data is probably most reliable for the recent period from 1980 to 1996, for which trends are stable survey-wide (0.0 percent average annual population change, n=29 survey routes). Thirty-year BBS data, 1966-1996, show steeply negative trends but none are statistically significant. The thirty-year trend estimates may be confounded by low sample sizes for the period 1966-1979 when only 9 routes total were run survey-wide, so they must be interpreted with caution. Trend estimates for 1966-1979 show steep, statistically significant declines but are based on too few samples to be reliable (Sauer et al. 1997). A reanalysis by Miller (1992), however, found declining trends on selected BBS routes in Arizona (n=5) and New Mexico (n=6) that run through managed ponderosa pine forests. In the 1970s, Grace's Warblers expanded their range into California and Nevada where they were previously unknown, and breeding populations were established in five mountain ranges in southern Nevada by the early 1970s (Johnson 1994). DeSante and George (1994)



Figure 64. *Dendroica graciae*. Photo courtesy of Mike Danzenbaker

<http://www.avesphoto.com/website/NA/>

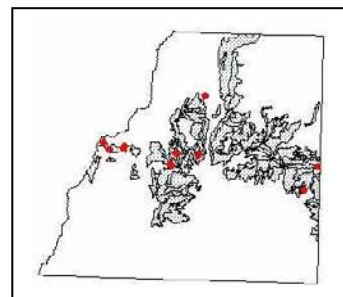


Figure 65. Distribution of Grace's warbler in La Plata County. Shaded areas are mapped as ponderosa pine.

suggest populations have increased in Colorado and Nevada due to a northward range expansion. Brawn and Balda (1988) hypothesized that populations in the southwestern U.S. have increased from presettlement times due to an increase in intermediate-aged trees, and hence an increase in foliage productivity. Scurlock and Finch (1997) compared relative abundance descriptions from accounts in 1911, 1928, and 1961 and suggest the species has increased in this century. Of historical note, in the 1860s Dr. Elliott Coues, who first described Grace's warbler for western science, wrote that it was the most abundant bird after the Audubon's warbler (*Dendroica coronata*) in montane Arizona pine forests (Bent 1953).

Known Threats and Management Issues: There is little knowledge of direct threats, but large-scale clear-cutting and extensive overstory removal is detrimental (NatureServe Explorer 2003). Current pressures to harvest timber at accelerated rates in Mexico and Central America will likely impact the species. Fires that kill canopy trees are also detrimental. The absence of Grace's Warblers from burned and salvage-logged plots in a large wildfire in a northern Arizona ponderosa pine forest is presumably related to loss of the forest canopy (Finch et al. 1997). In New Mexico, Johnson and Wauer (1996) studied changes over 14 years after the 1977 La Mesa wildfire and found that abundance declined on plots where scorch or crown fire killed trees. Note, however, that fire plays an important role in ponderosa pine forests and fire patterns in southwestern ponderosa pine have changed dramatically in this century. Ponderosa pine forests evolved with frequent, low intensity fires, which created open stands of larger trees. Today, fire suppression has altered the forest structure, allowing the growth of more small-diameter trees per acre, creating "ladder fuels" that carry fire to the forest crown, and leading to larger, more severe or lethal fires (see Moir et al. 1997). Understory burns that do not kill the canopy foliage may not significantly affect Grace's Warbler, but the response to different fire regimes and post-fire ecology needs study. No information is available on response to urbanization or recreation, but Marzluff (1997) hypothesizes that the abundance or productivity of canopy-nesting warblers may moderately decline from effects of urbanization through increased predation, habitat loss, and road development; and through the effects of camping and hiking through habitat changes and disturbance. In summary, the upper canopy of pine forests is important foraging and nesting habitat and activities that reduce or clear pine forests or degrade the forest canopy or prey availability would be detrimental. Activities that reduce or remove understory shrubs and other vegetation (e.g. shrub eradication, grazing, fire) may have less impact, but the importance of understory vegetation to this species is poorly understood. Szaro and Balda (1979a), however, found that Gambel oak on open forest sites was used more often than predicted based on the shrub's availability. In addition, Brawn and Balda (1988) reported higher breeding densities in plots with moderate or high oak density than in plots with no oak or low oak density.

Potential Conservation Areas that support *Dendroica graciae*: Cherry Creek, Durango West, Bayfield Northeast and Lower Hermosa Creek.

Egretta thula (Snowy egret)

Taxonomy

Class: Aves
Order: Ciconiiformes
Family: Ardeidae
Genus: *Egretta*

Taxonomic Comments: None.

CNHP Ranking: G5 S2B

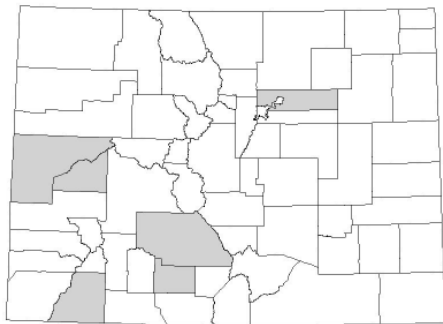
State/Federal Status: None.

Description and Phenology: Snowy egret is a medium-sized, long-legged wading bird with entirely white plumage. Its average length is 20 inches, with a wingspan of 38 inches. Eggs are laid usually April to May or June in north. Clutch size usually is 4-5 in north, 2-4 in south. Incubation lasts 18 days or longer, by both sexes. Young leave the nest at 20-25 days. Snowy egrets often nests in large colonies. Birds forage during daylight (Powell 1987). Their diet consists primarily of aquatic insects, with lesser amounts of fish, reptiles, amphibians and small mammals.

Global Range: Snowy egret has a very large range, extending from the U. S. and Canada to southern South America. In the U. S., the highest densities in the winter are the Gulf Coast of Texas and Louisiana, the mouth of the Mississippi River, the lower Colorado River, and Florida.



Figure 66. *Egretta thula*.
Photo © Mark Thomas



Distribution of snowy egret in Colorado.

State Range: CNHP has records of seven occurrences in Colorado, from Adams, Delta, La Plata, Mesa, Rio Grande and Saguache counties. The La Plata County occurrence was new in 2003, at Pastorius Reservoir.

Habitat comments: Snowy egret inhabits marshes, lakes, ponds, mangroves and shallow coastal habitats. In Colorado, reservoirs are often utilized. The birds nest in trees or shrubs, or on the ground.

Distribution/Abundance: Although the snowy egret is globally secure, it is rare in some areas due to loss or

degradation of wetland habitats.

Known threats and management issues: Threats include clearing of flood plain forests, loss and degradation of wetlands. In Idaho, reduced reproductive success was attributed to DDE residues accumulated in the non-breeding season in Mexico (Findholt 1984).

Potential Conservation Areas that support *Egretta thula*: Pastorius Reservoir

Falco peregrinus anatum (American Peregrine Falcon)

Taxonomy

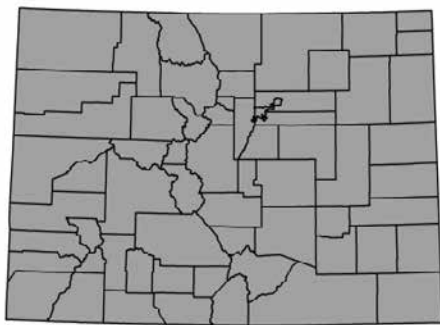
Class: Aves
Order: Falconiformes
Family: Falconidae
Genus: *Falco*

Taxonomic Comments: Three of the approximately 20 recognized subspecies occur in North America (Brown and Amadon 1968); only *Falco peregrinus anatum* (the American Peregrine Falcon) occurs in Colorado (U.S. Fish and Wildlife Service 1984).

CNHP Ranking: G4T3 S3B, SZN

State/Federal Status: Colorado species of special concern; removed from federal endangered species list in August 1999.

Habitat Comments: In western North America, Peregrine Falcons nest on ledges of high cliffs in the foothills and mountains from



American Peregrine Falcon distribution (all seasons) in Colorado (adapted from Andrews and Righter 1992)

4,500 to over 9,000 ft (1,388 to 2,776 m) in elevation (U.S. Fish and Wildlife Service 1984). The steepest and most inaccessible locations on the tallest cliffs are preferred, especially those that offer flat, protected ledges at least 18 inches wide, with sheer rock above and below (Johnsgard 1979). Peregrine Falcons formerly nested at sites that were much more accessible than tall cliffs; human disturbance at these accessible sites has precluded their use by the birds (Kingery 1998). In Colorado, pinyon/juniper woodland occurs in the vicinity of about half of all Peregrine Falcon nest sites, and ponderosa pine woodland or forest is found at about one-quarter of the sites (Kingery 1998). Peregrine Falcons in the midwestern and eastern states, where high cliffs generally are unavailable, often nest on human-made structures such as buildings, bridges, and smokestacks (87 percent of midwestern pairs (Tordoff *et al.* 1998) and 33 percent of eastern pairs (Cade *et al.* 1996). Preferred habitats for hunting include agricultural lands, meadows, drainage bottoms, marshes, and lakes (U.S. Fish and Wildlife Service 1984). Migrating and wintering birds often are associated with reservoirs, rivers, and marshes, but they also use grasslands and agricultural areas (Enderson 1965, Andrews and Righter 1992).

Distribution/Abundance: The Peregrine Falcon was once one of the most widely-distributed birds in the world, occurring on all continents except Antarctica, and on many islands (Hickey and Anderson 1969). Throughout its range, the species has undergone major reductions in numbers and density (Hickey 1969). From 1950 to 1965, a severe decline in numbers occurred in Peregrine Falcon breeding populations in North America and in parts of Europe (Hickey 1969). In the Rocky Mountain region, only one-third of historical Peregrine nest sites were still occupied by 1965 (Enderson 1969). By 1971, the North American breeding range, which had formerly covered most of the continent, included only Canada, Alaska, and Baja, California (Cade 1971). In 1977, the Colorado population reached a low of four breeding pairs (Gray 1995). By 1995, due to an intensive program of captive breeding and reintroduction, Peregrines occupied 71 breeding sites in Colorado (Kingery 1998). Today, Peregrine Falcons breed along the foothills of



Figure 67. American peregrine falcon. Photo courtesy USFWS

Colorado's Front Range and (in higher concentrations) in the river valleys and canyons of the Western Slope (Kingery 1998). *Falco peregrinus anatum* nests across Alaska and Canada and throughout much of the western United States to central Mexico (U.S. Fish and Wildlife Service 1999). More northerly-breeding members of this subspecies migrate long distances to wintering areas in South America, whereas more southerly-breeding individuals show more variable migratory behavior (some migrate relatively short distances within western North America and others do not migrate at all) (Yates *et al.* 1988).

Important Life History Characteristics: Peregrine Falcons show very strong fidelity to nesting territories; individual birds commonly return to the same territories year after year (Tordoff and Redig 1997). Peregrine Falcons do not build their own nests, but instead they use old nests of eagles, hawks, or ravens (Hickey and Anderson 1969). A nest site may be reused by Peregrines (different individuals) for decades (Hickey 1942, Cade *et al.* 1967) or even centuries (Ferguson -Lees 1957). Mated pairs of Peregrines defend an area of about 90 m around the nest by performing a sky dance and a high, circling display (Kingery 1998). The female does most of the incubating of the eggs; the male supplies her with food and sometimes relieves her at the nest (Johnsgard 1979). The female also does most of the brooding and feeding of the young during the first two weeks after hatching; later, both parents drop prey items into the nest, where the young must compete for them (Johnsgard 1979). After the young have left the nest, they remain in the area for several weeks (mid-June to mid-July) and they are fed and protected by both adults (U.S. Fish and Wildlife Service 1984). Peregrine Falcons may travel up to 17 miles from their nesting sites to the areas where they hunt (Porter and White 1973, Enderson and Craig 1997). Mated pairs of Peregrines sometimes hunt cooperatively, with one falcon frightening potential prey (birds) into flight paths along which they are vulnerable to attack by the other falcon (Snow 1972). Prey of the Peregrine Falcon includes many types of birds, especially domestic pigeons, wild ducks and other waterfowl, and shorebirds, as well as mammals, fishes (see White and Roseneau 1970), and invertebrates (i.e., beetles, dragonflies, butterflies) (Hickey and Anderson 1969). Flight speeds of 62 mph (horizontal flight, Portal 1922 [cited by Terres 1980]) and 175 mph (diving for prey, Lawson 1930 [cited by Terres 1980]) have been recorded for Peregrine Falcons.

Known Threats and Management Issues: The severe population declines experienced by Peregrine Falcons in North America were primarily due to the effects of pesticides, particularly DDT and dieldrin (Nisbet 1988, Peakall and Kiff 1988, Risebrough and Peakall 1988). Reproductive symptoms of pesticide exposure included failure to lay eggs, reduced clutch size, excessively thin eggshells, embryonic mortality, nestling mortality, and failure to re-lay after loss of the first clutch (Cade *et al.* 1988). Through captive breeding and reintroduction programs, many agencies and organizations have successfully restored Peregrine Falcon populations to portions of the species' historical range, including Colorado (Andrews and Righter 1992). Direct, human-caused mortality may result from shooting (Bond 1946, Cade 1960, Enderson 1965), poisoning (Enderson 1965, Reichel *et al.* 1974), egg collecting (Rice 1969:159) or capture-related deaths caused by falconers (Bailey and Niedrach 1965). Historically, the direct killing of Peregrines by pigeon fanciers caused serious reductions in Peregrine populations in the United States and Europe (Mebs 1960 [cited by Olsen and Olsen 1980], Mebs 1969, Herbert and Herbert 1969, Hickey and Anderson 1969). Peregrines sometimes are killed by collisions with powerlines as they dive at high speeds after prey (Herren 1969, U.S. Fish and Wildlife Service 1984), and collisions with human-made objects are the leading cause of death and injury among midwestern Peregrines (Redig and Tordoff 1994, cited by Sweeney *et al.* 1997). Human disturbance at nest sites may cause nest abandonment (Herbert and Herbert 1965, Mebs 1969, Snow 1972, Olsen and Olsen 1980, U.S. Fish and Wildlife Service 1984). The increasing popularity of recreational rock climbing in North America is becoming a serious problem for natural resource managers who are trying to protect nesting Peregrine Falcons (Ratcliffe 1969, U.S. Fish and Wildlife Service 1999).

Potential Conservation Areas that support *Falco peregrinus anatum*: Animas City Mountain, Hermosa Cliffs, Tuckerville

Haliaeetus leucocephalus (Bald Eagle)

Taxonomy

Class: Aves
Order: Falconiformes
Family: Accipitridae
Genus: *Haliaeetus*

Taxonomic Comments: none.

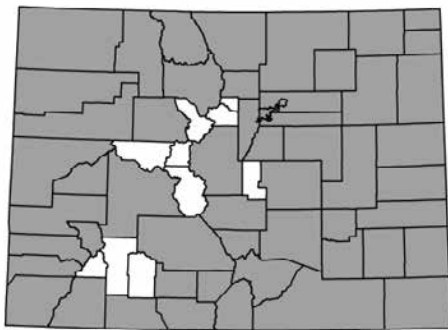
CNHP Ranking: G4 S1B, S3N

State/Federal Status: Listed as federally threatened (LT).



Figure 68. Bald eagle. Photo copyright © M. Kiesling

Habitat Comments: Breeding habitat for Bald Eagles consists of forested areas near large bodies of water (Andrew and Mosher 1982, Usgaard and Higgins 1995). Nests typically are placed in tops of tall trees located near suitable foraging habitat (Anthony and Isaacs 1989, Kralovec *et al.* 1992). Factors affecting the quality of foraging habitats include the characteristics of the prey base (Livingston *et al.* 1990), the structure of the aquatic habitat and the extent of human development and disturbance (McGarigal *et al.* 1991). Sites used for diurnal perching tend to include tall trees located near shoreline foraging habitat (Chester *et al.* 1990, Chandler *et al.* 1995). Winter habitats occur along major river systems and along eastern and western North American coasts (Millsap 1986) and are characterized by the presence of abundant food, protected roost sites, and little or no human disturbance (Keister *et al.* 1987). Roosting habitat consists of tall trees that offer protection from prevailing winds and are generally located near aquatic foraging areas (Keister and Anthony 1983, Grubb *et al.* 1989, Chester *et al.* 1990, Buehler *et al.* 1991b). Most roosting sites for Bald Eagles in western North America are in coniferous (or sometimes in riparian) trees (Grubb *et al.* 1989).



Bald Eagle distribution (all seasons) in Colorado (adapted from Andrews and Righter 1992)

Distribution/Abundance: Bald Eagles breed in suitable habitats throughout much of North America, including Alaska, Canada, all 48 contiguous states in the U.S. except Vermont and Rhode Island, and parts of Mexico (Buehler 2000). No records exist of Bald Eagles breeding outside North America (Buehler 2000). Most wintering areas for Bald Eagles are located in the lower 48 states and in coastal areas of Alaska and Canada, in aquatic habitats where open water persists for foraging (Millsap 1986). Some adult Bald Eagles migrate seasonally as necessary when food becomes unavailable (Millsap 1986, Buehler *et al.* 1991a, Harmata and Stahlecker 1993), whereas others remain in the vicinity of their breeding territories throughout the year (Swenson *et al.* 1986, Garrett *et al.* 1993, Jenkins and Jackman 1993). Many of the Bald

Eagles that winter in Colorado migrate to breeding areas in Saskatchewan and Manitoba in January-March (Harmata and Stahlecker 1993). Bald Eagles breed in northwestern, southwestern, and north-central Colorado (Andrews and Righter 1992).

Important Life History Characteristics: Bald Eagles are opportunistic foragers and their diet varies greatly, depending upon the location and the availability of various types of prey (Todd *et al.* 1982). In most regions Bald Eagles forage in aquatic habitats and prefer fishes (Brown 1993, Stalmaster and Kaiser 1998). Mammals and birds, however, are important components of the diet at many sites (Todd *et al.* 1982, Kralovec *et al.* 1992). Bald Eagles typically hunt from perches or while soaring, but they also feed on carrion on the ground in areas where humans do not disturb them (Buehler 2000). At some wintering sites, ungulate carrion is a critical component of the diet (Swenson *et al.* 1986). Bald Eagles often engage in kleptoparasitism or food piracy; typically they steal fishes or other prey items from other Bald Eagles or

from Ospreys while in flight or on the ground (Todd *et al.* 1982, Hansen 1986). Bald Eagles use sticks and branches to build large nests, which often are reused each year (Buehler 2000). A well-known nest in Ohio was used for 34 years before the tree in which it was located blew down (Herrick 1924). Bald Eagles roost communally (or sometimes solitarily) at traditional winter roosting sites (Keister *et al.* 1987, Grubb *et al.* 1989), and, in some cases, at post-breeding-season summer roosting sites (Chester *et al.* 1990). Mated pairs of Bald Eagles defend their breeding territories against encroachments by other Bald Eagles (Buehler 2000). Male and female Bald Eagles exhibit strong fidelity to their mates and to their nest sites (Gerrard *et al.* 1992a, Jenkins and Jackman 1993). A female Bald Eagle in Saskatchewan, for example, used the same territory for 13 years (Gerrard *et al.* 1992a). If one member of a mated pair dies or disappears, the surviving eagle typically continues to occupy the same territory and finds a new mate (Grubb *et al.* 1988, Jenkins and Jackman 1993). Many Bald Eagles also show fidelity (i.e., they return year after year) to their wintering areas (Harmata and Stahlecker 1993).

Known Threats and Management Issues: Major threats to the Bald Eagle include the loss of critical habitat components such as nest trees (Weekes 1974), perch sites, and winter roosts (Hansen *et al.* 1981) to natural or human-induced causes. Throughout the range of the Bald Eagle, loss of critical breeding and wintering habitats is a serious problem (Therres *et al.* 1993). Human activities and disturbance can affect populations of Bald Eagles and other birds in many important ways. These factors can alter foraging patterns, distribution, and habitat use (Buehler *et al.* 1991b, Grubb and King 1991, Knight *et al.* 1991, McGarigal *et al.* 1991, Brown and Stevens 1997), reduce reproductive success (White and Thurow 1985) and foraging efficiency (Knight *et al.* 1991, Stalmaster and Kaiser 1998), and increase energy expenditures (Stalmaster 1983) and stress (Fernandez and Azkona 1993). Additional threats to the Bald Eagle include shooting (Reichel *et al.* 1984), trapping, electrocution (Smith and Murphy 1972), and poisoning by pesticides or lead shot (Hickey and Anderson 1968, Swenson *et al.* 1986, Kramer and Redig 1997).

Potential Conservation Areas which include nesting sites of *Haliaeetus leucocephalus*: Electra Lake, Coal Gulch.

Himantopus mexicanus (Black-necked stilt)

Taxonomy

Class: Aves

Order: *Charadriiformes*

Family: *Recurvirostridae*

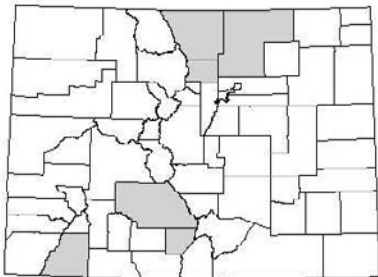
Genus: *Himantopus*

Taxonomic Comments: *H. m. mexicanus* and *H. m. knudseni* are regarded as distinct species by some authors. Subspecies *knudsenii*, known from Hawaii, is listed as endangered by the USFWS.

CNHP Ranking: G5 S3B

State/Federal Status: None

Description and Phenology: Black-necked stilt is a tall slender wader with a long straight slender bill, black (male) or brownish (female) upperparts, white underparts, very long red or pink legs and feet, and a white spot above the eye. Immature birds have buffy edges on the dark feathers of the upperparts. Both adults, in turn, incubate 4 eggs about 25 days (Terres 1980). Young are tended by both adults, and become independent in about 4 weeks (Harrison 1978). They first fly at 7-8 weeks (Berger 1981)



Distribution of black-necked stilts in Colorado.

Global range: The species has a large range, covering western and southern U. S. and extending into South America and Hawaii. It is globally secure due primarily to its large range, but occurrences tend to be very localized, and population trends are poorly known for many regions.

State range: There are seven occurrences in CNHP's database, including one from La Plata County at Pastoris Reservoir documented in 2003. Other counties are Alamosa, Boulder, Larimer, Saguache and Weld.

Habitat Comments: Black-necked stilts inhabit shallow salt or fresh water areas with soft muddy bottoms; grassy marshes, wet savanna, mudflats, shallow ponds, flooded fields, borders of salt ponds and mangrove swamps (Tropical to Temperate zones) (AOU 1983, Raffaele 1983). They may nest on the ground or in shallow water on a plant tussock.

Known Threats and Management Issues: Although globally secure, locally the birds may be limited by suitable habitat.

Potential Conservation Areas in La Plata County that support black-necked stilts: Pastorius Reservoir.



Figure 69. Black-necked stilt.
Photo ©J. M. Spindel

Phalaropus tricolor (Wilson's Phalarope)

Taxonomy

Class: Aves

Order: *Charadriiformes*

Family: *Scolopacidae*

Genus: *Phalaropus*

CNHP Ranking: G5 S4B S4N

State/Federal Status: None

Description: Wilson's phalarope is a fairly small, long-legged shorebird, about 7.5 inches long, with a white rump and pale gray tail. Its wings are dark and unstriped. It has a thin, straight black bill that is much longer than its head.



Figure 70. Wilson's phalarope. Photo copyright © Don Baccus, dhogaza@pacifier.com

Global range: Wilson's phalarope is known from nearly all of the U. S. and the southern provinces of Canada. It has a large breeding range, mainly in the interior portion of western North America and the Great Lakes region. The birds migrate northward through U.S. (mostly over interior prairies west of Mississippi River, uncommon along east coast) mainly in April-May (Terres 1980). It migrates regularly through Middle America (September-October and mid-April to late May in Costa Rica), Colombia and Ecuador. Southward migration begins in mid-June (mostly females). The Great Salt Lake (Utah) has the world's largest concentration in fall (500,000-700,000 individuals) (Paton et al. 1992).



Wilson's phalarope distribution in Colorado (CNHP records only)

State range: Although there are only two occurrences of Wilson's phalarope in the CNHP database, from Rio Grande and La Plata counties, this species has been located in at least 12 Colorado Counties

Habitat Comments: Wilson's phalaropes nest in idle, hayed, and grazed grasslands adjacent to wetlands (Hohn 1967, Kantrud and Higgins 1992).

Known Threats and Management Issues: Although globally secure, locally the birds may be limited by suitable habitat. The species has declined in some areas due to loss and degradation of wetlands. It is an "accidental and unsuitable host" of the Brown-headed Cowbird (*Molothrus ater*), an obligate brood parasite. Studies have found that grasslands and previously grazed areas provided habitat for nesting, but areas with cattle present during the breeding season are less suitable (Renken 1983, Renken and Dinsmore 1987, Kantrud and Higgins 1992).

Potential Conservation Areas in La Plata County that support Wilson's phalarope: Pastorius Reservoir.

Sterna forsteri (Forster's tern)

Taxonomy

Class: Aves
Order: Charadriiformes
Family: Laridae
Genus: *Sterna*

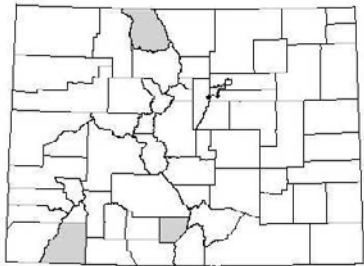
CNHP Ranking: G5 S2B S4N

State/Federal Status: None

Description: Forster's tern is a medium sized shorebird with a

long, deeply forked tail. Its head is smoothly rounded. Its upper wing is gray with pale primaries, while its underwing is pale with a broad dark trailing edge.

Global range/abundance: Forster's tern occupies virtually all of the U.S. and the southern provinces of Canada. It winters in central California and Baja California, and as far south as Guatemala. The 1982 breeding population from New York to Virginia was estimated at 4600 birds. Most of the Gulf Coast breeding population (about 23,000) occurs in Louisiana. About 8000 birds nested along the Pacific coast in the late 1970s, mostly in the San Francisco Bay area.



Forster's tern locations in Colorado (CNHP records only)

State range: There are five documented occurrences in the CNHP database, including one in La Plata County. The others are in Jackson and Alamosa counties.

Habitat Comments: Forster's tern inhabits freshwater and salt marshes. During migration and in winter also seacoasts, bays, estuaries, rivers and lakes (AOU 1983).

Known Threats and Management Issues: Threats include human disturbance and development of nesting areas, loss of nests to natural flooding, and possibly predation by laughing gulls (Byrd and Johnston 1991).

Potential Conservation Areas in La Plata County that support Forster's tern: Pastorius Reservoir.



Figure71 . Forster's tern. Photo courtesy of Mike Danzenbaker. www.avesphoto.com

***Vireo vicinior* (Gray Vireo)**

Taxonomy

Class: Aves
Order: Passeriformes
Family: Vireonidae
Genus: *Vireo*

Taxonomic Comments: none.

CNHP Ranking: G4 S2B, SZN

State/Federal Status: None

Description and Phenology: Gray vireos (Figure 72) are small songbirds, gray above, white below, with a gray eye ring, and dull white lores. Their wings are brownish with two faint bars. They are diurnal. They arrive in Colorado in the spring, and return to wintering territories in Mexico in the fall.

Global range: Gray vireos breed in southwestern North America, in Utah, western Colorado, New Mexico, Arizona, Nevada, California and Texas, and winter in western Mexico. Colorado represents the northeastern portion of its breeding range (National Geographic Society 1983).

State range: The Gray Vireo is characterized as an uncommon and very local summer resident in Colorado (Andrews and Righter 1992). The species is confined to the western and south-central counties. There are 56 records of Gray Vireos from at least 16 Colorado counties.

Habitat Comments: Pinyon-juniper woodlands. In La Plata County, gray vireos were found most often in the lower elevations where Utah juniper was dominant. In their winter range in Mexico, gray vireos are heavily dependent on the fruit of elephant trees (*Bursera microphylla*). Barlow (1977) suggests that large tracts of undisturbed habitat are required to support individual pairs, given the size of territories he observed in Texas and Arizona. In addition, habitat fragmentation increases vulnerability to cowbird brood parasitism.

Distribution/Abundance: Gray vireos are neotropical migrants, with few breeding populations in the U. S. North American Breeding Bird Survey (BBS) trend estimates show significant survey-wide population declines from 1966 to 1996 (Sauer et al. 1997). Nevada is the only state where BBS data indicate a significant 30-year increase.

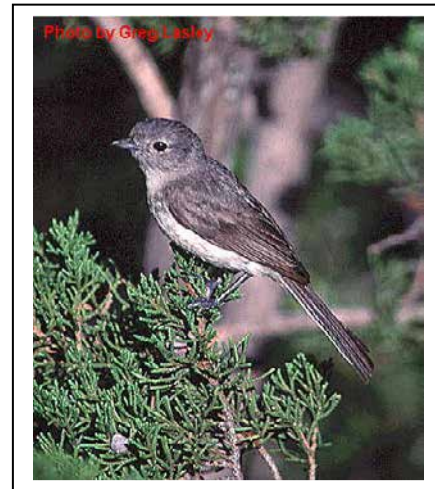


Figure 72. Gray vireo. Photo copyright Greg Lasley. From USGS, Patuxent Bird Identification Information Center <http://www.mbr-pwrc.usgs.gov/Infocenter/i6340id.html>

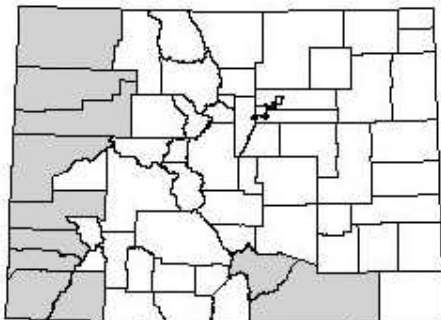


Figure 73. Gray vireo distribution in Colorado

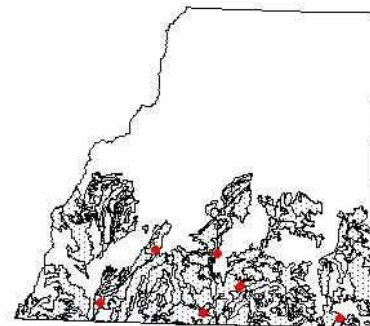


Figure 73. Distribution of Gray vireo in La Plata County. Shaded areas are pinyon-juniper or juniper woodlands.

Known Threats and Management Issues: Threats and reasons for range contractions are largely unknown. Pinyon-juniper woodlands are subject to grazing and clearing to increase grassland, mesquite and desert scrub habitats are grazed and cleared for development, and chaparral habitats have undergone extensive conversion in urban areas of southern California. There are no studies to date on the effects of habitat fragmentation and conversion, grazing, changes in fire regimes, changes to upslope habitats from water diversion, off-road vehicle use, or levels of disturbance. Habitat fragmentation or the presence of livestock that facilitate brood parasitism by the brown-headed cowbird (*Molothrus ater*) would be detrimental (USDA Forest Service 1994). Gray vireos are considered a common host for the cowbird, but rates of parasitism and impacts on productivity are unknown. (Ehrlich et al. 1988). Changes in fire regime that bring about an increase in fire extent or frequency may be detrimental (USDA Forest Service 1994).

The vireo and its principal habitats are still widely distributed throughout the southwest, so there is opportunity to conserve the species while it still occurs throughout most of its historic range. However, without better understanding the causes of decline, restoration solely through habitat protection may be fruitless, particularly if brood parasitism or large-scale cumulative changes are at play (Natureserve 2004).

Potential Conservation Areas in La Plata County that include Gray vireos: Gaines Canyon, Road 136.

Gila robusta (Roundtail chub)

Taxonomy

Class: *Osteichthyes*
Order: *Cypriniformes*
Family: *Cyprinidae*
Genus: *Gila*



CNHP Ranking: G3 S2

State/Federal Status: BLM sensitive species

Description: Roundtail chub is a relatively large minnow that reaches a maximum total length of about 43 cm.

The number of dorsal, anal, and pelvic fin rays is usually nine (8-10). The body is completely scaled, and scales are small, thin, and only slightly embedded. Both sexes have an orange-red color on ventrolateral surfaces and on all fins except the dorsal fin (Muth et al. 1985). This coloration becomes more intense in males during the breeding season (Minckley 1973).

Figure 74. Roundtail chub. *Photo courtesy of Arizona Fish and Game Dept.*

Global range/abundance: The species is known only from the western U. S., in Arizona, Colorado, New Mexico, Nevada, Utah and Wyoming. It has apparently been extirpated from California. There are 98 collection sites mapped. Abundance is greatly reduced since historic times.

State range: In Colorado, Roundtail chub is known from Archuleta, Delta, Dolores, Eagle, Garfield, Grand, Jefferson, La Plata, Mesa, Moffat, Montrose, Montezuma, Rio Blanco, Routt, and San Miguel counties.

Habitat Comments: Roundtail chub inhabit rocky runs, rapids, and pools of creeks and small to large rivers; also large reservoirs in the upper Colorado River system. They generally prefer cobble-rubble, sand-cobble, or sand-gravel substrate. Adults are associated with the largest, most permanent water in streams (Minckley 1981). They inhabit pools and eddies, below or adjacent to rapids and boulders, in cool to warm water mid-elevation streams and rivers (Minckley 1973, Bestgen and Propst 1989). They are usually found near cover such as rocks, rootwads, undercuts, or deep water (Bestgen and Propst 1989). Large populations often occur in pools behind irrigation diversions (Barber and Minckley 1966).

Known Threats and Management Issues: Threats include interactions of watershed changes, such as reductions in suitable habitat due to impoundment, channel downcutting, substrate sedimentation, water diversion, and groundwater pumping, and the invasion of non-native predatory and competitive species. Roundtail chubs are believed to be declining in the La Plata River (Japhet, pers. comm.) This may be partly due to recent drought. The species was nearly lost in the La Plata River due to de-watering in 2003. About 75 roundtail chubs were removed from the La Plata River in 2003, and will be used as brood stock to re-populate the river (Japhet, pers. comm.)

Potential Conservation Areas in La Plata County that support Roundtail chub: Lower La Plata River, Lower Florida River.

***Oncorhynchus clarki pleuriticus* (Colorado River cutthroat trout)**

Taxonomy

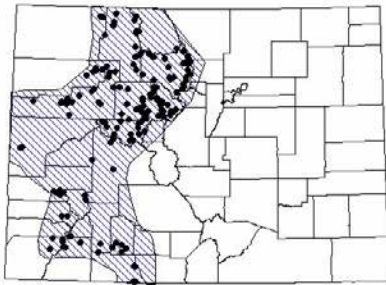
Class: Osteichthyes
Order: Salmoniformes
Family: Salmonidae
Genus: *Oncorhynchus*

Taxonomic Comments: Colorado River cutthroat trout are closely related to Greenback River cutthroat trout (*Oncorhynchus clarki stomias*) and Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*). Colorado River cutthroat trout hybridize with various species and subspecies of the genus *Oncorhynchus* and therefore local cutthroat populations can range in appearance from "pure-looking" to obvious hybrids (U.S. Fish and Wildlife Service 1998).



Figure 75. Colorado River cutthroat trout.

CNHP Ranking: G4T3 S3



Colorado Distribution

State/Federal Status: BLM and Forest Service Sensitive Species; State of Colorado Species of Concern.

Phenology: *Oncorhynchus clarki pleuriticus* spawn in late spring when temperature reaches about 45 F. Spawning begins after flows have peaked in spring or early summer and ends before runoff subsides. Emergence of fry tends to occur in mid-to late summer and subadults become sexually mature in 2-3 years.

Global Range: Historically *Oncorhynchus clarki pleuriticus* was distributed throughout the colder headwaters of the Green and Colorado rivers as far south as the San Juan River and perhaps occupied portions of the lower reaches of large rivers in

winter (Young 1995). Currently the distribution is limited to a few small headwater streams of the Green and upper Colorado rivers in Colorado, Utah, and Wyoming, including the Escalante River drainage in southern Utah (Hepworth et al. 2001). Formerly Colorado River cutthroat trout may have occurred in northeastern Arizona in the Chuska Mountains (speculation by Behnke 1992). As a result of stocking, they now also occur in several high elevation lakes in the Rocky Mountains; most of these populations are not self-sustaining due to lack of adequate spawning streams (Spahr et al. 1991).

State Range: In Colorado, pure strains of *Oncorhynchus clarki pleuriticus* are at present limited to a few small headwater streams of the Colorado River drainage. The Colorado Division of Wildlife is currently developing a new broodstock of Colorado River cutthroat trout at the Durango Hatchery. In the near future, the Division of Wildlife will be stocking a few barren streams (with no trout present) in La Plata County and elsewhere in the San Juan Basin with pure Colorado River cutthroat trout to establish new "conservation populations" (Japhet, pers. comm.). In addition to the few conservation populations, there are many other waters in La Plata County that contain Colorado River cutthroat trout, along with other trout species. Pure Colorado River cutthroat trout (Nanita Lake strain--Trapper's Lake origin) were stocked in numerous high lakes and in several lower elevation rivers in La Plata County in recent years. These fish were stocked to provide recreational fishing opportunity in waters where other species of trout are also found. For example, rainbow trout, Yellowstone cutthroat, and Snake River cutthroat have also been stocked in many of the high lakes in these sites. From this point forward, only Colorado River cutthroat trout will be stocked in high lakes within the Weminuche Wilderness. Trout in many of these lakes are not reproducing, due to absence of spawning habitat, and therefore are not considered viable populations.

Nonetheless, they are important genetic refugia, especially as the non-native trout die out (Japhet, pers. comm.).

Habitat Comments: Colorado River cutthroat trout inhabit clear, cold, well-oxygenated mountain streams with moderate gradients, rocky to gravelly substrates, and abundant riparian vegetation. They are also found in ponds and lakes (Trotter 1987).

Distribution/Abundance: Pure populations of the Colorado River cutthroat trout have disappeared from most of the historical range (Behnke 1992) and presently less than 1% of the historical range may be occupied. An estimated 318 populations (some not recently verified as extant) may still exist within the historical range in Colorado, Utah, and Wyoming. The Colorado Division of Wildlife has reintroduced Colorado River cutthroat trout at many sites in the Green and Colorado River drainages. In La Plata County, two populations (Deer Creek and South Fork Hermosa Creek) previously believed to be Colorado River cutthroat trout were genetically tested in 2003 and found to be Yellowstone cutthroat trout that had been introduced (Japhet, pers. comm.).

Known Threats and Management Issues: The decline in Colorado River cutthroat trout populations was caused by several factors related to human activities. One of the major factors was the introduction of non-native salmonid species (rainbow trout, brook trout, brown trout, and Yellowstone cutthroat trout) into their historic range. Rainbow trout and various cutthroat subspecies readily hybridize with Colorado River cutthroat trout (Everhart and Seaman 1971, U.S. Fish and Wildlife Service 1998). Introduced brook trout (Behnke and Zarn 1976, Behnke 1979) and brown trout (Wang 1989) tend to outcompete and ultimately displace Colorado River cutthroat trout. Finally, because cutthroat trout are more easily caught than other salmonid species, harvest by anglers may have played an important role in reducing Colorado River cutthroat populations, particularly in waters where non-native species were present with Colorado River cutthroat trout (U.S. Fish and Wildlife Service 1998).

Other factors that contributed to the decline of Colorado River cutthroat trout populations also were associated with the human settlement and development of the Rockies. Exploitation of land, water, minerals, timber resources, and fisheries adversely affected Colorado River cutthroat trout and their habitat (U.S. Fish and Wildlife Service 1998). The diversion of streams and the removal of water for irrigation of agricultural lands had major impacts on the ecology and hydrology of waters occupied by Colorado River cutthroat trout.

Whirling disease (caused by a microscopic, water-borne parasite *Myxobolus cerebralis*), which causes skeletal deformities and ultimately death in trout species is also a concern within the current range of the Colorado River cutthroat trout.

Potential Conservation Areas supporting *Oncorhynchus clarki pleuriticus*: Big Bend Creek, Clear Creek La Plata, East Fork Hermosa Creek, and West Virginia Gulch.

Cynomys gunnisoni (Gunnison's Prairie Dog)

Taxonomy

Class: Mammalia
Order: Rodentia
Family: Sciuridae
Genus: *Cynomys*

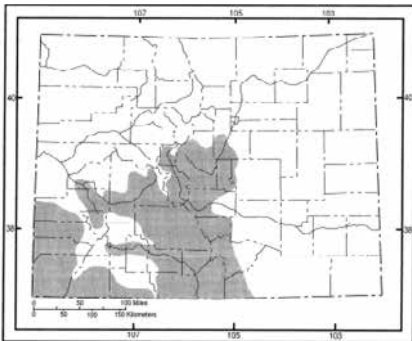
Taxonomic Comments: The subspecies *Cynomys gunnisoni gunnisoni*, which is extinct over most of its former range, inhabits southern La Plata County. Gunnison's prairie dog exhibits low within-population genetic diversity and significant differentiation between colonies (Travis et al. 1997).



Figure 75. Gunnison's prairie dog. Photo by R. B. Forbes

CNHP Ranking: G5 S5

State/Federal Status: Forest Service sensitive



Gunnison's prairie dog distribution in Colorado (from Fitzgerald et al. 1994)

Phenology: Mating occurs shortly after emerging from hibernation in late May and April with birthing occurring in late May and early June. Pups will appear above ground in July.

Global Range: Gunnison's prairie dogs inhabit the montane valleys and high plateaus of the "Four Corners" area of Colorado, Utah, Arizona, and New Mexico, where they occur at elevations from 6,000 to 12,000 ft (1,830 to 3,660 m) (Pizzimenti and Hoffmann 1973). In many parts of their range pronounced physical barriers such as rivers and mountain ranges limit their distribution. *Cynomys gunnisoni zuniensis* occurs in parts of all four states, but *C. g. gunnisoni* occurs only from central Colorado through north-central New Mexico (Pizzimenti and Hoffmann 1973).

State Range: Gunnison's prairie dogs occupy southwestern Colorado and the valleys in the central and south-central Rocky Mountains within the state. South Park, Colorado marks the northern limit of the range of Gunnison's prairie dog (Pizzimenti and Hoffmann 1973).

Range in La Plata County: Prairie dogs are found primarily on agricultural land, in central and south La Plata County. In the eastern part of the county, the habitat is mostly irrigated, while in the west it is dryland agriculture. Figure __ shows the distribution of prairie dogs recorded in La Plata County in 2003. Shaded areas are agricultural land. Surrounding areas are primarily pinyon-juniper woodlands.

Habitat Comments: Suitable habitat for Gunnison's prairie dogs includes grasslands and semidesert and montane shrublands (Fitzgerald et al. 1994). Flat or gently rolling terrain with friable soils (to allow excavation of burrow systems) is preferred. The presence of prairie dog towns greatly increases biological diversity by providing vertical structure (the burrows and mounds), which affords sites for vertebrates and invertebrates to forage, breed, rest, and seek shelter (i.e., Wilcomb 1954, Clark et al. 1982).

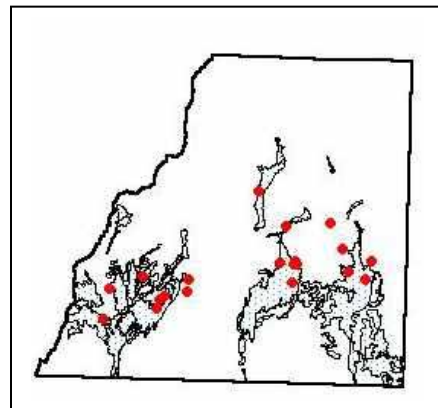


Figure 76. Distribution of Gunnison's prairie dog in La Plata County (red dots). Shaded areas are agricultural land.

Important Life History Characteristics: All five species of North American prairie dogs are diurnal, terrestrial, colonially-dwelling herbivores that excavate elaborate burrow systems for shelter and protection from predators (Nowak 1999). Gunnison's prairie dogs differ from the more common and widespread black-tailed prairie dogs (*Cynomys ludovicianus*) in several ways. Gunnison's prairie dogs are smaller-bodied, have a whitish (rather than blackish) tail tip, and hibernate (Pizzimenti and Hoffmann 1973, Rayor *et al.* 1987, Hoogland 1995). Less social than *C. ludovicianus*, Gunnison's prairie dogs have a relatively limited social behavioral repertoire and less well-developed cohesive behavior (Rayor 1988). Burrow and mound construction are less complex and colonies are smaller and less densely settled than in black-tailed prairie dogs (Fitzgerald *et al.* 1994). Gunnison's colonies are characterized by the presence of more protective plant cover than colonies of black-tailed prairie dogs because the latter species clips standing vegetation (non-food plants) to enhance detection of approaching predators (King 1955, Fitzgerald *et al.* 1994).

Distribution/Abundance: Gunnison's prairie dog is declining throughout its range, although the extent of the decline is unknown.

Known Threats and Management Issues: Extermination programs (public and private) have targeted Gunnison's prairie dogs for more than 100 years (Pizzimenti and Hoffmann 1973). Classified as a small game species in Colorado, Gunnison's prairie dogs receive no protection from harvest, and so poisoning and shooting campaigns continue unabated. Plague (caused by the bacillus *Yersinia pestis* and transmitted by fleas) historically has greatly influenced the distribution of this species in Colorado (Lechleitner *et al.* 1962, 1968; Rayor 1985, Fitzgerald *et al.* 1994) and will likely continue to do so. As in the past, however, the greatest threats to the Gunnison's prairie dog will come from humans due to real or perceived conflicts with agricultural economics.

Potential Conservation Areas in La Plata County that support Gunnison's prairiedog: Loma Linda, Red Mesa.

Historic occurrences of tracked animal species in La Plata County:

Figure 77.
Western Yellow-billed Cuckoo
*Coccyzus americanus
occidentalis*
CNHP rank: G5T3 SNA
State/Federal status: FS/BLM
sensitive
Last observed: 1983



Figure 78.
Columbian sharp-tailed grouse
*Tympanuchus phasianellus
columbianus*
CNHP rank: G4T3 S2
State/Federal status: FS/BLM
sensitive
Last observed: 1969

Figure 79.
Nokomis fritillary
Speyeria nokomis nokomis
CNHP rank: G3T1 S1
State/Federal status: BLM sensitive
Last observed: 1981



male

male

female

Photo copyright © by Paul Opler.

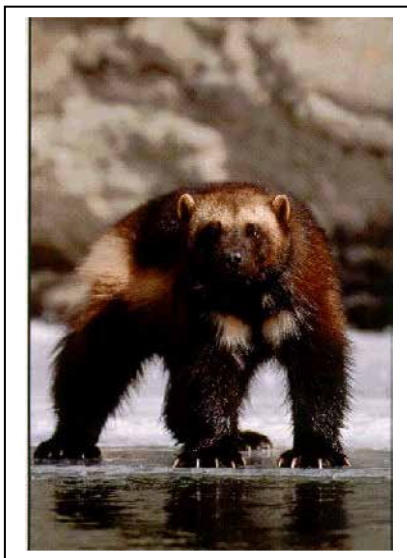


Figure 80.
Wolverine
Gulo gulo
CNHP rank: G4 S1
Federal/state status:
Colorado State
Endangered and Forest
Service Sensitive
Last observed: 1979

Photo copyright © by D. J.
Cox
Natural exposures Inc.



Figure 81.
Lynx
Lynx canadensis
CNHP rank: G5 S1
Federal/State status: LT
Last observed (except for introduced population): 1911

Photo copyright © by A. and S. Carey

Figure 82.
Black-footed Ferret
Mustela nigripes
CNHP rank: G1 S1
Federal/State status: Listed Endangered
Last observed: 1953

photo by M.R. Matchett/USFWS

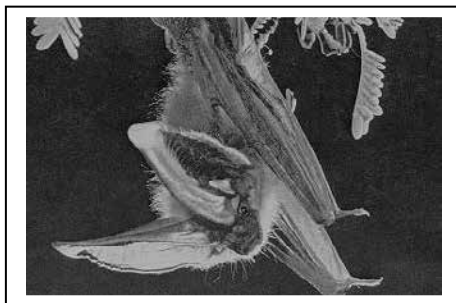
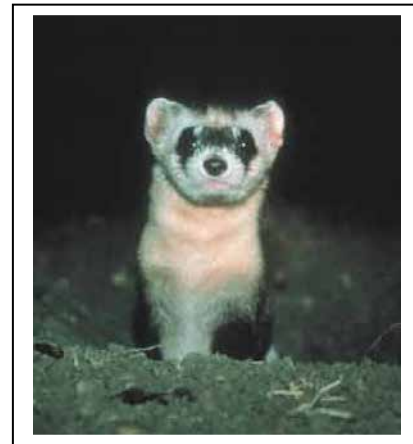


Figure 83.
Townsend's Big-eared Bat Subsp.
Plecotus townsendii pallescens
CNHP rank: G4T4 S2
Federal/State status: FS/BLM sensitive
Last observed: 1993

Chapter 5. Threats to Biodiversity and Conservation Strategies

Threats to Biological Diversity in La Plata County

Specific threats to species and potential conservation areas are discussed throughout this report. Some general threats to biodiversity are mentioned below.

Hydrological Modifications

Hydrological alteration in the form of 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 construction of dams, reservoirs, and other water diversions. These actions have altered the normal high peak flows that were once a part of the natural hydrological regime of the rivers and smaller tributaries in La Plata County. These natural flows are necessary for continued viability of most riparian vegetation. For example, many plants can only reproduce with flooding events, e.g., cottonwood trees (Rood and Mahoney 1993). As plant composition changes in response to alterations in the flooding regime, the composition of the aquatic and terrestrial fauna may also change. Thus, floodplain dynamics along the rivers and smaller tributaries, which are necessary for continued development of wetland habitat, have been greatly altered in La Plata County. New, naturally occurring wetlands are not being created within the floodplains and aquatic habitat has been reduced.

In addition to river impoundment, rivers have also been altered by stream bank stabilization projects (e.g., channelization) (Rosgen 1996). Most streams and rivers are dynamic and inherently move across the land. Stabilizing or channelizing stream 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 associations require different geomorphologic settings, e.g., point bars are required for some species of willows to regenerate, mature cottonwood/shrubland forests occur on terraces, and old oxbow reaches may eventually provide habitat for many wetland associations. By stabilizing a river, the creation of these geomorphic settings is often eliminated. Thus, the plant associations that require such fluvial processes are no longer able to regenerate or survive. In general, the cumulative affects from dams, reservoirs, and channelization on plant associations, have caused a gradual shift from diverse multi-aged riparian woodlands to mature single aged forest canopies.

Many wetlands, not associated with fluvial processes, have been altered by irrigation practices, water diversions, and well pumping. The increase of irrigated agriculture in La Plata County inadvertently created many new wetlands in areas where wetlands never existed. For example, seepage from hundreds of miles of unlined canals and earthen ditches and much of the water applied in irrigation contributes to groundwater recharge and surface water runoff. As a result, many areas have developed wetland characteristics where none existed prior to irrigation. Conversely, many historical wetlands, such as seeps and springs, have been lost or altered due to water “development” projects, such as water diversions and impoundments, to create stock ponds. Thus, as the quality and extent of historical wetlands diminished, some of the habitat loss was offset by irrigation-induced wetlands. It is debatable whether the biodiversity significance of an integrated network of river bottom wetlands, sinuous marshy streams, and extensive intact seep and spring wetlands can be equated to the dispersed pattern of irrigation-induced wetlands across an agricultural landscape. However, irrigation-induced wetlands perform some of the functions performed by natural wetlands. For example, in addition to providing valuable wildlife habitat, irrigation-induced wetlands may be acting to remove nitrate, pesticides, and sediments from agricultural tail waters before entering major rivers and local aquifers.

Development

Residential development is an increasing threat in La Plata County, especially in rural areas where real estate costs are somewhat attainable. Development creates a number of stresses, including habitat loss and fragmentation, introduction of non-native species, fire suppression, and domestic animals (dogs and cats) (Oxley et al. 1974 and Coleman and Temple 1994). Habitat loss to development is considered irreversible and should therefore be channeled to areas with lower biological significance.

Mining

Historic mining operations were widespread throughout the San Juans, and La Plata County is no exception. Silver and coal mining have seen major booms in the past, especially silver placer mining on the La Plata River and the extensive mining activities in the upper Animas River drainage. Impacts from mines, both past and present affect many areas, especially wetland and riparian areas via degradation of water quality. Overall, the Animas River has good water quality in La Plata County as tributaries dilute the water downstream from the high concentrations of mine adits in San Juan County (Blair et al. 1996; USDI 2000, USGS 2000).

In response to Colorado's rapid growth rate, aggregate mining in Colorado has increased by over 30 percent since 1993 (Macalady 2000). Gravel mining is a noticeable industry in La Plata County, and its impacts are of concern for wetland and riparian areas. Floodplain gravel mines remove riparian vegetation and shallow, bottomland habitat and replace them with deepwater ponds. The removal of riparian vegetation coupled with the increase in non-native plant species has decreased essential habitat for numerous species, especially avian species (Macalady 2000). Alternatives exist to minimize impacts associated with gravel mining such as improved reclamation efforts, targeting terrace deposits, utilizing crushed stone, and recycled material such as asphalt (Macalady 2000).

Currently, much emphasis is being placed on developing oil and gas resources. Density of oil and gas wells is already high, and is anticipated to increase in the near future. In addition to direct disturbance, fragmentation and habitat loss from wells, impacts from access roads, pipelines and noise threaten native plants and animals.

Livestock Grazing

Much of La Plata County is utilized for rangeland. Especially at lower elevations in the county, livestock tend to congregate near wetland and riparian areas for shade, lush browse, and access to water. Long-term, improper livestock use of wetland and riparian areas can potentially erode stream banks, cause streams to incise, lower the water table, alter channel morphology, impair plant regeneration, establish non-native species, shift community structure and composition, degrade water quality, and diminish general riparian and wetland functions (Windell et al. 1986). Depending on grazing practices and local environmental conditions, impacts can be minimal and largely reversible (slight shifts in species composition) to severe and irreversible (extensive channel incision, introduction of non-native forage species). As drought conditions culminated in 2002, many La Plata County ranchers reduced herds to compensate for grazing impacts to their land.

Logging

Most logging operations require a large network of roads. The impacts from roads can result in threats to biodiversity (see "Roads" below for more detailed discussion). The Forest Service monitors logging closely, nonetheless, problems can still occur.

Recreation

Recreation is increasing and becoming a threat to natural ecosystems in La Plata County. Easily accessible public lands offer residents a plethora of areas to choose from. Different types of recreation (e.g., motorized versus non-motorized activities) typically have different effects on ecosystem processes. ATVs can disrupt migration and breeding patterns, and fragment habitat for native resident species. ATVs have also been identified as a vector for the invasion of non-native plant species.

Non-motorized recreation, mostly hikers but also some mountain biking and rock climbing, presents a different set of issues (Cole and Knight 1990; Knight and Cole 1991). Wildlife behavior can be significantly altered by repeat visits of hikers/bicyclists. Alpine areas, mountain lakes, and riparian zones are routes and destinations for many established trails. Thus, impacts to native vegetation (mainly trampling) in these areas could potentially be high.

Roads

There is a complex, dense network of roads in many parts of La Plata County due to livestock activities, past timber harvests, mining operations, and recreation. 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 et al. 1997).

Roads function as conduits, barriers, habitats, sources, and sinks for some species (Forman 1995). Road networks crossing landscapes can increase erosion and alter local hydrological regimes. Runoff from roads may impact local vegetation via contribution of heavy metals and sediments. Road networks interrupt horizontal ecological flows, alter landscape spatial pattern, and therefore inhibit important interior species (Forman and Alexander 1998).

Effects on wildlife can be attributed to road avoidance (a species avoids crossing a road) and occasionally roadkill. Traffic noise appears to be the most important variable in road avoidance, although visual disturbance, pollutants, and predators moving along a road are alternative hypotheses as to the cause of avoidance (Forman and Alexander 1998). Songbirds appear to be sensitive to remarkably low noise levels, even to noise levels similar to that of a library reading room (Reijnen et al. 1995).

Non-native Species

Invasion of non-native and aggressive species, and their replacement of native species, is one of the biggest threats to La Plata County's natural diversity (James 1993; D'Antonio and Vitousek 1992). Non-native plants or animals can have wide-ranging impacts and 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.

Although complete eradication of non-native aggressive species is not possible, some control efforts can pay off. One important guideline is that when a plant is removed, something will take its place. "Ecological voids do not exist" (Young 1981). Simply killing aggressive species, unless there is a seed source for desirable replacements, will result in more unwanted species, perhaps even more noxious than those removed. Seeding of desirable plant species is often necessary. When seeding, it is important to consider seedbed characteristics including rock cover, and the potential of the soil to support the planted species. A first step is to assess the current vegetation, in relation to the potential of the site. For example, former attempts to control halogeton (*Halogeton glomeratus*) were given up because land managers were unable to come up with a desirable species to replace it, especially on saline or alkaline soils (Young 1981). One approach is to experiment on a small scale to determine the potential success of a weed control/seeding project, using native plant species. Ideally, seed should be harvested locally. A mixture of native grasses and forbs is desirable, so that each species may succeed in the microhabitat for which it is best suited. In general, lower elevations of the county are more affected by non-native and aggressive plant species than higher elevations and level valley bottoms more than steep slopes. Most of the major river corridors, and many of their tributaries have been invaded by pasture grasses. See the section on non-native plants in Chapter 3 for discussion of specific non-native plants that are prevalent in La Plata County.

Fragmentation and Edge Effects

Edges are simply the outer boundary of an ecosystem that abruptly grades into another type of habitat (e.g., edge of a conifer forest adjacent to a meadow) (Forman and Godron 1986). Edges are often created by naturally occurring processes such as floods, fires, and wind and will recover naturally over time. Edges can also be created by human activities such as roads, timber harvesting, agricultural practices, rangeland, etc. Human induced edges are often dominated by plant species that are adapted to disturbance. As the landscape is increasingly fragmented by large-scale, rapid anthropogenic conversion, these edges become increasingly abundant. The overall reduction of large landscapes jeopardizes the existence of specialist species, may increase non-native species, and limits the mobility of species that require large landscapes or a diversity of landscapes for their survival (e.g., large mammals or migratory waterbirds).

Natural Processes

Drought culminated in 2002, after several years of below average precipitation in La Plata County. The effects of drought are many and varied; drought was taken into consideration when observing condition of wetland sites and native species in La Plata County in 2003. However, it is unknown how severe or limiting the stress from drought is on vegetation in La Plata County.

Beetle killed and damaged trees are beginning to be more common in La Plata County. The problem is not widespread, but neighboring regions are severely affected. Although no sites profiled in this

report contain beetle damaged trees, or are surrounded by forest with a large percent of beetle damage, La Plata County is threatened by this ecological process. Bark beetles target stressed, weakened or dying trees (Day 1996), and after drought conditions have ensued, conifer forests in La Plata County could be a suitable target.

Potential Conservation Strategies

Conservation Strategies can be classified as three major types:

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

The first step to facilitate any of the conservation strategies suggested above is to identify the significant elements of biodiversity and their locations in the county. This report and the accompanying GIS data provide information necessary for this first step. The next step is to use this information to conserve these elements and the areas that support them. The PCA descriptions within this report provide protection and management suggestions for each area identified during the inventory. However, some general recommendations for conservation of biological diversity in La Plata County are given here.

1. Develop and implement a plan for protecting the PCAs profiled in this report, with most attention directed toward areas with biodiversity rank (B-rank) B1, B2 and B3. The PCAs provide a basic framework for implementing a comprehensive conservation program. The B1, B2 and B3 sites, because they have global biological significance, are in need of priority attention. Those interested in conserving these areas could consider purchasing lands or development rights from willing landowners. Also, one can support local organizations, such as land trusts that purchase or acquire conservation easements for protection of biological diversity or open space. Partnerships with organizations that access federal funding for conservation should be developed. Finally, continued cooperation among local entities to preserve the county's biodiversity is always recommended.

2. Use this report in the review of proposed activities in or near PCAs to determine how activities affect elements of biodiversity. All of the PCAs presented contain elements of biodiversity that are of state or global significance. Weighing the biodiversity represented by PCAs should allow planners and biologists to consider natural resource conservation when making land use decisions.

Certain land 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 seemingly minor changes can have profound and far-reaching impacts. As proposed land use changes are considered, they should be compared to the maps presented herein and in GIS formats. If a proposed project has the potential to impact a site, planning personnel can work with persons, organizations, or agencies with the appropriate biological expertise to assist in the planning process. CNHP routinely conducts site-specific environmental reviews and should be considered a valuable resource. Also, CNHP is continually updating biodiversity data throughout the state and can provide up-to-date information in the area of concern. To contact CNHP's Environmental Review Coordinator call (970) 491-7331. Other key partners, such as the Colorado Division of Wildlife, can be valuable resources.

3. Recognize the importance of larger, contiguous natural communities.

While the PCAs identified in this report contain significant elements of natural diversity, protection of large areas in each vegetation type may ensure that we do not lose species that have not yet been located. Since all rare species cannot be easily identified, consider conservation or management of large, contiguous communities that may house a host of these species. Protecting large, unfragmented

blocks of land in each of the major vegetation types may increase the available habitat for lesser-known and more common forms of wildlife. Large migrating animals like deer and elk are a part of our natural diversity, and their needs for winter range and access to food and water should be taken into consideration. Similarly, landscape fragmentation affects smaller animals and plants by altering continuous vegetation that may function as habitat corridors or by disrupting a continuous landscape and creating habitat for edge-adapted species (Forman and Godron 1986). Clustering developments and designating large common areas for preservation of natural communities may be more beneficial to rare species than scattering residences widely over the landscape. Providing education programs that explain the value of open space and relay the importance of these larger communities may increase interest in planning for biodiversity in future development. Trails and roads commonly fragment otherwise contiguous landscapes (Forman and Alexander 1998).

4. Increase efforts to protect biodiversity by promoting cooperation and incentives among landowners, pertinent government agencies, and non-profit conservation organizations. One of the most effective means of developing cooperation for biodiversity conservation is to involve all stakeholders in land use planning. The long-term protection of natural diversity will be facilitated by the cooperation of private landowners, businesses, government agencies, and non-government organizations. Efforts to provide stronger ties among federal, state, local, and private interests involved in the protection or management of natural lands will increase the chance of success. By developing incentives that encourage biodiversity considerations in land-use planning, the likelihood of conserving biodiversity should increase. Such incentives will make planning for conservation a higher priority for private and public entities.

5. Promote wise management of the biodiversity resources that exist within PCAs. Since the delineation of PCAs does not by itself provide protection for the plants, animals, and plant communities, management that supports these elements should be encouraged. The development of a site-specific conservation plan for PCAs is a necessary component of the long-term protection of the elements within the PCAs. Because some of the most serious impacts to the La Plata County ecosystems are at a large scale (i.e., 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 CNHP, the Colorado Division of Wildlife, the U.S. Fish and Wildlife Service, the Natural Resources Conservation Service, The Nature Conservancy, and various academic institutions. With the rate of population growth in Colorado, rare and imperiled species will likely decline if not given appropriate protection or management.

6. Stay informed and involved in public land management decisions. Approximately 50 percent of the study area is publicly owned and another 13 percent is Ute Southern Ute Tribal Land. Many of the PCAs identified here are on public land and may be protected from development, but these same areas may not be protected from other impacts. Even the land ownership is not always secure, since federal and state agencies are becoming more and more involved in land exchanges. The San Juan National Forest is in the process of developing or revising management plans, such as Forest Management Plans and Grazing Management Plans. These plans require public input. By encouraging the protection of the biologically significant PCAs on public lands, La Plata County can retain a greater diversity of habitats and species.

7. Continue inventories for species that cannot be surveyed adequately in one field season and continue inventories on lands that could not be accessed in 2003. Not all targeted inventory areas can be surveyed in one field season due to several factors, including lack of access to lands, the phenology of the species being surveyed, or time constraints. Because some species are ephemeral or migratory, completing an inventory in one field season is often difficult. Despite the best efforts during one field season, it is likely that some elements were not documented during the survey. Thus, it is recommended that this report and the data included within it serve as a guide for subsequent surveys of La Plata County.

8. Continue to take a proactive approach to weed and exotic species control. Weeds affect both agriculture and native plant communities. The introduction and/or sale of non-native species that impact natural areas can greatly hinder efforts to conserve rare plant and animal species. Exotic, invasive species such as tamarisk (*Tamarix ramosissima*), Russian olive (*Eleagnus angustifolia*), oxeye daisy (*Leucanthemum vulgare*), and non-native fish species can severely alter habitats by out-competing native

species. Natural area managers, public agencies, and private landowners should be encouraged to remove these species from their properties. The use of native species for revegetation and landscaping efforts should limit the effects of invasive weeds. Ideally, native seeds should be harvested and cultivated locally. The Native Plant Revegetation Guide for Colorado by the Colorado Natural Areas Program describes the appropriate species to be used for revegetation. This resource is available on the World Wide Web at <http://parks.state.co.us/cnap/publications.html>.

9. Encourage public education functions and publications. One of the greatest tools in conserving land for biodiversity is to explain the value of such areas to the public. As described in this report, La Plata County is rich in animal and plant diversity and houses some of the most unique environments in Colorado. Conveying the value and function of these habitats and the species that inhabit them to the public can generate greater interest in conserving lands. Conducting forums or presentations that highlight the biodiversity of La Plata County should increase awareness of the uniqueness of the habitats within the county. Similarly, providing educational pamphlets or newsletters that explain why these areas are so valuable can increase public interest and support for biodiversity conservation.

10. Develop and implement comprehensive program to address loss of wetlands. In conjunction with the information contained in this report, information regarding the degree and trend of loss for all wetland types (i.e., salt meadows, emergent marshes, riparian forests, seeps/springs, etc.) should be sought and utilized to design and implement a comprehensive approach to the management and protection of La Plata County wetlands. Such an effort could provide a blueprint for wetland conservation in the study area. Encourage and support statewide wetland protection efforts such as CDOW's Wetlands Partnership. County governments are encouraged to support research efforts on wetlands to aid in their conservation. Area wide education on the importance of wetlands could be implemented through the county extension service or other local agencies. Encourage communication and cooperation with landowners regarding protection of wetlands in La Plata County. Utilize the expertise and breadth of experience within the State and Federal agencies.

Chapter VI. Potential Conservation Areas

Sixty-eight Potential Conservation Areas (PCAs) were identified in La Plata County (Figure 84, Table 12). Potential Conservation Areas represent our best estimate of the primary area needed to support the plants, animals or communities on which the PCA is based. Each Potential Conservation Area is described in a standard site profile reflecting data fields in CNHP's Biotics Data System. They are arranged below in the approximate order of their need for conservation attention. The sections of this report and the contents are outlined and explained below.

Biodiversity Rank (B-rank): The overall significance of the site in terms of rarity of the Natural Heritage resources and the quality (condition, abundance, etc.) of the occurrences. For rank definitions, please see the **Natural Heritage Ranking System** section of this report.

Protection Urgency Rank (P-rank): An estimate of the urgency of conservation protection. This rank generally refers to the need for a major change of protective status (i.e., ownership or designation as a natural area). For rank definitions, please see the **Natural Heritage Ranking System** section of this report (Chapter I)

Management Urgency Rank (M-rank): An estimate of the time frame in which conservation management must occur. Using best scientific estimates, this rank refers to the need for management such as weed control, trail closures, etc. For rank definitions, please see the **Natural Heritage Ranking System** section of this report (Chapter I).

Location: County, general location, usually in approximate air miles from the nearest town, and USGS 7.5 minute topographic map name.

Legal Description: Township, range and section(s).

Elevation Range: Lowest and highest elevations within the site boundaries, as drawn on U.S.G.S. topographic maps.

Size: Number of acres within the site boundary, as determined from GIS mapping (ArcView).

General Description: A brief narrative of the topography, vegetation, and current use of the potential conservation area. Common names are used in the text, followed by scientific names in parentheses.

Biodiversity Rank Justification: A synopsis of the significant elements occurring in the site. A table within the site profile lists the element occurrences found within the site, their rarity ranks, the occurrence ranks and federal and state agency special designations. The species or communities that are the primary element of concern are printed in bold type within the table. When several entries are in bold type, any one of the occurrences would be sufficient to justify the site rank. See Table 1, Chapter I, for explanations of ranks, and Table 2, Chapter I, for legal designations.

Table of elements found in the PCA: Includes scientific name, common name, global and state ranks, federal or state status and element occurrence rank. Elements followed by ** are not attached to the PCA in CNHP's database, but are included in the table because they fall within the site boundaries and help to characterize the PCA.

Boundary Justification: Justification for the location of the potential conservation site planning boundary delineated in this report, including all known occurrences of natural heritage resources and, in some cases, adjacent lands required for their protection.

Protection rank comments: Any additional pertinent information regarding the need for protection of the site.

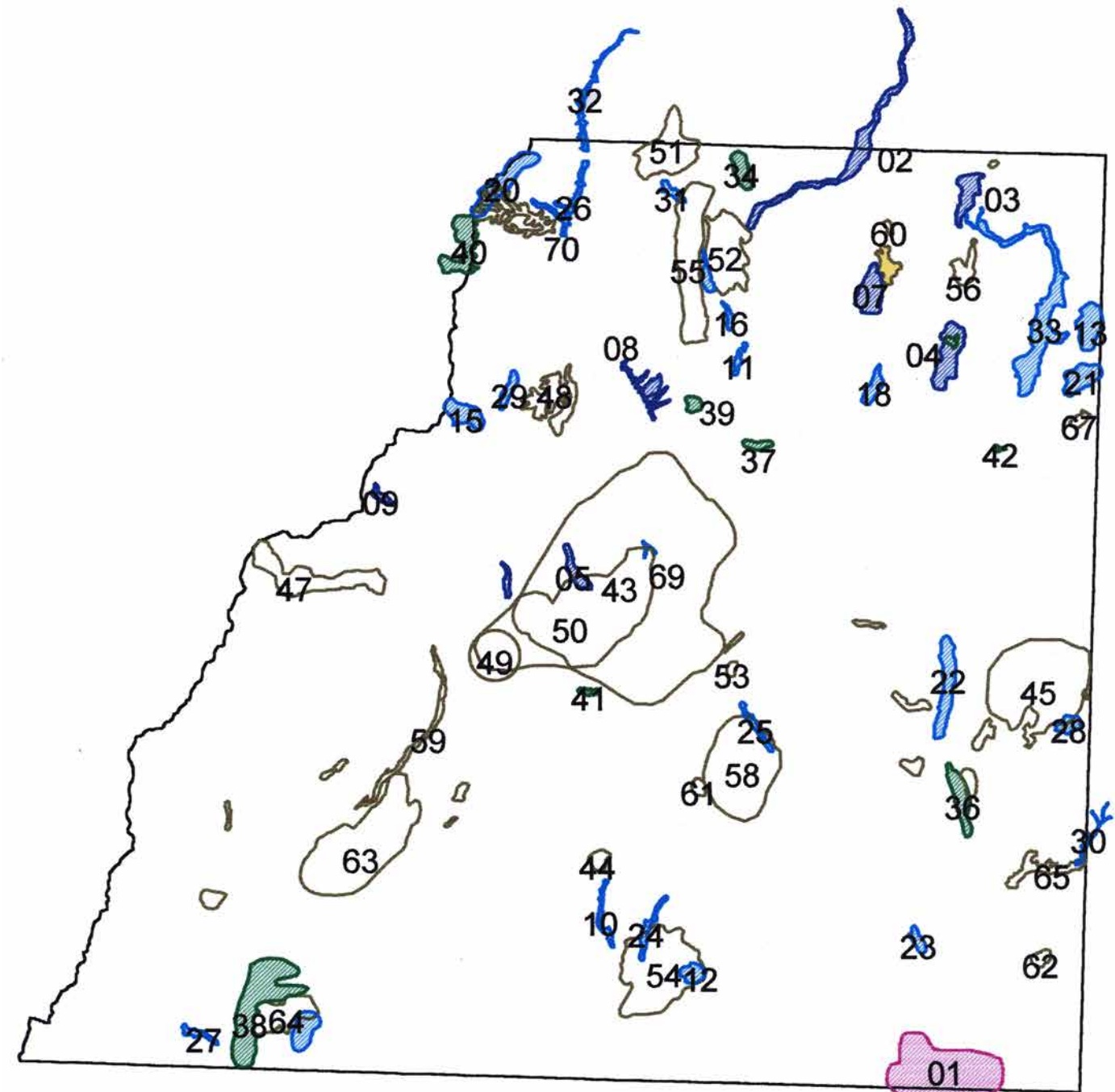
Management rank comments: Any additional pertinent information regarding the need for management actions at the site.

Other Areas of Interest: Following the PCA profiles are descriptions of other areas of interest in La Plata County. These represent locations of good examples of common plant communities in the county, but are not considered potential conservation areas due to insufficient information or the fact that the entire extent of the community was not surveyed.

Table 12.

Legend ID	PCA Name	Biodiversity Rank
01	Cemetery Canyon	B1: Outstanding Biodiversity Significance
02	Animas River Canyon	B2: Very High Biodiversity Significance
03	Columbine Pass-Chicago Basin	B2: Very High Biodiversity Significance
04	Endlich Mesa	B2: Very High Biodiversity Significance
05	Junction Creek	B2: Very High Biodiversity Significance
06	Lightner Creek	B2: Very High Biodiversity Significance
07	Lime Mesa	B2: Very High Biodiversity Significance
08	Lower Hermosa Creek	B2: Very High Biodiversity Significance
09	Madden Creek	B2: Very High Biodiversity Significance
10	Animas River at La Posta	B3: High Biodiversity Significance
11	Animas River at Rockwood	B3: High Biodiversity Significance
12	Bondad	B3: High Biodiversity Significance
13	Cave Basin Trail	B3: High Biodiversity Significance
14	Cinder Gulch	B3: High Biodiversity Significance
15	Cumberland Basin	B3: High Biodiversity Significance
16	Elbert Creek	B3: High Biodiversity Significance
17	Falls Creek	B3: High Biodiversity Significance
18	Florida River at Burnt Timber Creek	B3: High Biodiversity Significance
19	Haviland Lake	B3: High Biodiversity Significance
20	Highline Trail	B3: High Biodiversity Significance
21	Indian Creek at Tuckerville	B3: High Biodiversity Significance
22	Los Pinos at Bayfield North	B3: High Biodiversity Significance
23	Los Pinos at Rattlesnake Hill	B3: High Biodiversity Significance
24	Lower Florida River	B3: High Biodiversity Significance
25	Middle Florida River	B3: High Biodiversity Significance
26	Middle Hermosa Creek	B3: High Biodiversity Significance
27	Morgan Canyon	B3: High Biodiversity Significance
28	Sauls Creek	B3: High Biodiversity Significance
29	Sheephead Basin	B3: High Biodiversity Significance
30	Spring Creek North	B3: High Biodiversity Significance
31	Upper Elbert Creek	B3: High Biodiversity Significance
32	Upper Hermosa Creek	B3: High Biodiversity Significance
33	Vallecito Creek-Johnson Creek	B3: High Biodiversity Significance
34	Cascade Creek	B4: Moderate Biodiversity Significance
35	Endlich Mesa Basin	B4: Moderate Biodiversity Significance
36	Los Pinos at Bayfield South	B4: Moderate Biodiversity Significance
37	Lower Coon Creek	B4: Moderate Biodiversity Significance
38	Lower La Plata River	B4: Moderate Biodiversity Significance
39	Mitchell Lakes	B4: Moderate Biodiversity Significance
40	Orphan Butte	B4: Moderate Biodiversity Significance
41	Smelter Mountain	B4: Moderate Biodiversity Significance
42	Vallecito Reservoir Tributary	B4: Moderate Biodiversity Significance
43	Animas City Mountain	B5: General Biodiversity Interest
44	Animas River at Goat Canyon	B5: General Biodiversity Interest
45	Bayfield Northeast	B5: General Biodiversity Interest
46	Big Bend Creek	B5: General Biodiversity Interest
47	Cherry Creek	B5: General Biodiversity Interest
48	Clear Creek La Plata	B5: General Biodiversity Interest
49	Coal Gulch	B5: General Biodiversity Interest
50	Durango West	B5: General Biodiversity Interest
51	East Fork Hermosa Creek	B5: General Biodiversity Interest
52	Electra Lake	B5: General Biodiversity Interest
53	Florida River Uplands	B5: General Biodiversity Interest
54	Gaines Canyon	B5: General Biodiversity Interest
55	Hermosa Cliffs	B5: General Biodiversity Interest
56	Lake Marie	B5: General Biodiversity Interest
57	Lange Canyon	B5: General Biodiversity Interest
58	Loma Linda	B5: General Biodiversity Interest
59	Middle La Plata River	B5: General Biodiversity Interest
60	Needle Creek at Emerald Lake	B5: General Biodiversity Interest
61	Pastorius Reservoir	B5: General Biodiversity Interest
62	Pine River Canal	B5: General Biodiversity Interest
63	Red Mesa	B5: General Biodiversity Interest
64	Road 136	B5: General Biodiversity Interest
65	Spring Creek at Ignacio	B5: General Biodiversity Interest
66	Sunlight Basin	B5: General Biodiversity Interest
67	Tuckerville	B5: General Biodiversity Interest
68	West Virginia Gulch	B5: General Biodiversity Interest

Figure 84. Potential Conservation Areas



Potential Conservation Area Profiles: B1 PCAs

Cemetery Canyon

Potential Conservation Area Profiles: B2 PCAs

Animas River Canyon

Columbine Pass-Chicago Basin

Endlich Mesa

Junction Creek

Lightner Creek

Lime Mesa

Lower Hermosa Creek

Madden Creek

Potential Conservation Area Profiles: B3 PCAs

Animas River at La Posta

Animas River at Rockwood

Bondad

Cave Basin Trail

Cinder Gulch

Cumberland Basin

Elbert Creek

Falls Creek

Florida River at Burnt Timber Creek

Haviland Lake

Highline Trail

Indian Creek at Tuckerville

Los Pinos at Bayfield North

Los Pinos at Rattlesnake Hill

Lower Florida River

Middle Florida River

Middle Hermosa Creek

Morgan Canyon

Sauls Creek

Sheephead basin

Smelter Mountain

Spring Creek North

Upper Elbert Creek

Upper Hermosa Creek

Vallecito Creek-Johnson Creek

Potential Conservation Area Profiles: B4 PCAs

Cascade Creek

Endlich Mesa Basin

Los Pinos at Bayfield South

Lower La Plata River

Mitchell Lakes

Orphan Butte

Potential Conservation Area Profiles: B5 PCAs

Animas City Mountain
Animas River at Goat Canyon
Bayfield Northeast
Big Bend Creek
Cherry Creek
Clear Creek La Plata
Coal Gulch
Durango West
East Fork Hermosa Creek
Electra Lake
Florida River Uplands
Gaines Canyon
Hermosa Cliffs
Lake Marie
Lange Canyon
Loma Linda
Middle La Plata River
Needle Creek at Emerald Lake
Pastorius Reservoir
Pine River Canal
Red Mesa
Road 136
Spring Creek at Ignacio
Sunlight Basin
Tuckerville
West Virginia Gulch

Missionary Ridge Burn PCAs

Lower Coon Creek
Vallecito Reservoir Tributary

Sites of Local Significance and Other Areas of interest

Animas Overlook
Animas River at Durango
Barnes Mountain
Bodo State Wildlife Area
Clear Creek Trail
Durango Nature Center
Hesperus
La Boca
Lost Lake
Middle Mountain Road
Miller Creek
South Florida Mesa
Stump Lakes

Cemetery Canyon PCA

Biodiversity Rank: B1: Outstanding biodiversity significance. This PCA contains an excellent (and the only known) occurrence of Knowlton's cactus, a critically imperiled (G1S1) plant that is federally listed as endangered (LE).

Protection Urgency Rank: P3: The site is on private land within the Southern Ute Indian Reservation.

Management Urgency Rank: M4: Monitoring of the population by The Nature Conservancy is ongoing.

Location: La Plata County, CO and San Juan County, NM. The Cemetery Canyon PCA is located at the border of Colorado and New Mexico south of La Boca.

U.S.G.S. 7.5-min. quadrangles: Ignacio, Tiffany and Burnt Mesa

Legal Description: T32N, R7W, Sections 8-24; T32N R6W Sections 18, 19..

Elevation: 6150 feet to 7150 ft

Size: Approximately 7652 acres

General Description: This PCA, on the border of Colorado and New Mexico, is a region of low rocky hills and knolls dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). There are numerous operating gas wells in the area. The sandy-gravelly soil is associated with remnant alluvial terraces of the Los Pinos River, and has an abundance of small rounded pebbles on its surface. The underlying geologic substrate is the Tertiary San Jose formation. Associated species include black sagebrush (*Artemisia nova*), broom snakeweed (*Gutierrezia sarothrae*), and blue gramma (*Bouteloua gracilis*). Although the state boundary is not marked, most of the cacti at the site are believed to be on the New Mexico side of the border.

Biodiversity Rank Justification and Comments: This PCA is the type locality (the collection location of the specimen on which the plant's official description is based) of Knowlton's cactus (*Pediocactus knowltonii*). It is an excellent (A ranked) occurrence of the species, containing several thousand plants, and it is the only specific location known for this species in the world. Any local disturbance, disease, or predation could cause the extinction of the entire species. Therefore, the species is critically imperiled on a global scale (G1S1).

Table #. Natural Heritage element occurrences at Cemetery Canyon PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Pediocactus knowltonii</i>	Knowlton's cactus	G1	S1	LE	A

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

Boundary Justification: The boundary is drawn to include the population of Knowlton's cactus, including both sides of the Colorado-New Mexico border. Additional area has been included as potential habitat and to keep the exact location confidential.

Protection Comments: Knowlton's cactus is listed as endangered (LE) under the Endangered Species Act. This prohibits collection, although plants are not otherwise protected on private land by the ESA. The property is now privately owned by The Nature Conservancy, and annual monitoring of the population is ongoing.

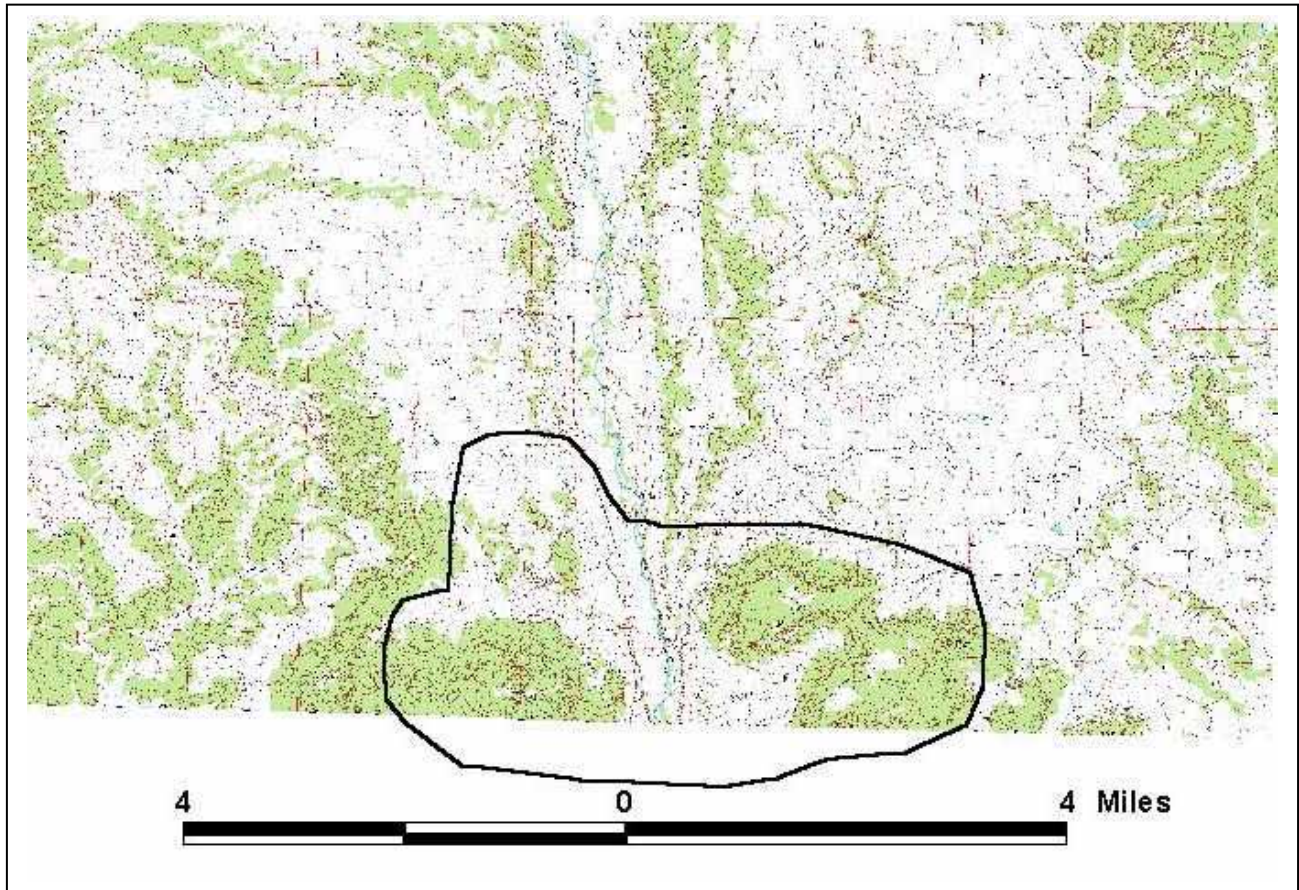
Management Rank Comments: The major threat to Knowlton's cactus is collecting by cactus collectors. Much has been done to protect Knowlton's cactus from extinction. The Nature Conservancy and the Public Service Company of New Mexico have been instrumental in providing protection to the species through

land exchanges and fencing. The BLM conducted a two-year survey for Knowlton's cactus on BLM lands in the vicinity of the type locality (Heil 1985), but no new populations were found. Major tasks remain before Knowlton's cactus can be considered secure. Alleviation of collection of the cactus is of primary importance (Heil 1985).

On a site visit in 2002, herbivory was noted on many plants that had been marked with aluminum identification tags. It is conjectured that the tags may be attractive to rodents that then nibble on the cacti.

Although much effort has been put into surveying appropriate habitat for additional populations of the cactus, none have been found. In the 1980's the species was introduced in two nearby areas with similar habitat in New Mexico, both by transplanting cuttings and by seed. These sites are being monitored annually. Although population numbers fluctuate, the plants are surviving. Further efforts at introduction may be critical for preventing the extinction of this species. There are additional areas of potential habitat in La Plata and Archuleta counties that have not been adequately surveyed for Knowlton's cactus (Sivinski, pers. comm.)

Cemetery Canyon Potential Conservation Area. B1: Outstanding Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

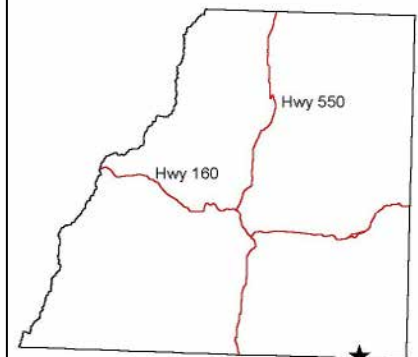


PCA Boundary

Ignacio, 37107-A6
Tiffany, 37107-A5
7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Animas River Canyon PCA

Biodiversity Rank: B2. Very high biodiversity significance. The PCA supports an excellent (A ranked) occurrence of a globally imperiled (G2) plant community, and six other good (B ranked) and excellent (A ranked) riparian communities.

Protection Urgency Rank: P4. No Protection actions are needed in the foreseeable future. The site is within the USFS land.

Management Urgency Rank: M4. . Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the current quality of the element occurrences.

Location: San Juan and La Plata counties. From about 4.5 miles south of Silverton, to about 19 miles north of Durango.

U.S.G.S. 7.5-min. quadrangles: Snowdon Peak, Mountain View Crest, Electra Lake.

Legal Description: T38N R8W S5, 6; T39N R8W S13, 24-28, 31-33; T39N R7W S5-7, 18, 19; T40N R7W S17, 21, 22, 28, 29, 32

Elevation: 7600 ft. to 9000 ft.

Size: Approximately 2,665 acres

Redders, 2003, Community Type: Deciduous-Evergreen Forests: *Populus angustifolia-Picea pungens/Alnus incana*; *Populus angustifolia-Pseudotsuga menziesii*; *Populus angustifolia-Picea engelmannii-Abies lasiocarpa*; *Populus angustifolia/Salix exigua*

General Description: The Animas River, between the confluence of Molas Creek and Little Cascade Creek, forms a spectacular 13.5 mile long canyon. The river cuts through the granitic gneiss visible on the Needle and West Needle Mountains and through even older metamorphic rock, derived principally from volcanic rock (Chronic 1980). The PCA contains a mosaic of high quality riparian communities, including the globally vulnerable montane riparian forest dominated by white fir (*Abies concolor*), Colorado blue spruce (*Picea pungens*), narrowleaf cottonwood (*Populus angustifolia*) and Rocky Mountain maple (*Acer glabrum*). The natural periodic flooding regime that is critical for regeneration of cottonwoods and willows appears to be intact. The area has a high diversity of plant species and associations, with few exotic species. Other important plant species that characterize this stretch include subalpine fir (*Abies lasiocarpa*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), New Mexican white pine (*Pinus strobiformis*), thinleaf alder (*Alnus incana*), red-osier dogwood (*Cornus sericea*), chokecherry (*Prunus virginiana* var *melanocarpa*) and several willows (*Salix* spp.). Farther downstream, beginning at about Rockwood, the spruce-fir forest gives way to ponderosa pine (*Pinus ponderosa*), Rocky Mountain juniper (*Juniperus scopulorum*) and Gambel's oak (*Quercus gambelii*). Riparian species such as box elder (*Acer negundo*) and river birch (*Betula occidentalis*) become more common than the higher elevation alder and willows. The Durango-Silverton railroad parallels the river through the site, bringing thousands of visitors each year through this scenic area. Stops are made at Elk Park, at the northern end of the PCA, and at Needleton, near the middle of the PCA, where passengers may disembark for hiking or sightseeing and be picked up by a later train. The canyon can be accessed by foot or horseback from Molas Pass, via the Molas Creek trail, or from Kite Lake, via the Elk Creek trail. Most of the canyon is inaccessible to the public.

Biodiversity Rank Justification and Comments: The Animas River Canyon PCA supports an excellent (A ranked) occurrence of a globally imperiled (G2) *Abies concolor/Picea pungens – Populus angustifolia/Acer glabrum* plant community. The PCA supports two excellent (A ranked) examples of globally vulnerable (G3) montane riparian forests (*Picea pungens/Alnus incana*; *Populus angustifolia-Pseudotsuga menziesii*). The site also contains two good (B ranked) examples of apparently globally secure (G4) riparian forests (*Abies lasiocarpa – Picea engelmannii – Populus angustifolia /Lonicera involucrata*; *Populus angustifolia/Salix exigua*). The PCA contains a good example (B ranked) of a globally vulnerable

(G3) willow shrubland (*Alnus incana*/*Salix drummondiana*). Finally the site supports an excellent (Aranked) example of an apparently globally secure (G4) riparian forest (*Populus angustifolia*-*Picea pungens*/*Alnus incana*).

Table 15. Natural Heritage element occurrences at Animas River Canyon PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Abies concolor</i> – <i>Picea pungens</i> – <i>Populus angustifolia</i>/<i>Acer glabrum</i>	White fir – blue spruce – narrowleaf cottonwood/ Rocky Mountain maple	G2	S2		A
<i>Picea pungens</i> / <i>Alnus incana</i> woodland	Blue spruce/thinleaf alder-Montane riparian forests	G3	S3		A
<i>Populus angustifolia</i> - <i>Pseudotsuga menziesii</i> forest	Narrowleaf cottonwood-Douglas fir -Montane riparian forest	G3	S2		A
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> - <i>Populus angustifolia</i> / <i>Lonicera involucrata</i> forest	Subalpine fir-Blue spruce-Narrowleaf cottonwood/twinberry-Montane riparian forest	G4	S3		B
<i>Populus angustifolia</i> / <i>Salix exigua</i> forest	Narrowleaf cottonwood/coyote willow riparian forests	G4	S4		B
<i>Populus angustifolia</i> - <i>Picea pungens</i> / <i>Alnus incana</i> forest	Narrowleaf cottonwood-Blue spruce/thinleaf alder-Montane riparian forests	G4	S4		A
<i>Alnus incana</i> / <i>Salix drummondiana</i>	Thinleaf alder/Drummond's willow-Montane riparian shrubland	G3	S3		B

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

Boundary Justification: The boundary is drawn to include the entire length of the imperiled montane riparian woodland plant community. It includes the canyon and flood plain of the Animas River in this 13.5 mile stretch. The PCA also coincidentally encompasses a mosaic of several other riparian communities. A buffer of approximately 200 ft. upslope from the riparian zone was added, to account for the effects of runoff from this area on stream flows and water quality.

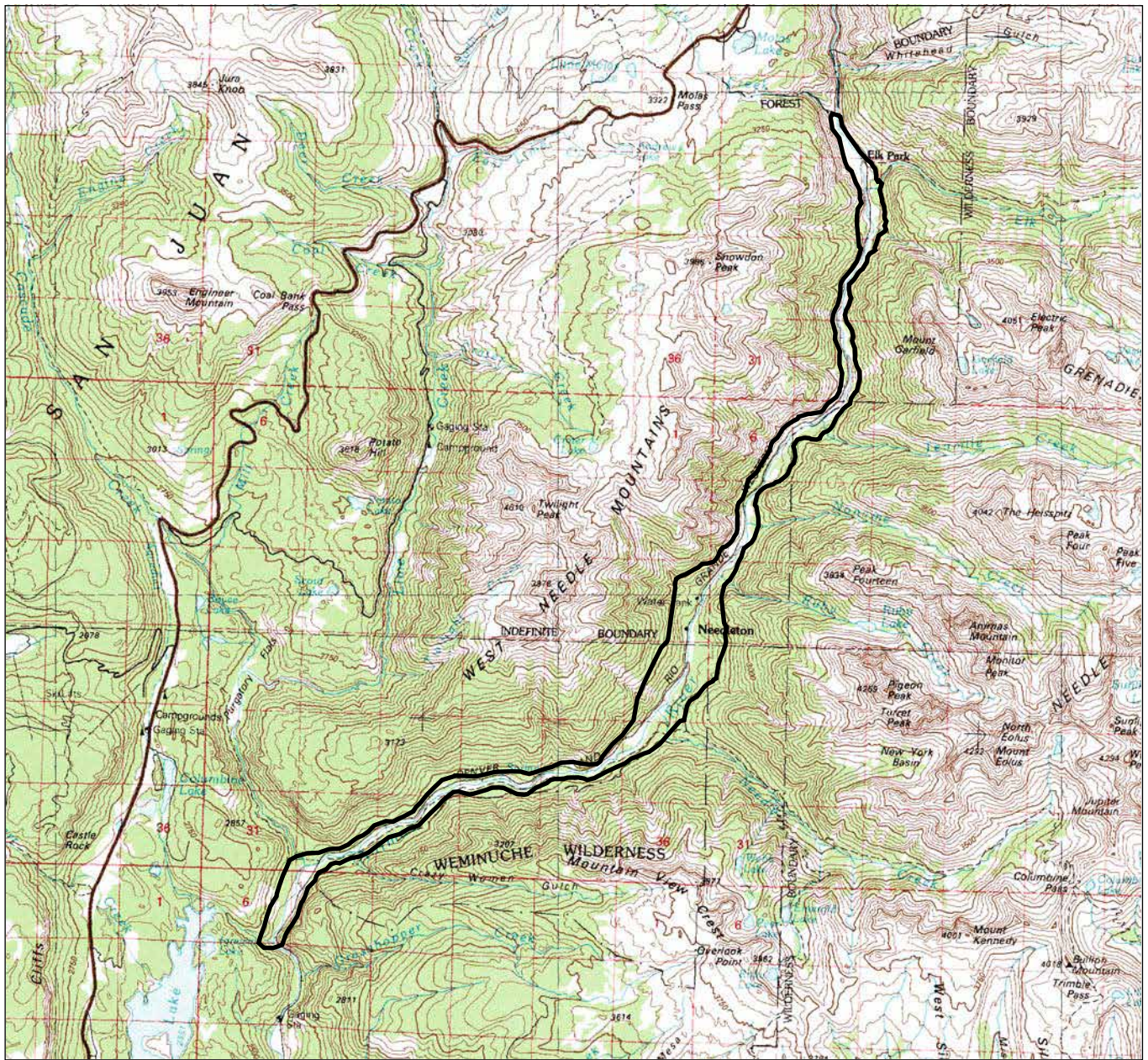
Protection Comments: Except for a few small private inholdings, the entire site is within the San Juan National Forest. It is surrounded by the Weminuche Wilderness, but the canyon itself is excluded from the wilderness.

Management Comments: Most of the canyon is not accessible. There is probably some effect on vegetation from the train's smoke. Continued monitoring will help to protect the area from invasive non-native plants that may be introduced by the railroad or recreational users.

Soils: Soils for this PCA range from shallow, poorly developed mineral derived to sandy loams and coarse alluvial materials. This portion of La Plata County is not included in the county's soil survey.

Wetland Functional Assessment for the Animas River Canyon PCA: Wetland ecologists did not visit this site in 2003, thus a functional assessment was not performed. The site was visited in 2002.

Figure 11. Animas River Canyon Potential Conservation Area, B2: Very High Biodiversity Significance



1 0 1 Miles

Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

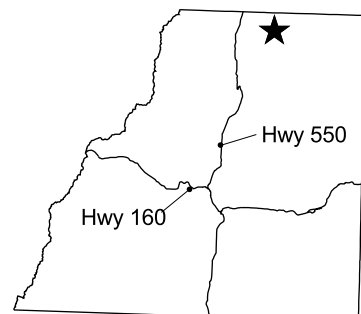
 **PCA Boundary**

Silverton, 37107-E1
30x60 Minute Series

Digital Raster Graphics produced
by the U.S. Geological Survey

map created 2 April 2004
UTM, Zone13, NAD27

Location in Study Area



Columbine Pass-Chicago Basin PCA

Biodiversity Rank: B2: Very high biodiversity significance. The PCA supports an excellent occurrence of a globally imperiled plant.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years.

Management Urgency Rank: M4: Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

Location: La Plata County, San Juan National Forest, Weminuche Wilderness.

U.S.G.S. 7.5-min. quadrangles: Columbine Pass

Legal Description: T38N R7W Section 2; T39N R7W Section 25, 26, 35, 36

Elevation: 12,400 ft to 13,000 feet

Size: Approximately 985 acres

General Description: The steep alpine slopes of this PCA consist primarily of rock outcrops and loose talus of gravelly pink granite. There is little vegetation except for scattered Colorado columbine (*Aquilegia coerulea*), alpine groundsel (*Senecio holmii*), alpine mountain sorrel (*Oxyria digyna*), and the two rare plants, San Juan whitlow-grass (*Draba graminea*) and Altai chickweed (*Stellaria irrigua*). A popular hiking and horse trail climbs from Columbine Lake on the east, over the pass and down to Chicago Basin on the west. In September 2003, most of the San Juan whitlow-grass plants were vegetative, with only a few flowering. We counted over 200 individuals on the steep west side of Columbine Pass, and expect that there are more in areas that are difficult to access. Two patches of kittentails (*Besseya ritteriana*) and one of showy whitlow-grass (*Draba spectabilis* var *oxyloba*) were found nearby in somewhat less steep areas with deeper soil and more vegetation. Surrounding alpine communities include alpine avens (*Geum rosii*), false strawberry (*Sibbaldia procumbens*), tufted hairgrass (*Deschampsia cespitosa*), and other typical alpine species.

Biodiversity Rank Justification and Comments: This PCA contains an excellent (A ranked) occurrence of a globally imperiled (G2) plant, San Juan whitlow-grass. This species is endemic to Colorado, with 21 occurrences in five counties, all in the San Juan Mountains at elevations above 12,400 feet. Also included in the PCA are good (B ranked) occurrences of Altai chickweed, rare in Colorado (S2); kittentails; and Showy whitlow-grass, both ranked vulnerable (G3). There are several historic occurrences of plants in the Chicago Basin area that are not included in this PCA, including San Juan whitlow-grass, Altai chickweed, Colorado Divide whitlow-grass (*Draba streptobrachia*), and Kotzebue's grass of Parnassus (*Parnassia kotzebuei*). Precise locations of these occurrences were not documented, and the populations have not been located within the last 20 years. The PCA could be enlarged to include these if they are relocated in the future.

Table #. Natural Heritage element occurrences at Columbine Pass-Chicago Basin PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Draba graminea</i>	San Juan whitlow-grass	G2	S2		A
<i>Stellaria irrigua</i>	Altai chick weed	G4?	S2		B
<i>Besseya ritteriana</i>	Kittentails	G3	S3		B
<i>Draba spectabilis</i> var <i>oxyloba</i>	Showy whitlow-grass	G3?T3Q	S3S4		B

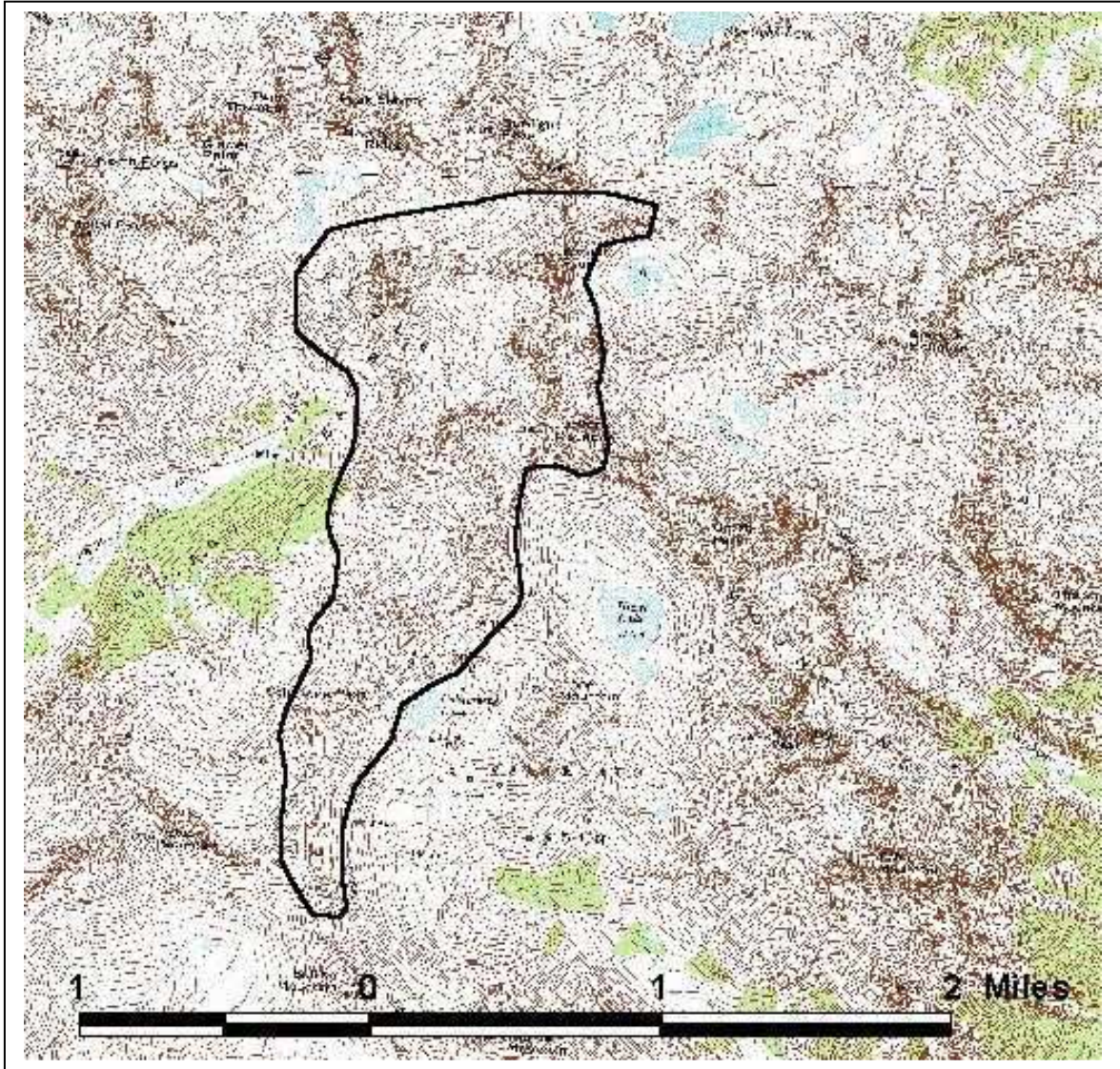
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary is drawn to encompass the population of San Juan whitlow- grass that was located in 2003. It includes additional similar habitat along the ridge north of Columbine Pass that is expected to be occupied by San Juan whitlow-grass, although it was not possible to survey it. The entire ridge provides habitat for the population to expand or move over time. Historic occurrences of San Juan whitlow- grass were reported in the Chicago Basin area but precise locations were not documented. It is likely that the species is more widespread in the steep talus areas that were not surveyed. Populations of kittentails and Altai chickweed fall within the boundary, and are also probably more widespread throughout the area in similar habitat.

Protection Rank Comments: The PCA is entirely within the Weminuche Wilderness of the San Juan National Forest. Special regulations have been enacted due to the high usage of Chicago Basin as a hiking destination, including a ban on campfires. San Juan whitlow-grass has no special protection in spite of its rarity. It is currently on a list of species being considered for inclusion on the Region 2 Forest Service sensitive species list, but for which more information is needed. Designation as a Forest Service Sensitive Species would help to ensure that management decisions take into account effects of actions on this species. Designation of this area as a research natural area, special interest area or special botanical area would help to ensure management compatible with the long term viability of the rare plants in the site.

Management Rank Comments: A hiking and horse trail runs through the San Juan whitlow- grass population at Columbine Pass. However, few hikers have reason to venture off the trail. There was no evidence of human disturbance or exotic species at the site.

Columbine Pass-Chicago Basin PCA. B2: Very High Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



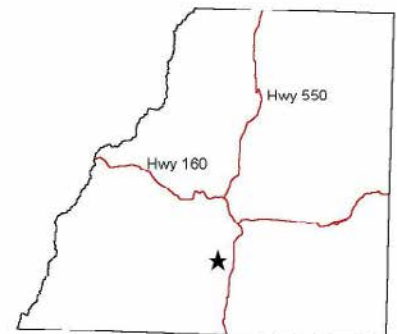
PCA Boundary

Columbine Pass 37107-E5
7.5 Minute Series

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

Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Endlich Mesa PCA

Biodiversity Rank: B2: Very high biodiversity significance. The PCA supports an excellent example of a globally imperiled (G2) plant.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years.

Management Urgency Rank: M3: No management needs are known.

Location: The Endlich Mesa PCA is located in northeastern La Plata County. It is accessible from the Endlich Mesa Trail, which begins at the end of Forest Road 597, which begins at the north end of Lemon Reservoir. It is about 19 air miles northeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Vallecito Reservoir

Legal Description: T37N R7W Sections 1, 2, 10, 11, 14 and 15; T38N R7W Sections 34, 35.

Elevation: 11,480 feet to 12,300 feet

Size: approximately 1664 acres

General Description: This PCA is located at timberline, with scattered clumps of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*). The habitat of Rothrock's Easter daisy (*Townsendia rothrockii*) is fellfields, or open rocky areas with very shallow compacted soils. Leadville limestone bedrock is broken and gravelly at its exposed surface. There is minimal vegetation, except in depressions that have accumulated deeper soils and on small knolls with reddish soil, which do not support the rare plants. The site includes the mesa top and another barren area to the east that has lighter tan soils. Rothrock's Easter daisy numbered in the thousands on the mesa top, and in the hundreds on the lighter soils. Associated plants in the area included Holm's ragwort (*Ligularia holmii*), moss campion (*Silene acaulis*), alpine sandwort (*Lidia obtusiloba*), orange sneezeweed (*Dugaldia hoopesii*), cutleaf anemone (*Anemone multifida*), Geyer's onion (*Allium geayeri*) and Parry's goldenrod (*Oreochrysum parryi*).

Biodiversity Rank Justification and Comments: The Endlich Mesa PCA supports an excellent (A ranked) occurrence of Rothrock's Easter daisy, a globally imperiled (G2) plant. This is one of the two largest occurrences of Rothrock's Easter daisy known. The other is also in La Plata County, at Lime Mesa. Both sites are on Leadville limestone, and have similar topography.

Table #. Natural Heritage element occurrences at the Endlich Mesa PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Townsendia rothrockii</i>	Rothrock's Easter daisy	G2	S2		A

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

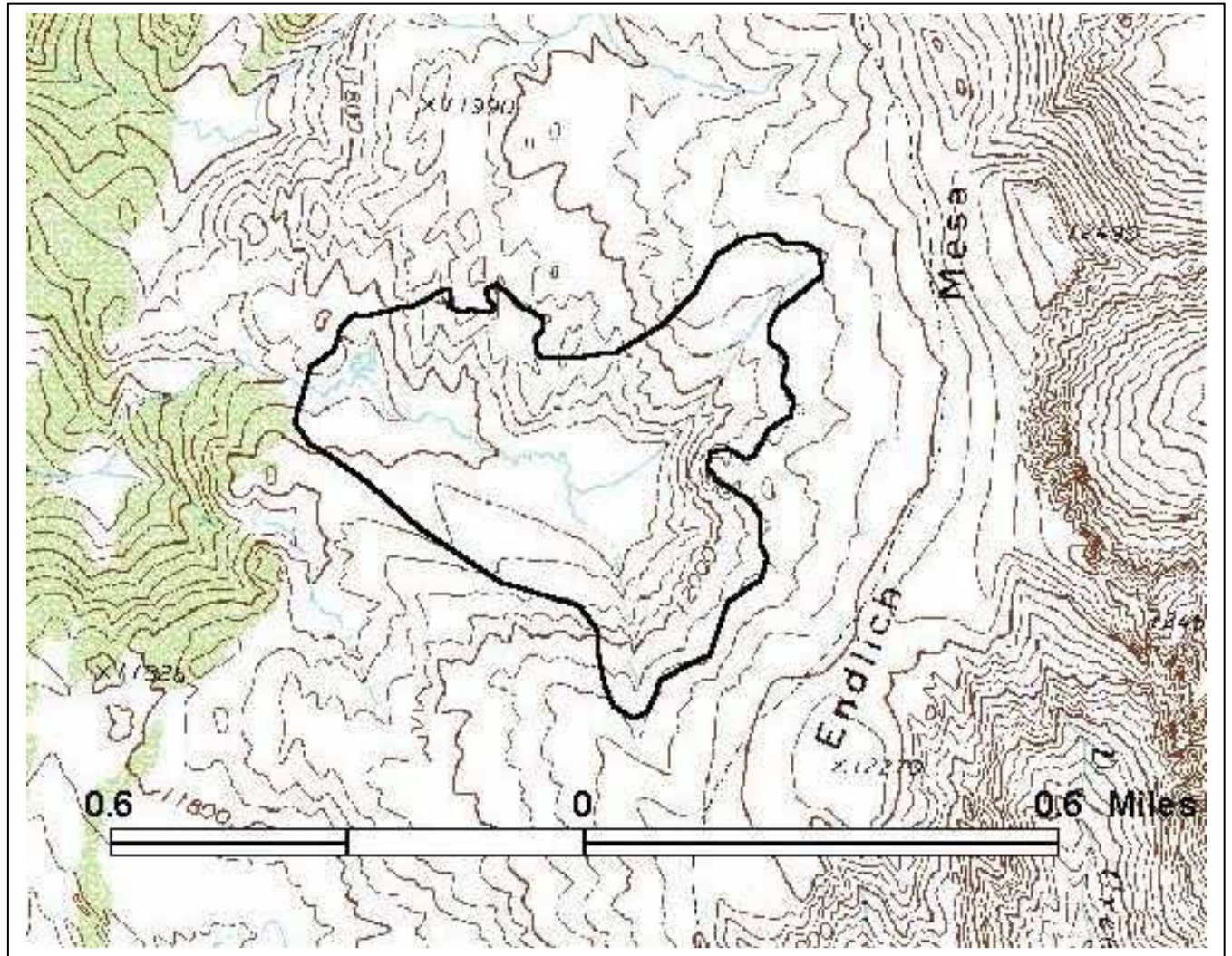
Boundary Justification: The boundary is drawn to encompass the known location of Rothrock's Easter daisy on Endlich Mesa. The extent of the population to the north, west and south was determined. There may be additional plants to the east and northeast in areas that were not surveyed. Additional area to the north of the occurrence is included to allow colonization of new sites over time and to include habitat for pollinators. Potential habitat was determined by elevation (11,600 to 12,300 ft), gentle slopes, current vegetation (mostly treeless), and substrate (Leadville limestone and granites). This PCA encompasses the Endlich Mesa Basin PCA.

Protection Comments: This PCA is within the San Juan National Forest. The northern part of the site is within currently managed with emphasis on maintaining or improving wilderness character in a pristine

(away from trail) or primitive (trail corridor) recreation setting with high levels of solitude and opportunities for challenge and risk. Inclusion of *Townsendia rothrockii* on the Region 2 sensitive species list would help to focus attention on preserving the habitat of the plants. Currently, *T. rothrockii* is under consideration for the sensitive list, but is part of a large group of species for which the Forest Service believes it has insufficient information. Obtaining the necessary information before the forest plan is revised would enable a decision on this rare species, and perhaps lead to its protection in this and other sites where the plant occurs.

Management Comments: Periodic monitoring of the rare plant population at this PCA is recommended to recognize any future changes and management needs. There were no exotic species observed at the site. A hiking trail runs through the population, but off-trail use was not apparent. Signage to encourage hikers and horsemen to stay on the trail and not camp in the area of the rare plant population would aid in its long-term preservation.

Endlich Mesa Basin Potential Conservation Area. B4: Moderate Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Columbine Pass, 37107-E5
7.5 Minute Series

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

Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Junction Creek PCA

Biodiversity Rank: B2. Very high biodiversity significance, nearly irreplaceable. The site supports an excellent (A ranked) example of a globally imperiled (G2) riparian woodland, and a good (B ranked) example of a globally imperiled (G2) riparian forest.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The entire site is managed by the U.S. Forest Service.

Management Urgency Rank: M3. New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA. Exotic weed invasion at Quinn Creek and the Colorado Trail trailhead may advance in the future.

Location: Junction Creek PCA is located northwest of Durango surrounding Junction Creek from the Colorado Trail trailhead to the confluence of Castle Creek.

U.S.G.S. 7.5-min. quadrangles: Durango West, Monument Hill

Legal Description: T36N R10W Sections 23, 25, 26, 35, 36

Elevation: 8,040 – 7,120 ft.

Size: Approximately 551 acres

Redders, 2003, Community Type: Deciduous – Evergreen Forest: *Populus angustifolia* – *Picea pungens* / *Alnus incana*; Deciduous Forest: *Acer negundo* – *Populus angustifolia* / *Cornus sericea*

General Description: This PCA surrounds Junction Creek in a v-shaped valley that eventually opens wider at its lower reaches. The stream channel is mostly straight, constricted by the severe landscape. Stream channel health is enhanced where log jams and large rocks create a series of pools. Coniferous trees occupy the riparian zone, becoming very dense in the narrow bottoms and less dense in wider areas where the deciduous forests dominate. The natural plant community, white fir – blue spruce – narrowleaf cottonwood / Rocky Mountain maple (*Abies concolor* – *Populus angustifolia* / *Acer glabrum*) dominates the riparian zone while box elder – narrowleaf cottonwood / red-osier dogwood (*Acer negundo* – *Populus angustifolia* / *Cornus sericea*) plant community is found in smaller patches. The shrub layer is vigorous and diverse throughout.

The area near the Colorado Trail trailhead reflects its popularity and close proximity to Durango. Social trails to the creek abound while non-native species and introduced grasses are more common than native riparian plants in the understory. Not far upstream, this condition greatly improves as impacts lessen. Even at the bridged trail crossing near Quinn Creek, the riparian herbaceous composition is mostly native and in good condition. Canada thistle is present but never dense.

Biodiversity Rank Justification and Comments: The PCA supports an excellent (A ranked) example of the globally imperiled (G2) plant community, box elder – narrowleaf cottonwood / red osier dogwood. This association is documented only from western Colorado (Nature Serve Explorer 2003). This plant community is apparently a late-seral community with mature to decadent cottonwoods high above the box elder stands. This riparian plant community can slowly convert to an upland association over time (Carsey et al. 2002). The PCA also supports a good (B ranked) example of the globally imperiled (G2) white fir – blue spruce – narrowleaf cottonwood / Rocky Mountain maple plant association. The presence of white fir distinguishes this plant community from the more common narrowleaf cottonwood – blue spruce / thinleaf alder plant association and is characteristic of the southern most mountains in Colorado (Carsey, et al. 2003). This association is only documented from southern Colorado, though it is thought to occur in northern New Mexico (Nature Serve Explorer 2003).

Table 16. Natural Heritage element occurrences at Junction Creek PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Acer negundo</i> – <i>Populus angustifolia</i> / <i>Cornus sericea</i>	Box elder – narrowleaf cottonwood / red-osier dogwood	G2	S2		A
<i>Abies concolor</i> – (<i>Picea pungens</i>) – <i>Populus angustifolia</i> / <i>Acer glabrum</i>	White fir – blue spruce – narrowleaf cottonwood / Rocky Mountain maple	G2	S2		B

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

Boundary Justification: The boundaries incorporate an area that will allow natural hydrological processes such as seasonal flooding, sediment deposition, and new channel formation to maintain viable populations of the elements along Junction Creek. It should be noted that the hydrological processes necessary to the elements are not fully contained by the PCA boundaries. Given that the elements are dependent on natural hydrological processes associated with Junction Creek and its tributaries, upstream activities such as water diversions, impoundments, improper livestock grazing, mining, and development are detrimental to the hydrology of the riparian area. This boundary indicates the minimum area that should be considered for any conservation management plan.

Protection Comments: The entire PCA is owned and managed by the U.S. Forest Service.

Management Comments: Excessive social trails can impact bank stabilization, sediment and toxicants, and invite weed invasion. Canada thistle is common in some areas, but is never dense. Weed invasion is a foreseeable threat if impacted areas are not managed.

Soils Description: Soils sampled are loamy sand, with cobble and gravel horizons. Soil survey of La Plata County Area, Colorado (USDA 1988) describe soils as Pescar fine sandy loam, classified as coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Aquic Ustifluent. The northern portion of the PCA is not described by the soil survey.

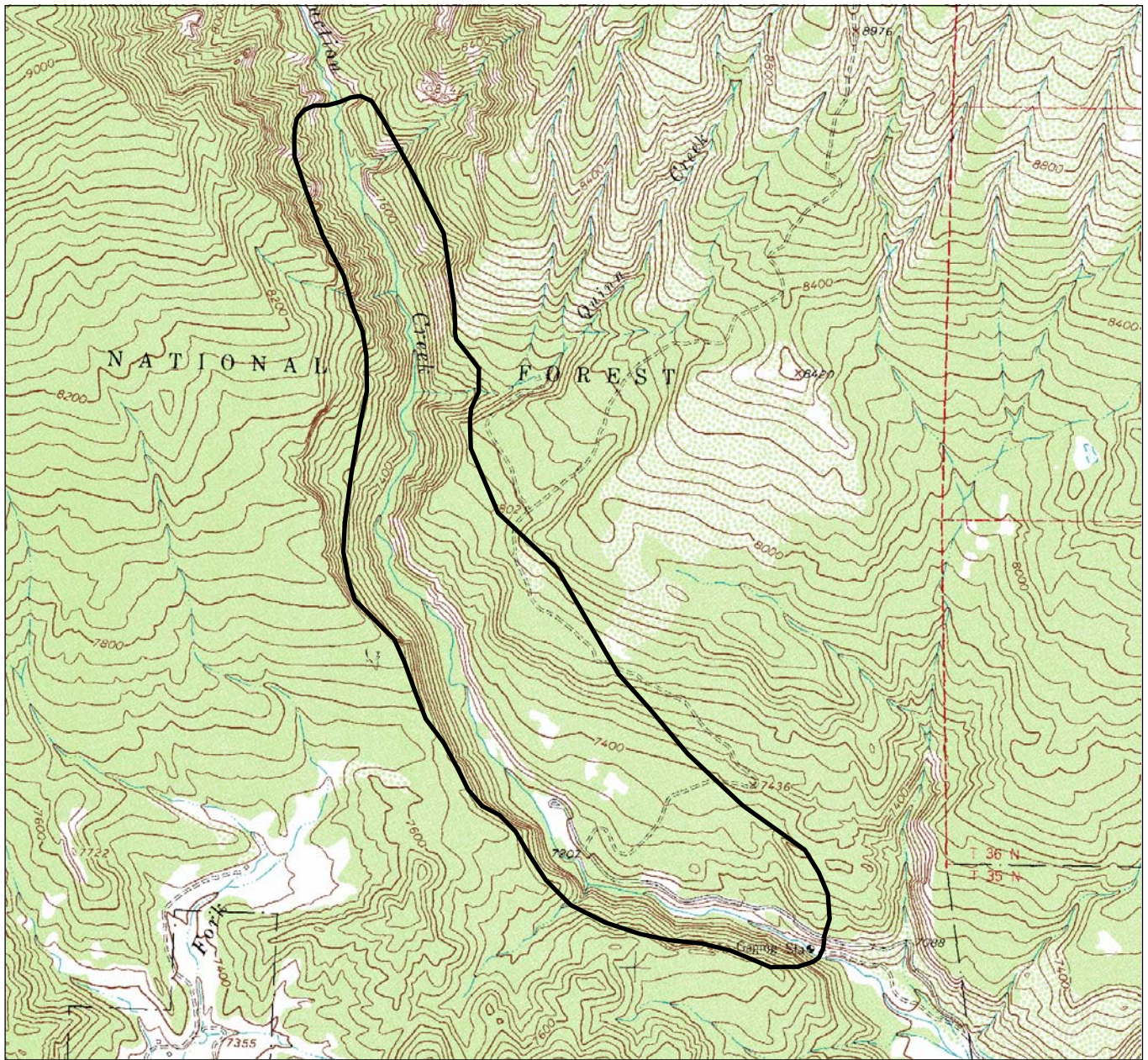
Restoration Potential: The river hydrology is intact within the Junction Creek PCA. The riparian area is functioning as expected. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species. For suggestions on native plant revegetation, the Colorado Natural Area Program offers advice in their website, <http://www.parks.state.co.us/cnap/index.html>.

Wetland Functional Assessment for the Junction Creek PCA:
Proposed HGM Class: Riverine **Subclass:** R3
Cowardin System: Palustrine
CNHP's Wetland Classification:

Table 17. Wetland functional assessment for the riverine wetland at the Junction Creek PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This riparian wetland appears to be functioning at its potential.
<i>Hydrological Functions</i>		
Flood Attenuation and Storage	Moderate	Although it is a v-shaped valley with steep to moderate gradient, coarse alluvial soils with pools and slight broadening of the riparian zone indicate positive function in some areas.
Sediment/Shoreline Stabilization	Moderate	Bank erosion is occurring especially in the lower reaches where social trails are present. Overall dense woody layer contributes positively to function. Upper reaches with dense, native herbaceous layer. Upper reach also with several log jams, large rocks in the stream, slowing water and creating sediment traps.
Groundwater Discharge/Recharge	Yes	Although stream channel is straight, pools over coarse alluvium (loamy sand and cobble) soils, indicate possible recharge.
Dynamic Surface Water Storage	N/A	
<i>Biogeochemical Functions</i>		
Elemental Cycling	Normal	Overall density and vigor of vegetation with normal amounts of detritus indicate normal elemental cycling.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	There is some sediment trapping. Vigorous vegetative growth including native herbaceous layer removes imported nutrients and toxicants.
<i>Biological Functions</i>		
Habitat Diversity	Low	One Cowardin class is present -- a forested wetland habitat.
General Wildlife Habitat	High	Rich plant composition (many fruit bearing shrubs and willows) provide diverse habitat. Deer sign, song birds noted.
General Fish/Aquatic Habitat	Moderate	Low flow for much of the year. Fish noted in deep pools. Riffles and pools offer aquatic habitat.
Production Export/Food Chain Support	High	Overhanging vegetation and sign of high water lines are positive indicators for exporting carbons to downstream systems.
Uniqueness	High	Although the wetland type is common, the area supports a mosaic of G2 plant associations within a healthy forest.

Figure 12. Junction Creek Potential Conservation Area, B2: Very High Biodiversity Significance



0.25 0 0.25 Miles



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

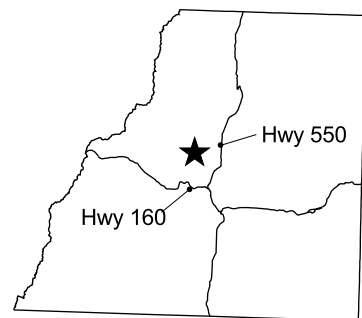
 **PCA Boundary**

Durango West, 37107-C8
 7.5 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 2 April 2004
 UTM, Zone13, NAD27

Location in Study Area



Lightner Creek PCA

Biodiversity Rank: B2: Very high biodiversity significance. The PCA supports a good (B ranked) example of a globally imperiled (G2) plant community.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future. The PCA is almost entirely owned by the U.S. Forest Service with private lands in the southern portion.

Management Urgency Rank: M2: New management actions may be needed within 5 years to prevent loss of the element occurrence within the PCA. Aggressive weeds are prevalent.

Location: The Lightner Creek PCA is located northwest of Durango surrounding Lightner Creek near the South Fork confluence and the National Forest boundary.

U.S.G.S. 7.5-min. quadrangles: Durango West
 Legal Description: T36N R10W Sections 29, 32
 T35N R10W Section 5

Elevation: 700ft.

Size: Approximately 207 acres

Redders, 2003, Community Type: Deciduous Forest: *Acer negundo* – *Populus angustifolia* / *Cornus sericea*. Deciduous - Evergreen Forest: *Populus angustifolia* - *Pseudotsuga menziesii*

General Description: Lightner Creek is situated in a steep canyon, running south from its headwaters in the La Plata Mountain range. The stream gradient eventually decreases in a broader valley about eight miles before its confluence with the Animas River. Steep canyon walls to steep hillslopes surround the stream with mixed conifer forests that dominate the uplands. The narrow riparian area claims the old flood plain and active channel. Narrowleaf cottonwood (*Populus angustifolia*) and box elder (*Acer negundo*) dominate the riparian tree canopy while Mexican white pine (*Abies concolor*) and Douglas fir (*Pseudotsuga menziesii*) are occasionally situated in the riparian zone. Regeneration is vigorous with conifer saplings on higher benches and cottonwood recruits in the old flood plain and point bars. Dense patches of red-osier dogwood (*Cornus sericea*) are found on the benches while Drummond’s willow (*Salix drummondiana*) and thinleaf alder (*Alnus incana*) occupy the active channel. The willows overhang the narrow channel for short distances. The shaded herbaceous layer is sparse with non-native grasses and weedy species. Much of the ground is covered with leaf litter, downed logs and detritus. Where the gradient decreases, beaver activity has created small, successive pools. Canada thistle (*Cirsium arvense*) is common throughout, but not dense. Near the beaver ponds is a ditch diversion with bare soils and sparse weed invasion. An old roadbed is adjacent with the creek for part of the reach. It is covered with dandelions (*Taraxacum officinale*) and there is evidence of horse use.

Biodiversity Rank Justification and Comments: This site supports the globally imperiled (G2) box elder – narrowleaf cottonwood / red-osier dogwood plant association in good (B ranked) condition. This association is documented only from western Colorado (Nature Serve Explorer 2003). This natural plant community is a late seral community often occurring on higher benches or older flood plains resulting from river channel migration (Carsey, et al. 2003).

Table 18. Natural Heritage element occurrences at Lightner Creek PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Acer negundo</i> – <i>Populus angustifolia</i> / <i>Cornus sericea</i>	Box elder – narrowleaf cottonwood / red-osier dogwood	G2	S2		B

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. Seasonal flooding and sediment deposition will help maintain a viable population of the element along Lightner Creek. The boundary surrounds the old road (used as a trail) where heavy use and disturbances that cause erosion may contribute to excessive sediment deposition, elevated nutrient levels, and invite weed invasion in the wetland area. Refraining from heavy disturbance within the PCA boundaries may benefit the functionality and lasting conservation of the wetland. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The U.S. Forest Service manages most of the PCA and private land also exists.

Management Comments: A private ditch diversion and horse packing may contribute to the weed invasion in the PCA.

Soils Description: Soils within the riparian area are rocky and alluvium derived. Carsey et al. (2003) describe soils of the box elder – narrowleaf cottonwood / red-osier dogwood riparian class as loamy sand to silty clay loam with minimal skeletal fraction where mottling may occur at about 20 to 25 inches. The Soil Survey of La Plata County Area, Colorado (USDA 1988) describes the southern part of the Lightner Creek PCA as Pescar fine sandy loam classified as coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Aquic Ustifluent. The steep, northern portion of the PCA is not described by the soil survey.

Restoration Potential: River hydrology is nearly intact (slightly altered by irrigation diversion) and the area is in good condition. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the Lightner Creek PCA:

Proposed HGM Class: Riverine

Subclass: R2R3

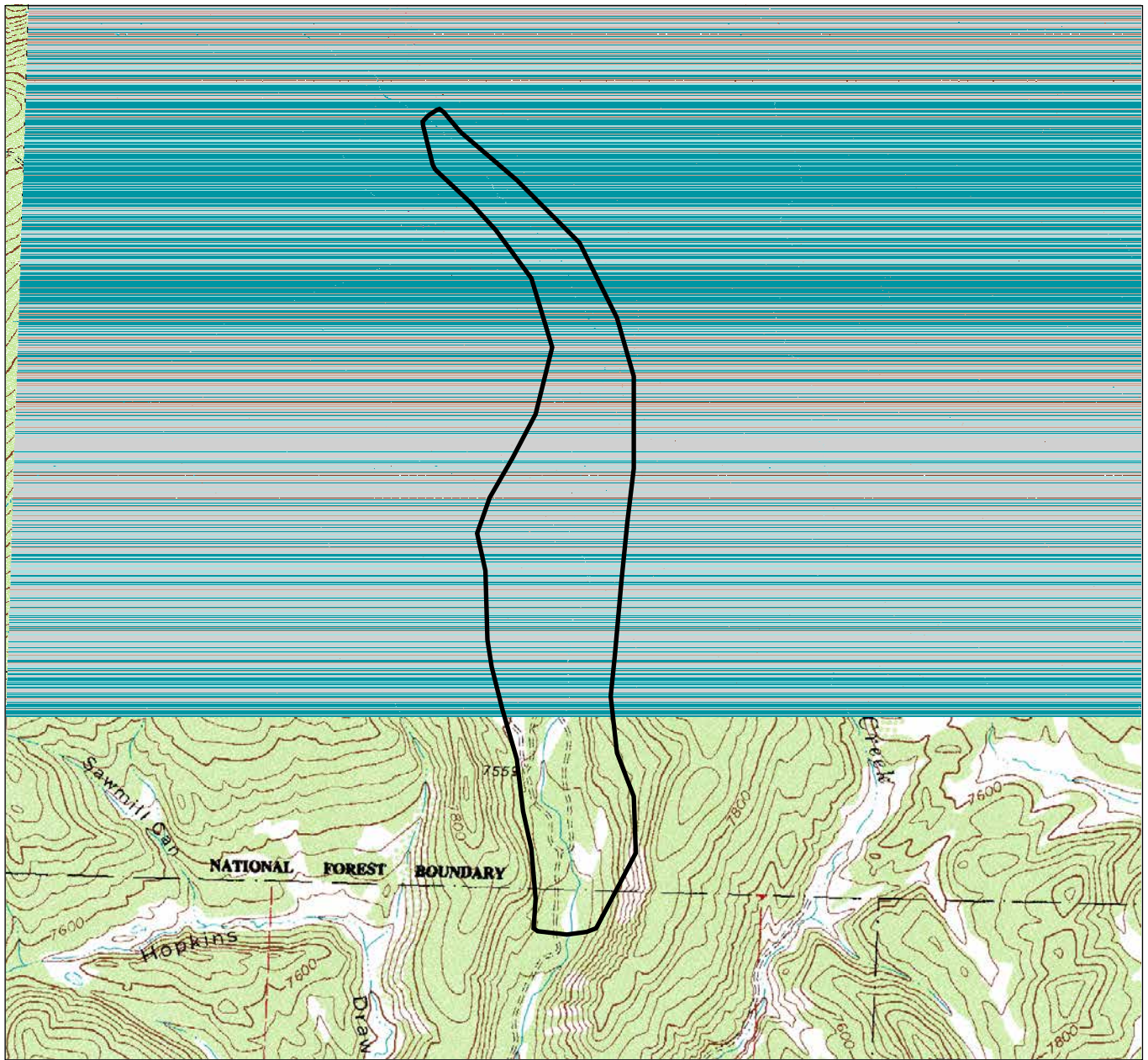
Cowardin System: Palustrine

CNHP's Wetland Classification: *Acer negundo* – *Populus angustifolia* / *Cornus sericea*

Table 19. Wetland functional assessment for the riverine wetland at the Lightner Creek PCA.


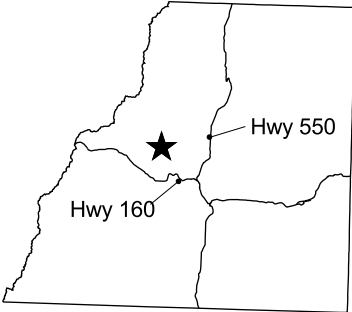
Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	The narrow stream channel limits attenuation. There are some areas with small beaver ponds and broad alluvial areas for moderate function.
Sediment/Shoreline Stabilization	Moderate	There are some entrenched banks and loose soils. A dense to moderate shrub layer with sparse, non-native understory yields moderate shoreline stabilization.
Groundwater Discharge/Recharge	Yes	Signs of seeps on canyon wall, currently dry probably due to drought. Course alluvial soils indicate recharge at back flow eddies and ponds.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	Generous amounts of detritus and vigorous woody vegetation indicate normal elemental cycling.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	The slight broadening of the valley with a gentler gradient and beaver ponds slow water enough to grow algae and trap sediments. Point bar deposition supports cottonwood recruits. Sparse herbaceous layer.
Biological Functions		
Habitat Diversity	Moderate	The area supports two Cowardin classes -- forested wetland habitat and scrub shrub.
General Wildlife Habitat	High	Wildlife sign noted. Diverse tree and shrub layer provide dynamic habitat for a variety of birds and herbivores.
General Fish/Aquatic Habitat	High	Low flows for most of the year, but diversity in aquatic habitat available. Fish observed.
Production Export/Food Chain Support	High	There is over hanging vegetation and sign of high water on the banks providing ample opportunity for production export.
Uniqueness	High	Although a common wetland type, the area supports a good example of a G2 plant association.

Figure 13. Lightner Creek Potential Conservation Area, B2: Very High Biodiversity Significance



0.2 0 0.2 Miles



<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Durango West, 37107-C8 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey</p> <p>map created 2 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	---	--

Lime Mesa PCA

Biodiversity Rank: B2: Very high biodiversity significance. The PCA supports excellent occurrences of two globally imperiled (G2) plants.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years.

Management Urgency Rank: M3: New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA.

Location: La Plata County, San Juan National Forest. The Lime Mesa PCA is located approximately 20 air miles northeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Mountain View Crest

Legal Description: T38N R7W Sections 18, 19, 30; T38N R8W Sections 24, 25

Elevation: 11,400 to 11,800 feet

Size: Approximately 1289 acres

General Description: This PCA is characterized by large openings in the subalpine forest near timberline. It occupies the ecotone between spruce-fir forest and prostrate shrub tundra. Very shallow compacted rocky soils overlie Leadville limestone that has weathered in place. Both Rothrock's Easter daisy (*Townsendia rothrockii*) and Colorado tansy aster (*Machaeranthera coloradoensis*) are most abundant on fellfields, small rocky knolls with sparse vegetation. Plants were in late flower and fruit when observed in late August. Associated plants were Rand's goldenrod (*Solidago simplex*), field chickweed (*Cerastium strictum*), alpine sandwort (*Lidia obtusiloba*), alpine bluegrass (*Poa alpina*), Gordon's ivesia (*Ivesia gordonii*), nodding locoweed (*Oxytropis deflexa* var. *deflexa*), and featherleaf fleabane (*Erigeron pinnatisectus*). Adjacent dry areas with deeper soils and more vegetation were dominated by alpine avens (*Geum rossii*), shrubby cinquefoil (*Potentilla fruticosa*), hairy golden aster (*Heterotheca villosa*) and Parry's clover (*Trifolium parryi*). Small depressions with deep soils and more moisture supported populations of showy whitlow-grass (*Draba spectabilis* var. *oxyloba*) and kittentails (*Besseya ritteriana*) growing under Colorado false hellebore (*Veratrum tenuipetalum*).

Biodiversity Rank Justification and Comments: The Lime Mesa PCA supports excellent (A ranked) occurrences of two globally imperiled (G2) plants, Rothrock's Easter daisy and Colorado tansy aster. Thousands of individuals of each species were found in 2003. There is also a good (B ranked) occurrence of a kittentails, a globally vulnerable (G3) plant. Showy whitlow-grass was found at the site, and has since been placed on CNHP's watchlist (S3S4). A specimen of Colorado Divide whitlow-grass (*Draba streptobrachia*) at the University of Colorado Herbarium was collected in the general area in 1982 by Siplivinsky. However, since the exact location and information on abundance were not given, it is not included below.

Table #. Natural Heritage element occurrences at the Lime Mesa PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Townsendia rothrockii</i>	Rothrock's Easter daisy	G2	S2		A
<i>Machaeranthera coloradoensis</i>	Colorado tansy aster	G2	S2	FS	A
<i>Besseya ritteriana</i>	Kittentails	G3	S3		B
<i>Draba spectabilis</i> var. <i>oxyloba</i>	Showy whitlow-grass	G3?T3Q	S3S4		B

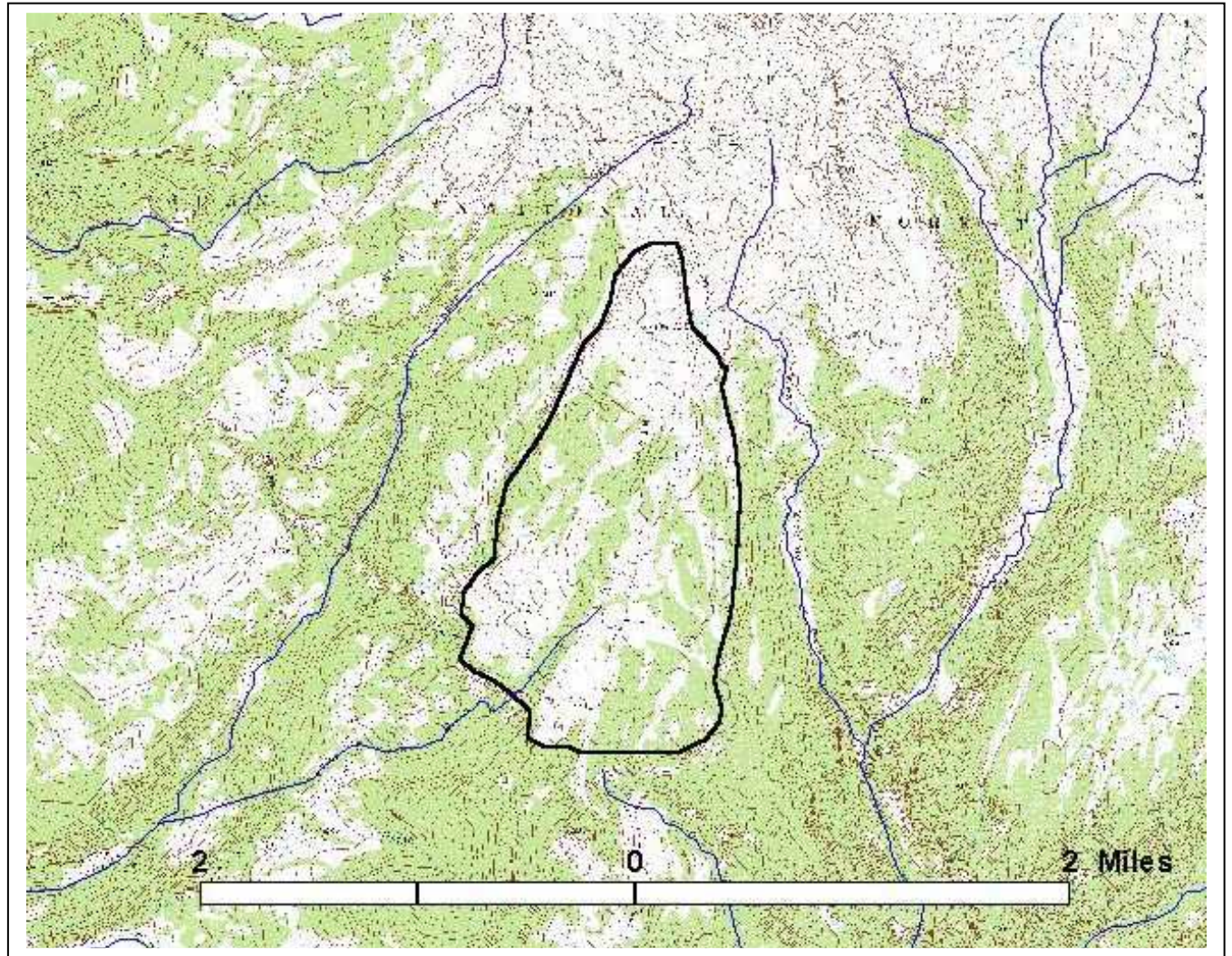
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary encompasses the occurrences of Rothrock's Easter daisy and Colorado tansy-aster, which occur in open areas within the spruce-fir forest. The kittentails and showy whitlow-grass were found within these boundaries. Additional area was included to allow for colonization of new sites in the future. Potential habitat was determined by elevation (11,600 to 12,300 ft), gentle slopes, current vegetation, and substrate (Leadville limestone and granites).

Protection Comments: This PCA is within the San Juan National Forest. It lies just to the west of the Weminuche Wilderness, and current management emphasizes grazing (Management Area 6B) and non-motorized recreation (M.A. 3A). Special designation in the forest management plan would help to preserve this unique site. Inclusion of *Townsendia rothrockii* on the Region 2 sensitive species list would help to focus attention on preserving the habitat of the plants. Currently, *T. rothrockii* is under consideration for the sensitive list, but is part of a large group of species for which the Forest Service believes it has insufficient information. Obtaining the necessary information before the forest plan is revised would enable a decision on this rare species, and perhaps lead to its protection in this and other sites where the plant occurs.

Management Comments: Periodic monitoring of the rare plant population at this PCA is recommended to recognize any future changes and management needs. There were no exotic species observed at the site. A hiking trail runs through the population, but off-trail use was not apparent.

Lime Mesa Potential Conservation Area. B2: Very High Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

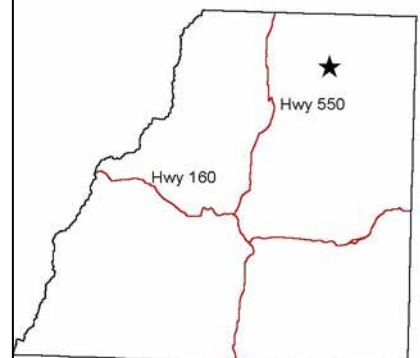


PCA Boundary

Mountain View Crest,
37107-E6
7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Lower Hermosa Creek PCA

Biodiversity Rank: B2: Very high biodiversity significance. The PCA supports a good example of globally imperiled (G2/S2) montane riparian forest, excellent example of a globally secure (G5) bird, but critically vulnerable for Colorado (S3B), and a good example of a globally secure but state imperiled (G5/S2) plant.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future. The PCA is entirely managed by the U.S. Forest Service.

Management Urgency Rank: M3: New management actions may be needed within 5 years to prevent the loss of the element occurrences. Weed control, proper grazing regimes, and management of recreational activities are the main concerns.

Location: The Lower Hermosa Creek PCA is located 2 miles northwest of the Town of Hermosa.

U.S.G.S. 7.5-min. quadrangle: Monument Hill, Hermosa

Legal Description: T37N R9W Sections 8, 9, 15, 16, 17, 21, 22, 28

Elevation: 7,000 – 8,200 ft.

Size: Approximately 741 acres

Redders, 2000, Community Type: Deciduous – Evergreen Forest: *Populus angustifolia* – *Picea pungens*.

General Description: The Lower Hermosa Creek PCA is located northwest of the Town of Hermosa. This lower reach of Hermosa Creek flows through a steep, cool, shady canyon. There is little floodplain due to the narrow topography of the riparian canyon. Tall limestone cliffs border both sides of Hermosa Creek. The PCA is fed by many rivulets, Dutch Creek, Stony Gulch, Swampy Creek, Jones Creek, and Silver Creek, as well as many unnamed drainages. The montane riparian forest is dominated by white fir (*Abies concolor*) with Colorado blue spruce (*Picea pungens*). Narrowleaf cottonwood (*Populus angustifolia*) appears in the lower reaches of the PCA. The shrub layer (65% cover) is composed of Rocky Mountain maple (*Acer glabrum*), redosier dogwood (*Cornus sericea*), alder (*Alnus incana*), and Drummonds willow (*Salix drummondiana*). The forb layer (~10% cover) consists of lupine (*Lupine* spp.), meadowrue (*Thalictrum fendleri*), strawberry (*Fragaria virginiana*), arnica (*Arnica mollis*) and cowparsnip (*Heracleum sphondylium* subsp. *montanum*). The graminoids cover is sparse and along the floodplain was dominated by the hay grasses meadow timothy and Kentucky bluegrass (*Phleum pratense*, *Poa pratensis*). The uplands are typical for this part of La Plata County, dominated by ponderosa pine (*Pinus ponderosa*) with Gambels oak (*Quercus gambelii*). The soils are composed of gravel and large cobbles at the creek and loamy soils in the uplands. Weeds noted within the PCA include mullein (*Verbascum thapsus*), Canada thistle (*Cirsium arvense*), and houndstongue (*Cynoglossum officinale*).

Biodiversity Rank Justification: This site supports a good example of globally imperiled (G2/S2) white bark fir-Colorado blue spruce-narrowleaf cottonwood/Rocky Mountain maple. This evergreen forest association is a rich, mixed conifer-deciduous forest occurring on active floodplains and streambanks of montane valley floors. The presence of *Abies concolor* distinguishes this community from the more common *Populus angustifolia* - *Picea pungens* / *Alnus incana* Woodland and is indicative of the southern-most mountains in Colorado (Carsey et al. 2003). This plant community is documented for only Colorado (Nature Serve 2003). The PCA also encompasses an unranked occurrence of Graces Warbler (*Dendroica graciae*), a globally secure bird but State vulnerable (G5/S2) and an unranked occurrence for American yellow ladys slipper (*Cypripedium calceolus* ssp. *parviflorum*), a globally secure plant but State imperiled (G5/S2).

Table 20. Natural Heritage element occurrences at Lower Hermosa Creek PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Abies concolor-Picea pungens-Populus angustifolia/Acer glabrum</i>	<i>Montane riparian forest</i>	G2	S2		B
<i>Dendroica graciae</i>	<i>Graces warbler</i>	G5	S3B		E
<i>Cypripedium calceolus ssp. parviflorum</i>	<i>American yellow ladys slipper</i>	G5	S2		E

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. The boundaries encompass the occurrences with a 500 – 1,000 foot buffer that follow the stream channel. The northern boundary begins at the confluence with Hermosa Creek and Dutch Creek. The south boundary ends at Spring Creek. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The San Juan National Forest owns the PCA. It is suggested that conservation actions such as education on the biodiversity of the PCA would help ensure its protection from the below mentioned threats.

Management Comments: Possible threats to the occurrence include expansion of non-natives e.g., Canada thistle (*Cirsium arvense*), hay grasses (*Poa pratensis*, *Phleum pratense*) that are currently located mainly along the hiking trail. Altered hydrology from improper recreational use from horses, mountain bikers and ATV motorists may also pose a threat.

Soils Description: Soils within the PCA are mainly well drained and loamy. These are classified as Harlan cobbly loam. The Hermosa Creek is bordered by steep cliffs, the soils found at the base of these rock escarpments are classified as Haploborolls-Rubble. The soils within the flood plain are coarse, rocky and sandy. These soils are classified as Riverwash (USDA 1988).

Restoration Potential: Currently the wetland and its hydrology are intact. Weed control would be the main restoration activity.

Wetland Functional Assessment for the Lower Hermosa Creek PCA:

Proposed HGM Class: Riverine

Subclass: R3/4

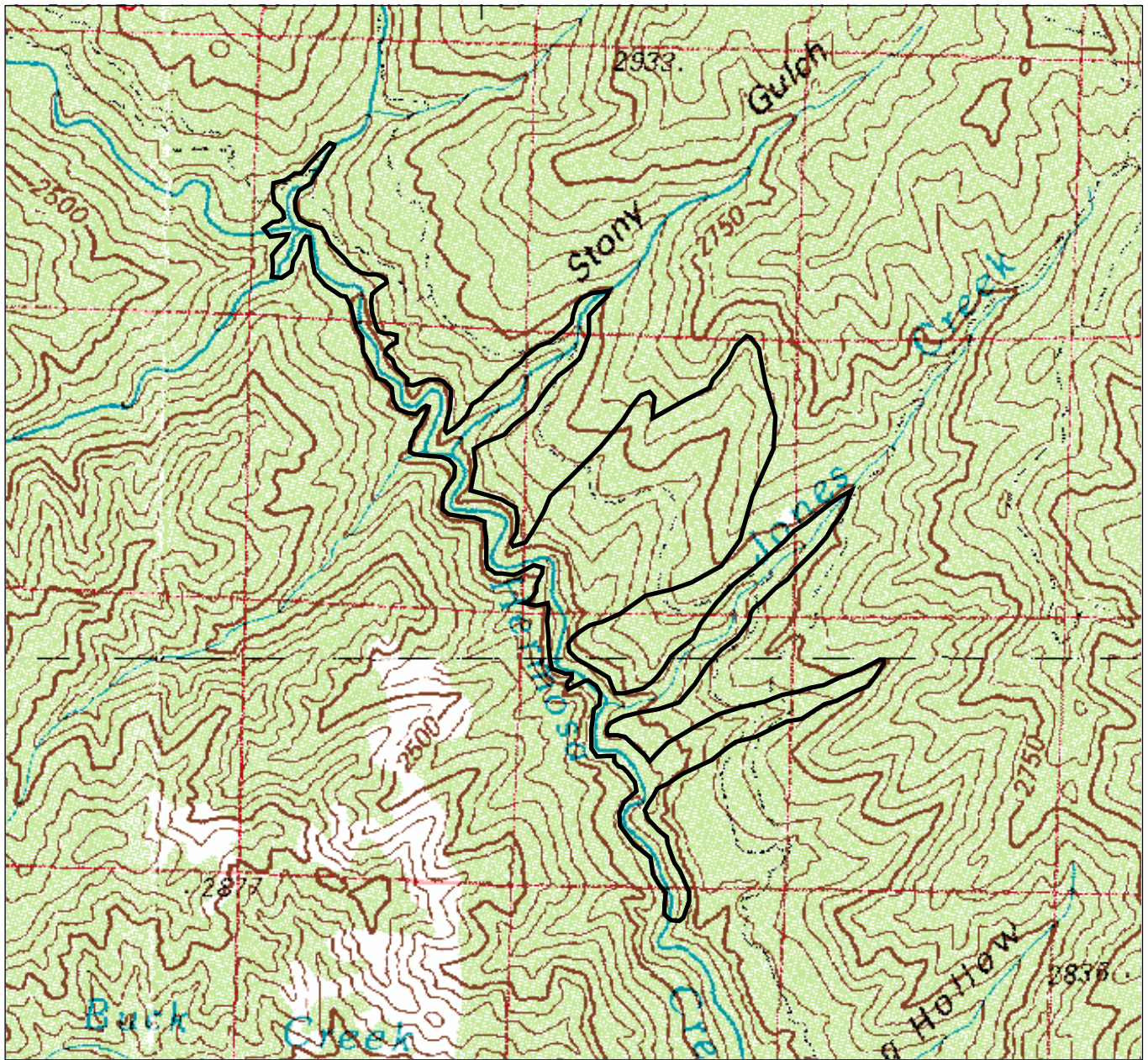
Cowardin System: Palustrine

CNHP's Wetland Classification: *Abies concolor-Picea pungens-Populus angustifolia/Acer glabrum*

Table 21. Wetland functional assessment for the slope wetland at the Lower Hermosa Creek PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Low	The wetland is located within in a steep, narrow canyon with little opportunity for flood attenuation.
Sediment/Shoreline Stabilization	Low	The wetland is experiencing streambank erosion from undercutting, likely due to the steep topography and accelerated by grazing and recreational activities.
Groundwater Discharge/Recharge	Yes	Likely springs and seeps feed the wetland. Groundwater recharge is low due to lack of perennial water, but soils are composed of gravel and sand.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	No disruptions noted. The wetland is functioning similar to other foothill riparian wetlands.
Removal of Imported Nutrients, Toxicants, and Sediments.	Low	Wetland is characterized by open tree canopy with low % cover of shrubs or herbaceous cover. Soils are sandy and therefore there is little opportunity to remove sediments and toxicants.
Biological Functions		
Habitat Diversity	Moderate	The area supports two Cowardin class.
General Wildlife Habitat	Moderate	Wildlife sign noted. A diverse tree layer provides dynamic habitat for a variety of birds and herbivores.
General Fish/Aquatic Habitat	Low	No fish observed.
Production Export/Food Chain Support	Moderate	Presence of an outlet and inlet. Wetland not permanently flooded without severe scouring, vegetation does overhang bank
Uniqueness	High	Plant community is globally imperiled and is known only from southwestern Colorado.

Figure 14. Lower Hermosa Creek Potential Conservation Area, B2: Very High Biodiversity Significance



0.4 0 0.4 Miles



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

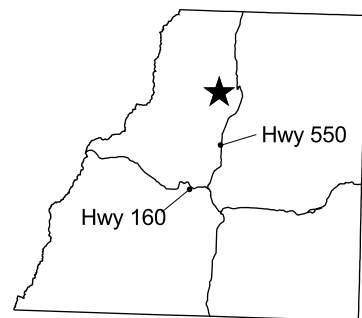
 **PCA Boundary**

Durango, 37107-A1
 30x60 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 2 April 2004
 UTM, Zone13, NAD27

Location in Study Area



Madden Creek PCA

Biodiversity Rank: B2. Very High biodiversity significance. The area supports a good (B ranked) example of a globally imperiled (G2) plant association.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The area is owned and managed by the San Juan National Forest with adjacent private inholding.

Management Urgency Rank: M4. Current management seems to favor the persistence of the elements in the PCA but management actions may be needed in the future to maintain the current quality of the element occurrences.

Location: The Madden Creek PCA is located along Madden Creek upstream of the confluence with the La Plata River, south of the La Plata town site.

U.S.G.S. 7.5-min. quadrangles: La Plata
Legal Description: T36N R11W Section 8

Elevation: 9,100 ft.

Size: Approximately 229 acres

Redders, 2003, Community Type: Deciduous – Evergreen Forest: *Populus angustifolia* – *Picea pungens* / *Alnus incana*; *Populus angustifolia* - *Pseudotsuga menziesii*

General Description: Madden Creek is in a steep, narrow valley descending from the high talus slopes of the La Plata Mountain Range. Willow carrs occupy the upper river reaches, but as the creek approaches the La Plata River, the riparian area is characteristically narrow and rocky with dense and diverse vegetation. This mixed coniferous – deciduous riparian forest harbors white fir (*Abies concolor*), subalpine fir (*Abies lasiocarpa*), Douglas fir (*Pseudotsuga menziesii*) and narrowleaf cottonwood (*Populus angustifolia*) in the tree layer, with Rocky Mountain maple (*Acer glabrum*), thinleaf alder (*Alnus incana*), Drummond’s willow (*Salix drummondiana*) and boxelder (*Acer negundo*) dominating the shrub layer.

Nearby, the area receives a lot of recreation on the La Plata River, where County Road 124/Forest Road 571 offers Forest access and campground amenities. The PCA is managed by the U.S. Forest Service with private property adjacent. An old mining road travels up the Madden Creek drainage, and is typical of the La Plata Mountain range. Weed invasion is minimal in the PCA.

Biodiversity Rank Justification and Comments: The site supports a good example (B ranked) of a globally imperiled (G2) plant community. The white fir – blue spruce - narrowleaf cottonwood / Rocky Mountain maple plant association is distinguished from the more common narrowleaf cottonwood – blue spruce / thinleaf alder plant association by the presence of white fir and is characteristic of the southern most mountains in Colorado (Carsey, et al. 2003). This association is only documented from southern Colorado, though it is thought to occur in northern New Mexico (Nature Serve Explorer 2003).

Table 22. Natural Heritage element occurrences at Madden Creek PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Abies concolor</i> – <i>Picea pungens</i> – <i>Populus angustifolia</i> / <i>Acer glabrum</i>	White fir – blue spruce - narrowleaf cottonwood / Rocky Mountain maple	G2	S2		B

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes from surrounding drainages as possible. Seasonal flooding and sediment deposition will help maintain a viable population of the element along Madden Creek. The boundary provides a buffer from trails and roads where heavy disturbance that causes erosion may contribute to excessive sediment deposition and elevated nutrient levels in the wetland area (water and soil). Eroded areas also invite weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The PCA is mostly within the San Juan National Forest, with a private inholding adjacent.

Management Comments: The PCA is upstream from an area that receives high visitation on the La Plata River. Private land owners adjacent have gated the old mining road, forcing a new trail up Madden Creek to access nearby Forest Land. Although there is little impact now, this slight trail may require management in the future.

Soils Description: Soils in this community type are well drained and poorly developed mineral soils with shallow sandy loams over coarse alluvial materials (Carsey et al. 2002).

Restoration Potential: The area is functioning as expected.

Wetland Functional Assessment for the Madden Creek PCA:

Proposed HGM Class: Riverine

Subclass: R2R3

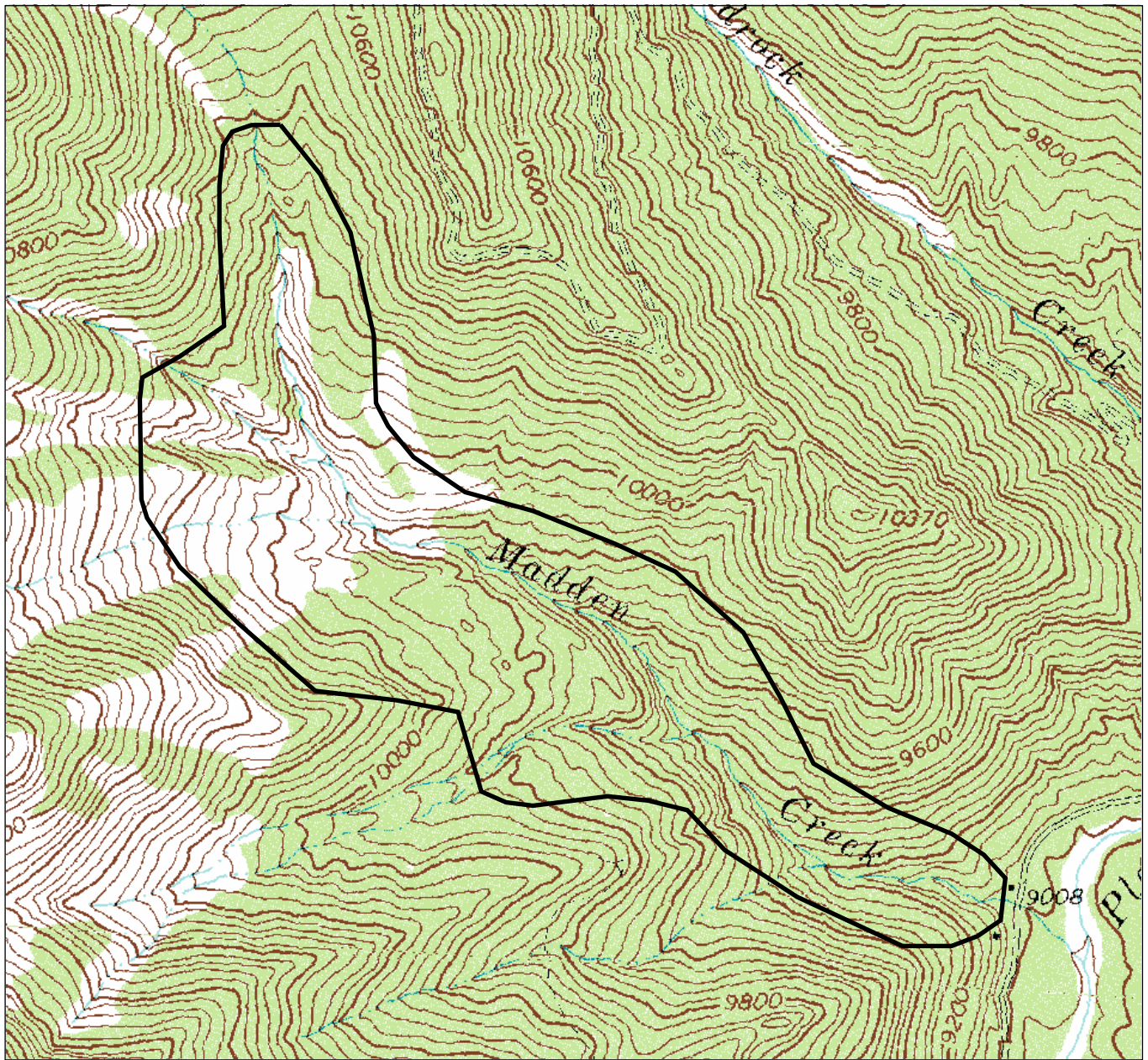
Cowardin System: Palustrine

CNHP's Wetland Classification: *Abies concolor* – (*Picea pungens*) – *Populus angustifolia* / *Acer glabrum*

Table 23. Wetland functional assessment for the riverine wetland at the Madden Creek PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Low	The riparian area is steep with little floodplain, thus limits function.
Sediment/Shoreline Stabilization	High	Dense woody vegetation stabilizes banks in steep riparian area.
Groundwater Discharge/Recharge	Yes	Springs were observed in the area.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	Occurrence is functioning optimal to similar wetland types.
Removal of Imported Nutrients, Toxicants, and Sediments.	Low	No floodplain with little soil development limits this function.
Biological Functions		
Habitat Diversity	Moderate	Area supports two Cowardin classes (forested wetland and scrub shrub type).
General Wildlife Habitat	High	Diverse and dense tree and shrub layer provides rich habitat for a variety of species.
General Fish/Aquatic Habitat	Low	Straight stream channel with no altered hydrology.
Production Export/Food Chain Support	High	Occurrence is a densely vegetated riparian area that receives seasonal flushing of organic material to downstream systems.
Uniqueness	High	Although the wetland type is common, the area supports a G2 plant association.

Figure 15. Madden Creek Potential Conservation Area, B2: Very High Biodiversity Significance



0.1 0 0.1 Miles



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

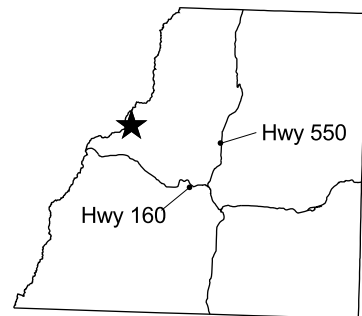
La Plata, 37108-D1
 7.5 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 2 April 2004

UTM, Zone13, NAD27

Location in Study Area



Animas River at La Posta PCA

Biodiversity Rank: B3. High biodiversity significance. The PCA supports a globally imperiled (G2) plant community in fair (C ranked) condition.

Protection Urgency Rank: P4. There is no land protection threat known in the foreseeable future. The PCA is privately owned.

Management Urgency Rank: M1. New management action required immediately or element occurrence could be lost or irretrievably degraded. Exotic shrub invasion and altered hydrology will have deleterious effects.

Location: This PCA is located on the Animas River at La Posta and adjacent with the Sunnyside Mesa.

U.S.G.S. 7.5-min. quadrangles: Long Mountain

Legal Description: T33N R10W Sections 12, 13, 14, 24, 1

Elevation: 6100ft.

Size: Approximately 353 acres

Redders, 2003, Community Type: Deciduous Forest: *Populus angustifolia* / *Salix exigua*

General Description: This PCA is along the Animas River in a wide alluvial valley within mesa/canyon topography. Wide meanders and point bar deposits harbor narrowleaf cottonwood and sandbar willow saplings. Back flow eddies, small sloughs and water from Trumble Draw support emergent wetlands in small patches where cattails dominate. Channel migration has resulted in low terraces with lower montane riparian forests (*Populus angustifolia*, *Populus deltoides*; *Acer negundo*) with a very dense and diverse shrub layer including sandbar willow (*Salix exigua*), silver buffaloberry (*Shepherdia argentea*), Russian olive (*Elaeagnus angustifolia*), river birch (*Betula occidentalis*), skunkbush (*Rhus trilobata*), juniper (*Juniperus scopulorum*), tamarisk (*Tamarix ramosissima*), and strapleaf willow (*Salix eriocephala* var. *ligulifolia*). The understory is generally weedy with yellow and white sweet clover and hay grasses present in dense stands.

Although Russian olive and tamarisk are present in the riparian area, they are sparse, not dense (see Restoration Potential). The sagebrush flat upland has several non-native weeds dominating the herbaceous layer, including Russian knapweed (*Centaurea repens*), Canada thistle (*Cirsium arvense*), musk thistle (*Cardus nutans*) and cheatgrass (*Bromus tectorum*).

The Animas River provides water for agriculture and supplements Durango's municipal water supply. The river's latest impact is a major water diversion for the filling of the Animas/La Plata Reservoir project beginning implementation fall of 2003. The water is being pumped from the river, not dammed. The pumping site is north (upstream) of this PCA. The pumping station will have a total of eight pumps ranging from the smallest at 14 cubic feet per second and the largest at 56 cfs. The inlet conduit at Ridges Basin will have the capacity for 280 cubic feet per second. It is unclear at this time how the flow will be affected downstream from the pumping station, but the uptake is governed by 1)downstream senior water right demands; 2)the amount of water in the river; 3)seasonal minimum by-pass flows; 4)the pumping capacity of the Durango Pumping Plant; 5)design-based reservoir filling criteria (USBR 2004). The direct effects of this particular diversion on plant communities and riparian health are unknown to date. Because regeneration and establishment of new stands of cottonwood are dependent upon flooding events, any alteration to the natural flow regime of a river can affect the cottonwood ecosystem. One example is upstream dams stabilizing stream flows by reducing the frequency and magnitude of floods. This results in fewer flood events that would allow cottonwood stand regeneration. Without periodic disturbance by flooding, riparian areas become dominated by late-seral communities (Hansen et al. 1995) and subject to exotic weed invasion by species such as tamarisk and Russian olive.

Biodiversity Rank Justification and Comments: This site supports the globally imperiled (G2) narrowleaf cottonwood/ strapleaf willow – silver buffaloberry natural plant community in fair (C ranked)

condition. This community is thought to be extremely limited in western Colorado and believed to have been more wide-spread in the past. Intense, long-term use by livestock and alterations in the river flow regime have caused a decline in its distribution (Carsey, et al. 2003). This area was surveyed by CNHP riparian ecologists in 1998 and was revisited in 2003. The element occurrence rank dropped from a B (good) to a C (fair) due to the new hydrological diversion for the Animas/La Plata reservoir project upstream and the apparent increase in weed invasion in the adjacent uplands.

Table 24. Natural Heritage element occurrences at Animas River at La Posta PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i>/<i>Salix eriocephala</i> var. <i>ligulifolia</i> – <i>Shepherdia argentea</i>	Narrowleaf cottonwood/ strapleaf willow – silver buffaloberry	G2	S2		C

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the available hydrological processes as possible. Seasonal flooding, sediment deposition, and new channel formation help maintain viable riparian populations of the elements along the Animas River. It should be noted that the hydrological processes necessary to the elements are not fully contained by the PCA boundaries. Because the narrowleaf cottonwood is dependent on natural hydrological processes associated with the Animas River and its tributaries, increased upstream activities such as water diversions, additional impoundments, improper livestock grazing, and development are detrimental to the riparian area. This boundary indicates the minimum area that should be considered for any conservation management plan.

Protection Comments: The central area of the PCA is managed by the Southern Ute Indian Tribe. There is also private property in the PCA. Private property parcels (most smaller than 500 acres) line the Animas River from the Forest Service boundary north of Bakers Bridge to the county and state line (county records). Public education regarding wetland ecology may encourage volunteer efforts toward conservation. Placement of conservation easements on private property is one action that promotes the lasting conservation of an area and may benefit the landowner.

Management Comments: Most of the PCA is managed by the Southern Ute Indian Tribe with a fishing access provided. Uplands have been heavily grazed in the past and now require weed control. It is strongly suggested to monitor and control exotic shrub invasion (tamarisk, Russian olive).

Soils Description: Soil Survey of La Plata County Area, Colorado (USDA 1988) delineates most of the PCA as Pescar fine sandy loam classified as coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Aquic Ustifluent. Some of the terraces are delineated as Sycle fine sandy loam, classified as mesic Aridic Haplustolls.

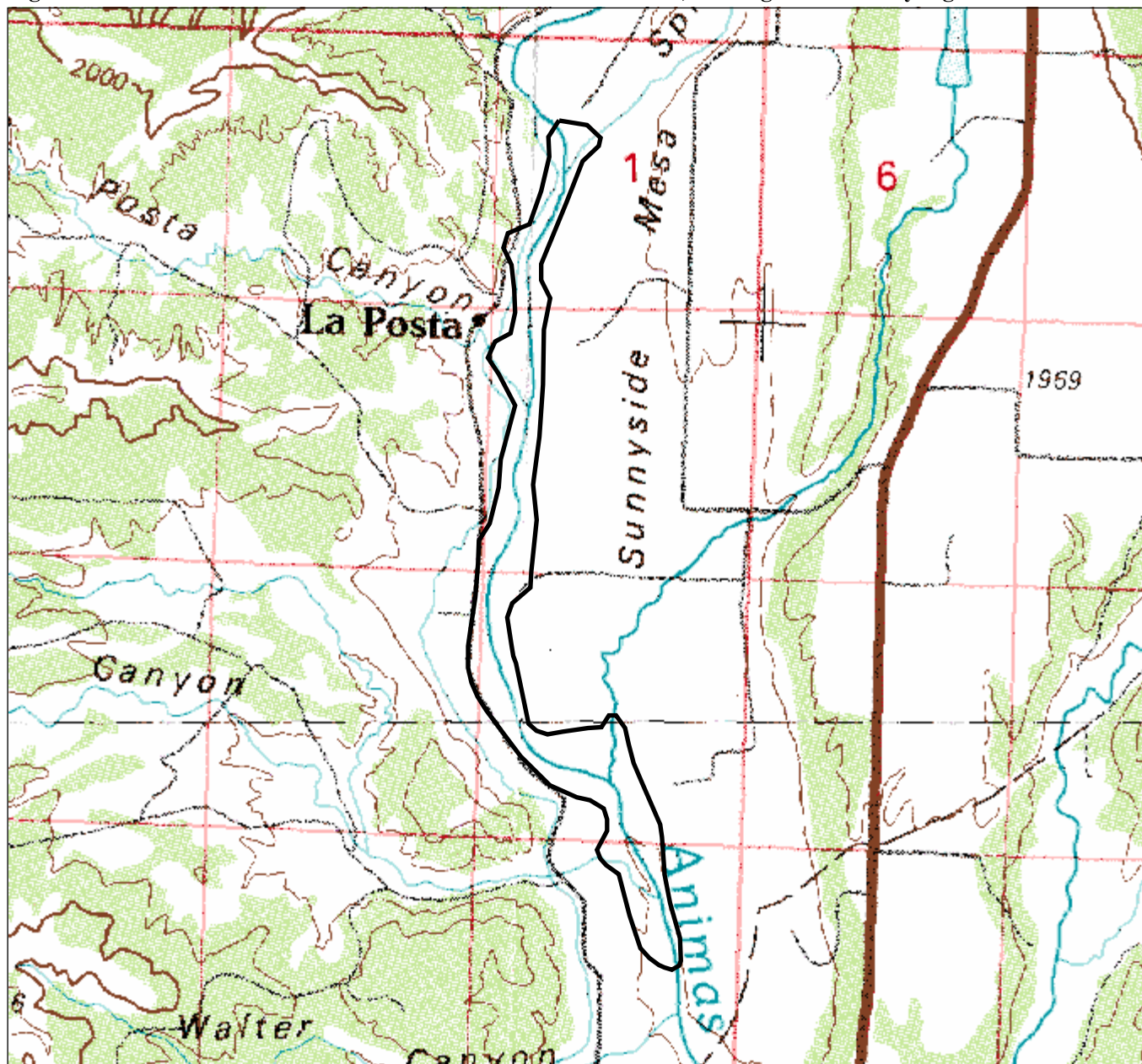
Restoration Potential: Eradication of noxious shrubs in the riparian area is strongly suggested. The current level of invasion density is not high and represents a timely opportunity for eradication before invasion becomes overwhelming. Influx of non-native species requires continual monitoring. Controlling weed invasion on uplands is also suggested. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the title PCA:
Proposed HGM Class: Riverine **Subclass:** R4/R5
Cowardin System: Palustrine
CNHP's Wetland Classification: *Populus angustifolia* / *Salix eriocephala* var. *ligulifolia* - *Shepherdia argentea*

Table 25. Wetland functional assessment for the riverine wetland at the Animas River at La Posta PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	High	Although the flooding regime is altered by diversions, the area is functional for flooding events. Dense shrub layer, emergent vegetation patches indicate attenuation and storage function.
Sediment/Shoreline Stabilization	Moderate	Sparse to dense non-native understory. Some bank erosion, but as expected for this type. Broad flood plain.
Groundwater Discharge/Recharge	Yes	Spring known from Trumble Draw.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Disrupted	With excessive weed invasion and hydrologic alterations, this wetland is not able to perform this duty to a normal level.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	Diverse structure for sediment trapping indicates a positive function. Low amounts of organic matter in the soil and high irrigation runoff indicate reduced function.
Biological Functions		
Habitat Diversity	Moderate	Area supports at least two Cowardin classes (forested and scrub shrub wetland type).
General Wildlife Habitat	High	Dense tree and shrub layer offer good habitat. Deer sign, songbirds, birds of prey noted.
General Fish/Aquatic Habitat	High	Gold medal fishing waters. Fishing access provided by the Southern Ute Indian Tribe.
Production Export/Food Chain Support	Moderate	Although little overhanging vegetation, the area's dense shrub and tree layer supplies nutrients and carbon sources.
Uniqueness	High	Although the wetland type is common, the PCA supports a G2 plant association in fair condition.

Figure 16. Animas River at La Posta Potential Conservation Area, B3: High Biodiversity Significance



0.3 0 0.3 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

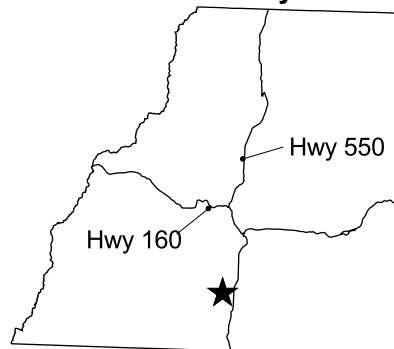
Durango, 37107-A1
 30x60 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Animas River at Rockwood PCA

Biodiversity Rank: B3. High biodiversity significance. The site supports an excellent (A ranked) example of a globally vulnerable (G3) plant association.

Protection Urgency Rank: P3. Protection actions may be needed, but probably not within the next 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA if protection action is not taken.

Management Urgency Rank: M4. Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the current quality of the element occurrences.

Location: The Animas River at Rockwood PCA is located along the Animas River adjacent. Rockwood.

U.S.G.S. 7.5-min. quadrangles: Hermosa; Electra Lake
 Legal Description: T37N R8W Section 7

Elevation: 7,140 – 7,640 ft. **Size:** acres

Redders, 2003, Community Type: Deciduous Forest: *Populus angustifolia* / *Alnus incana*

General Description: The Animas River at Rockwood PCA is in a narrow portion of the Animas River Canyon where flow levels fluctuate dramatically. Narrowleaf cottonwood (*Populus angustifolia*) and thinleaf alder (*Alnus incana*) are rooted into the shallow rocky soils that are thoroughly scoured each season. Cottonwood regeneration is taking place in the gravel bottoms. The shrub layer is sparse compared to most occurrences of this plant community type. Upland communities are dominated by ponderosa pine (*Pinus ponderosa*) with Douglas fir (*Pseudotsuga menziesii*) and Rocky Mountain juniper (*Juniperus scopulorum*). Exotic weed invasion is not an issue. CNHP riparian ecologists visited the site in 1998 and report little impacts to the site. The Durango & Silverton Narrow Gauge train runs adjacent, but is very high above the occurrence, and there seems to be little access available to the site.

Biodiversity Rank Justification and Comments: This site supports the globally vulnerable (G3) *Populus angustifolia* / *Alnus incana* plant association in excellent (A ranked) condition. This association is documented from New Mexico and Colorado and is expected to occur throughout the *Populus angustifolia* range in the Rocky Mountains (Nature Serve Explorer 2003). The narrowleaf cottonwood / thinleaf alder plant community occurs along narrow fast moving stream reaches in montane areas, usually on the active floodplain (Carsey et al. 2002).

Table 26. Natural Heritage element occurrences at Animas River at Rockwood PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i> / <i>Alnus incana</i>	narrowleaf cottonwood / thinleaf alder	G3	S3		A

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

Boundary Justification: The boundaries incorporate an area that will allow the available hydrological processes. Seasonal flooding, sediment deposition, and new channel formation helps to maintain viable riparian populations of the elements along the Animas River. It should be noted that the hydrological processes necessary to the elements are not fully contained by the PCA boundaries.

Protection Comments: The area is owned partly by the San Juan National Forest but has private property inholdings. Placement of a conservation easement on private land may conserve the natural values of the

site and may provide benefits to the landowner. Riparian ecology education may also benefit landowners and land managers.

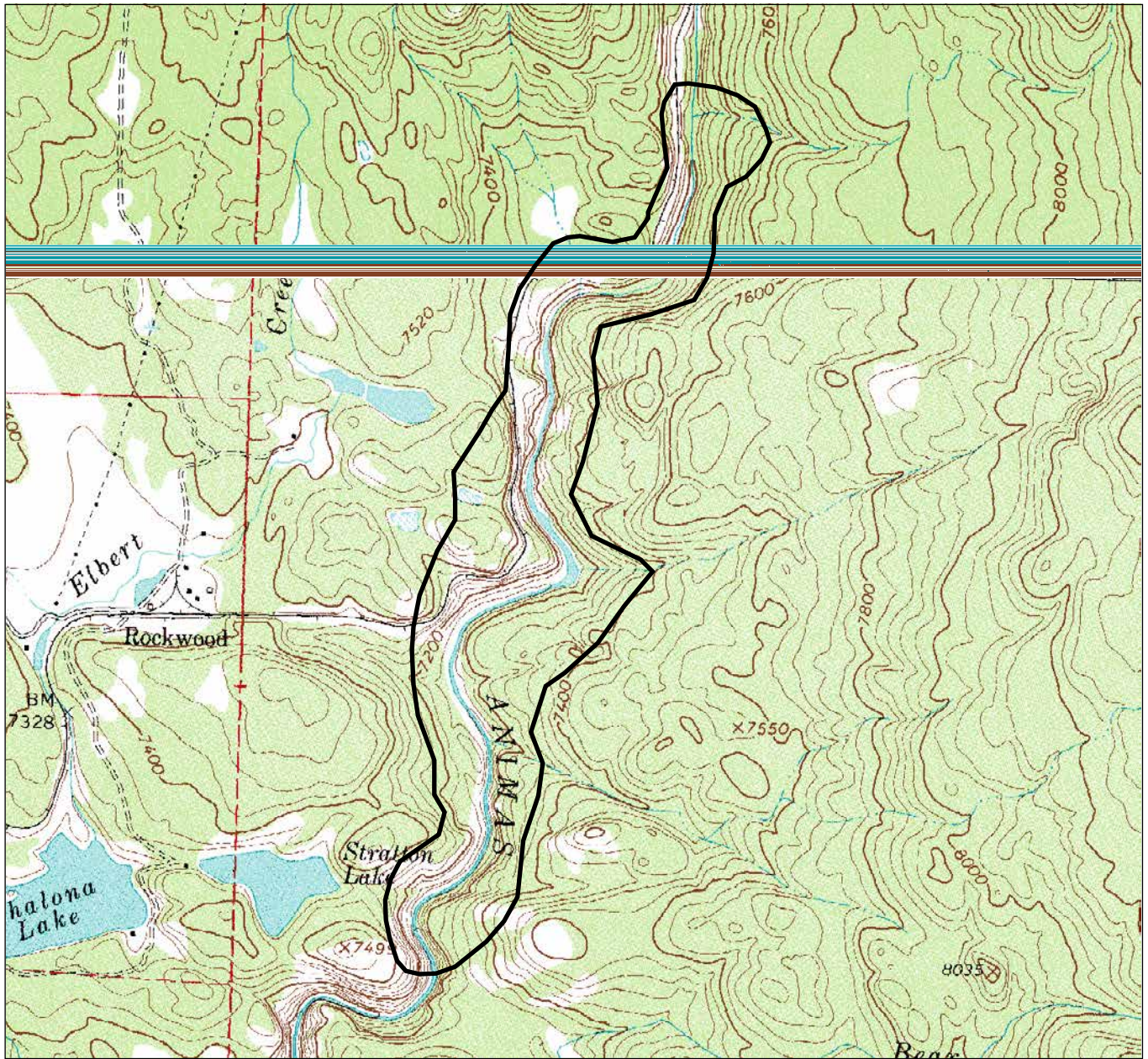
Management Comments: Although the area is not currently threatened, management may be needed in the future. There are few weeds in the site and the area along the river is difficult to access, providing intrinsic protection against direct threats. There may be indirect impacts from railroad maintenance. There are some weeds (*Poa pratensis*) along a trail to the river. Public education regarding riparian ecology may help build support for conservation management practices.

Soils Description: Very little soil development is taking place in the narrow, rocky canyon with boulders, cobble and gravel and very shallow mineral soils. Soils for the narrowleaf cottonwood / thinleaf alder community type are typically coarse textured, ranging from deep sands to shallow sandy loams (Carsey et al. 2002). Soil Survey of La Plata County Area, Colorado delineates the southern portion of the PCA as rock outcrop (USDA 1988). The northern portion is not included in the soil survey.

Restoration Potential: The site is functioning as expected.

Wetland Functional Assessment for the Animas River at Rockwood PCA: CNHP wetland ecologists did not visit this site in the 2003 field season. Thus, a functional assessment could not be conducted.

Figure 17. Animas River at Rockwood Potential Conservation Area, B3: High Biodiversity Significance



0.2 0 0.2 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

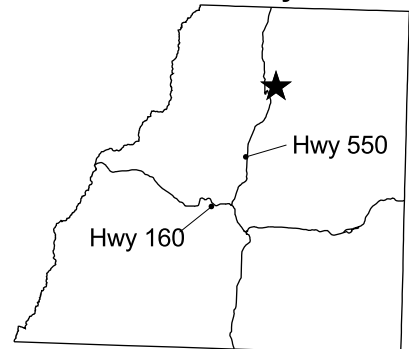
Hermosa, 37107-D7
 Electra Lake, 37107-E7
 7.5 Minute Series

Digital Raster Graphics produced by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Bondad PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports an excellent occurrence of a globally vulnerable (G3) plant.

Protection Urgency Rank: P4: No threat is known for the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: La Plata County, Southern Ute Indian Reservation. The Bondad PCA is located approximately 14 air miles south of Durango along County Road 212.

U.S.G.S. 7.5-min. quadrangles: Bondad
Legal Description: T33N R9W Sections 26, 27, 28, 34.

Elevation: 6,600 to 6,850 feet

Size: Approximately 513 acres

General Description: This PCA comprises barren shale badlands of the Tertiary San Jose formation. The area contains many gas wells and service roads. County Road 212 passes through the site. Dry washes and steep eroded slopes support the two rare plants. Pinyon and juniper woodlands clothe the less steep areas. Associated species include spearleaf buckwheat (*Eriogonum lonchophyllum*), rushy milkvetch (*Astragalus lonchocarpus*), yellow milkvetch (*Astragalus flavus*), Arboles milkvetch (*Astragalus oocalycis*), Spanish bayonet (*Yucca harrimanniae*), and sharpleaf twinpod (*Physaria acutifolia*). The pinyon-juniper plant community is the preferred habitat for gray vireos, which were found to be nesting at the site (see Gaines Canyon PCA drawn for the gray vireo).

Biodiversity Rank Justification: The Bondad PCA supports an excellent (A) occurrence of New Mexico false carrot, a species that is globally vulnerable (G3) and extremely rare in Colorado (S1?), with only this one location known in the state. There is also a fair (C) occurrence of San Juan Gilia, also globally vulnerable (G3) and rare (S2) in Colorado. The pinyon-juniper plant community, while common (G5), is in good condition (B) and is listed below to further characterize the habitat of the rare plants.

Table #. Natural Heritage element occurrences at Bondad PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Aletes sessiliflorus</i>	New Mexico false carrot	G3	S1		A
<i>Gilia haydenii</i>	San Juan Gilia	G3	S2		C
Plant communities					
<i>Pinus edulis/Cercocarpus montanus</i> **	Pinyon pine/Mountain mahogany (Mesic western slope pinyon-juniper woodland)	G5	S4		B

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

** The PCA does not include the entire extent of the pinyon-juniper community, which is common and widespread in southern La Plata County; nor does it include an adequate area necessary to support the ecological processes that the community depends on.

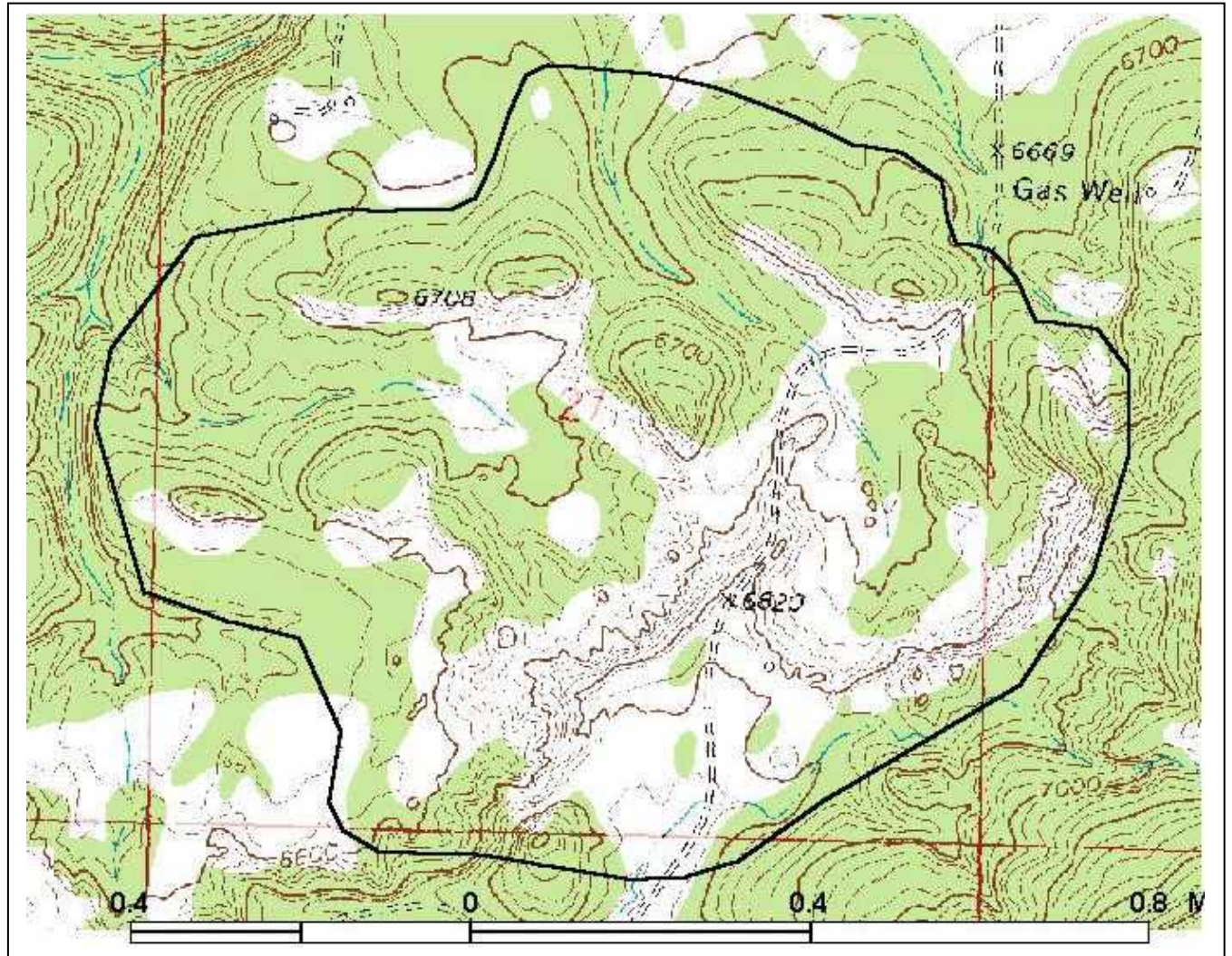
Boundary Justification: The boundary is drawn to encompass the occurrence of the New Mexico false carrot (*Aletes sessiliflorus*). It takes in the barren clay slopes that provide habitat for the rare plant, as well

as some of the surrounding pinyon-juniper woodland. The boundaries also include the occurrence of San Juan gilia and additional suitable habitat for that plant.

Protection Comments: The PCA is located on Southern Ute Tribal land, and includes a small amount of private land on the north.

Management Comments: Gas wells are already present in the site, and probably will create no additional disturbance. The rare plant occurrence is mostly on steep barren slopes that are not affected by the wells. There is some Russian knapweed (*Centaurea repens*) in the area.

Bondad Potential Conservation Area. B3: High Biodiversity Significance



<p>Colorado Natural Heritage Program</p>		<p>Location in Study Area</p>
<p>Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins CO 80523-8002</p>	<p>PCA Boundary</p>	
<p>Disclaimer <i>Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</i></p>	<p>Bondad Hill, 37107-A7 7.5 Minute Series Digital Raster Graphics Produced by the U. S. Geological Survey Map created 10 April 2004 UTM Zone 13 NAD 27</p>	

Cave Basin Trail PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports a good (B) occurrence of a globally vulnerable (G3) plant community.

Protection Urgency Rank: P4: No threat is known for the foreseeable future. The PCA is within the Weminuche Wilderness.

Management Urgency Rank: M2: Noxious weeds abound in the southern part of the trail before it enters wilderness.

Location: La Plata County. The Cave Basin Trail PCA is located in the Weminuche Wilderness of the San Juan National Forest. The trailhead can be reached from the Middle Mountain Road at the north end of Vallecito Reservoir. The PCA is approximately 25 air miles northeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Emerald Lake

Legal Description: T37N R6W Sections 1, 2. T38N R6W Sections 25, 26, 35, 36

Elevation: 11,240 to 11,600 feet

Size: Approximately 1232 acres

General Description: The Cave Basin trail is used by hikers and horseback riders. The trail begins in a clear-cut area that appears to be ideal habitat for grape ferns (*Botrychiums*) although a thorough search of the area was unproductive in 2003. The trail heads north and enters undisturbed spruce-fir forest at the boundary of the Weminuche Wilderness. An uncommon plant community with Carolina tasselrue (*Trautvetteria caroliniensis*) as the dominant understory species begins just inside the wilderness and continues for about a third of a mile. Other typical species in this community include showy alpine ragwort (*Ligularia amplexans*), Coulter daisy (*Erigeron coulteri*), strawberry (*Fragaria virginiana*), elk sedge (*Carex geyeri*), giant lousewort (*Pedicularis procera*), gooseberry currant (*Ribes montigenum*), osha (*Ligusticum porteri*), wild mountain parsley (*Pseudocymopterus montanus*), rattlesnake plantain (*Goodyera oblongifolia*), sweet cicely (*Osmorhiza depauperata*), and smooth woodrush (*Luzula parvifolia*). The plant association reappears again in a larger patch about a third of mile farther along.

There are both wet and dry open meadows interspersed throughout the forest. Wet meadows are home to showy whitlow-grass (*Draba spectabilis* var. *oxyloba*), along with other typical subalpine species such as Colorado false hellebore (*Veratrum tenuipetalum*), osha, large mountain fleabane, arrowleaf groundsel (*Senecio triangularis*), chiming bells (*Mertensia ciliata*), Rocky Mountain fringed gentian (*Gentianopsis thermalis*), elephant head (*Pedicularis groenlandica*), star gentian (*Swertia perennis*), and bittercress (*Cardamine cordifolia*). (See Appendix for more complete species lists).

Near the north end of the PCA are some interesting barren shale and rock areas with a different suite of species that grow in dry areas with shallow soils. These include alpine sandwort (*Lidia obtusiloba*), rosy pussytoes (*Antennaria rosea*), Gordon's ivesia (*Ivesia gordonii*), false strawberry (*Sibbaldia procumbens*), beautiful cinquefoil (*Potentilla pulcherrima*), rock jasmine (*Androsace septentrionalis*), stonecrop (*Sedum lanceolatum*), little club moss (Selaginella sp.), alpine fescue (*Festuca brachyphylla*) and Rand's goldenrod (*Solidago simplex*). On a nearby north facing slope with patches of bare soil was a good population of kittentails (*Besseyia ritteriana*).

Biodiversity Rank Justification: The PCA supports a good (B) occurrence of Engelmann spruce/Carolina tasselrue subalpine forest, a globally vulnerable plant community; and a fair (C) occurrence of kittentails, a globally vulnerable plant.

Table #. Natural Heritage element occurrences at Cave Basin Trail PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

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>Trautvetteria caroliniensis</i>	Engelmann spruce/Carolina tasselrue subalpine forest	G3	S2?		B
Plants					
<i>Besseyia ritteriana</i>	Kittentails	G3	S3		C

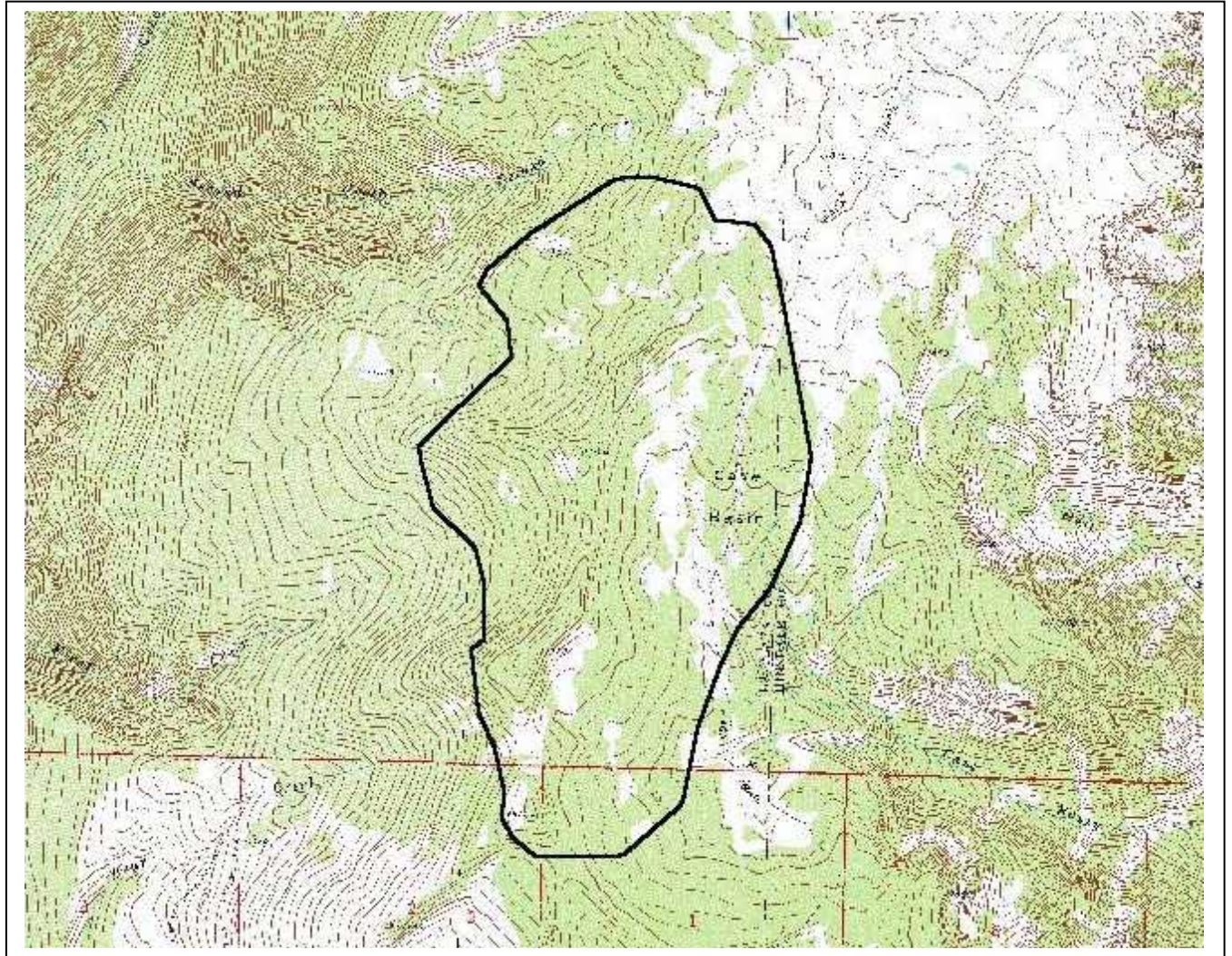
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary includes both the Engelmann spruce/Carolina tasselrue subalpine forest and the kittentails occurrences that were found along the Cave Basin Trail. Both the community and the rare plant are found within the larger mosaic of subalpine forest and interspersed subalpine meadows. It is expected that both of these elements are more widespread than has been documented to date, and additional area is included to allow for dynamic movement of the elements over time.

Protection Comments: Adequate protection is afforded by the wilderness designation.

Management Comments: The clear-cut area at the trailhead is heavily grazed and contains many exotic plants that could invade the wilderness. Canada thistle (*Cirsium arvense*) and hound's tongue (*Cynoglossum officinale*) are frequent. Pasture grasses including orchard grass (*Dactylis glomerata*) and Kentucky bluegrass (*Poa pratensis*) are also present along the trail, and are probably introduced by livestock. Enforcement of weed-free hay requirements should help to keep these species from becoming established within the wilderness.

Cave Basin Trail Potential Conservation Area. B3: High Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Emerald Lake, 37107-E4
Columbine Pass, 37107-E5
7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Cinder Gulch PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports an excellent example of a globally vulnerable grassland.

Protection Urgency Rank: P4: No threat is known for the foreseeable future. The site is protected on Southern Ute land.

Management Urgency Rank: M4: Current management and restoration appear to be successful.

Location: The Cinder Gulch PCA is located on Southern Ute tribal land in southwestern La Plata County, approximately 24 air miles southwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Redmesa
 Legal Description: T32N R12W Sections 10, 11, 15; T32N R13W Section 1

Elevation: 5,800 to 6200 feet

Size: Approximately 1,017 acres

General Description: This is large, level grassland dominated by alkali sacaton (*Sporobolus airoides*), in a mosaic with sagebrush (*Artemisia tridentata* ssp. *tridentata*), greasewood (*Sarcobatus vermiculatus*) and galleta (*Hilaria jamesii*) dominated areas. Adjacent Cinder Bluffs and other hills in the area have pinyon-juniper woodlands. This area was formerly heavily grazed, and had a dense sagebrush cover of 80% with a minimal understory. Cattle were removed 2 years ago, and some of the sagebrush was killed with an aerially applied herbicide in fall, 2001. There is now excellent grass recovery from the existing seed source, without any planting having been done (Jason Meecham, SUT Range Div., pers. comm. 2004). Sagebrush cover has been reduced to 10% in the plot examined by CNHP, and less than 30% throughout the area. Alkali sacaton accounted for 80%, with galleta 10%, and small amounts (< 1%) of several other shrubs and forbs including greasewood, four-wing saltbush (*Atriplex canescens*), winterfat (*Krascheninnikovia lanata*), hairspine prickly pear (*Opuntia polyacantha*), common sunflower (*Helianthus annuus*), sego lily (*Calochortus nuttallii*) and prince's plume (*Stanleya pinnata*). The site is included here to represent a larger area that has not been mapped.

Biodiversity Rank Justification: Alkali sacaton dominated grasslands are relatively uncommon in western Colorado, although they are more frequent in adjacent New Mexico (Jason Meecham, per. Comm.) This is an excellent (A ranked) example of a globally vulnerable (G3) plant community.

Table #. Natural Heritage element occurrences at Cinder Gulch PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Sporobolus airoides</i>	Great Plains Salt Meadows	G3	S3		A

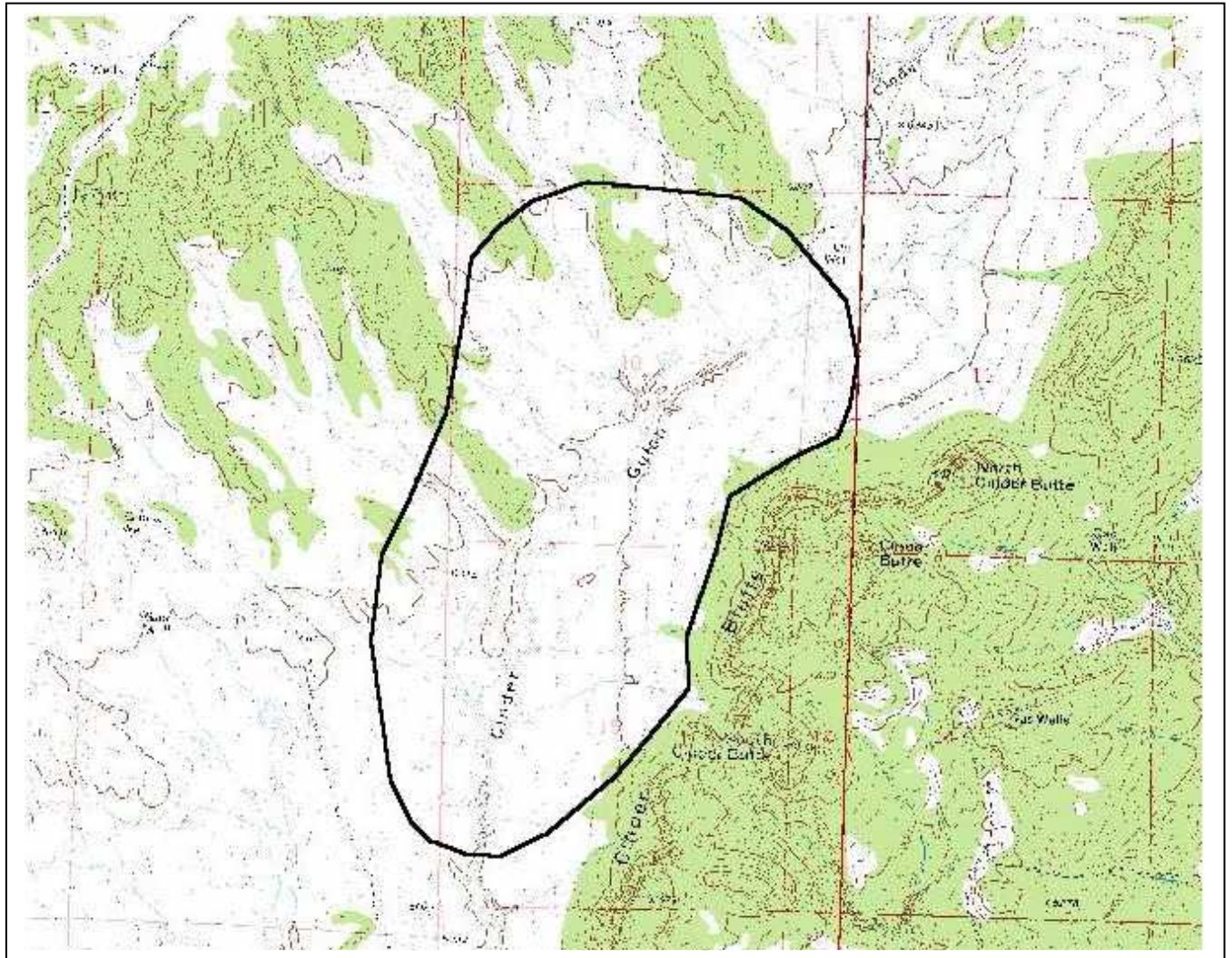
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary is drawn to encompass an area of excellent condition grassland that is representative of a larger area. The entire extent of the community was not mapped.

Protection Comments: Limited access to Southern Ute lands provides some protection of this area. Although oil and gas development is prevalent in the area, the effort put into restoration of this grassland indicates that it will be maintained in good condition.

Management Comments: This is an extremely successful restoration project in an overgrazed sagebrush area that may serve as a model for other such endeavors.

Cinder Gulch Potential Conservation Area. B3: High Biodiversity Significance



<p>Colorado Natural Heritage Program</p>		<p>Location in Study Area</p>
<p>Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins CO 80523-8002</p>	<p>PCA Boundary</p>	
<p>Disclaimer <i>Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</i></p>	<p>Red Mesa, 37108-A2 Pinkerton Mesa, 37108-A1 Columbine Pass, 37107-E5 7.5 Minute Series</p> <p>Digital Raster Graphics Produced by the U. S. Geological Survey Map created 10 April 2004 UTM Zone 13 NAD 27</p>	

Cumberland Basin PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports an excellent example of a globally vulnerable (G3) plant, and excellent occurrences of common alpine plant communities.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4. Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Cumberland Basin PCA is located at the headwaters of the La Plata River in western La Plata County, about 14 air miles northwest of Durango.

U.S.G.S. 7.5-min. quadrangles: La Plata

Legal Description: T37N R10W Sections 19, 30; T37N R11W Sections 23-25

Elevation: 10,520 to 12,258 feet

Size: Approximately 941 acres

General Description: The Cumberland Basin PCA encompasses the headwaters of the La Plata River. It is bounded on the west by Indian Trail Ridge, which forms the boundary between La Plata and Montezuma counties. On the north and east, it follows the divide between the La Plata River and Hermosa Creek drainages and includes Kennebec Pass. A rough four-wheel drive road leads to a parking area and provides access to the Colorado Trail, which continues west to Taylor Lake and east to Junction Creek. The landscape is a mosaic of subalpine forest that grades into isolated islands of dwarfed trees at the upper elevations, and lush meadows of wildflowers, alpine tundra and talus slopes. Two plants endemic to Colorado, kittentails (*Besseyia ritteriana*) and showy whitlowgrass (*Draba spectabilis* var. *oxyloba*), are found in wet meadows with osha (*Ligusticum porteri*), Colorado false hellebore (*Veratrum tenuipetalum*), bistort (*Bistorta bistortoides*), showy alpine ragwort (*Ligularia amplexans*), thistle ragwort (*Senecio crassulus*), king's crown (*Rhodiola integrifolia*) and other typical subalpine meadow species (See Appendix for complete species list). Higher, along the Colorado Trail on Indian Trail Ridge, alpine tundra supports an abundance of forbs and grasses, including alpine avens (*Geum rossii*), snow willow (*Salix reticulata*), Parry's clover (*Trifolium parryi*), American alpine speedwell (*Veronica nutans*), pale agoseris (*Agoseris glauca*), tufted hairgrass (*Deschampsia cespitosa*), timothy (*Phleum commutatum*), alpine bluegrass (*Poa alpina*), and spike trisetum (*Trisetum spicatum*). Altai chickweed (*Stellaria irrigua*) is found along the jeep road to Kennebec Pass, in scree, along with Fremont's groundsel (*Senecio fremontii*), Holm's ragwort (*Ligularia holmii*), thickroot claytonia (*Claytonia megarhiza*), sky pilot (*Polemonium viscosum*) and harbour penstemon (*Penstemon harbourii*).

Biodiversity Rank Justification: The rank of the Cumberland Basin PCA is based on an excellent (A ranked) occurrence of kittentails, a globally vulnerable (G3) plant. This plant is endemic to the San Juan Mountains. Also included in the site are an excellent occurrence of showy whitlow-grass, a Colorado endemic that is now "watchlisted" (S3S4) by CNHP, and a good (B) occurrence of Altai chick weed, a plant that is probably globally secure (G4?) but rare in Colorado (S2). Three common plant communities were documented from the site: an excellent (A) occurrence of alpine meadows, an excellent occurrence of a montane wet meadow, and a good (B) occurrence of alpine willow scrub.

Table #. Natural Heritage element occurrences at Cumberland Basin PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Besseyia ritteriana</i>	Kittentails	G3	S3		A
<i>Draba spectabilis</i> var <i>oxyloba</i>	Showy whitlow-grass	G3?T3Q	S3S4		A
<i>Stellaria irrigua</i>	Altai chick weed	G4?	S2		B
Plant Communities					
<i>Geum rossii</i> - <i>Polygonum bistortoides</i>	Alpine meadows	G4G5	S4S5		A
<i>Salix brachycarpa</i> /Mesic forbs	Alpine willow scrub	G4	S4		B
<i>Caltha leptosepala</i>	Montane wet meadow	G4	S4		A

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

Boundary Justification: The boundary is drawn to follow the ridges that define Columbus Basin, and incorporate the headwaters of the La Plata River. It includes three rare plant occurrences and provides additional suitable habitat for all three. All of these elements fall within the mosaic of alpine meadows dominated by alpine avens and bistort, with steeper slopes of talus interspersed. Kittentails and showy whitlow-grass are found in the meadow areas, while Altai chickweed grows in the talus. The boundaries incorporate an area that will allow the available hydrology from the surrounding ridges draining into the basin, supporting the elements. The boundary may not encompass the entire willow association; aerial photos were used to estimate its full extent. The alpine meadows plant community is included to represent an example of a common alpine community found in La Plata County. Its full extent is not included in the PCA.

Protection Comments: The site is within the San Juan National Forest. Further protection could be afforded by special designation in the forest plan revision.

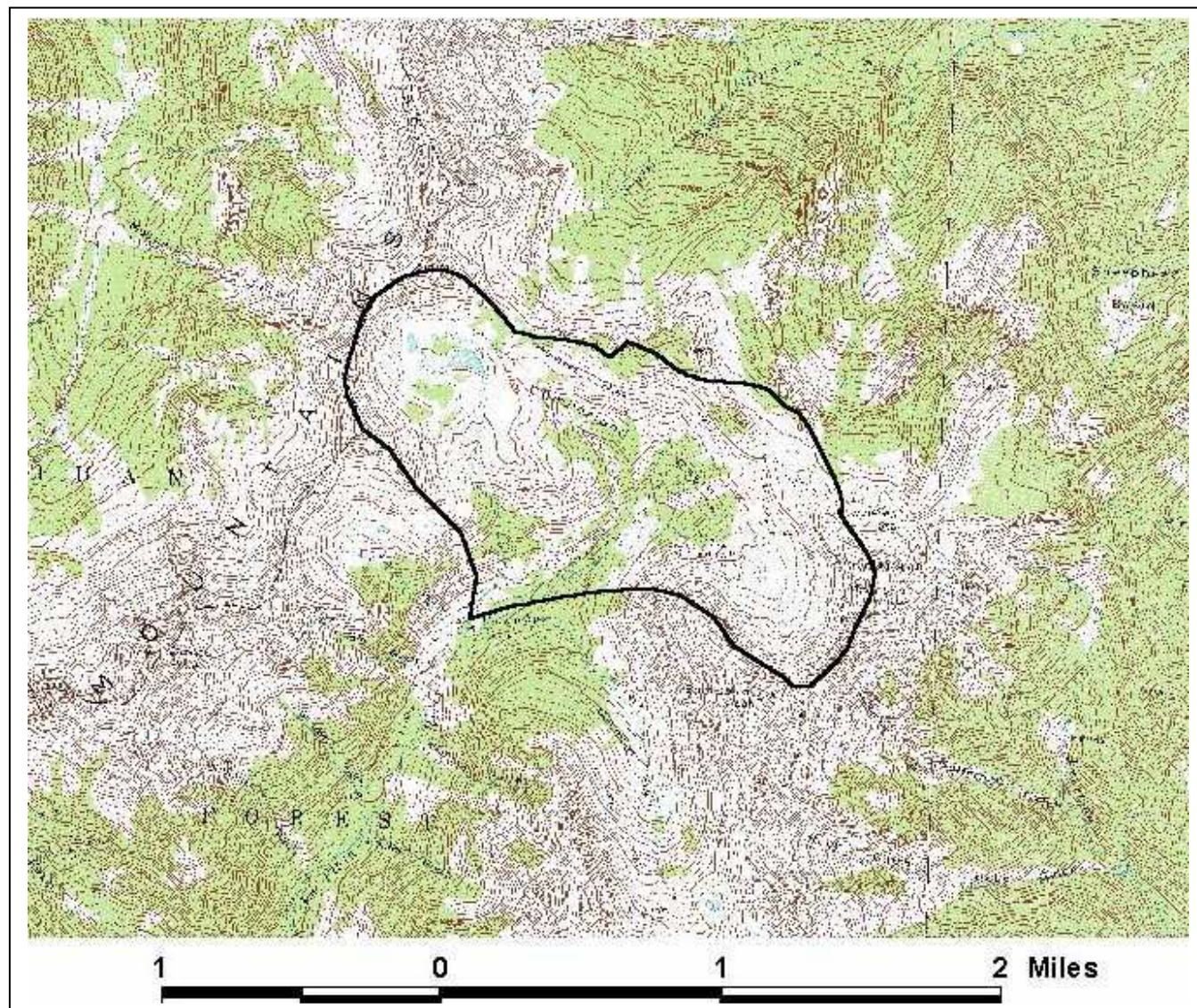
Management Comments: Despite heavy recreational use on trails and at Taylor Lake, the PCA is in excellent condition and plants appear to be thriving. Motorized recreation is allowed only on designated roads and trails. Continued monitoring is recommended to ensure early detection of weeds.

Soils Description: Soil textures for the *Salix brachycarpa*/ mesic forbs plant community range from silty clay loams to fine sandy loams with some mottling (Carsey et al. 2002).

Restoration Potential: The area is functioning as expected.

Wetland Functional Assessment for the Cumberland Basin PCA: A wetland functional assessment was not performed at this site. The area is subalpine and receives sheetflow drainage and first order stream inflow. The small inputs would influence some low functionality, although it is thought that the area is functioning as expected within its HGM wetland class.

Figure --. Cumberland Basin Potential Conservation Area. B3: High Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

La Plata, 37108-D1
 30 X 60 Minute Series

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

Map created 10 April 2004
 UTM Zone 13 NAD 27

Location in Study Area



Elbert Creek PCA

Biodiversity Rank: B3. High biodiversity significance. The area supports a globally imperiled (G2) plant community in fair (C ranked) condition, a globally vulnerable (G3) montane shrubland in good (B ranked) condition, a globally secure (G4) sedge meadow in fair (C ranked) condition, and a globally secure but state imperiled (S1) plant in excellent (A ranked) condition.

Protection Urgency Rank: P4. No Protection actions are needed in the foreseeable future. Most of the site is within USFS land.

Management Urgency Rank: M2. New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA. Non-native weed invasion is common throughout the PCA.

Location: Elbert Creek PCA is located south of Haviland Lake and east of Chris Park in the north-central portion of La Plata County.

U.S.G.S. 7.5-min. quadrangles: Electra Lake
Legal Description: T38N R8W Section 30, 31
 T38N R9W section 36, 25

Elevation: 7750ft.

Size: Approximately 167 acres

Redders, 2003, Community Type: Evergreen Forest type: *Picea pungens/ Cornus sericea; Picea pungens/ Salix* species. Deciduous - Evergreen Forests: *Populus angustifolia – Picea pungens/ Alnus incana*. Other Shrublands: *Alnus incana - Cornus sericea*

General Description: The Elbert Creek PCA is in a drainage with open to steep canyons below the Haviland Lake dam. The landscape diversity is high for its short distance. The stream runs through a relatively narrow canyon, creating occasional waterfalls, and spills into an open marsh area. The tree layer is diverse, dominated by white fir (*Abies concolor*) and blue spruce (*Picea pungens*) with associated species including narrowleaf cottonwood (*Populus angustifolia*), aspen (*Populus tremuloides*), and ponderosa pine (*Pinus ponderosa*). Rocky mountain maple (*Acer glabrum*) is infrequent in the riparian zone and upland slopes throughout the area, becoming dense in some places.

The shrub layer throughout the riparian area is diverse and dense with a mosaic of mountain shrubs dominating in the narrow canyons, including more willows in open areas where soils are more developed. Shrubs dominating the narrow canyon include thinleaf alder (*Alnus incana*), river birch (*Betula occidentalis*), red-osier dogwood (*Cornus sericea*), twinberry (*Lonicera involucrata*) and Bebb's willow (*Salix bebbiana*). The canyon also has a lush native, riparian herbaceous layer including angelica (*Angelica pinnata*), baneberry (*Actaea rubra*), bog orchid (*Habenaria hyperborea*), cow parsnip (*Heracleum lanatum*), thimble berry (*Rubus parviflorus*), goldenglow (*Rudbeckia ampla*), water sedge (*Carex aquatilis*), silvery sedge (*Carex canescens*), small tipped sedge (*Carex microglochis*), small winged sedge (*Carex microptera*), bellwort (*Disporum (Prosartes) trachycarpa*), field horsetail (*Equisetum arvense*), and fowl mannagrass (*Glyceria striata*).

The marsh sloughs with its hummocks and divided streamlets offer a viable alternative habitat in the midst of the riparian forest woodland. Beaver is well established in the largest marsh, maintaining the wetland area. In addition to willows (*Salix exigua*, *S. monticola*, *S. lasiandra*, *S. eriocephala* var. *ligulifolia*) encroaching into the wetland, the emergent vegetation, forbs and graminoids of the marsh area include burreed (*Sparganium emersum*), goldenglow (*Rudbeckia ampla*), large leafed avens (*Geum macrophyllum*), monk's hood (*Aconitum columbianum*), water hemlock (*Cicuta douglasii*), mint (*Mentha arvensis*), dead-nettle (*Galeopsis bifida*), checker-mallow (*Sidalcea candida*), beaked sedge (*Carex utriculata*), small winged sedge (*Carex microptera*), inland sedge (*Carex interior*), arctic rush (*Juncus balticus*), jointed rush (*Juncus articulatus*), longstyle rush (*Juncus longistylis*), cattails (*Typha latifolia*), fowl mannagrass (*Glyceria striata*), reed canary grass (*Phalaroides arundinacea*).

Forested uplands consist of spruce – fir or dry pine forests with aspen groves and Gambel oak (*Quercus gambelii*) stands intermixed. Tree species include ponderosa pine, blue spruce, white fir, aspen and Douglas fir (*Pseudotsiga menziesii*). There are hunting/horse camps in the area as well as horse trails and old road cuts. The area is close to a campground and popular fishing lake. Haviland Lake dam appears to offer little hydrological input. The stream is small with few signs of flushing flows. Weed invasion by Canada thistle (*Cirsium arvense*) is common, though not dense or overwhelming.

Biodiversity Rank Justification and Comments: This PCA supports the globally imperiled (G2) white fir – blue spruce - narrowleaf cottonwood/ Rocky Mountain maple plant association in fair (C ranked) condition. The presence of white fir distinguishes this plant community from the more common narrowleaf cottonwood – blue spruce / thinleaf alder plant association and is indicative of the southern most mountains in Colorado (Carsey, et al. 2003). This association is only documented from southern Colorado, though it is thought to occur in northern New Mexico (Nature Serve Explorer 2003). Thinleaf alder – red-osier dogwood plant community (G3) occupies the narrow canyon in good condition (B ranked). This association is uncommon but occurs locally throughout its range, documented from California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming (Nature Serve Explorer 2003). This community is thought to be an early-seral system, but long lived. The community tolerates flooding and requires a high water table in the spring.

The site also contains the state rare (S1) plant, American spikenard, in excellent (A ranked) condition. Although this species is common in the eastern U. S. and Canada, it is extremely rare in Colorado. All three known locations in Colorado are in La Plata County (see PCAs for Cascade Creek in volume 1 and Lower Hermosa Creek in this volume).

Table 28. Natural Heritage element occurrences at Elbert Creek PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Abies concolor</i> – <i>Picea pungens</i> – <i>Populus angustifolia</i> / <i>Acer glabrum</i>	White fir – blue spruce – narrowleaf cottonwood/ Rocky Mountain maple	G2	S2		C
<i>Alnus incana</i> - <i>Cornus sericea</i>	Thinleaf alder – red-osier dogwood	G3Q	S3		B
<i>Carex utriculata</i>	Beaked sedge	G5	S5		C
Plants					
<i>Aralia racemosa</i>	American spikenard	G4G5	S1		A

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

Boundary Justification: The boundaries incorporate an area that is adequate for the continuing existence of the mosaic of plant communities and rare plants in this short section of Elbert Creek between Haviland Lake and the Animas River. It is designed to allow as much of the available hydrological processes that maintain the communities as possible. Seasonal flooding, sediment deposition, and new channel formation where possible help to maintain viable riparian populations of the elements along Elbert Creek. It should be noted that the hydrological processes necessary to the elements are not fully contained by the PCA boundaries. Narrowleaf cottonwood is dependent on natural hydrological processes associated with Elbert Creek and its tributaries. Increased upstream activities such as water diversions, additional impoundments, improper livestock grazing, and development would be detrimental to the hydrology of the riparian area. This boundary indicates the minimum area that should be considered for any conservation management plan.

Protection Comments: Most of the area is managed by the U.S. Forest Service. There is private land in the southern reach of the PCA. National Forest lands are designated as Management Area 2A in the current (1985) Management Plan. This emphasizes semi-primitive motorized recreation, and includes some areas

that are suitable for timber harvest. Special designation in the new management plan, such as an area of botanical interest, could help preserve the rare plants and natural communities of Elbert Creek.

Management Comments: Weed invasion is sparse to dense and common throughout the PCA. Severely altered hydrology upstream of occurrences may have a deleterious effect. American spikenard shows some tendency to be intolerant of habitat decline or damage. Threats associated with habitat decline and collection of plants from wild populations for use in the herb trade are likely to increase in the future.

Soils Description: Soil sampled at marshland's edge is organic, dark, hemist (mucky peat), with oxidized root channels and mottling in the upper part, and has a silt texture horizon at the water table at 26 cm. Soil Survey of La Plata County Area, Colorado (USDA 1988) delineates the marsh areas as Alamosa loam described as a poorly drained soil and classified as fine-loamy, mixed, frigid Typic Argiaquolls. The rest of the canyon is delineated as rock outcrop, though there is some soil development. Carsey et al. (2003) describe soils for the white fir – blue spruce – narrowleaf cottonwood/ Rocky Mountain maple plant association as “well drained, poorly developed mineral soils with shallow sandy loams over coarse alluvial materials”.

Restoration Potential: The elements of natural diversity within the Elbert Creek PCA appear to be surviving, if not thriving, despite the altered hydrology and other perturbations in the area. Area dams have been in place for decades. The riparian area is functioning at potential within its HGM classification. Efforts toward the eradication of weeds and weed control are considered the highest and most realistic priority for the restoration of the site. Condition of the private property within the PCA is unknown. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the Elbert Creek PCA:

Proposed HGM Class: Riverine

Subclass: R2

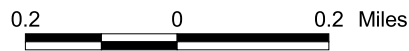
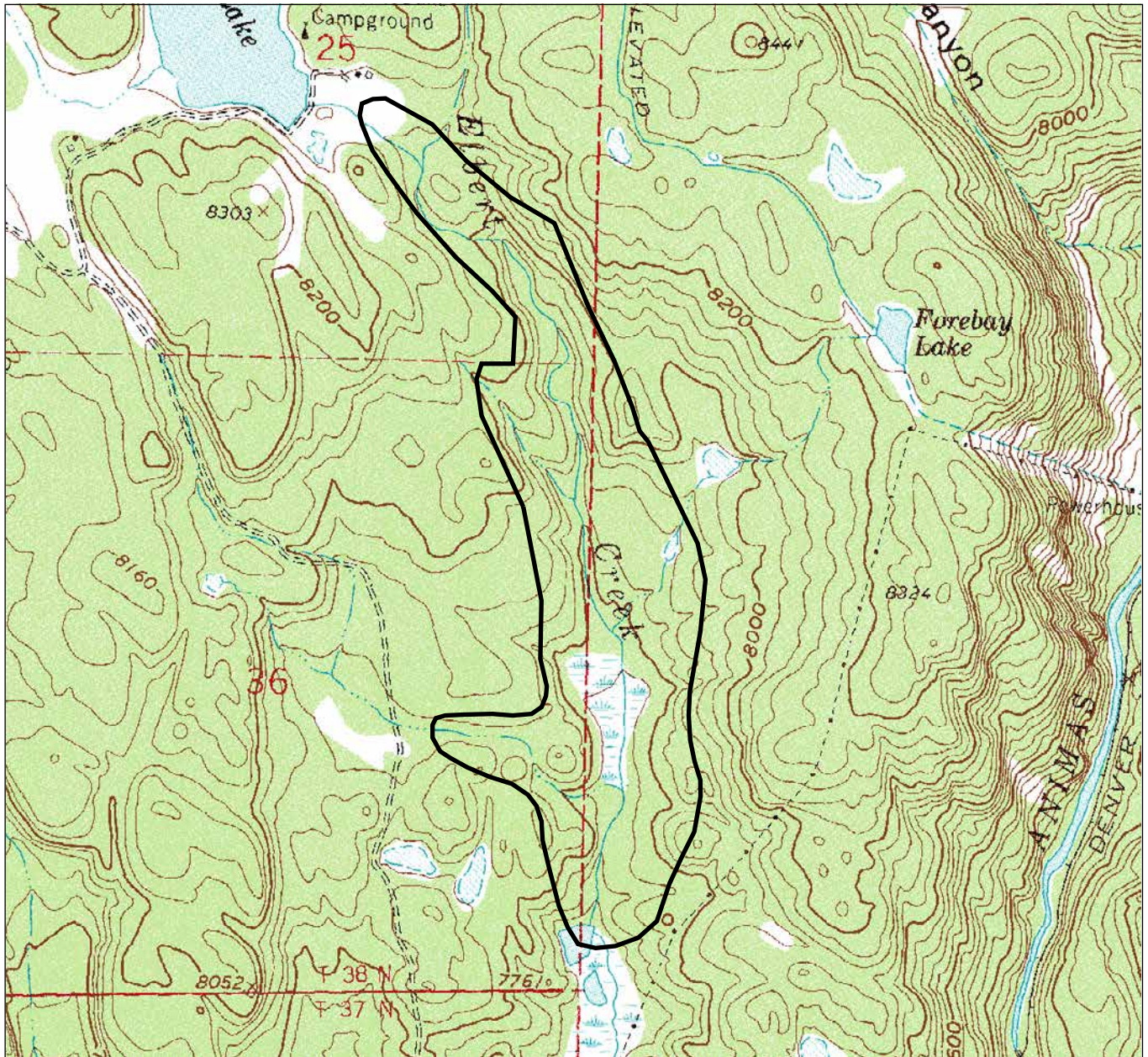
Cowardin System: Palustrine


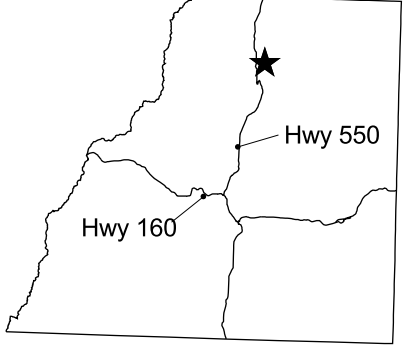
CNHP's Wetland Classification: *Abies concolor* – *Picea pungens* – *Populus angustifolia*/ *Acer glabrum*; *Alnus incana* / *Cornus sericea*

Table 29. Wetland functional assessment for the riverine wetland at the Elbert Creek PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	There is a controlled input of water with a relatively small drainage contributing below the dam. Flat areas with beaver activity, wetlands indicate positive function.
Sediment/Shoreline Stabilization	High	There is dense vegetative cover with mostly native representation, anchoring/stabilizing banks.
Groundwater Discharge/Recharge	No	Poorly developed mineral soils and poorly drained silty soils in marsh areas indicate little recharge. No discharge observed.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	Vegetative productivity is high, indicating a normal cycling of nutrients with little disturbance to the soil. There are high amounts of detritus in flatter areas.
Removal of Imported Nutrients, Toxicants, and Sediments.	High	Inputs are relatively low however, areas with saturated, organic soils and emergent vegetation offer ample opportunity for removal. The dense shrub layers also trap sediment.
Biological Functions		
Habitat Diversity	Moderate	There are two Cowardin classes present -- forested, and herbaceous wetlands create moderate habitat diversity.
General Wildlife Habitat	High	Wetland complex with a high diversity of vegetation provide much cover, browse, and nesting habitat for a variety of herbivores and birds.
General Fish/Aquatic Habitat	Moderate	Fish habitat has potential however opportunity is low due to altered hydrology and low inputs. Stream morphology offers a diverse aquatic habitat.
Production Export/Food Chain Support	Moderate	Dense and diverse vegetation supplies nutrients and carbon sources for invertebrates and fishes and downstream transport. Inputs/flooding are low.
Uniqueness	High	Area supports a G2S2 plant association, an S1 plant species, a G3 plant community and a G5 herbaceous wetland type.

Figure 19. Elbert Creek Potential Conservation Area, B3: High Biodiversity Significance



<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Electra Lake, 37107-E7 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	---	--

Falls Creek PCA

Biodiversity Rank: B3. High biodiversity significance. The PCA supports a globally imperiled (G2) plant community in fair (C ranked) condition.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The PCA is almost entirely managed by the U.S. Forest Service with a small amount of private land. No immediate protection concerns are foreseen.

Management Urgency Rank: M3. New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA. Extensive hydrologic alterations, weed invasion and management of recreation are the main threats.

Location: Falls Creek PCA is located north of Durango in the Falls Creek Valley and canyon connecting with the Animas Valley to the east.

U.S.G.S. 7.5-min. quadrangles: Durango East
Legal Description: T36N R10W Section 28

Elevation: 7110ft.

Size: 65 acres

Redders, 2003, Community Type: Deciduous Forest: *Populus angustifolia/Alnus incana* Deciduous – Evergreen Forest: *Populus angustifolia - Pseudotsuga menziesii*

General Description: The Falls Creek PCA is close to the city of Durango and offers both recreational and educational opportunities that are well utilized by the community. A rolling mesa lies in between Falls Creek valley and the Animas valley. Falls Creek actually cuts southeast through this mesa, and ends in the Animas valley. The small canyon is steep to open and supports a deciduous riparian woodland ribbon, with upland conifers commonly situated in the narrow riparian zone. The creek cascades over the tan Entrada sandstone and the oxidized red beds of the Dolores and Cutler Formations, creating a series of small waterfalls. An old roadbed runs adjacent for its entire length, and is now used as a trail. Social trails approach the creek wherever the landscape allows.

Narrowleaf cottonwoods (*Populus angustifolia*) are scattered throughout the area but are never dense. Associated tree species include Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*) and ponderosa pine (*Pinus ponderosa*). The shrub layer is a diverse, closed to open canopy with thinleaf alder (*Alnus incana*) and red-osier dogwood (*Cornus sericea*) widely represented. Other shrubs present are silver buffaloberry (*Shepherdia argentea*), strappleaf willow (*Salix eriocephala* var. *ligulifolia*), choke cherry (*Prunus virginiana*), virgins bower (*Clematis ligusticifolia*), Gambel oak (*Quercus gambelii*), Woods' rose (*Rosa woodsii*), shining willow (*Salix lasiandra*), serviceberry (*Amelanchier alnifolia*), and snowberry (*Symphoricarpos rotundifolius*). The diagnostic shrub species for this classification is silver buffaloberry or *Shepherdia argentea*. Its presence indicates the natural plant community (narrowleaf cottonwood/ strappleaf willow – silver buffaloberry), though it is not the most abundant shrub. Douglas fir is occasionally situated in the narrow riparian zone, with saplings more numerous than mature trees.

Biodiversity Rank Justification and Comments: This site supports the globally imperiled (G2) narrowleaf cottonwood/ strappleaf willow – silver buffaloberry natural plant community in fair (C ranked) condition. This community is thought to be extremely limited in western Colorado and believed to have been more wide spread in the past. Intense, long-term use by livestock and alterations in the river flow regime have caused a decline in its distribution (Carsey, et al. 2003). This association has an extremely limited distribution, and is only documented from western Colorado (Nature Serve Explorer 2003).

Table 30. Natural Heritage element occurrences at Falls Creek PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i>/ <i>Salix eriocephala</i> var. <i>ligulifolia</i> – <i>Shepherdia argentea</i>	Narrowleaf cottonwood / strapleaf willow – silver buffaloberry	G2	S2		C

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes as are available from surrounding hillsides and small drainages. Seasonal flooding and sediment deposition will help maintain a viable population of the plant community along Falls Creek. The boundary encompasses the trail and hay field as a buffer from heavy disturbance that causes erosion and may contribute to excessive sediment deposition and elevated nutrient levels in the wetland area (water and soil). It should be noted that the hydrological processes necessary to the elements are not fully contained by the PCA boundaries.

Protection Comments: The area is managed by the US Forest Service, however there is private land with a trail easement on the eastern end of Falls Creek. No immediate protection concerns are foreseen.

Management Comments: Agricultural practices and heavy recreation may be contributing excess nutrients, toxicants, sediment and non-native species to the PCA. Public education regarding riparian ecology may help limit the use of social trails where stream banks are impacted by erosion.

Soils Description: Soil sampled is sandy loam with fringes of organic soil development along the stream. The Soil Survey of La Plata County Area, Colorado (USDA 1988) states the PCA area contains Archuleta – Sanchez complex, shallow and well drained with soft bedrock close to the surface. Archuleta soil is classified as loamy, mixed, nonacid, frigid, shallow Typic Ustorthents and Sanchez soil is classified as loamy-skeletal, mixed Lithic Eutroboralfs. The Falls Creek valley upstream of the canyon is Hayness loam, alluvial and derived from the red bed sandstone. Hayness soil is classified as fine, loamy, mixed, mesic Entic Haplustolls.

Restoration Potential: The PCA is below a dam therefore complete hydrological restoration of the site is not feasible. Restoration opportunities include ensuring that trails crossing creeks are constructed to minimize their impact on the riparian zone. The agricultural and mesic meadows and cattail wetlands near the entrance of the Falls Creek canyon are priority sites for weed control. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species. Given the small size and position of the PCA, continual monitoring for exotic species is suggested to help eliminate the danger of invasion of tamarisk or Russian olive.

Wetland Functional Assessment for the Falls Creek PCA:

Proposed HGM Class: Riverine

Subclass: R3

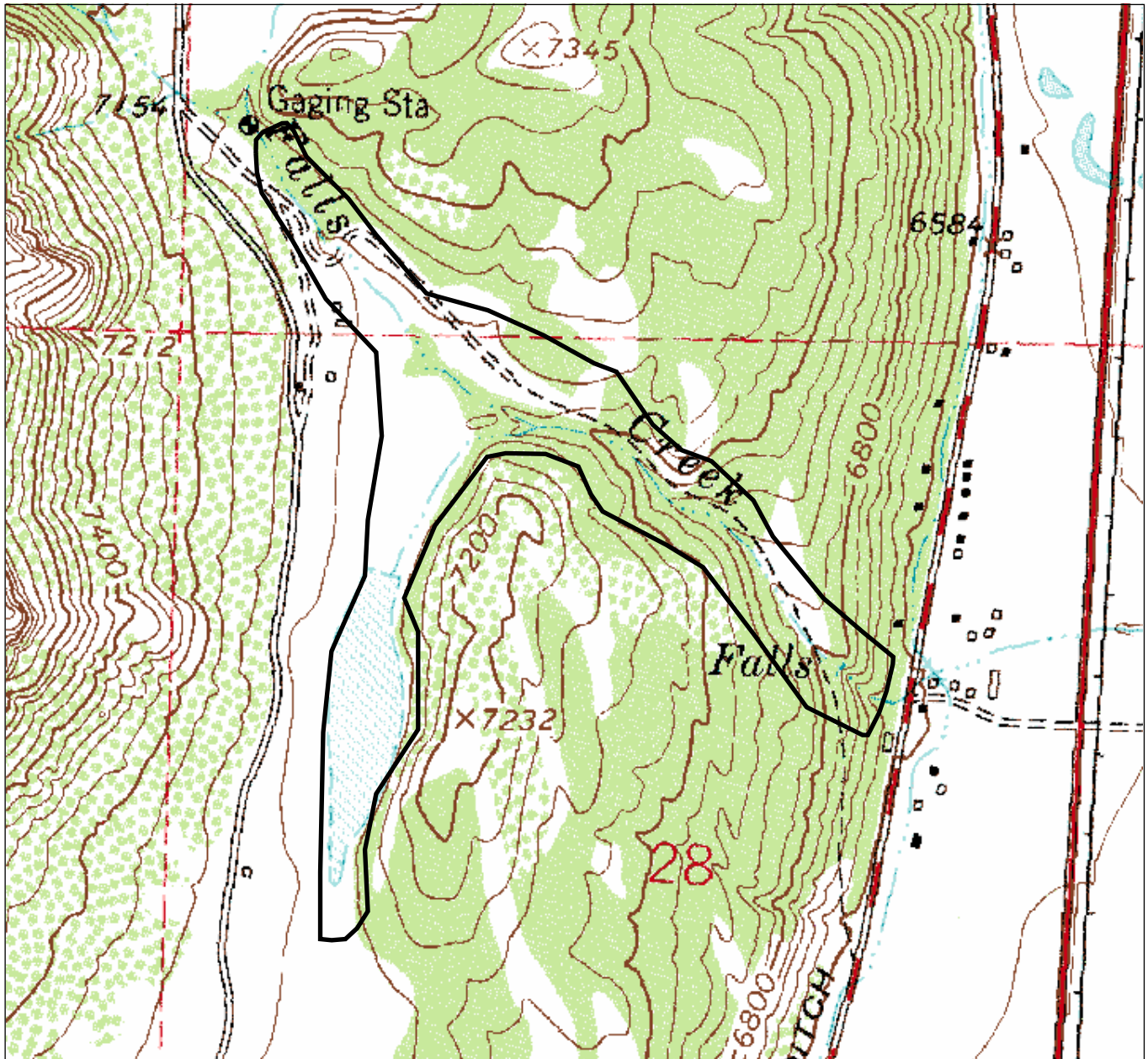
Cowardin System: Palustrine

CNHP's Wetland Classification: *Populus angustifolia/ Salix eriocephala* var. *ligulifolia* – *Shepherdia argentea*

Table 31. Wetland functional assessment for the riverine wetland at the Falls Creek PCA.

Function	Rating	Comments
Overall Functional Integrity	Below Potential	This riparian area has altered hydrology, agricultural and heavy recreation impacts.
Hydrological Functions		
Flood Attenuation and Storage	Low	Most of stream is within incised canyon with little storage or attenuation potential. It is also below a dam and showed little sign of flooding events.
Sediment/Shoreline Stabilization	Moderate	This wetland receives a small input of water. There is dense vegetation where soil is developed, but exposed bedrock as well.
Groundwater Discharge/Recharge	No	Small inputs of water and exposed bedrock indicate little chance for recharge in the canyon.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Disrupted	Due to agricultural impacts and severely altered hydrology, productivity and chemical cycling processes are disrupted.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	Although inputs are low, the dense, overhanging vegetation and fringes of soil development indicate a moderate level for this function.
Biological Functions		
Habitat Diversity	High	The area supports three Cowardin classes (forested, scrub shrub and emergent wetland habitat).
General Wildlife Habitat	Moderate	The PCA is in a heavy recreation area with close proximity to private lands and a city. Diverse native vegetation offers habitat for a variety of birds and herbivores. Signs of deer and bear noted.
General Fish/Aquatic Habitat	Low	Low inputs offer little habitat for fish. The limited number of pools and riffles indicate a low function for invertebrates. Very little aquatic habitat.
Production Export/Food Chain Support	Low	This riparian wetland is very small with a dam upstream and a waterfall and irrigation diversion downstream (at its end).
Uniqueness	High	Although the wetland class is common, the area supports a G2 plant association and is a site of local significance.

Figure 20. Falls Creek Potential Conservation Area, B3: High Biodiversity Significance



0.1 0 0.1 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

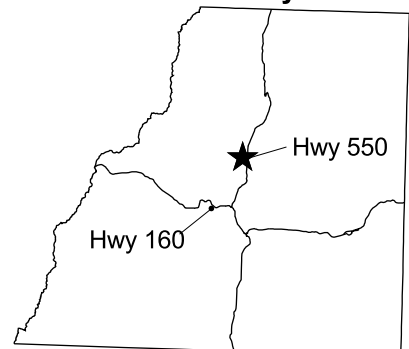
Durango East, 37107-C7
 7.5 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Florida River at Burnt Timber Creek PCA

Biodiversity Rank: B3. High biodiversity significance. This site contains a globally vulnerable (G3) plant community in good (B ranked) condition, two globally vulnerable shrublands in fair (C ranked) condition and an apparently globally secure and state vulnerable (G4S3) riparian woodland in good (B ranked) condition

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The entire site is owned by the U.S. Forest Service and most of the site is within the Weminuche Wilderness.

Management Urgency Rank: M2. New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA. Noxious weed expansion is the main threat.

Location: This PCA is located in the San Juan National Forest and Weminuche Wilderness north of Transfer Campground. It encompasses the Florida River, North Burnt Timber, Burnt Timber and South Burnt Timber Creeks.

U.S.G.S. 7.5-min. quadrangles: Lemon Reservoir
Legal Description: T37N R7W Sections 8, 17, 18, 19

Elevation: 10,200 – 8,500 ft.

Size: Approximately 519 acres

Redders, 2003, Community Type: Deciduous Forest: *Populus angustifolia* / *Cornus sericea*; Willow Shrublands: *Salix monticola* / Mesic Forbs.

General Description: This PCA encompasses the Florida River in a steep, narrow canyon and the east mountain bench above that canyon.

The area above the Florida River is at the southern reach of the rising Mountain View Crest. The area is sloping to flat with limestone, sandstone and granite outcrops of the Leadville Limestone and Hermosa Formations. The area harbors many seeps, springs, ephemeral and low order streams. Conifer forests on upland slopes consist of a diverse tree canopy including blue spruce (*Picea pungens*), white fir (*Abies concolor*), and Douglas fir (*Pseudotsuga menziesii*). Mountain shrub diversity is high in the narrow riparian zones, where more willow species occur in the open, flat meadows, and wetlands. Small depressions in this area often have standing water with mature aspen growing within. Larger swales and meadows support wetlands encouraged by beaver dams. Willows wind around the margins of wet meadows and standing water in a linear, dense to open canopy. Mesic graminoids and forbs occupy the wet meadows and hummocky areas adjacent the willows. Willow species include mountain willow (*Salix monticola*), shining willow (*Salix lasiandra*), Drummond's willow (*Salix drummondiana*), planeleaf willow (*Salix planifolia*) and strapleaf willow (*Salix eriocephala* var. *ligulifolia*). Graminoids commonly found are beaked sedge (*Carex utriculata*), northern manna grass (*Glyceria borealis*), smallwing sedge (*Carex microptera*), reed canary grass (*Phalaroides arundinacea*), field horsetail (*Equisetum arvense*) and mountain brome (*Bromus ciliatus*). The area drains into the Florida River. Weeds (Canada thistle) become very dense, especially on the beaver dams. A popular horse pack trail parallels the wetlands.

The upper Florida River Canyon was surveyed in 1995 by CNHP riparian ecologists. The canyon is occupied by mixed conifer – deciduous forests. Soils are mineral and in steep areas, poorly developed. The canyon is narrow and rocky with large sandstone and limestone boulders where non-obligate riparian conifers such as Douglas fir are situated in the riparian zone. In at least one area where the canyon opens, a pure deciduous forest occupies the reach. It consists of narrowleaf cottonwood (*Populus angustifolia*) and a variety of deciduous shrubs with red-osier dogwood (*Cornus sericea*) dominating. This community type is not common for the Florida River in this region. Farther up stream and into the Burnt Timber drainage is a thinleaf alder shrubland (*Alnus incana*/ mesic forbs). The accessibility of this area is difficult, limiting human visitation. There is sign of wildlife use but no domestic grazers. Domestic grazing does occur in the tributaries above, and weed encroachment is visible. Kentucky bluegrass (*Poa pratensis*) and dandelions (*Taraxacum officinale*) occupy the canyon area, however are reportedly not dense.

Biodiversity Rank Justification and Comments: The drainage supports the globally vulnerable (G3) thinleaf alder / mesic forbs plant association in good (B ranked) condition. Thinleaf alder is considered an early-seral species, establishing on fluvial deposits, where the shrubs trap sediments and eventually develop soils (Carsey et al. 2002). This association is considered a minor association in the western states, though it has a wide distribution (Nature Serve Explorer 2003). The PCA also contains the globally secure but vulnerable in the state (G4/S3) narrowleaf cottonwood / red –osier dogwood plant community in good condition. This plant association tends to be characterized by more mature cottonwood forests, isolated from frequent flooding events. It appears that the community needs a high water table to support the red-osier dogwood.

The higher bench supports two globally vulnerable (G3) willow shrublands in fair (C ranked) condition. The mountain willow / mesic graminoids plant association appears to be a stable, long lived plant community. The shining willow shrubland appears to be early-seral, occupying areas that have been or are currently filling in with silt. Beaver activity is commonly associated with this community type (Carsey 2002).

Table 32. Natural Heritage element occurrences at Florida River at Burnt Timber Creek PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Alnus incana</i> / mesic forbs	Thinleaf alder/ mesic forbs	G3	S3		B
<i>Salix caudata</i> ssp. <i>lucida</i> (<i>Salix lasiandra</i>)	Shining willow shrubland	G3Q	S2S3		C
<i>Salix monticola</i> / mesic graminoids	Mountain willow / mesic graminoids	G3	S3		C
<i>Populus angustifolia</i> / <i>Cornus sericea</i>	narrowleaf cottonwood /red-osier dogwood	G4	S3		B

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. Seasonal flooding and sediment deposition will help maintain the viability of the elements in the Florida River drainage. The boundary provides a buffer from trails and meadows where heavy disturbance that causes erosion may contribute to increased weed invasion. It should be noted that the hydrological processes necessary to the elements are not fully contained by the PCA boundaries.

Protection Comments: Most of the PCA is within the Weminuche Wilderness.

Management Comments: The U.S. Forest Service manages the entire PCA. Dense stands of Canada thistle occur on old beaver dams and are scattered to dense on drier, upland meadows.

Soils Description: Soils sampled on the eastern area above the canyon are organic, hemist (mucky peat) with mottling in the upper portion, indicating a period of drying out. Soils for the mountain willow / mesic graminoid shrubland are described as fine textured clay loams and sandy clay loams at varying depths with mottling or gleying in the upper horizons. Soils for the narrowleaf cottonwood / red-osier dogwood plant community are highly variable. Textures include silty clays, silty clay loams, clay loams, sandy clays, sandy clay loam, and loamy sands. (Carsey et al. 2002)

Restoration Potential: Restoration opportunities include noxious weed eradication and monitoring in the eastern portion of the PCA near forest trail 657 north of the Transfer Campground. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the Florida River at Burnt Timber Creeks PCA:

Proposed HGM Class: Riverine

Subclass R2

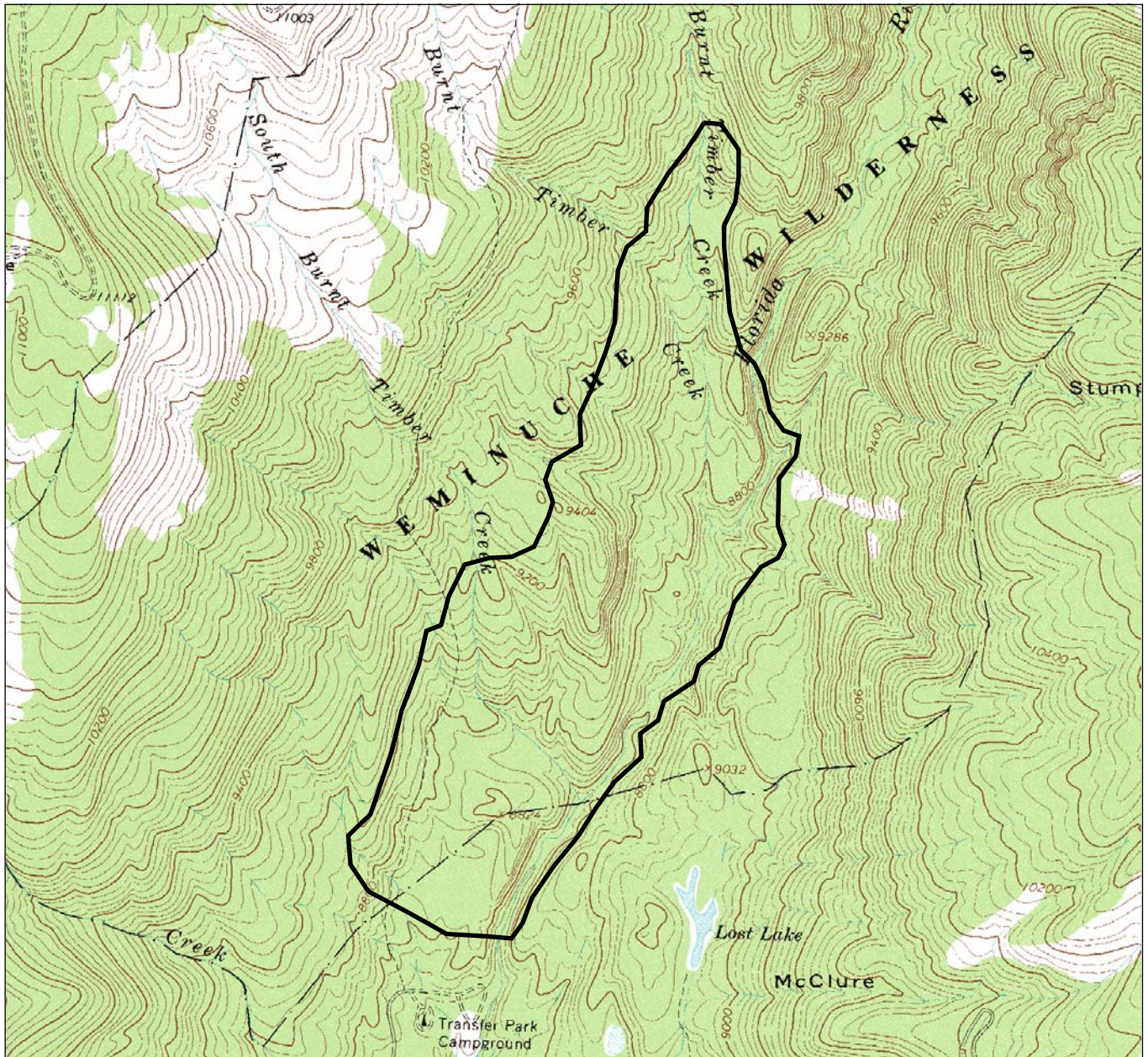
Cowardin System: Palustrine

CNHP's Wetland Classification: *Salix monticola* / Mesic graminoids; *Salix lasiandra* shrubland


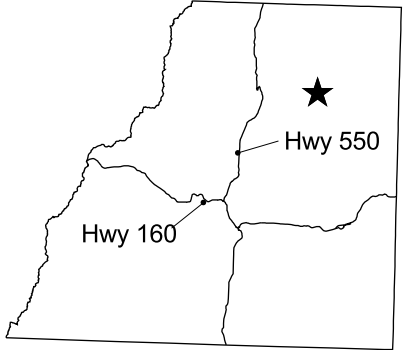
Table 33 . Wetland functional assessment for riverine wetlands at the Florida River at Burnt Timber Creek PCA. Note this assessment is for the willow dominated wetlands on the east side of the Florida River Canyon and not the canyon itself.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	Low inputs, but beaver dams and meadows for positive function. Constricted outlets.
Sediment/Shoreline Stabilization	Moderate	Water inputs from streams are small. Dense vegetation – both woody and herbaceous indicate positive function.
Groundwater Discharge/Recharge	Yes	Multiple seeps and springs were observed in the general area.
Dynamic Surface Water Storage	N/A	The ponds in the area are within a nearly flat meadow, catching sheetflow, stream drainage and groundwater with constricted outlets.
Biogeochemical Functions		
Elemental Cycling	Normal	Saturated, organic soils, and detrital carbon sources indicate a positive function, though past grazing and weeds may indicate some soil disturbance.
Removal of Imported Nutrients, Toxicants, and Sediments.	High	Although surface inputs are low, dense vegetation can trap sediments and remove nutrients, toxicants via burial and through plant tissues.
Biological Functions		
Habitat Diversity	High	The area supports three Cowardin classes: Scrub shrub, emergent and forested wetlands.
General Wildlife Habitat	High	Variety of shrub, herbaceous forage. Beaver activity and deer and elk sign.
General Fish/Aquatic Habitat	Moderate	The site is diverse for aquatic habitat, though no fish were observed.
Production Export/Food Chain Support	Moderate	Low flushing flows, dammed with constricted outlet.
Uniqueness	Moderate	Although the wetland class is common, the site supports a G3 plant association.

Figure 21. Florida River at Burnt Timber Creek Potential Conservation Area, B3: High Biodiversity Significance



0.2 0 0.2 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Lemon Reservoir, 37107-D6 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	--	--

Haviland Lake PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports a good example of globally vulnerable (G3G4/S3) subalpine riparian shrubland, excellent example of a plant that is globally secure, but critically imperiled in Colorado (G5/S1), and a good example of a globally secure but state imperiled (G5/S2) plant.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future. The PCA is almost entirely managed by the U.S. Forest Service with State lands in the western portion.

Management Urgency Rank: M3: New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA. Management actions could include weed control at the south end of the PCA and awareness that any road maintenance or expansion of Highway 550 could negatively affect the wetland and its element occurrences.

Location: The Haviland Lake PCA is located 21 miles north of Durango.

U.S.G.S. 7.5-min. quadrangles: Electra Lake

Legal Description: T38N R9W Sections 13, 14, 23, 24, 25, 26

Elevation: 8,200 ft.

Size: Approximately 386 acres

Redders, 2000, Community Type: *Betula glandulosa-Salix* species

General Description: The Haviland Lake PCA is located to the west of the Hermosa Cliffs and Highway 550. Electra Lake is located to the east. Haviland Lake PCA is an alkaline wetland that dries out by mid-summer. The hydrology of the area is supported by groundwater discharge and several unnamed drainages that flow from the adjacent Hermosa Cliffs. The dominant plant community, bog birch/mesic forb-mesic graminoid (*Betula glandulosa*/mesic forb-mesic graminoid), is a low stature, open shrubland. It occurs intermixed with several willow species (*Salix drummondiana*, *Salix monticola*, and *Salix serissima*), shrubby cinquefoil (*Daisphora floribunda*) and sedge (*Carex* spp.) meadows forming a complex wetland mosaic. The mesic graminoids and forbs include: bluejoint reedgrass (*Calamagrostis canadensis*), water sedge (*Carex aquatilis*), beaked sedge (*Carex utriculata*), golden sedge (*Carex aurea*), Baltic rush (*Juncus balticus*), arrowgrass (*Triglochin maritima*), blue-eyed grass (*Sisyrinchium altissium*), tufted hairgrass (*Deschampsia cespitosa*), spikerush (*Eleocharis palustris*), alpine meadowrue (*Thalictrum alpinum*), mint (*Mentha arvensis*), western yarrow (*Achillea millefolium*), bog orchid (*Limnorchis hyperborea*), and strawberry (*Fragaria virginiana*). There are several areas of ponded water with common aquatic plants e.g., maretail (*Hippuris vulgaris*). The pond banks support a variety of sedges (*Carex lanuginosa*, *C. aquatilis*, and *C. utriculata*). The soils are saturated mucky peat with oxidized areas in the upper soil profile, indicating a dry period during the growing season. The uplands are dominated by blue spruce (*Picea pungens*), white bark fir (*Abies concolor*), and ponderosa pine (*Pinus ponderosa*).

Biodiversity Rank Justification: This site supports a good example of the globally vulnerable (G3G4/S3) *Betula glandulosa*/mesic forb-mesic graminoid, subalpine riparian shrubland. This plant community is only documented for Colorado (Nature Serve 2003). It is found throughout the high mountain ranges of Colorado, although typically occurring only in small stands. Most stands of this association occur in subalpine meadows and willow communities. It grows in areas where soils are saturated from snowmelt runoff for a significant part of the growing season, often on fens or bogs, where the vegetation receives water from seeps and springs (Carsey et al. 2003). This PCA supports an excellent example of a globally secure plant, but critically imperiled in Colorado (G5/S1) *Carex viridula*, little green sedge. The site also includes a fair example (C ranked) of the globally secure but state imperiled (G5/S2) plant, yellow lady's slipper (*Cypripedium calceolus* ssp. *parviflorum*).

Table 34. Natural Heritage element occurrences at Haviland Lake PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Betula glandulosa</i>/mesic forb-mesic graminoid	Subalpine riparian wetland	G3G4	S3		B
Plants					
<i>Carex viridula</i>	Little green sedge	G5	S1		A
<i>Cypripedium calceolus</i> ssp. <i>parviflorum</i>	Yellow lady's slipper	G5	S2		C

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. The boundaries encompass the occurrences with a narrow buffer due to the physical constraints from the Hermosa Cliffs, Highway 550, and Electra Lake. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

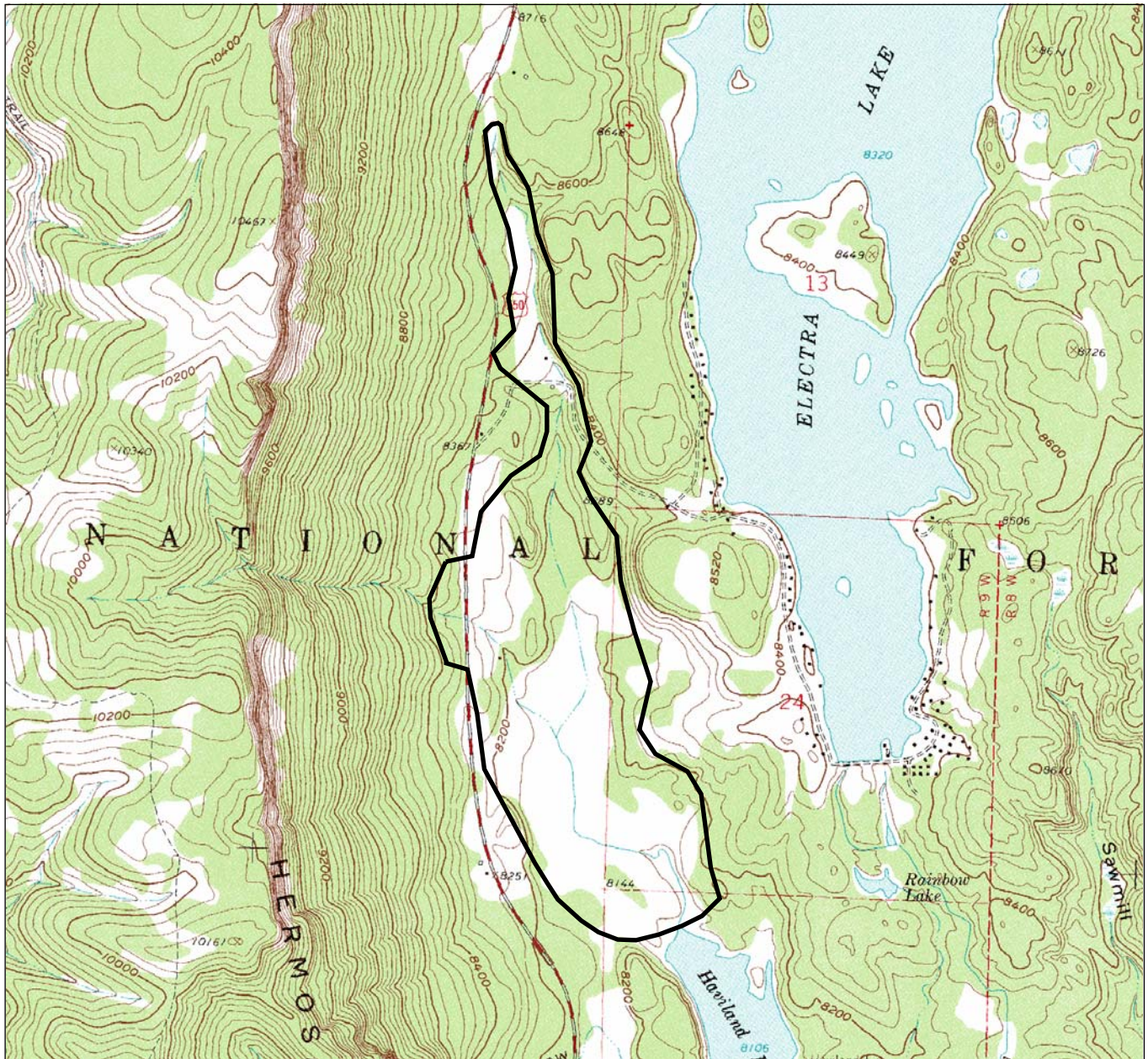
Protection Comments: The San Juan National Forest and the State of Colorado own the southern portion of the PCA. The northern portion is privately owned. It is suggested that a conservation easement and education on the biodiversity of the PCA would help ensure its protection from the below mentioned threats.

Management Comments: Possible threats to the occurrence include expansion of non-natives e.g., Canada thistle (*Cirsium arvense*), houndstongue, (*Cynoglossum officinale*), and musk thistle (*Cardus nutans*) from the south. Altered hydrology from road improvements or expansion could negatively impact the element occurrences. Residential development is another threat especially on the north end of the PCA.

Soils Description: Soils within the Haviland Lake PCA are a complex of sandy loam with areas of histosols and poorly drained soils located on alluvium. The majority of soils are characterized as Valto-Rock outcrop complex which is a fine sandy loam with a high water table. The areas of peaty soils are likely present due to groundwater discharge. This soil is described as Alamosa loam. The permeability of Alamosa soil is moderately slow with the available water capacity high (USDA 1988).

Restoration Potential: Currently the wetland and its hydrology are intact. Weed control would be the main restoration activity.

Figure 22. Haviland Lake Potential Conservation Area, B3: High Biodiversity Significance



0.2 0 0.2 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

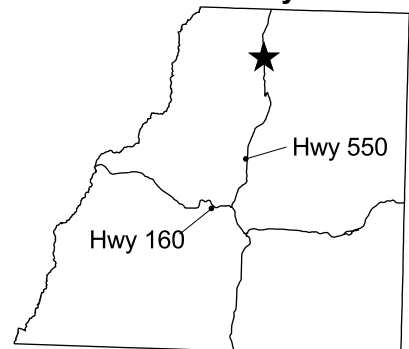
Electra Lake, 37107-E7
 7.5 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Highline Trail PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports an excellent (A) occurrence of a globally vulnerable plant.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management appears to be successful.

Location: The Highline Trail PCA is located in the extreme northwestern part of La Plata County, on the border of Montezuma County, about 23 miles northwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Elk Creek, Orphan Butte, and Hermosa Peak
 Legal Description: T38N R10W Section 6; T38N R11W S 1; T39N R10W S 20,
 21, 28, 29, 31, 32

Elevation: 9800 to 10,720 feet

Size: Approximately 1795 acres

General Description: This PCA is located along the long ridge that forms the border between La Plata and Montezuma counties. The site comprises a mosaic of open grasslands, wet meadows and subalpine forest. Forested areas occur along the ridgetop, and are dominated by Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*). Wet drainages running southeast from the ridge top are dominated by Colorado false hellebore (*Veratrum tenuipetalum*). Drier areas along the same slope are dominated by Thurber fescue (*Festuca thurberi*). Showy whitlow-grass (*Draba spectabilis* var. *oxyloba*) occurred in all three plant communities, while kittentails (*Besseyia ritteriana*) was mostly confined to the wet areas. The site includes the headwaters of Big Bend Creek, which supports Colorado River cutthroat trout (see Big Bend Creek PCA).

Biodiversity Rank Justification: The PCA rank is based on an excellent (A) occurrence of kittentails, a globally vulnerable (G3) plant. There are also excellent occurrences of showy draba, a species that has now been placed on CNHP's watchlist, and Thurber fescue meadows, a common (G4) grassland type in the San Juan Mountains.

Table #. Natural Heritage element occurrences at the Highline Trail PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Besseyia ritteriana</i>	Kittentails	G3	S3		A
<i>Draba spectabilis</i> var. <i>oxyloba</i> **	Showy Draba	G3?T3Q	S3S4		A
Plant Communities					
<i>Festuca thurberi</i> ***	Thurber fescue montane grasslands	G4	S4		A

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

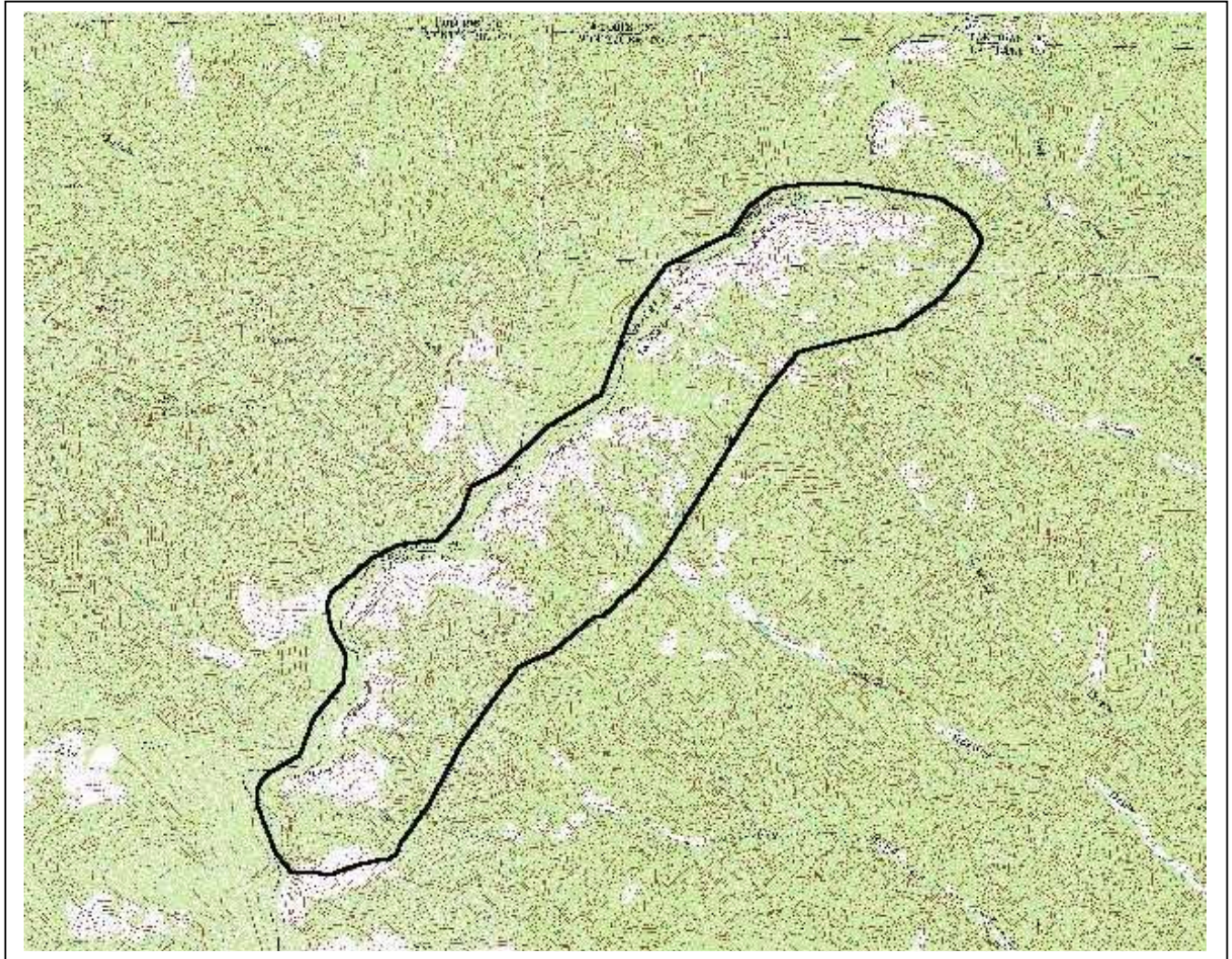
** watchlisted

Boundary Justification: The boundary is drawn to encompass the occurrence of kittentails. ***The Thurber fescue grassland occupies the same area. Both the plant and the community are expected to continue farther along the ridge to the south of the area that was surveyed.

Protection Comments: The PCA is entirely within the San Juan National forest. Under the current forest management plan it is part of a large roadless area in which management emphasis is on non-motorized recreation and forested land is not suitable for timber production (Management Area 3A).

Management Comments: Although the Highline Trail (part of the Colorado Trail) runs through the site, there was no evidence of impacts on the rare plants or the grassland. Periodic monitoring would assure early detection of weeds that could spread from the nearby roads and trails.

Highline Trail Potential Conservation Area. B3: High Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Orphan Butte, 37108-E1
Elk Creek, 37107-E8
Hermosa Peak, 37107-F8
Rico, 37108-F1
7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Indian Creek at Tuckerville PCA

Biodiversity Rank: B3. High biodiversity significance. The PCA supports a good example of a globally secure subalpine riparian shrubland.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The site is within the San Juan National Forest.

Management Urgency Rank: M3. New management action may be needed within 5 years to maintain the current quality of the element occurrences in the PCA. Weed invasion and improper recreation and grazing are the main threats to the PCA.

Location: The Indian Creek at Tuckerville PCA is located in northeastern La Plata County, about 24 air miles northeast of Durango. It can be reached from the Middle Mountain Road at the north end of Vallecito Reservoir.

U.S.G.S. 7.5-min. quadrangles: Granite Peak

Legal Description: T37N R6W Sections 10, 11, 12, 14, 15.

Elevation: 10,000 – 11,360 ft.

Size: Approximately 1,076 acres

Redders, 2003, Community Type: Willow shrubland: *Salix planifolia* / *Caltha leptosepala*.

General Description: This large area comprises a mosaic of spruce-fir forest, open Thurber fescue (*Festuca thurberi*) meadows, narrow stream beds dominated by willows, and more open wet meadows dominated by Colorado false hellebore (*Veratrum tenuipetalum*), green gentian (*Frasera speciosa*) and other tall forbs. Indian Creek runs through the site for about 1.5 miles. A large open park known as Runlett Park occupies the northern part of the PCA. Middle Mountain Road (FR 724) provides access to the area and is popular with four-wheel drive recreationists. It also leads to trails into the Weminuche and Rio Grande Wilderness Areas. Willows form linear thickets along the small stream and broaden over rivulets and hummocks.

Thurber fescue meadows occupy south and east facing slopes. Wet meadows are interspersed with the drier grasslands. Both of these habitats support two rare plants, kittentails (*Besseyia ritteriana*) and showy whitlow-grass (*Draba spectabilis* var. *oxyloba*). Other species here include Colorado false hellebore (*Veratrum tenuipetalum*), green gentian (*Frasera speciosa*), Parry's thistle (*Cirsium parryi*), smallwing sedge (*Carex microptera*), large mountain fleabane (*Erigeron coulteri*), nodding ragwort (*Ligularia bigelovii*), monkshood (*Aconitum columbianum*), fowl mannagrass (*Glyceria striata*), Richardson's geranium (*Geranium richardsonii*), cow parsnip (*Heracleum sphondylium* ssp. *montanum*), strawberry (*Fragaria virginiana*), chiming bells (*Mertensia ciliata*), osha (*Ligusticum porteri*), blue wildrye (*Elymus glaucus*), orange sneezeweed (*Dugaldia hoopesii*), tall fleabane (*Erigeron elatior*), black-eyed susan (*Rudbeckia ampla*), Fendler's waterleaf (*Hydrophyllum fendleri*), and fewleaf thistle (*Cirsium centaureae*).

Willows along Indian Creek are dominated by planeleaf willow (*Salix planifolia*) with associated shortfruit willow (*Salix brachycarpa*). The herbaceous layer in the willow shrubland is dominated by marsh marigold (*Caltha leptosepala*), with an associated suite of mesic forbs and mesic graminoids.

Biodiversity Rank Justification and Comments: The Indian Creek at Tuckerville PCA supports an excellent (A ranked) occurrence of kittentails, a globally vulnerable (G3) plant. It also has an excellent occurrence of showy whitlow-grass, a globally vulnerable subspecies. There were thousands of individuals of each plant at the site. Although locally abundant, both plants are endemic to the San Juan Mountains, and their small range, in a global perspective, makes them vulnerable to extinction from large-scale environmental changes such as global climate change. The PCA also has good to excellent examples of three globally secure plant communities that are included here to represent typical communities found in La Plata County.

Planeleaf willow / marsh marigold plant community was found to be in good (B ranked) condition. This occurrence is large in comparison to other patches observed in La Plata County. This plant association is usually found on saturated soils. It is long lived and changes with degree of soil saturation or fluctuations in the water table.

Table 36. Natural Heritage element occurrences at Indian Creek at Tuckerville PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Besseyia ritteriana</i>	Kittentails	G3	S3		A
<i>Draba spectabilis</i> var <i>oxyloba</i>	Showy Draba	G3?T3Q	S3S4		A
Plant Community					
<i>Festuca thurberi</i>	Thurber fescue grassland	G4	S4		A
<i>Salix brachycarpa</i> /Mesic forb	Alpine willow scrub	G4	S4		AB
<i>Salix planifolia</i> / <i>Caltha leptosepala</i>	Planeleaf willow / marsh marigold	G4	S4		B

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

Boundary Justification: The boundaries incorporate the headwaters and areas that will allow the natural hydrological processes to continue. Seasonal flooding will help maintain a viable population of the element along Indian Creek. The boundary also provides a small buffer from the nearby road, and around the willow carr where disturbance caused surface runoff may contribute excess nutrients, sediment and weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries. The boundary surrounds the occurrence of kittentails and includes additional habitat that was not thoroughly surveyed. This includes the Thurber fescue meadows.

Protection Comments: The PCA is owned and managed by the San Juan National Forest. Management emphasis under the current forest management plan (1985) is mixed, with parts of the PCA managed for recreation and parts for livestock.

Management Comments: Current management appears to be adequate. No exotic plant species or visible impacts of off-road vehicles were noted. Nearby areas along Middle Mountain Road in the Bear Creek drainage have abundant weeds, including Canada thistle (*Cirsium arvense*) and houndstongue (*Cynoglossum officinale*) that have potential to invade the PCA in the future. Continued monitoring for weeds may help to prevent this.

Soils Description: Soils sampled are dark, saturated with dense root fibers in the upper layer and textures of sandy loam and sandy clay loam in the lower horizons with cobbles and boulders.

Restoration Potential: The site is functioning as expected.

Wetland Functional Assessment for the Indian Creek at Tuckerville PCA:
Proposed HGM Class: Riverine **Subclass:** R1
Cowardin System: Palustrine
CNHP's Wetland Classification: *Salix planifolia* / *Caltha leptosepala*


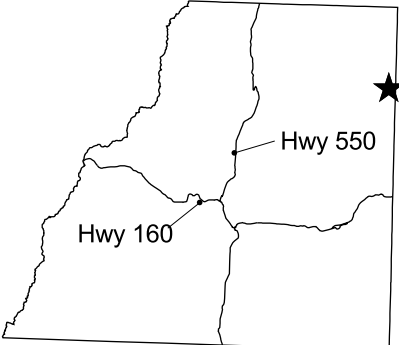
Table 37. Wetland functional assessment for the riverine wetland at the Indian Creek at Tuckerville PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	Small 1 st order stream in subalpine. Dense vegetation in broad willow carr for positive function. Some hummocks and rivulets with high sheetflow input.
Sediment/Shoreline Stabilization	High	Dense woody vegetation for stabilization. Few impacts from cattle and recreation. Small stream channel.
Groundwater Discharge/Recharge	Yes	Some seepy areas noted. Coarse material in soils for possible percolation.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	Detritus and high vegetation productivity indicate normal cycling for this wetland type.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	Inputs are low however, organic soils and extensive wet meadows provide ample opportunity for removal.
Biological Functions		
Habitat Diversity	Low	Scrub shrub wetland habitat.
General Wildlife Habitat	High	Willow carr provides browse and cover for a variety of wildlife. Surrounding forest and grass meadows enhance habitat.
General Fish/Aquatic Habitat	Low	The low order stream site does not support fish.
Production Export/Food Chain Support	Low	Rivulets in high elevation with low inputs.
Uniqueness	Low	The area supports a globally common plant community in good condition. The planeleaf willow/ marsh marigold association is large compared to other occurrences observed in the county.

Figure 23. Indian Creek at Tuckerville Potential Conservation Area, B3: High Biodiversity Significance



0.2 0 0.2 Miles

<p>Colorado Natural Heritage Program</p> <p>Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer</p> <p>Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Granite Peak, 37107-D4 Vallecito Reservoir, 37107-D5 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey</p> <p>map created 3 April 2004</p> <p>UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
---	--	--

Los Pinos at Bayfield North PCA

Biodiversity Rank: B3. High biodiversity significance. The PCA supports a fair example (C ranked) of a globally imperiled (G2) plant community, and a fair example of two globally vulnerable (G3) riparian woodlands.

Protection Urgency Rank: P3. Protection actions may be needed, but probably not within the next 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA if protection action is not taken. The entire PCA is within private property. There are at least three conservation easements within the PCA.

Management Urgency Rank: M2. New management action will be needed within 5 years to prevent the loss of the element occurrences in the PCA. Altered hydrology, agricultural impacts and weed invasion are the main threats.

Location: This PCA is located along the Pine River, north of Bayfield to Bear Creek.

U.S.G.S. 7.5-min. quadrangles: Bayfield, Ludwig Mountain
Legal Description: T35N R7W Section 35, 26, 23, 14
T34N R7W Section 2

Elevation: 7120 – 7000 ft.

Size: Approximately 1,607 acres

Redders, 2003, Community Type: Deciduous Forest: *Populus angustifolia* / *Crataegus rivularis*; *Populus angustifolia* / *Alnus incana*; *Populus angustifolia* / *Salix exigua*

General Description: This PCA occurs in a wide agricultural valley with home development becoming more common, claiming the valley bottom and adjacent hillslopes. Los Pinos River is dammed upstream (Vallecito Reservoir) and serves the agricultural area via multiple ditch diversions, from the reservoir to the county line. The river channel is relatively straight with few meanders, occasionally dividing to form islands. Some channel migration was noted as well as cottonwood/willow regeneration on point bars. The tree and shrub riparian vegetation appears to be stable despite pressures; however the herbaceous layer is sparse to moderately covered with introduced grasses and both native and non-native forbs. Grazing occurs both adjacent to and within the riparian zone throughout the PCA. Some homes are built within the riparian area, as is the case in the Pine River Ranches subdivision in the northern part of the PCA.

The uplands are comprised of slopes and mesas with ponderosa pine (*Pinus ponderosa*) dominating over grasses, intermixed with Gambel oak stands (*Quercus gambelii*). The cottonwood dominated natural plant communities within the PCA form a mosaic within the riparian ribbon including narrowleaf cottonwood / river hawthorn (*Populus angustifolia* / *Crataegus rivularis*), narrowleaf cottonwood / river birch (*Populus angustifolia* / *Betula occidentalis*), and narrowleaf cottonwood / thinleaf alder (*Populus angustifolia* / *Alnus incana*). River hawthorn occupies dryer sites while thinleaf alder lines the river bank in some cases. Bald eagles (*Haliaeetus leucocephalus*) are in the general area.

Biodiversity Rank Justification and Comments: The PCA supports the globally imperiled (G2?) narrowleaf cottonwood / river hawthorn natural plant community in fair condition. Carsey *et al.* (2003) explains that river hawthorn occupies the driest parts of the riparian system. It may be an indicator that the area no longer floods. This association is only documented in Colorado from the southern Rocky Mountains (Nature Serve Explorer 2003). The site also supports the globally vulnerable (G3) narrowleaf cottonwood / thinleaf alder (*Populus angustifolia* / *Alnus incana*) plant association. This association is documented in New Mexico and Colorado and is expected to occur throughout the *Populus angustifolia* range in the Rocky Mountains (Nature Serve Explorer 2003). This community usually occupies the active flood plain and immediate banks and benches. The globally vulnerable narrowleaf cottonwood / river birch (*Populus angustifolia* / *Betula occidentalis*) is also a part of the plant community mosaic and occupies the

banks and benches as well. The relatively large size of this particular occurrence positively affects its viability.

Table 38. Natural Heritage element occurrences at Los Pinos at Bayfield North PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i> / <i>Crateagus rivularis</i>	Narrowleaf cottonwood/ river hawthorn	G2	S2		C
<i>Populus angustifolia</i> / <i>Betula occidentalis</i>	Narrowleaf cottonwood / river birch	G3	S2		C
<i>Populus angustifolia</i> / <i>Alnus incana</i>	Narrowleaf cottonwood / thinleaf alder	G3	S3		C

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes from surrounding drainages as possible. Seasonal flooding and sediment deposition will help maintain a viable population of the element along Los Pinos River. The boundaries also provide a small buffer from nearby trails, roads and hay fields where heavy disturbance that causes erosion may contribute to excessive sediment deposition and elevated nutrient levels in the wetland area, and subsequent weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: This PCA is entirely within private properties. Subdivisions and home developments concentrated in the valley bottom (with homes built very close to the river) will fragment riparian ecosystems. There are currently three known conservation easements within the PCA. Public education regarding riparian ecology may insure more volunteer efforts toward conservation of this resource. Additional conservation easements may provide benefits to the landowner.

Management Comments: Although the elements are surviving with currently altered hydrology, any more diversions or impoundments may negatively affect the elements. Weed control is strongly suggested. It is suggested to evaluate and improve grazing practices within the riparian area to prevent erosion and sedimentation.

Soils Description: The texture of the soil sampled is silty clay loam. Soil Survey of La Plata County Area, Colorado (USDA 1988) delineates much of the riparian zone as Fluvaquents, sandy, frequently flooded. It is further described as consisting of deep, somewhat poorly drained soils over recent alluvial material.

Restoration Potential: Restoration opportunities include weed eradication and monitoring. Oxeye daisy, Canada thistle, and musk thistle are common throughout the PCA, although the weeds are never dense. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species. Given the elevation and position of the PCA, continual monitoring for exotic species is suggested to help eliminate the danger of invasion of tamarisk or Russian olive. No exotic shrubs were seen within the site, but are known to occur downstream.

Wetland Functional Assessment for the Los Pinos at Bayfield North PCA:

Proposed HGM Class: Riverine

Subclass: R4

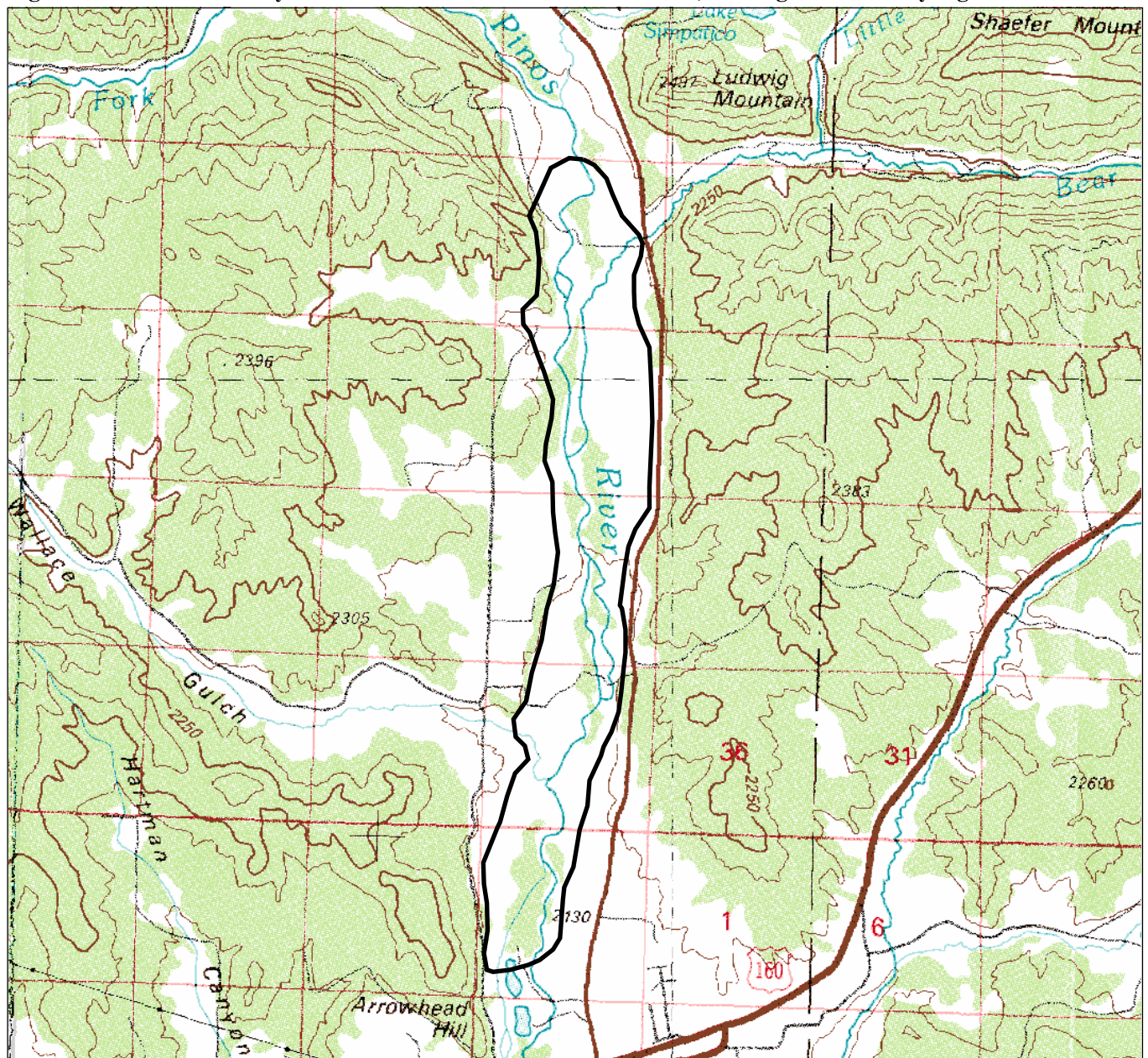
Cowardin System: Palustrine

CNHP's Wetland Classification: *Populus angustifolia* / *Crateagus rivularis*, *Populus angustifolia* / *Betula occidentalis* and *Populus angustifolia* / *Alnus incana*.

Table 39. Wetland functional assessment for the riverine wetland at the Los Pinos at Bayfield North PCA.

Function	Rating	Comments
Overall Functional Integrity	Below Potential	This wetland appears to be functioning below its potential.
Hydrological Functions		
Flood Attenuation and Storage	Low	Vallecito Reservoir is upstream with multiple ditch diversions as well. There are few signs of debris deposition and a low herbaceous density.
Sediment/Shoreline Stabilization	Low	There is an open to dense shrub layer, stabilizing the banks. The understory is sparse.
Groundwater Discharge/Recharge	Yes	Coarse, alluvial substrate indicates positive recharge. Soil's texture is silty clay loam with cobbles.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Disrupted	Agricultural runoff and altered hydrology disrupt this function.
Removal of Imported Nutrients, Toxicants, and Sediments.	Low	River morphology limits sediment trapping. The riparian area is narrow in places and surrounded by agricultural fields.
Biological Functions		
Habitat Diversity	Low	The area supports a riparian forested wetland.
General Wildlife Habitat	High	Song birds, birds of prey, deer and elk, beaver activity.
General Fish/Aquatic Habitat	Moderate	The river channel has few meanders and back flow eddies or pools.
Production Export/Food Chain Support	Moderate	The dense shrub layer overhangs in places with moderate flushing flows supplies nutrients and carbon sources for invertebrates and fishes and downstream transport. High water is altered by dam upstream.
Uniqueness	High	Although the wetland class is common, the area supports a G2 plant community and two G3 plant communities in a diverse riparian mosaic.

Figure 24. Los Pinos at Bayfield North Potential Conservation Area, B3: High Biodiversity Significance



0.6 0 0.6 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

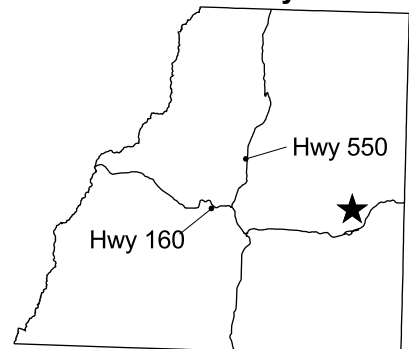
Durango, 37107-A1
 30x60 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Los Pinos at Rattlesnake Hill

Biodiversity Rank: B3. High biodiversity significance. The site supports a globally imperiled (G2) plant community in fair (C ranked) condition, and a globally vulnerable (G3) riparian woodland in fair (C ranked) condition.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future.

Management Urgency Rank: M2. New management action will be needed within 5 years to prevent loss of element occurrences. Altered hydrology, agricultural practices and weed invasion are the main threats.

Location: This PCA is located along the Pine River south of Ignacio.

U.S.G.S. 7.5-min. quadrangles: Tiffany, Ignacio
Legal Description: T33N R7W Section 28, 21, 16, 17, 20.

Elevation: 6,400ft.

Size: Approximately 315 acres

Redders, 2003, Community Type: Deciduous Forest: *Populus angustifolia* / *Crataegus rivularis*; *Populus angustifolia* / *Alnus incana*.

General Description: Los Pinos River divides just south of Ignacio and then converges by Rattlesnake Hill, where Rock Creek converges as well in the broad riparian woodland. This PCA is in a wide valley used mainly as agricultural land. The Pine River has cut through the geologic strata revealing rocks mainly sedimentary in origin with the hillslopes and mesas dominated by pinon pine (*Pinus edulis*), juniper (*Juniperus osteosperma*), Gambel oak (*Quercus gambelii*) and sagebrush (*Artemisia* spp). The river channel consists of modern alluvium with surrounding areas, including Rattlesnake Hill mapped as the Animas Formation (Tweto, 1979).

The broad floodplain has an overstory of narrowleaf cottonwood and plains cottonwood (*Populus angustifolia*, *Populus deltoides* ssp. *wislizenii*) while the understory is of mixed shrubs and includes cottonwood saplings. Common shrub species include sand bar willow (*Salix exigua*), golden current (*Ribes aureum*), thinleaf alder (*Alnus incana*), silver buffalo berry (*Shepherdia argentea*), bluestem willow (*Salix irrorata*), strappleaf willow (*Salix ligulifolia*), skunkbush sumac (*Rhus trilobata*), river hawthorn (*Crataegus rivularis*) and river birch (*Betula occidentalis*). In 1998, CNHP riparian ecologists found fringes of slender spikerush (*Eleocharis acicularis*) in this diverse area, though the species was not located in 2003. The area also has cacti, on raised cobbled soil, while dense riparian shrub thickets are adjacent. Canada thistle and musk thistle are scattered throughout the riparian area and become dense in adjacent hay meadows.

These meadows have a weedy composition including dense patches of knapweed. A fence runs east/west through the site and there is sign of grazing by horses and cattle. There was no sign of grazing reported in 1998. Russian olive is known to occur both upstream and downstream of the PCA though none were noted within the site during the 2003 field season.

Biodiversity Rank Justification and Comments: This site supports the globally imperiled (G2) narrowleaf cottonwood/ strappleaf willow – silver buffaloberry natural plant community in fair condition. This community is thought to be extremely limited in western Colorado and believed to have been more wide spread in the past. Intense, long-term use by livestock and alterations in the river flow regime have caused a decline in its distribution (Carsey, *et al.* 2003). The site supports the globally vulnerable (G3) narrowleaf cottonwood / thinleaf alder (*Populus angustifolia* / *Alnus incana*) plant association. This community usually occupies the active flood plain and immediate banks and benches.

Table 40. Natural Heritage element occurrences at Los Pinos at Rattlesnake Hill PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i> / <i>Salix eriocephala</i> var. <i>ligulifolia</i> – <i>Shepherdia argentea</i>	Narrowleaf cottonwood / strapleaf willow – silver buffaloberry	G2	S2		C
<i>Populus angustifolia</i> / <i>Alnus incana</i>	Narrowleaf cottonwood / thinleaf alder	G3	S3		C

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes from surrounding drainages as possible. Seasonal flooding and sediment deposition will help maintain a viable population of the elements along Los Pinos River. The boundaries also provide a small buffer from nearby trails, roads and hay fields where heavy disturbance that causes erosion may contribute to excessive sediment deposition and elevated nutrient levels in the wetland area, and invite weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The Southern Ute Indian Tribe owns most of the area in the PCA. Some areas are privately owned. Education regarding riparian ecology may encourage volunteer efforts toward conserving this natural resource. Placement of conservation easements is one action that may benefit the landowner.

Management Comments: Although the elements are surviving with currently altered hydrology, additional diversions or impoundments may negatively affect the elements. Weed control is strongly suggested. It is suggested to evaluate and improve grazing practices within the riparian area.

Soils Description: Soils sampled have silty clay loam texture and multiple sandy depositions in the horizons. Mottling occurs in the upper region. Soil Survey of the La Plata County Area, Colorado (USDA 1988) delineates two main soils in mosaic in the PCA. They are Pescar fine sandy loam classified as coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Aquic Ustifluent and Fluvaquents, sandy, frequently flooded described as consisting of deep, somewhat poorly drained soils over recent alluvial material.

Restoration Potential: Restoration opportunities include non-native weed eradication and monitoring. Knapweed, Canada thistle, and musk thistle are common throughout the PCA, reaching moderate density in the riparian area and high density in the meadow west of the Pine River at Rattlesnake Hill. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species. Given the elevation and position of the PCA, continual monitoring for exotic species is suggested to help eliminate the danger of invasion of tamarisk or Russian olive. No exotic shrubs were seen within the site, but are known to occur both upstream and downstream.

Wetland Functional Assessment for the Los Pinos at Rattlesnake Hill PCA:
Proposed HGM Class: Riverine **Subclass:** R3/4
Cowardin System: Palustrine
CNHP's Wetland Classification:

Table 41. Wetland functional assessment for the riverine wetland at the Los Pinos at Rattlesnake Hill PCA.

Function	Rating	Comments
Overall Functional Integrity	Below Potential	This wetland appears to be functioning below its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	A broad riparian forest with some fringes of sedge for storage capacity. High levels of bank erosion and diverging river channel indicate lower function.
Sediment/Shoreline Stabilization	Moderate	Some erosion is occurring and soils are disturbed by livestock. The herbaceous understory is mostly non-native and is sparse to dense. The dense woody vegetation and sapling regeneration stabilizes shoreline.
Groundwater Discharge/Recharge	Yes	Back flow eddies over coarse alluvium may indicate some groundwater recharge, however the mineral derived soils have silty clay loam texture.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Disrupted	Agricultural run off and altered hydrology disrupt this function.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	There are sand depositions in the soil horizon indicating flooding events and sediment trapping. The river morphology however, limits this function by limiting permanently and semi permanently flooded areas.
Biological Functions		
Habitat Diversity	Moderate	There are two Cowardin classes present. Scrub shrub and forested wetland.
General Wildlife Habitat	High	Relatively large forested area with diverse shrub layer. Waterfowl, birds of prey, deer sighted, elk sign, great blue heron.
General Fish/Aquatic Habitat	High	Great blue heron fishing observed.
Production Export/Food Chain Support	Moderate	Although the area is broad and large with a dense to open forest, the hydrology is controlled altering the flushing flows necessary to export nutrients downstream.
Uniqueness	High	Although the wetland class is common, the PCA supports a G2 plant association.

Figure 25. Los Pinos at Rattlesnake Hill Potential Conservation Area, B3: High Biodiversity Significance



0.2 0 0.2 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

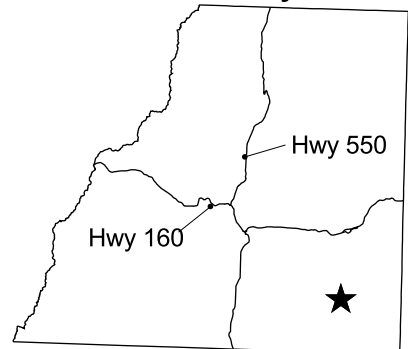
Tiffany, 37107-A5
 Ignacio, 37107-A6
 7.5 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Lower Florida River PCA

Biodiversity Rank: B3. High biodiversity significance. The PCA supports a globally imperiled (G2) plant community in fair (C ranked) condition.

Protection Urgency Rank: P2. Protection action may be needed within 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA within this approximate timeframe.

Management Urgency Rank: M2. New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA. Extensive altered hydrology, development, agricultural practices, exotic shrub invasion are the main threats.

Location: The Lower Florida River PCA is located along the Florida River at its lower reach before the confluence with the Animas River.

U.S.G.S. 7.5-min. quadrangles: Bondad Hill, Loma Linda
Legal Description: T33N R9W Section 17, 20, 29

Elevation: 6,100ft.

Size: Approximately 430 acres

Redders, 2003, Community Type: Deciduous Forests: *Populus angustifolia* / *Salix exigua*

General Description: The Florida River runs through an alluvial valley on Florida Mesa with smaller side canyons feeding into the river. Local residents describe flooding events from such canyons, especially in the fall. Otherwise the hydrology of the Florida is severely altered: Lemon Reservoir is upstream, the river provides the City of Durango its municipal supply, and there are several ditch diversions supplying the largely agricultural area.

The low mesa walls rising above the valley are part of the Nacimiento Formation, made up of shale and sandstone (Tweto 1979). Cottonwood communities occupy the river for its entire length, however are not contiguous. Narrowleaf cottonwood / strapleaf willow – silver buffaloberry is the driving element for the Lower Florida River PCA. Vegetation is characterized by mature cottonwoods with regeneration occurring only occasionally. The shrub layer is dense to sparse with sandbar willow (*Salix exigua*), silver buffaloberry (*Shepherdia argentea*), skunkbush sumac (*Rhus trilobata*), strapleaf willow (*Salix eriocephala* var. *ligulifolia*), river hawthorn (*Crataegus rivularis*) and Wood's rose (*Rosa woodsii*). The understory is largely introduced grasses and a mixture of native and non-native herbaceous species. There are fringes of spikerush (*Eleocharis palustris*) along the creek. Channel migration has occurred in several areas, leaving terraces that were once flood plain. Some of these areas contain Rocky Mountain Juniper (*Juniperus scopulorum*) and a few decadent cottonwoods or hay fields. Many of these areas have made a complete transition to an upland community.

Although land use is predominantly agricultural, land use trends are toward more home development and subdivisions, and expected continuing gas well development and infill. In a wildlife conservation easement within the PCA a hay field has been converted to an irrigated marshland, supporting approximately 6 acres of cattail dominated emergent wetland. In areas near the PCA, bluegrass lawns extend to the river's edge, reflecting the wide variety of land management practices.

Biodiversity Rank Justification and Comments: The biodiversity rank for this PCA is based on the globally imperiled (G2) narrowleaf cottonwood/ strapleaf willow – silver buffaloberry natural plant community in fair condition. This community is thought to be extremely limited in western Colorado and believed to have been more wide spread in the past. Intense, long-term use by livestock and alterations in the river flow regime have caused a decline in its distribution (Carsey, *et al.* 2003). This stretch of the Florida River contains a roundtail chub (*Gila robusta*) population that is extant, though reportedly not abundant (Mike Japhet personal communication).

Table 42. Natural Heritage element occurrences at Lower Florida River PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i> / <i>Salix eriocephala</i> var. <i>ligulifolia</i> - <i>Shepherdia argentea</i>	Narrowleaf cottonwood/ strapleaf willow – silver buffaloberry	G2	S2		
Fish					
<i>Gila robusta</i>	Roundtail chub	G3	S2		E

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes from surrounding drainages as possible. Seasonal flooding and sediment deposition will help maintain a viable population of the element along Florida River. The boundaries also provide a small buffer from nearby trails, roads and hay fields where heavy disturbance that causes erosion may contribute to excessive sediment deposition, elevated nutrient levels, and invite weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The PCA is entirely within private property. Continued land use practices such as home developments and gas well infill are expected. There are two known conservation easements in the area emphasizing wildlife habitat and the river corridor. Public education regarding wetland ecology may encourage volunteer efforts toward conservation. Placement of conservation easements on private property is one action that promotes the lasting conservation and may benefit the landowner.

Management Comments: Exotic shrub invasion is occurring within the PCA. Property owners manage for exotic invasion in some areas.

Soils Description: Sampled soil texture is silty clay with coarse alluvial horizons intermixed, such as layers of cobble and sandy layers from at least two major flooding events. Soil Survey of La Plata County Area, Colorado delineates the area as Tefton Loam, classified as fine loamy, mixed (calcareous), mesic Aquic Ustifluent, and described as somewhat poorly drained sandy loams over alluvial valley floors (USDA 1988). Carsey *et al.* (2003) describes typical soils of this community type as deep sandy loams.

Restoration Potential: Restoration opportunities include exotic weed eradication and monitoring. Bank stabilizing may prove beneficial for aquatic habitat in some areas. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

It is thought that beaver activity on the river reach surveyed, increased riparian functionality values by creating structural changes to the river morphology. The functions affected are possible water table recharge, improved aquatic habitat, increased sediment trapping, higher flood attenuation, vegetation structure diversity (increased habitat), nutrient/toxicant removal (via vigorous vegetative growth and through burial).

Wetland Functional Assessment for the Lower Florida River PCA:

Proposed HGM Class: Riverine

Subclass: R3/4

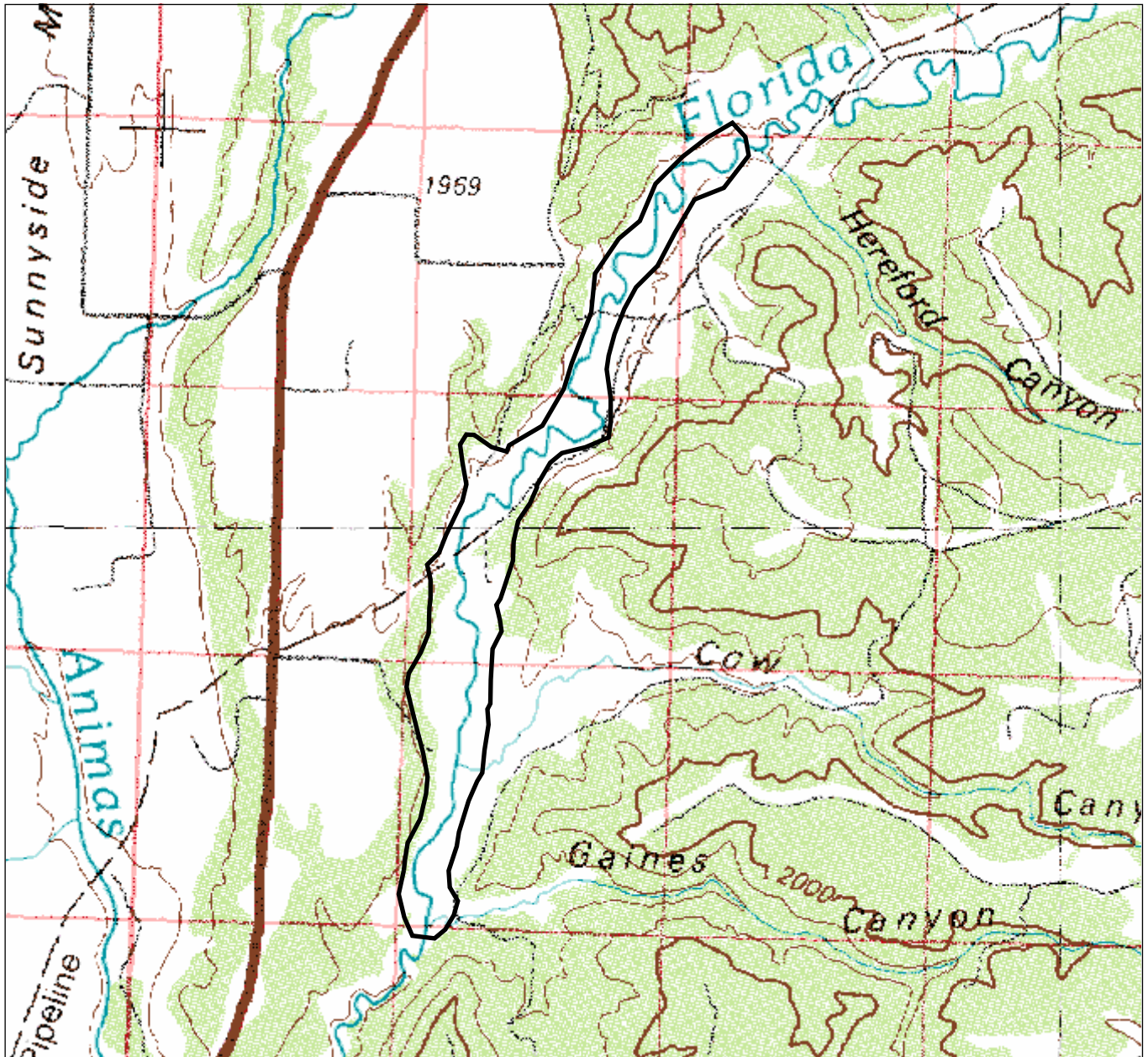
Cowardin System: Palustrine

CNHP's Wetland Classification: *Populus angustifolia* / *Salix eriocephala* var. *ligulifolia* - *Shepherdia argentea*

Table 43. Wetland functional assessment for the riverine wetland at the Lower Florida PCA.

Function	Rating	Comments
Overall Functional Integrity	Below Potential	This wetland appears to be functioning below its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	There is severely altered hydrology upstream of this PCA, however, flooding events are fed from side canyons. Dense vegetation and shrub cover for much of the length, with fringes of spike rushes and beaver ponds allow attenuation. Introduced grasses and weedy species dominate most of the herbaceous layer.
Sediment/Shoreline Stabilization	Moderate	Some bank erosion noted, incised areas and steep soft shale areas negatively affect this function. Dense shrub layer ensures some bank stabilization. Incision alternates with meanders and occurs in close proximity to soft shale/sandstone mesa walls.
Groundwater Discharge/Recharge	Yes	Beaver activity and cattail marsh in one area provide recharge. Although the soil is silty clay, there is cobble and coarse alluvial material intermixed.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Disrupted	Altered hydrology and agricultural/domestic impacts disrupt this function.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	Marshlands are adjacent with riparian area in part of the PCA. Dense and vigorous vegetation indicate positive function. Tail waters from irrigated fields add nutrients and toxicants.
Biological Functions		
Habitat Diversity	High	There are three Cowardin classes present: emergent, scrub shrub and forested wetland habitat.
General Wildlife Habitat	High	Area rich in wildlife, waterfowl, birds of prey, songbirds, beaver.
General Fish/Aquatic Habitat	Moderate	Beaver created pools and subsequent riffles indicate aquatic habitat. Low stream flow with multiple diversions.
Production Export/Food Chain Support	High	Dense shrub layer in areas, diverse vegetation structure and seasonal floods indicate positive function.
Uniqueness	High	PCA supports a G2 plant community, a G3 fish and diverse wildlife and waterfowl habitat in the midst of mostly agricultural lands in an arid environment.

Figure 26. Lower Florida River Potential Conservation Area, B3: High Biodiversity Significance



0.4 0 0.4 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

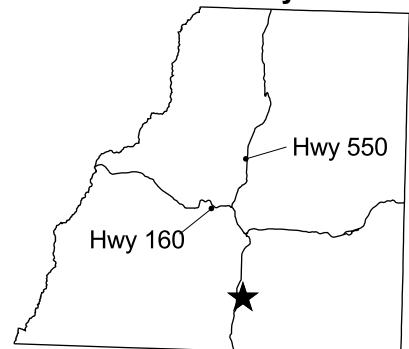
Durango, 37107-A1
 30x60 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Middle Florida River PCA

Biodiversity Rank: B3. High biodiversity significance. The PCA supports two globally imperiled (G2) riparian woodlands in fair (C ranked) condition.

Protection Urgency Rank: P3. Protection action may be needed, but probably not within the next 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA if protection action is not taken.

Management Urgency Rank: M3. New management action may be needed within 5 years to maintain the current quality of the element occurrences in the PCA. Extensive altered hydrology, weed invasion and agricultural practices are the main threats.

Location: The Middle Florida River PCA is located along the Florida River at County Road 225 and its intersection with CR 223.

U.S.G.S. 7.5-min. quadrangles: Loma Linda, Durango East
Legal Description: T34N R8W Section 5, 9
T35N R8W Section 32, 31, 30

Elevation: 6865 ft.

Size: Approximately 356 acres

Redders, 2003, Community Type: Deciduous Forest: *Populus angustifolia*/ *Salix* species; *Populus angustifolia* / *Crataegus rivularis*; *Populus angustifolia* / *Alnus incana*

General Description: This PCA is in an alluvial valley flanked on one side by a low mesa wall and the other by a secondary flood plain which are mostly agricultural fields. Uplands harbor ponderosa pine forests, juniper and scrub oak stands. The Florida River runs through the Florida Mesa providing deciduous riparian forest habitat and water diversions for agricultural use. Channel migration has left terraces (some level with adjacent hay fields) and back flow channels that are now mostly dry. The old flood plains as well as intermittent ditches and natural drainages support the narrowleaf cottonwood / river hawthorn (*Populus angustifolia* / *Crataegus rivularis*) plant community. This type is only known from Colorado on the lower slopes of the San Juan Mountains, in the Gunnison Basin, and along tributaries of the San Miguel River, Colorado (Carsey et al. 2002). Graminoid and forb cover is minimal. Within the PCA, the active river channel and floodplain supports the narrowleaf cottonwood / strapleaf willow – silver buffaloberry (*Populus angustifolia*/ *Salix eriocephala* var. *ligulifolia* - *Shepherdia argentea*) natural plant community. There are no records of undisturbed stands in Colorado (Carsey et al. 2002). Other shrub species present include thinleaf alder (*Alnus incana*), which is sometimes dense, shining willow (*Salix lasiandra*), and Wood’s rose (*Rosa woodsii*).

River channel restoration in one area of the PCA has proven successful with pools, riffles and active point bar deposition with cottonwood and willow regeneration. These characteristics in the riparian system lead to more positive wetland functionality. The river was more turbid than usual in summer of 2003 due to the wildfires of 2002 and the consequential erosion and sediment runoff. The Florida River drains a portion of the Missionary Ridge wildfire area.

The hydrology of the Florida River is severely altered: Lemon Reservoir is upstream, the river provides the City of Durango its municipal supply, and there are several ditch diversions supplying the largely agricultural area. Although land use is predominantly agricultural, land use also includes home development/subdivisions and gas well development with infill expected.

Biodiversity Rank Justification and Comments: This site supports the globally imperiled (G2) narrowleaf cottonwood/ strapleaf willow – silver buffaloberry natural plant community in fair (C ranked) condition. This community is thought to be extremely limited in western Colorado and believed to have been more wide spread in the past. Intense, long-term use by livestock and alterations in the river flow regime have caused a decline in its distribution (Carsey, et al. 2003). The PCA also supports the globally imperiled (G2?) narrowleaf cottonwood / river hawthorn natural plant community. Carsey et al. (2002)

explains that river hawthorn occupies the driest parts of the riparian system. It may be an indicator that the area no longer floods.

Table 44. Natural Heritage element occurrences at Mid Florida PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i> / <i>Salix eriocephala</i> var. <i>ligulifolia</i> – <i>Shepherdia argentea</i>	Narrowleaf cottonwood / strapleaf willow – silver buffaloberry	G2	S2		C
<i>Populus angustifolia</i> / <i>Crataegus rivularis</i>	narrowleaf cottonwood / river hawthorn	G2?	S2		C

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes from surrounding drainages as possible. Seasonal flooding and sediment deposition will help maintain a viable population of the element along Florida River. The boundary provides a buffer from roads and hay fields where heavy disturbance that causes erosion may contribute to excessive sediment deposition, elevated nutrient levels, and weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The PCA is entirely within private properties. Continued land use practices such as home development, subdividing and gas well infill are expected. There are no known conservation easements within the PCA. Education regarding riparian ecology may encourage volunteer efforts toward conserving this natural resource. Placement of conservation easements on private property is one action that promotes the lasting conservation of an area and may benefit the landowner.

Management Comments: The PCA is owned by several private citizens and therefore is managed by a variety of private land practices. To maintain or increase the quality of the elements on the Florida River, weed control will need to be addressed. In areas where river morphology has been evaluated and restoration implemented, it has resulted in more positive riparian wetland function.

Soils Description: Soils sampled have silty loam, silty clay textures and cobble/alluvial material. Soil Survey of La Plata County Area, Colorado (USDA 1988) delineate soils in the area as Pescar fine sandy loam classified as coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Aquic Ustifluent. Old oxbow areas are delineated as Tefton Loam, classified as fine loamy, mixed (calcareous), mesic Aquic Ustifluent, and described as somewhat poorly drained sandy loams over alluvial valley floors. The foot of the mesa adjacent to the river and various swales are delineated as Vosburg Fine Sandy Loam, classified as fine-loamy mixed, mesic Ustollic Haplargids. This soil is described as well drained sandy soils derived in coarse alluvium from shale and sandstones. Carsey *et al.* (2003) describes typical soils of this community type as deep sandy loams.

Restoration Potential: Restoration opportunities include exotic weed eradication and monitoring. River morphology restoration such as bank stabilizing may prove beneficial for aquatic habitat and riparian function in some areas. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species. Given the elevation and landscape context of the PCA, continual monitoring for exotic species is suggested to help eliminate the danger of invasion of tamarisk or Russian olive.

Wetland Functional Assessment for the title PCA:

Proposed HGM Class: Riverine

Subclass: R3/4

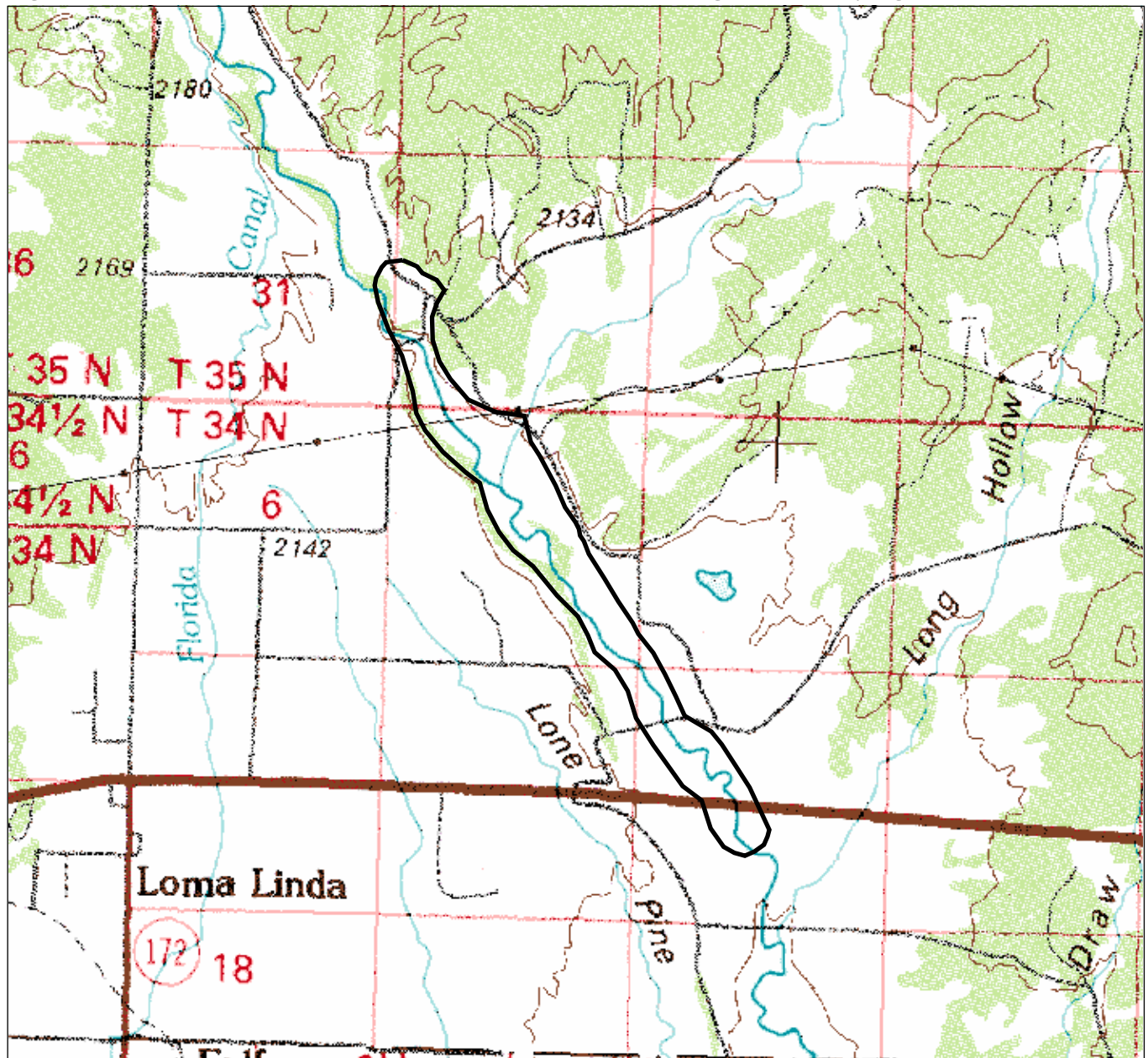
Cowardin System: Palustrine

CNHP's Wetland Classification: *Populus angustifolia*/ *Salix eriocephala* var. *ligulifolia* - *Shepherdia argentea*; *Populus angustifolia* / *Crataegus rivularis*


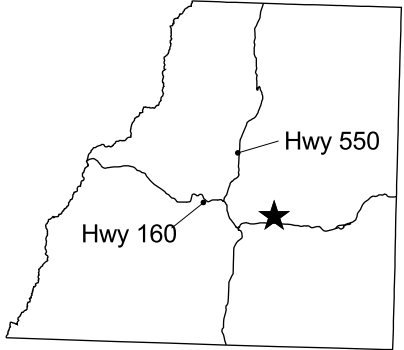
Table 45. Wetland functional assessment for the riverine wetland at the Middle Florida PCA.

Function	Rating	Comments
Overall Functional Integrity	Below Potential	The wetland appears to be functioning below its potential, however, river morphology restoration has enhanced functionality.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	Although there are low flows and altered hydrology the gentle gradient, old oxbows and point bar deposition indicate some attenuation function.
Sediment/Shoreline Stabilization	Moderate	Area has good stability where shrub density is high. Area where channel is restored is stable, other areas have bank erosion, agriculture up to river bank.
Groundwater Discharge/Recharge	Yes	Recharge may occur. Although the soils are somewhat poorly drained, the coarse alluvial material and back flow eddies indicate possible recharge.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Disrupted	Altered hydrology and agricultural impacts disrupt the normal function.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	Shrub density is patchy, but overall moderate and vigorous. Hay grasses and weeds in the understory indicate lower function.
Biological Functions		
Habitat Diversity	Low	There are two Cowardin classes present: scrub shrub and forested.
General Wildlife Habitat	High	Sign of deer, elk, songbirds, birds of prey. Recent beaver activity noted, but not current year (2003).
General Fish/Aquatic Habitat	Low	Restored river morphology creates better habitat for fish, however due to the sedimentation caused by the wildfires of 2002, no fish were present.
Production Export/Food Chain Support	Moderate	Altered hydrology affects this function by low flows. Flooding events flush organic materials downstream resulting utilization of these carbons by aquatic, microbes, invertebrates and vertebrates.
Uniqueness	High	Although the wetland class is common, the area supports two G2 plant communities.

Figure 27. Middle Florida River Potential Conservation Area, B3: High Biodiversity Significance



0.3 0 0.3 Miles

<p>Colorado Natural Heritage Program</p> <p>Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Durango, 37107-A1 30x60 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	---	--

Middle Hermosa Creek PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports a good example of globally vulnerable (G3/S3) montane riparian forest, a good example of a globally secure montane riparian forest, but vulnerable in Colorado (G5/S3), a good example of a globally secure (G4/S4) willow shrubland, and a poor example of a globally secure but vulnerable in Colorado (G4/S3) montane riparian willow carr.

Protection Urgency Rank: P2: Protection actions may be needed within 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA. The PCA is entirely managed by the U.S. Forest Service.

Management Urgency Rank: M2: New management actions may be needed within 5 years to prevent the loss of the element occurrences. Weed control, proper grazing regimes, and management of recreational activities are the main concerns.

Location: The Middle Hermosa Creek PCA is located approximately 30 air miles northwest of Durango.

U.S.G.S. 7.5-min. quadrangle: Elk Creek

Legal Description: T38N R10W Section 2, 3, 4, 10, 11, 21
T39N R10W Section 25, 26, 33, 35, 36

Elevation: 8,400 – 8,800 ft.

Size: Approximately 710 acres

Redders, 2000, Community Type: *Picea pungens/Alnus incana*, *Salix monticola*/mesic forb, *Picea engelmannii-Abies lasiocarpa/Calamagrostis canadensis*

General Description: The Middle Hermosa Creek PCA is located south of Hermosa Park and north of the confluence of Hermosa Creek and Big Bend Creek. The PCA encompasses several drainages that feed Hermosa Creek, e.g. Lone Spruce Draw, Corral Draw, Blind Canyon, Hooch Creek, West Cross Creek, and East Cross Creek. This portion of Hermosa Creek is a steep, narrow canyon with few meanders and a limited floodplain. The dominant riparian plant association is Colorado blue spruce (*Picea pungens*) with alder (*Alnus incana*). This plant association is found throughout the Hermosa Creek drainage where there are steep canyons that are subject to cold air drainage and limited sunlight. The understory consists of twinberry (*Lonicera involucrata*), goldenglow (*Rudbeckia ampla*), yarrow (*Achillea lanulosa*), strawberry (*Fragaria* sp.) horetail (*Equisetum arvense*), and Canada reedgrass (*Calamagrostis canadensis*). The PCA is also drawn for a subalpine fir (*Abies lasiocarpa*) with Engelmann spruce (*Picea engelmannii*) montane riparian forest located along Lone Spruce Draw. Lone Spruce Draw is also a narrow canyon with small meandering stream. The herbaceous layer is dominated by cowparsnip (*Heracleum sphondylium* subsp. *montanum*), geranium (*Geranium richardsonii*), false Solomons seal (*Maianthemum stellatum*), mannagrass (*Glyceria striata*), horsetail (*Equisetum arvense*), and Canada reedgrass. A montane riparian willow carr (*Salix monticola*/mesic forb) is documented for Corral Draw. The understory is sparse, dominated by geranium (*Geranium richardsonii*) and strawberry (*Fragaria* sp.). It is a small and heavily impacted by livestock grazing. In general, the uplands are dominated by ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*).

Biodiversity Rank Justification: This site is based on a good example (B ranked) of the globally vulnerable (G3/S3) blue spruce / thinleaf alder plant association. Blue spruce appears to be a climax riparian species. The PCA also contains a good (B ranked) example of the state vulnerable (S3) subalpine fir – Engelmann spruce/ bluejoint reedgrass (*Abies lasiocarpa* – *Picea engelmannii* / *Calamagrostis canadensis*) plant association. Although subalpine fir and Engelmann spruce are not obligate riparian species, they influence the subalpine riparian community types, where the understory species depends upon moisture regime. This particular community reflects a wetter site and is only found sporadically in the northern Rocky Mountains and occasionally in the southern San Juan Mountains (Carsey *et al.* 2002). The PCA supports the state vulnerable (S3) willow shrubland, mountain willow / mesic forbs (*Salix monticola* / mesic forbs) in poor (D ranked) condition. The occurrence is D ranked due to the condition impacts of

heavy grazing. Also present is the state vulnerable (S3) willow shrubland, shortfruit willow / mesic forbs (*Salix brachycarpa* / mesic forbs) in good (B ranked) condition.

Table 46. Natural Heritage element occurrences at Middle Hermosa Creek PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Picea pungens/Alnus incana</i>	Montane riparian forest	G3	S3		B
<i>Salix brachycarpa</i> / Mesic forbs	Shortfruit willow / mesic forbs	G4	S4		B
<i>Abies lasiocarpa-Picea engelmannii/ Calamagrostis canadensis</i>	Montane riparian forest	G5	S3		B
<i>Salix monticola</i> /mesic forb	Montane riparian willow carr	G4	S3		D

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. The boundaries encompass the occurrences with a 100 foot buffer that follows the stream channel. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The San Juan National Forest owns the PCA.

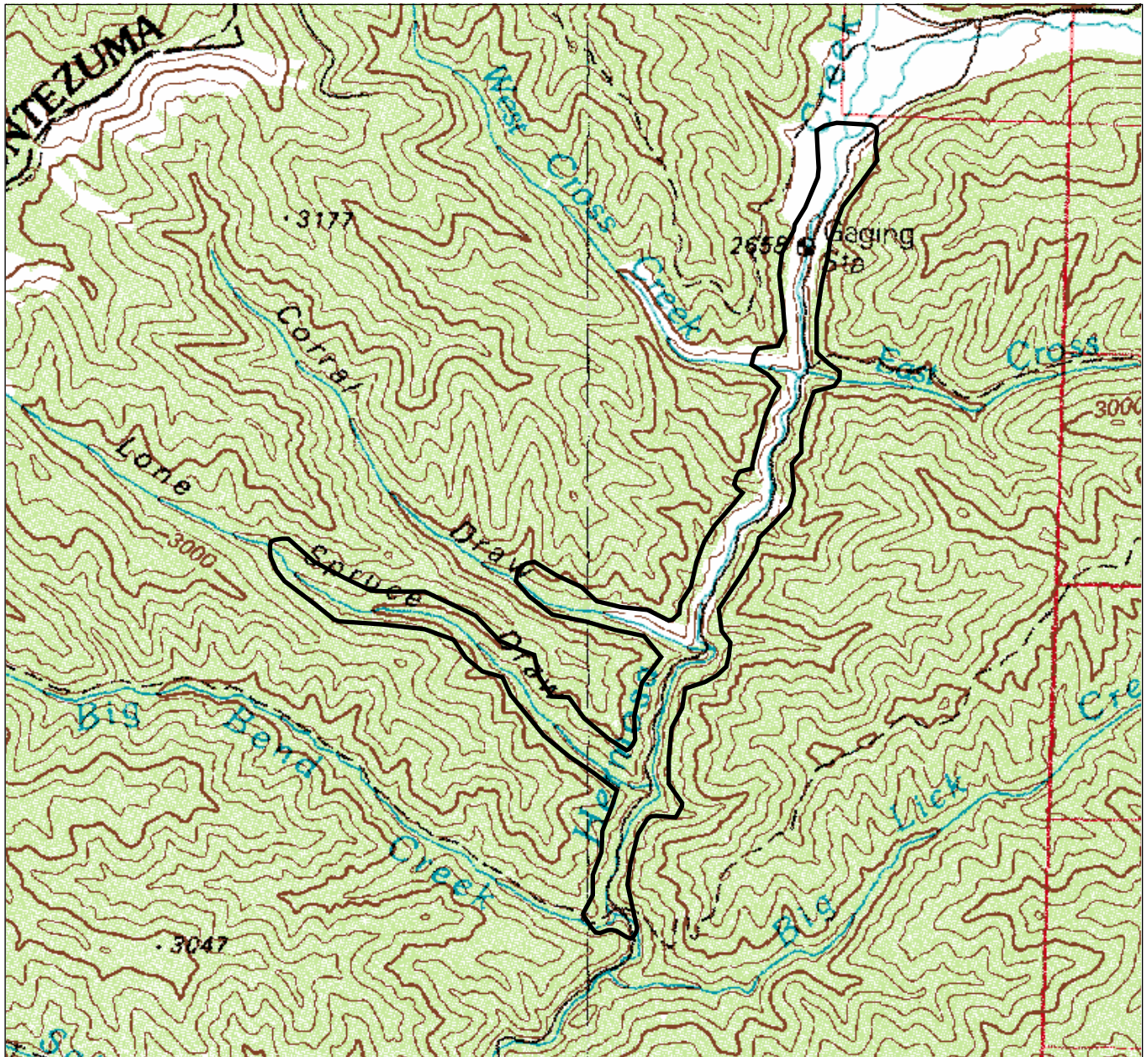
Management Comments: Possible threats to the occurrence include expansion of non-natives e.g., Canada thistle (*Cirsium arvense*), hay grasses (*Poa pratensis*, *Phleum pratense*) that are currently located mainly along the hiking trail. A popular multi use trail runs adjacent, where the area receives heavy recreational use by hikers, horses, mountain bikes, and motorized vehicles (motorcycles and ATVs). Improper recreation use and grazing will alter hydrology and expand weed invasion. It is suggested that education regarding tread lightly policies on the PCA would help ensure its protection from the mentioned threats. The extensive upland forest is currently unaltered by urban or agricultural use, however there is a ski area lease adjacent the PCA and the effects of the impacts are unknown (i.e. snowmaking).

Soils Description: Soils of the blue spruce / thinleaf alder community type are typically shallow, loamy sand to silty clay loams with heavy organic matter content over gravel, cobbles, and boulders (Carsey *et al.* 2003).


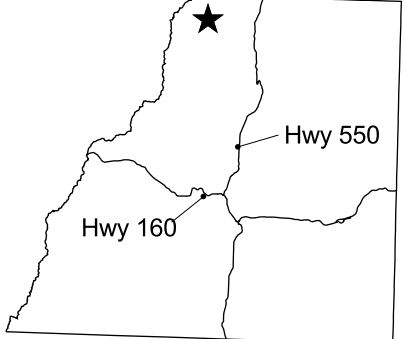
Restoration Potential: Restoration opportunities include weed eradication and monitoring. Weeds are present on adjacent uplands and introduced grasses occur in the riparian zone. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the Middle Hermosa Creek PCA: A wetland functional assessment was not performed at this site. The area is functioning as expected within its HGM wetland class.

Figure 28. Middle Hermosa Creek Potential Conservation Area, B3: High Biodiversity Significance



0.5 0 0.5 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Silverton, 37107-E1 30x60 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey</p> <p>map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	--	--

Morgan Canyon PCA

Biodiversity Rank: B3. High biodiversity significance. The site contains a globally vulnerable (G3) plant community in good (B ranked) condition.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The area is owned by the Southern Ute Indian Tribe.

Management Urgency Rank: M3. New management action will be needed within 5 years to maintain the current quality of the element occurrence in the PCA. Weed invasion is the main threat to the PCA.

Location: The Morgan Canyon PCA is located in the southwest portion of La Plata County near the New Mexico border, about 5 1/2 miles southwest of Redmesa.

U.S.G.S. 7.5-min. quadrangles: Redmesa

Legal Description: T32N R13W Section 4, 5, 6

Elevation: 6,240 -- 6,440 ft.

Size: Approximately 266 acres

Redders, 2003, Community Type: Not Applicable. There are no associations that fit the shrub composition of this site in the classification.

General Description: Morgan Canyon PCA lies in a canyon with sheer walls of yellow and gray Cliffhouse Sandstone. There is dense vegetation and large boulders choking the canyon. Narrowleaf cottonwood (*Populus angustifolia*) dominates the open to sparse tree canopy and skunkbush sumac (*Rhus trilobata*) dominates the dense shrub layer with associated species including Fendler's bush (*Fendlera falcata*) and virgins bower (*Clematis ligusticifolia*). Pinyon pine (*Pinus edulis*) and juniper (*Juniperus osteosperma*) are situated within the canyon as well. The cottonwood community occupies the sandy canyon bottom where storm water runs through. The area is in an arid environment where the soils are bare except for riparian zones. Hydrology is ephemeral, with pools of water persisting into the summer.

Biodiversity Rank Justification and Comments: The PCA supports the globally vulnerable (G3) narrowleaf cottonwood / skunkbush sumac plant community in good (B ranked) condition. This association usually occurs on immediate riverbanks but can be on higher terraces (Carsey, K. et al. 2003). Late seral communities will form dense stands of *Rhus trilobata*, excluding other shrubs. As cottonwoods die off, the community changes to an upland community. This association is uncommon but occurs locally in the mountains and canyons of Colorado, Utah, Wyoming and Idaho (Nature Serve Explorer 2003).

Table 47. Natural Heritage element occurrences at Morgan Canyon PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i> / <i>Rhus trilobata</i>	narrowleaf cottonwood / skunkbush sumac	G3	S3		B?

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes from surrounding drainages as possible. Seasonal flooding and sediment deposition will help maintain a viable population of the element in Morgan Canyon.

Protection Comments: The PCA is within Southern Ute Indian Tribal property with private property at the mouth of the canyon. Continued land use practices such as gas well development and infill is expected.

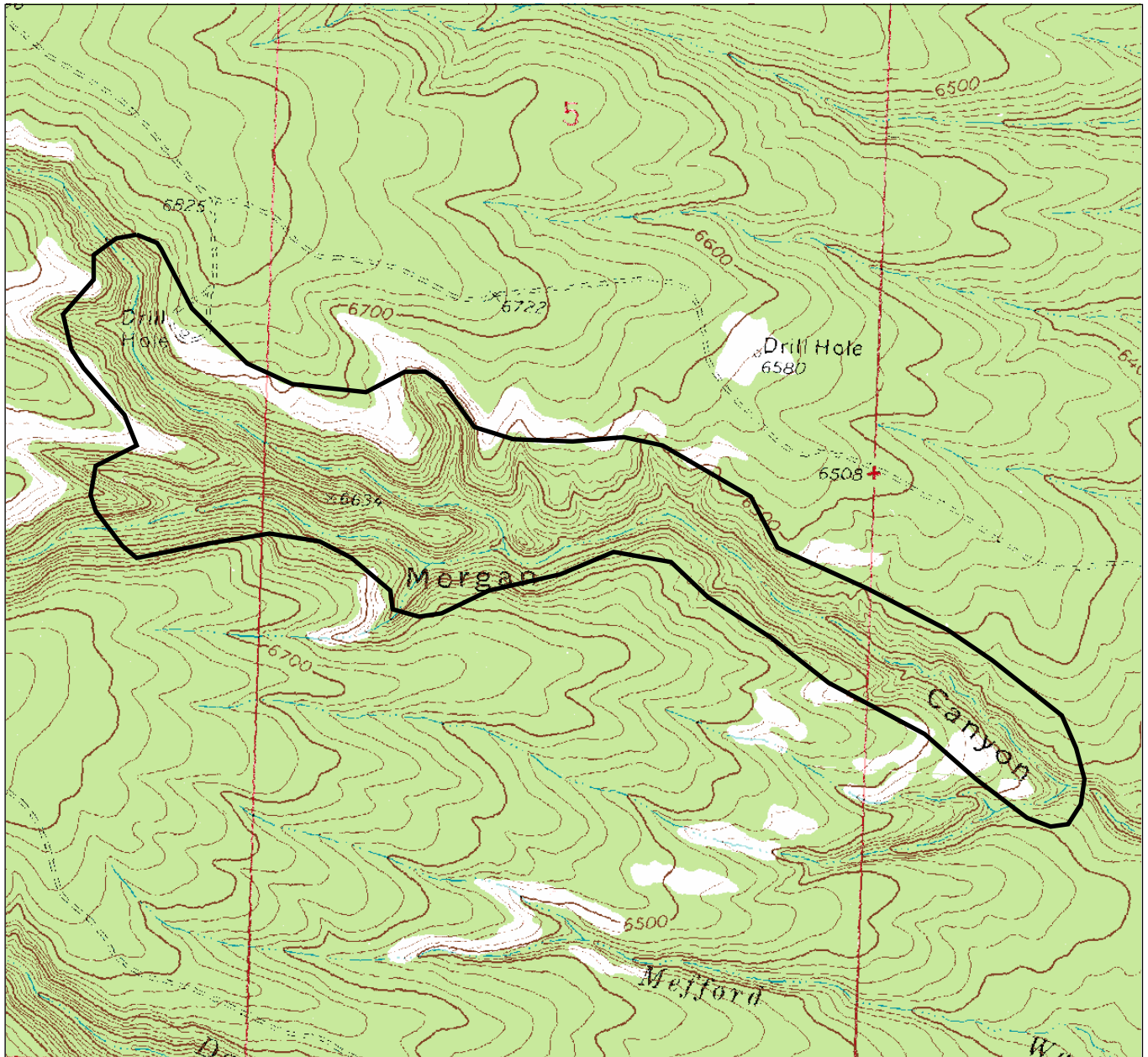
Management Comments: Management needs may require weed control to maintain the current condition of the area. Weeds currently invading include sweet clover (*Melilotus* spp), musk thistle (*Cardus nutans*), Kentucky bluegrass (*Poa pratensis*), hay grasses as well as cheatgrass (*Bromus tectorum*).

Soils Description: The soil textures of this community type are typically fine sandy loams, clay loams, silty clay loams, and silty clay. Soil Survey of La Plata County Area, Colorado (USDA 1988) delineate Morgan Canyon as rock outcrop.


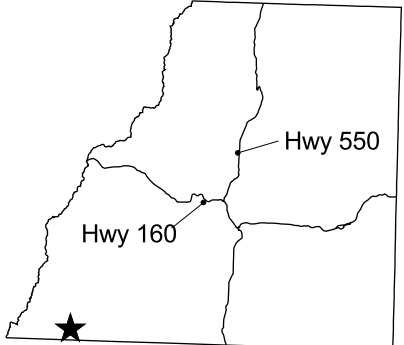
Restoration Potential: The area is functioning as expected. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the Morgan Canyon PCA: CNHP wetland ecologists did not visit this drainage in the 2003 field season. Thus, a functional assessment could not be conducted.

Figure 29. Morgan Canyon Potential Conservation Area, B3: High Biodiversity Significance



0.2 0 0.2 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Red Mesa, 37108-A2 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	---	--

Sauls Creek PCA

Biodiversity Rank: B3. High biodiversity significance. The site supports the globally vulnerable (G2G3) willow shrubland in good (B ranked) condition.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The site is within the San Juan National Forest.

Management Urgency Rank: M3. New management action may be needed within 5 years to maintain the current quality of the element occurrences in the PCA. Weed invasion, recreation and gas well exploration are the main threats to the PCA.

Location: The Sauls Creek PCA is located in east La Plata County, surrounding the upper tributaries of Sauls Creek.

U.S.G.S. 7.5-min. quadrangles: Bayfield, Baldy Mountain
Legal Description: T35N R6W Section 35, 34
T34N R6W Section 2, 3

Elevation: 7,480 – 7,800 ft.

Size: Approximately 446 acres

Redders, 2003, Community Type: Willow shrublands: *Salix eriocephala* var. *ligulifolia*; *Crataegus rivularis* / *Salix* Species

General Description: Sauls Creek PCA encompasses two headwater tributaries to Sauls Creek. The area harbors ephemeral streams with incised gullies cutting through broader, sloping valleys. A dynamic mosaic of forest and riparian systems occur in the gullies where upland forest encroaches on willow thicket patches with large ponderosa pines (*Pinus ponderosa*), aspen (*Populus tremuloides*) and scrub oak (*Quercus gambelii*). Willow thickets are dominated by strappleaf willow (*Salix ligulifolia*) and coyote willow (*Salix exigua*). The riparian zone also supports some shrub diversity including river hawthorn (*Crataegus rivularis*), choke cherry (*Prunus virginiana*), Wood's rose (*Rosa woodsii*), snowberry (*Symphoricarpos rotundifolius*) and service berry (*Amelanchier alnifolia*). Otherwise, the uplands consist of xeric ponderosa pine forests with some dense Gambel oak stands.

Downstream areas contain stock ponds and oil wells as well as a degraded willow shrubland that has apparently been overgrazed. There are numerous oil well pads in the area as well as recent oil well development, including new roads; all roads in the area are reseeded with non-native grasses.

Biodiversity Rank Justification and Comments: The PCA supports a good (B) and a fair (C) example of the globally imperiled (G3G3) strappleaf willow plant community. This shrubland is documented from Colorado in the San Juan, Rio Grande, Pike–San Isabel and Arapahoe-Roosevelt National Forests and is thought to occur in northern New Mexico (Nature Serve Explorer 2003).

Table 48. Natural Heritage element occurrences at Sauls Creek PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Salix eriocephala</i> var. <i>ligulifolia</i>	Strapleaf willow	G2G3	S2S3		B
<i>Salix eriocephala</i> var. <i>ligulifolia</i>	Strapleaf willow	G2G3	S2S3		C

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes from surrounding drainages as possible. Seasonal flooding is important to the viability of the elements in the Sauls Creek drainage. The boundaries also provide a small buffer from nearby trails, roads and gas wells where surface runoff may contribute excess nutrients, sediment and weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The PCA is owned and managed by the San Juan National Forest.

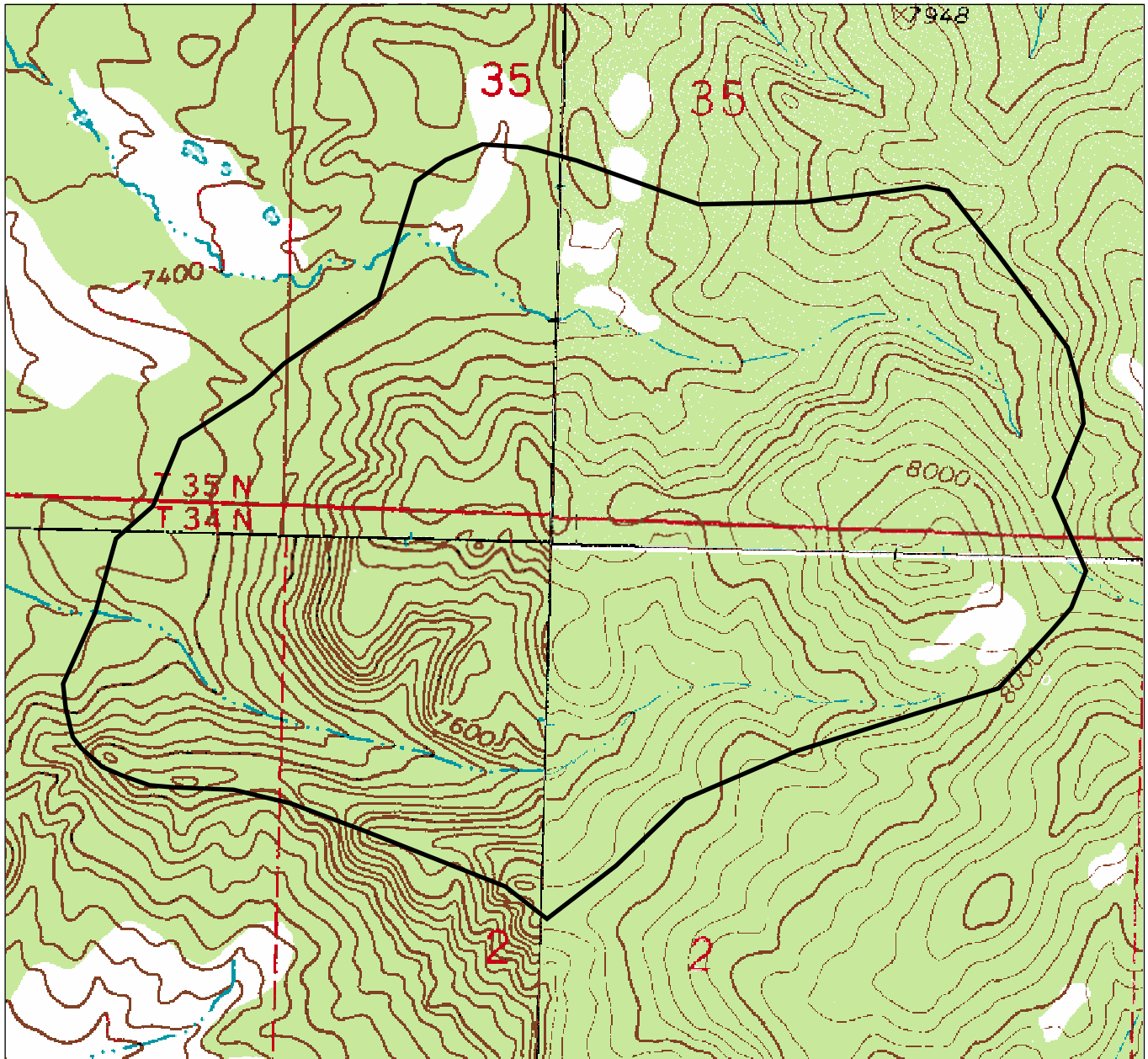
Management Comments: It is suggested to eradicate and monitor exotic species to maintain the current quality of the elements in the PCA. The surrounding area receives heavy recreational use. Monitoring the area for weed invasion is suggested especially with increased gas development with subsequent roads, and accessibility for recreation and firewood cutting.

Soils Description: Soils sampled are deep with a silty clay loam texture and crumbly, coarse to very coarse structure. Soils for this community type are typically saturated sandy loams and clay loams with a high organic matter content in the upper layers (Carsey et al. 2002).

Restoration Potential: Restoration opportunities include weed eradication and monitoring. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species. The Colorado Natural Areas Program has a native plant revegetation guide available on their website at <http://www.parks.state.co.us/cnap/indes.html> which may provide helpful information about using native plants for revegetation projects.

Wetland Functional Assessment for the Sauls Creek PCA: CNHP wetland ecologists did not conduct a wetland functional assessment in this drainage while surveying this site in the 2003 field season.

Figure 30. Sauls Creek Potential Conservation Area, B3: High Biodiversity Significance



0.1 0 0.1 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

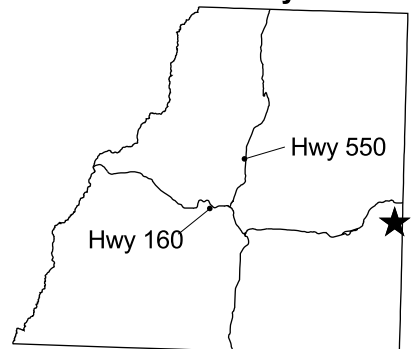
Pargin Mountain, 37107-B4
 Bayfield, 37107-B5
 Baldy Mountain, 37107-C4
 Ludwig Mountain, 37107-C5
 7.5 Minute Series

Digital Raster Graphics produced by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Sheephead Basin PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports a good (B) occurrence of a globally vulnerable (G3) plant.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management appears to be successful.

Location: The Sheephead Basin PCA is located in northwestern La Plata County in the San Juan National Forest, about 13 miles north-northwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Monument Hill
 Legal Description: T37N R10W Section 16, 17, 20

Elevation: 8,800 to 11,000 feet

Size: Approximately 390 acres

General Description: The PCA comprises a small alpine stream that is a tributary of the South Fork of Hermosa Creek, and adjacent wet slopes within a montane forest. Two rare plants, kittentails (*Besseyia ritteriana*) and showy whitlow-grass (*Draba spectabilis*), are found on steep, wet north-facing hillsides that are dominated by Colorado false hellebore (*Veratrum tenuipetalum*) and green gentian (*Frasera speciosa*). Other species that occupy these slopes are monkshood (*Aconitum columbianum*), giant red Indian paintbrush (*Castilleja miniata*), Parry’s thistle (*Cirsium parryi*), tall larkspur (*Delphinium barbeyi*), orange sneezeweed (*Dugaldia hoopesii*), fireweed (*Epilobium angustifolium*), fireweed (*Chamerion danielisii*), blue wildrye (*Elymus glaucus*), large mountain fleabane (*Erigeron coulteri*), cow parsnip (*Heracleum sphondylium* ssp. *montanum*), Fendler’s waterleaf (*Hydrophyllum fendleri*), osha (*Ligusticum porteri*), chiming bells (*Mertensia ciliata*) and tall ragwort (*Senecio serra*).

A small narrow stream hosted a similar suite of species, typical of streamside vegetation in the San Juan Mountains, dominated by bittercress (*Cardamine cordifolia*), chiming bells and arrowleaf groundsel (*Senecio triangularis*). Other species here included monkshood (*Aconitum columbianum*), rose paintbrush (*Castilleja rhexifolia*), Hornemann’s willow herb (*Epilobium hornemannii*), large mountain fleabane (*Erigeron coulteri*), fowl mannagrass (*Glyceria striata*), nodding ragwort (*Ligularia bigelovii*), brook saxifrage (*Micranthes odontoloma*), cowbane (*Oxypolis fendleri*), Whipple penstemon (*Penstemon whippleanus*), towering Jacob’s ladder (*Polemonium foliosissimum*), wolf currant (*Ribes wolfii*), and elderberry (*Sambucus racemosa*).

Biodiversity Rank Justification: The PCA supports good (B ranked) occurrence of kittentails, a plant that is globally vulnerable (G3) and a fair (C ranked) example of a plant community that is apparently secure (G4). Although locally abundant, kittentails is endemic to the San Juan Mountains, and the species’ small range, in a global perspective, makes it vulnerable to extinction from large-scale environmental changes such as global climate change. The site also contains showy whitlow-grass, a plant that was considered vulnerable until this survey, when many new occurrences were located, and is now watchlisted (S3S4) by CNHP. The alpine wetland plant community, while common, was documented to further characterize the site and to represent this community in the county.

Table #. Natural Heritage element occurrences at Sheephead Basin PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Besseyia ritteriana</i>	Kittentails	G3	S3		B
<i>Draba spectabilis</i> var. <i>oxyloba</i>	Showy whitlow-grass	G3?T3Q	S3S4		B
Plant Communities					

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Besseya ritteriana</i>	Kittentails	G3	S3		B
<i>Draba spectabilis var. oxyloba</i>	Showy whitlow-grass	G3?T3Q	S3S4		B
<i>Cardamine cordifolia</i> - <i>Mertensia ciliata</i> - <i>Senecio triangularis</i>	Alpine wetlands	G4	S4		C

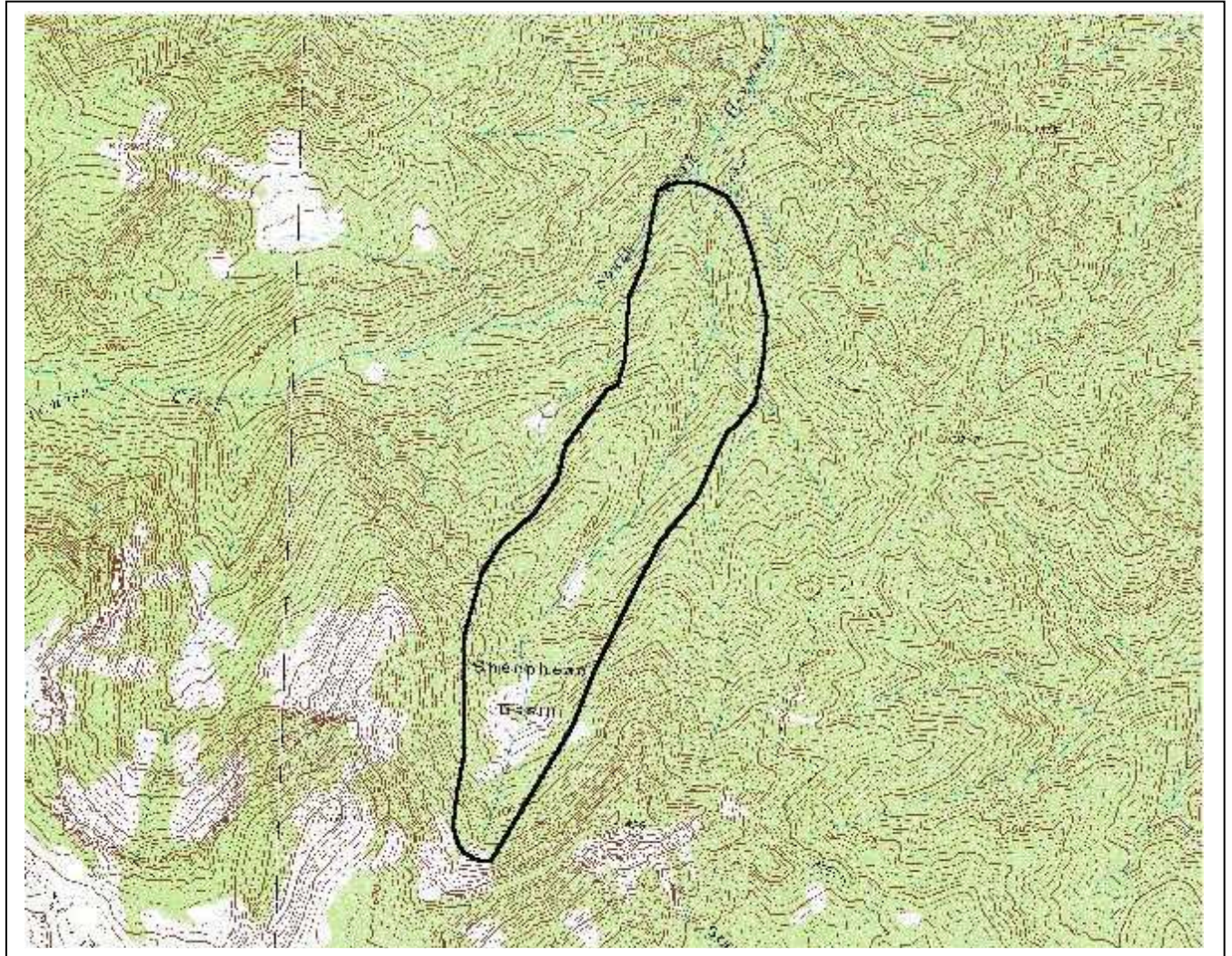
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary is drawn to enclose the rare plant and community occurrences and additional habitat to allow the elements to occupy different areas over time, as well as some of the upstream area that provides the necessary hydrologic regime for the persistence of these elements.

Protection Comments: The PCA is within the San Juan National Forest.

Management Comments: This, and most of the surrounding forest is in pristine condition. The presence of a road that is used for recreation does not appear to have caused weed invasion at this time, although continued monitoring for exotic species will help to perpetuate this condition.

Sheephead Basin Potential Conservation Area. B3: High Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Monument Hill, 37107-D8
La Plata, 37108-D1

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Smelter Mountain PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports a good example of a globally vulnerable (G3) plant community.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future. The PCA is within the Bodo State Wildlife Area.

Management Urgency Rank: M2: Control of exotic plants at the radio towers would help to prevent their spreading into the PCA.

Location: The Smelter Mountain PCA is located southwest of Durango on the south side of U.S. Highway 160.

U.S.G.S. 7.5-min. quadrangles: Durango West

Legal Description: T35N R9W S 30, 31; T35N R10W S 22, 23, 25, 26, 35

Elevation: 7000 to 7725 feet

Size: Approximately 984 acres

General Description: The Smelter Mountain PCA occupies steep north-facing slopes above Lightner Creek, visible from Highway 160. Part of the site falls within the Bodo State Wildlife Area. The radio towers that top the ridge above the eastern part of the PCA are a visible and familiar landmark to Durango residents. The site provides a good example of a mixed mountain shrubland community. Although Gambel oak (*Quercus gambelii*) and mountain mahogany (*Cercocarpus montanus*) are two of the most abundant shrubs, they share dominance with Utah serviceberry (*Amelanchier utahensis*), squaw apple (*Peraphyllum ramosissimum*), big sagebrush (*Artemisia tridentata*), snowberry (*Symphoricarpos oreophilus*) and cliff fendlerbush (*Fendlera rupicola*). Stringers of conifers, including ponderosa pine and Douglas fir occupy cooler drainages, while the shrubs are dominant on convex slopes. A very diverse understory of grasses and forbs includes elk sedge (*Carex geyeri*), Indian rice grass (*Oryzopsis hymenoides*), needle and thread (*Stipa comata*), bottlebrush squirreltail (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithii*), prairie junegrass (*Koeleria macrantha*), muttongrass (*Poa fendleriana*), actinea (*Tetranneuris ivesiana*), toadflax penstemon (*Penstemon linarioides*), banana yucca (*Yucca baccata*), pingue rubberweed (*Picradenia richardsonii*), sand lupine (*Lupinus ammophilus*), Oregon grape (*Mahonia repens*) and many other species. (See appendix for complete list) The area along the ridge where the radio towers are located is excluded from the PCA as it is disturbed and harbors many exotic species. However, most of these have not invaded the steep slopes below.

Biodiversity Rank Justification: The Smelter Mountain PCA supports a good (B) occurrence of a globally vulnerable (G3) plant community. This PCA provides representation of the community in La Plata County, and is valuable not only for its high diversity of species, but also as habitat for the animals and lesser-known organisms that may depend on this community type. There is also a record, based on a herbarium specimen, of showy collomia (*Collomia grandiflora*), a plant that is very rare in Colorado (S1). This occurrence is unranked, and could not be found in 2003, although it may still be extant and relocated later. This is one of only five occurrences of the species in Colorado, and the only one in La Plata County.

Table #. Natural Heritage element occurrences at Smelter Mountain PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Quercus gambellii-</i> <i>Cercocarpus montanus/Carex</i> <i>geyeri</i>	Mixed mountain shrublands	G3	S3		B
Plants					
<i>Collomia grandiflora</i> **	Showy collomia	G5	S1		E

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

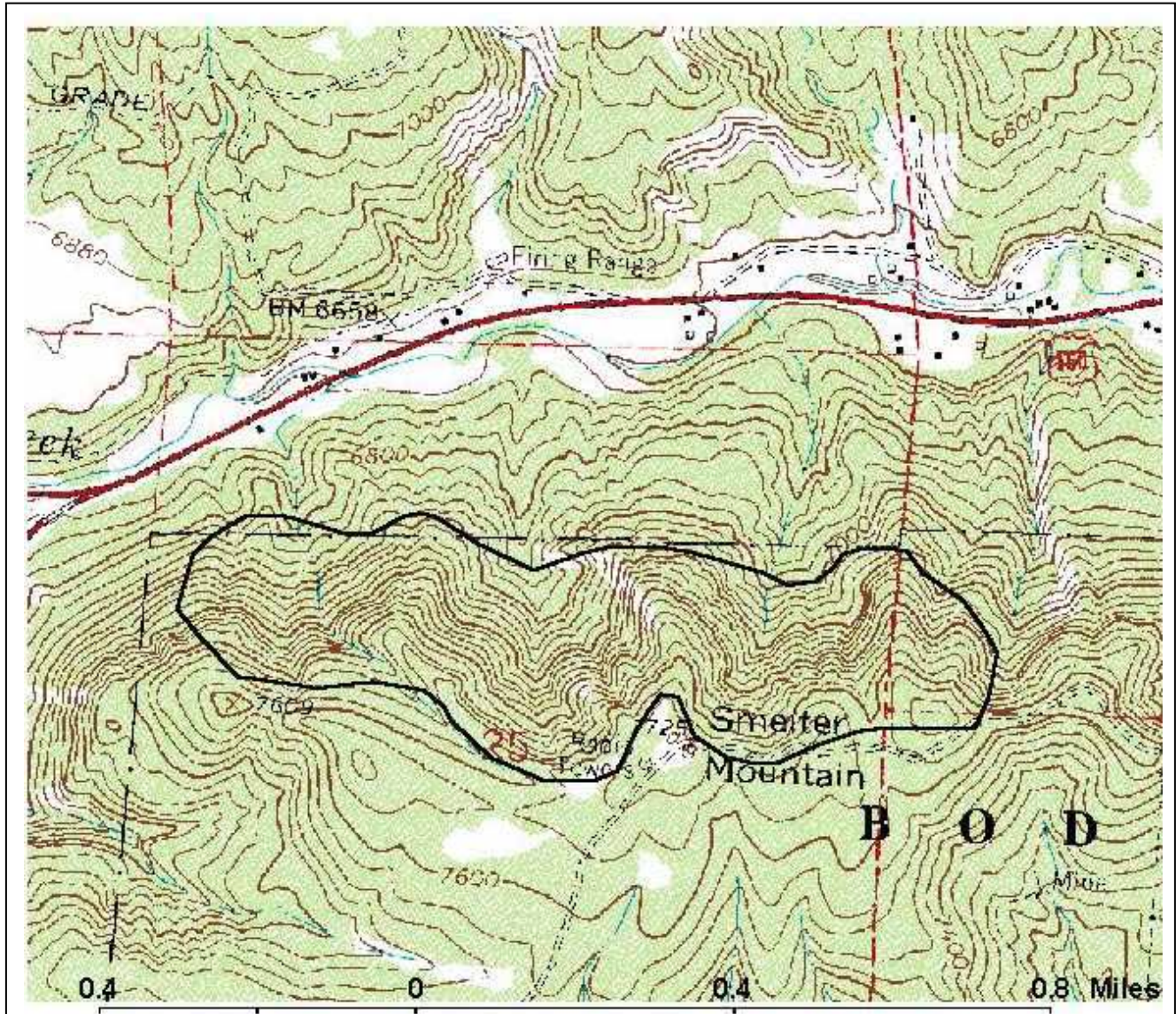
** *Collomia grandiflora* was documented within the boundaries of the PCA near the radio towers, according to an un-dated specimen at the Fort Lewis College herbarium. If a separate PCA were drawn for the plant, it would be much smaller.

Boundary Justification: The boundary is drawn to include the steep north-facing slopes that support the mixed mountain shrub community. It excludes disturbed areas at the top of the ridge that have been invaded by exotic plant species. The occurrence of showy collomia falls within these boundaries, but covers a much smaller area.

Protection Comments: Part of the site is included in the Bodo State Wildlife Area. Private land that is visible from Highway 160 and appears to be similar is included. This part of the PCA may be subject to development, although the steepness of the terrain makes that unlikely.

Management Comments: A large assortment of non-native species at the radio towers includes cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola australis*), alyssum (*Alyssum parviflorum*), yellow sweet clover (*Melilotus officinalis*), alfalfa (*Medicago sativa*), tumble mustard (*Sisymbrium altissimum*), crested wheatgrass (*Agropyron cristatum*), musk thistle (*Carduus nutans*), jointed oatgrass (*Cylindropyrum cylindricum*), and smooth brome (*Bromus inermis*). Control of these exotics would help to preserve the quality of the PCA.

Smelter Mountain Potential Conservation Area. B3: High Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Electra Lake 37107-E7
 Engineer Mountain 37107-F7
 7.5 Minute Series

Digital Raster Graphics
 Produced by the U. S. Geological Survey
 Map created 10 April 2004
 UTM Zone 13 NAD 27

Location in Study Area



Spring Creek North PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports a good example of globally vulnerable (G3G4/S3) lower montane riparian shrubland, an excellent example of a globally secure plant, but critically imperiled for Colorado (G5/S1), and a good example of a globally secure but state imperiled (G5/S2) plant.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future. The PCA is almost entirely managed by the U.S. Forest Service, however oil and gas exploration is prevalent within this portion of La Plata County.

Management Urgency Rank: M3: New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA. Management actions could include weed control, awareness of any road maintenance or expansion of USFS road 537 could negatively affect the wetland and its element occurrences, and monitoring of cattle grazing to prevent further erosion and undercutting of streambank.

Location: The Spring Creek North PCA is located 3 miles southwest of Pargin Mountain.

U.S.G.S. 7.5-min. quadrangle: Pargin Mountain

Legal Description: T34N R6W Sections 14, 22, 23, 27

Elevation: 8,200 ft.

Size: Approximately 174 acres

Redders, 2000, Community Type: Not Applicable: there are no classifications that fit the vegetation composition in this publication.

General Description: The Spring Creek North PCA is located 3 miles southwest of Pargin Mountain and 7 air miles east of Bayfield. Spring Creek is a lower foothills stream, located along a steep, narrow canyon within an intermittent stream channel. The dominant plant community (*Populus angustifolia/Juniperus scopulorum*) is an uncommon association. The uplands are dominated by Gambels oak (*Quercus gambelii*), pinyon pine (*Pinus edulis*). South of the PCA the riparian zone widens with the shrub layer dominated by skunkbrush (*Rhus trilobata*) and river hawthorn (*Crataegus rivularis*). The soils are very sandy with river bottom dry at the time of the site visit.

Biodiversity Rank Justification: This site supports a good example of globally imperiled (G2G3/S3) narrowleaf cottonwood-Rocky Mountain juniper woodland (*Populus tremuloides/Juniperus scopulorum*). This plant community is documented for New Mexico and Wyoming, as well as Colorado. *Populus angustifolia/Juniperus scopulorum*-dominated riparian areas are uncommon (Carsey et al. 2003). This community occurs along lower foothill streams with perennial to intermittent stream flows. This is the only observed occurrence during the 2003 field survey.

Table 49. Natural Heritage element occurrences at Spring Creek North PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia/Juniperus scopulorum</i>	Narrowleaf cottonwood/Rocky Mountain woodland	G2/G3	S3		B

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. The boundaries encompass the occurrences with a 100 – 500 ft foot

buffer that follow the stream channel and USFS Road 537. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The San Juan National Forest owns the PCA. It is suggested that a conservation easement and education on the PCA would help ensure its protection from the below mentioned threats.

Management Comments: Possible threats to the occurrence include expansion of non-natives e.g., Canada thistle (*Cirsium arvense*), musk thistle (*Cardus nutans*), hay grasses (*Poa pratensis*, *Phleum pratense*) that are currently located just along the USFS road. Altered hydrology from road improvements or expansion could negatively impact the element occurrences. Oil and gas exploration and development is very prevalent within in this portion of La Plata County.

Soils Description: Soils within the Spring Creek North PCA are silty clay loam. They are fine textured derived from shale parent material. The soils within the flood plain of Spring Creek are typical of rangeland in this portion of La Plata County with erodible soils and high shrink-swell portion due to the intermittent flow of Spring Creek. Pannel (USDA 1988) describes this soil type as Bayfield silty clay loam.

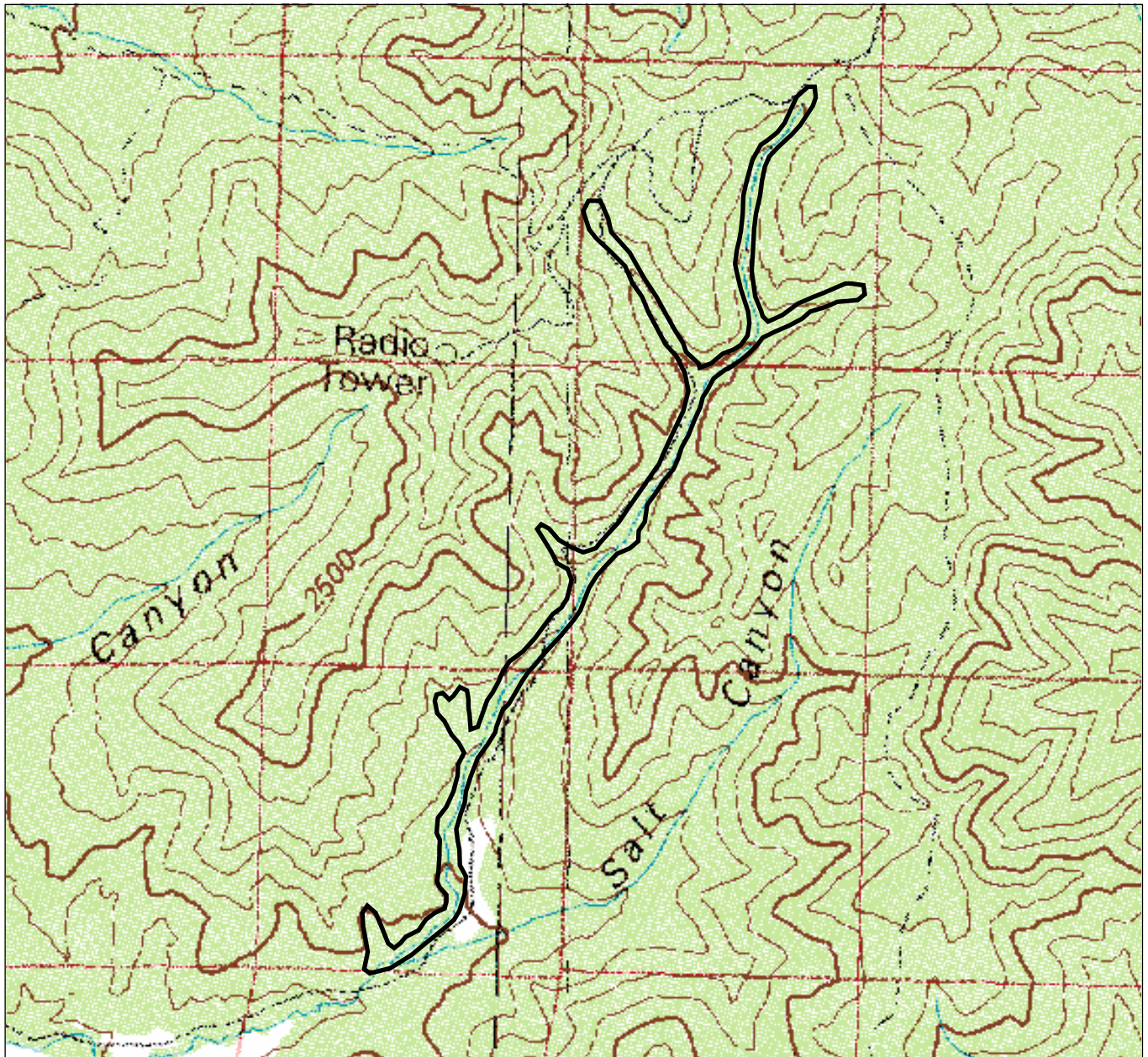
Restoration Potential: Currently the wetland and its hydrology are intact. Weed control would be the main restoration activity.

Wetland Functional Assessment for the Spring Creek North PCA:
Proposed HGM Class: Riverine **Subclass:** R3/4
Cowardin System: Palustrine
CNHP's Wetland Classification: *Populus angustifolia/Juniperus scopulorum*

Table 50. Wetland functional assessment for the slope wetland at the Spring Creek North PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Low	The wetland is located within in a steep, narrow canyon with little opportunity for flood attenuation.
Sediment/Shoreline Stabilization	Low	The wetland experience streambank erosion from undercutting, likely due to the steep topography and accelerated by cattle grazing.
Groundwater Discharge/Recharge	Yes	Likely springs and seeps feed the wetland. Groundwater recharge is low due to lack of perennial water, but soils are composed of gravel and sand.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	No disruptions noted. The wetland is functioning similar to other foothill riparian wetlands.
Removal of Imported Nutrients, Toxicants, and Sediments.	Low	Wetland is characterized by open tree canopy with low % cover of shrubs or herbaceous cover. Soils are sandy therefore little opportunity to remove sediments and toxicants.
Biological Functions		
Habitat Diversity	Low	The area supports one Cowardin class.
General Wildlife Habitat	Moderate	Wildlife sign noted. Somewhat of a diverse tree layer provide dynamic habitat for a variety of birds and herbivores.
General Fish/Aquatic Habitat	Low	No fish observed.
Production Export/Food Chain Support	Moderate	Presence of an outlet and inlet. Wetland not permanently flooded without severe scouring, vegetation does overhang bank
Uniqueness	High	Plant community is globally imperiled and was the only type documented in La Plata County in 2003.

Figure 31. Spring Creek North Potential Conservation Area, B3: High Biodiversity Significance



0.4 0 0.4 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

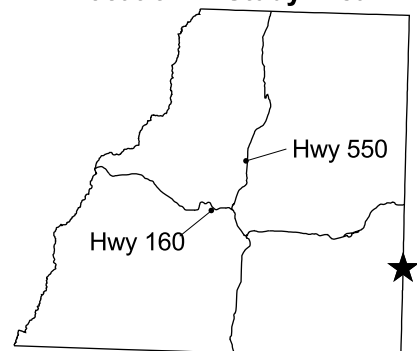
Durango, 37107-A1
 30x60 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Upper Elbert Creek PCA

Biodiversity Rank: B3. High biodiversity significance. The area supports a globally vulnerable but imperiled in the state (G3G4/S2) subalpine riparian shrubland in good (B ranked) condition.

Protection Urgency Rank: P3. Protection actions may be needed, but probably not within the next 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA if protection action is not taken. The area is within the San Juan National Forest, but is adjacent with leased land for the Durango Mountain Resort ski area.

Management Urgency Rank: M3. New management action may be needed within 5 years to maintain the current quality of the element occurrence in the PCA. Weed invasion, improper recreation and grazing practices are the main threats to the PCA.

Location: The Upper Elbert Creek PCA is located in north central La Plata County, near the headwaters of Elbert Creek and Butler Creek at Forest Road 581 in the San Juan National Forest.

U.S.G.S. 7.5-min. quadrangles: Electra Lake
Legal Description: T39N R9W Section 28, 34, 33

Elevation: 10,080 ft.

Size: Approximately 276 acres

Redders, 2003, Community Type: Willow Shrublands: *Salix wolfii* / *Carex utriculata*; *Salix planifolia* / *Carex aquatilis*.

General Description: Upper Elbert Creek PCA is in a high elevation open meadow surrounding first and second order streams. The creek supports a short-stature willow carr in a narrow to wide thicket. Willow species include planeleaf willow (*Salix planifolia*) and wolf willow (*Salix wolfii*), where planeleaf willow dominates and is situated in the wetter areas. Mesic graminoids dominate in the stream channel and low, moist areas. Mesic graminoids are dominated by beaked sedge (*Carex utriculata*). A linear fringe of forbs cling to the stream bank. The creek is moderately sinuous with steep cut banks from one to three feet deep. Cattle have eroded the stream banks in few localized areas where upland meadows are moderately grazed. The surrounding hillslopes harbor a healthy spruce - fir forest with open hillsides of Thurber fescue (*Festuca thurburi*). There is a popular mountain biking trail adjacent Elbert Creek with relatively easy access from Forest Roads.

Biodiversity Rank Justification and Comments: This site supports a globally vulnerable, (G3G4) plant community in good (B ranked) condition. The planeleaf willow / beaked sedge (*Salix planifolia* / *Carex utriculata*) plant community appears to be less common than the planeleaf willow / water sedge (*Carex aquatilis*) plant community and may be indicative of wetter sites. This association is infrequent in the subalpine and alpine of Idaho and Washington, and thought to occur in Canada (Nature Serve Explorer 2003).

Table 51. Natural Heritage element occurrences at Upper Elbert PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Salix planifolia</i> / <i>Carex utriculata</i>	Planeleaf willow / beaked sedge	G3G4	S2		B

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

Boundary Justification: The boundaries incorporate the headwaters and areas that will allow the natural hydrological processes to continue. Seasonal flooding and sediment deposition will help maintain the viability of the element along Elbert Creek. Disturbances such as heavy grazing or recreation that cause erosion may contribute to excessive sediment deposition, elevated nutrient levels and weed invasion. Refraining from heavy disturbance within the PCA boundaries may benefit the functionality and lasting conservation of the wetland. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The PCA is owned and managed by the San Juan National Forest. Leased land is adjacent for the Durango Mountain Resort ski area.

Management Comments: Current management practices maintain the elements in this PCA, however, impacts from grazing and recreation may need to be evaluated.

Soils Description: Sampled soil texture is sandy clay loam with mottling and oxidized root channels in the upper horizon. Typically, soils of this community type have organic matter or peat soils in the upper horizon.

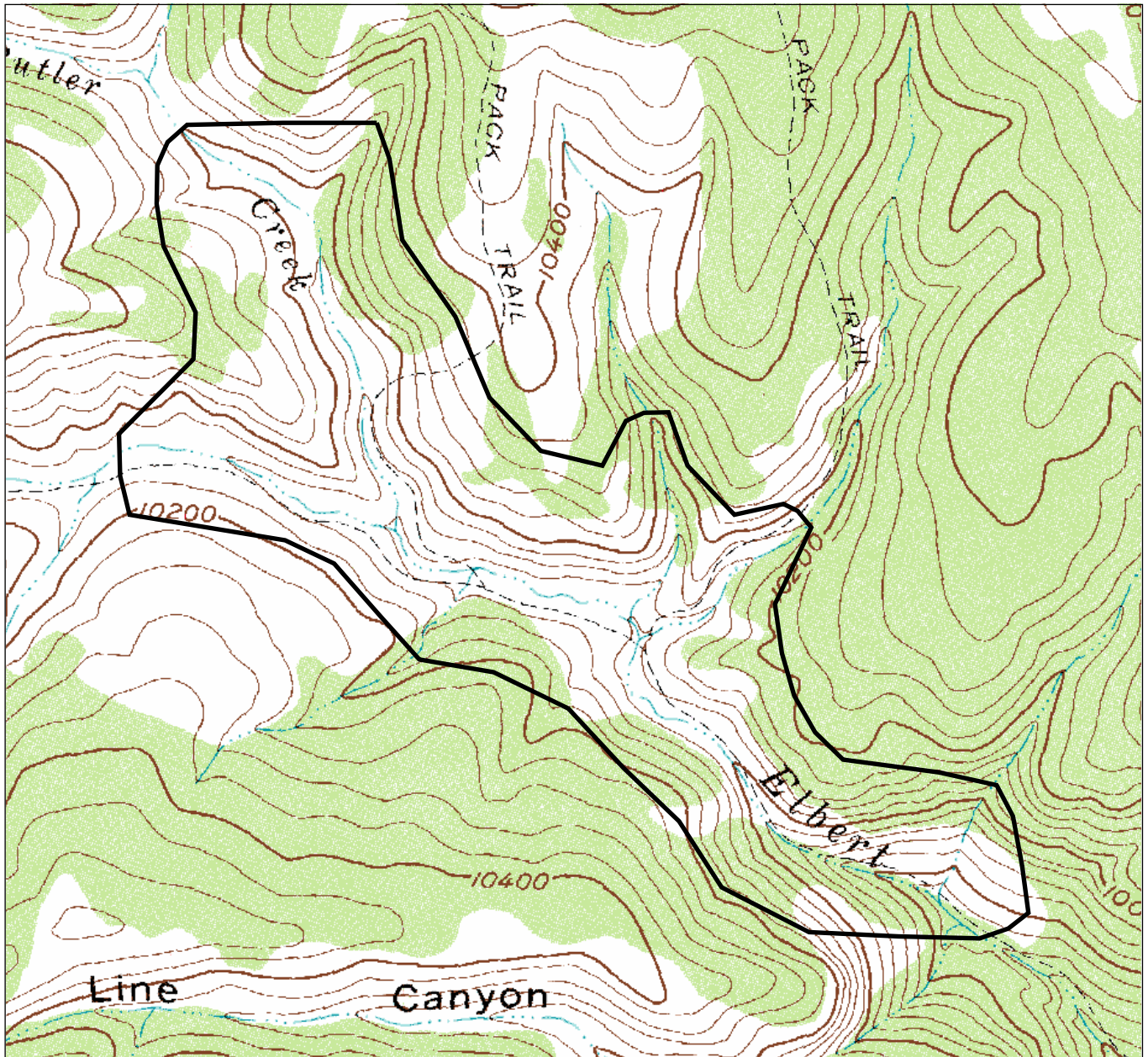
Restoration Potential: The site is functioning as expected. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the title PCA:
Proposed HGM Class: Riverine **Subclass:** R1
Cowardin System: Palustrine
CNHP's Wetland Classification: *Salix planifolia* / *Carex utriculata*

Table 52. Wetland functional assessment for the riverine wetland at the Upper Elbert Creek PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	Small headwater stream with little inputs. Willow carr with dense graminoid vegetation for attenuation. Some steep cut banks limit function.
Sediment/Shoreline Stabilization	Moderate	Dense woody vegetation along stream stabilizes banks. Some rivulets and sediment trapping. Cattle caused erosion limits function in some areas.
Groundwater Discharge/Recharge	Yes	Broad wetland with constricted outlet with some coarse soils indicates possible recharge.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	Dense vegetation with a fair amount of detritus indicate normal function. This function may be threatened by cattle induced erosion (bare soil and upland grasses encroaching).
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	Small streams in high elevation with low inputs and moderate to heavy grazing impacts indicate moderate function.
Biological Functions		
Habitat Diversity	Low	Area supports one Cowardin class: Scrub-shrub wetland.
General Wildlife Habitat	High	Willow carr offers browse and cover for a variety of wildlife. Deer sign noted.
General Fish/Aquatic Habitat	Low	No fish were observed, habitat is limited for fishes.
Production Export/Food Chain Support	Moderate	Willows line the stream, though the banks are incised in some areas. Spring run off exports carbons downstream.
Uniqueness	Moderate	Site supports a G3G4 S2 plant community.

Figure 32. Upper Elbert Creek Potential Conservation Area, B3: High Biodiversity Significance



0.1 0 0.1 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

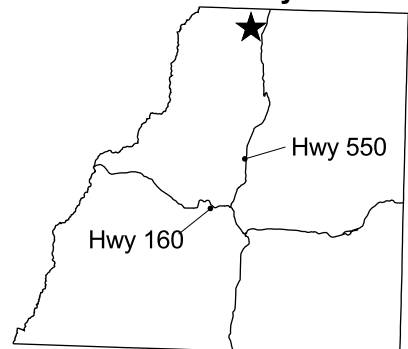
Electra Lake, 37107-E7
 7.5 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Upper Hermosa Creek PCA

Biodiversity Rank: B3. High Biodiversity Significance. The site is drawn for a good occurrence of a globally vulnerable montane riparian forest.

Protection Urgency Rank: P3. Protection actions may be needed, but probably not within the next 5 years. It is estimated that stresses may reduce the viability of the elements within the site if protection action is not taken. The Potential Conservation Area is located on USFS land with private in-holdings. There is currently no special protection for the area.

Management Urgency Rank: M3. New management actions may be needed within five years to maintain the current quality of the riparian wetland. Dispersed campsites are located throughout the floodplain and have the potential to negatively impact the riparian vegetation. There are several active mining claims located at the headwaters. If developed, these claims could also have a deleterious effect on the occurrence.

Location: San Juan and La Plata counties, about seven miles west of Durango Mountain Resort

U.S.G.S. 7.5-min. quadrangles: Hermosa Peak

Legal Description: T40N R9W Sections 19, 20, 30; T40N R10W Sections 25, 36;
T39N R10W Sections 1, 2, 11, 13, 14, 23, 24,

Elevation: 8,900ft. to 11,400ft.

Size: Approximately 60 acres

Redders, 2003, Community Type: Evergreen Forests: *Picea pungens*/*Alnus incana*

General Description: The Upper Hermosa Creek PCA is located in a scenic, riparian corridor in southern San Juan County. The narrow valley flows through Precambrian rock between the Rico Mountains to the west and Graysill and Engineer Mountains to the east. Hermosa Creek headwaters start at the boundary of Dolores and San Juan counties near Bolam Pass. The creek is fed by several tributaries that include Hotel Draw, Grassy, Corral, Black and Petty Creeks.

Soils of the PCA are a complex of deep and shallow well drained soils derived from redbed sandstone and shale and rhyolite. They are mapped as Haviland-Needleton complex, 30 to 60 percent slopes; Graysill-Scotch complex, 30 to 60 percent slopes; and Hourglass-Wander complex, 5 to 30 percent slopes (USDA 2003).

Vegetation in the riparian corridor is dominated by blue spruce (*Picea pungens*) with thinleaf alder (*Alnus incana*), Drummond's willow (*Salix drummondiana*), and Rocky Mountain willow (*Salix monticola*). Other common species in the riparian zone include elderberry (*Sambucus racemosa*), meadowrue (*Thalictrum fendleri*), chokecherry (*Prunus virginiana*) and Richardson's geranium (*Geranium richardsonii*). Many springs feed the creek in the upper sections, and support small, mossy wetlands. The drier slopes are dominated by Engelmann spruce (*Picea engelmannii*). The Graysill Mine is located near the headwaters but is currently inactive and serves as a historic landmark.

Biodiversity Rank Justification and Comments: The Upper Hermosa Creek PCA supports a good (B ranked) occurrence of montane forests dominated by blue spruce and thinleaf alder. This plant community is considered globally vulnerable (G3).

Table 53. Natural Heritage element occurrences at Upper Hermosa Creek PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Picea pungens/Alnus incana</i>	Montane forests	G3	S3		B

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

Boundary Justification: The boundary is drawn to include the Hermosa Creek floodplain from its headwaters near Bolam Pass to Hermosa Park. The boundaries incorporate an area that will allow natural hydrological processes such as seasonal flooding, sediment deposition, and new channel formation to maintain a healthy montane forest community. It should be noted that the hydrological processes necessary to the riparian elements are not fully contained by the site boundaries. Any upstream activities such as water diversions, impoundments, and mining development could potentially be detrimental to the riparian forest. This boundary indicates the minimum area that should be considered for any conservation management plan.

Protection Comments: Protection actions may be needed, but probably not within the next 5 years. The PCA is located on the San Juan National Forest, with private in-holdings. There is currently no special protection for the area.

Management Comments: Dispersed campsites are located throughout the floodplain. There are several active mining claims located at the headwaters. These activities have the potential to have negative effects on the riparian plant community.

This is the only part of San Juan County where cattle grazing was observed, and it has altered some areas, particularly in the southern part of the PCA. Non-native plants observed include Canada thistle (*Cirsium arvense*), common dandelion (*Taraxacum officinale*) and meadow timothy (*Phleum pratense*).

Soils Description: Soils are rocky, derived from alluvial outwash. Texture is sandy with large gravel.

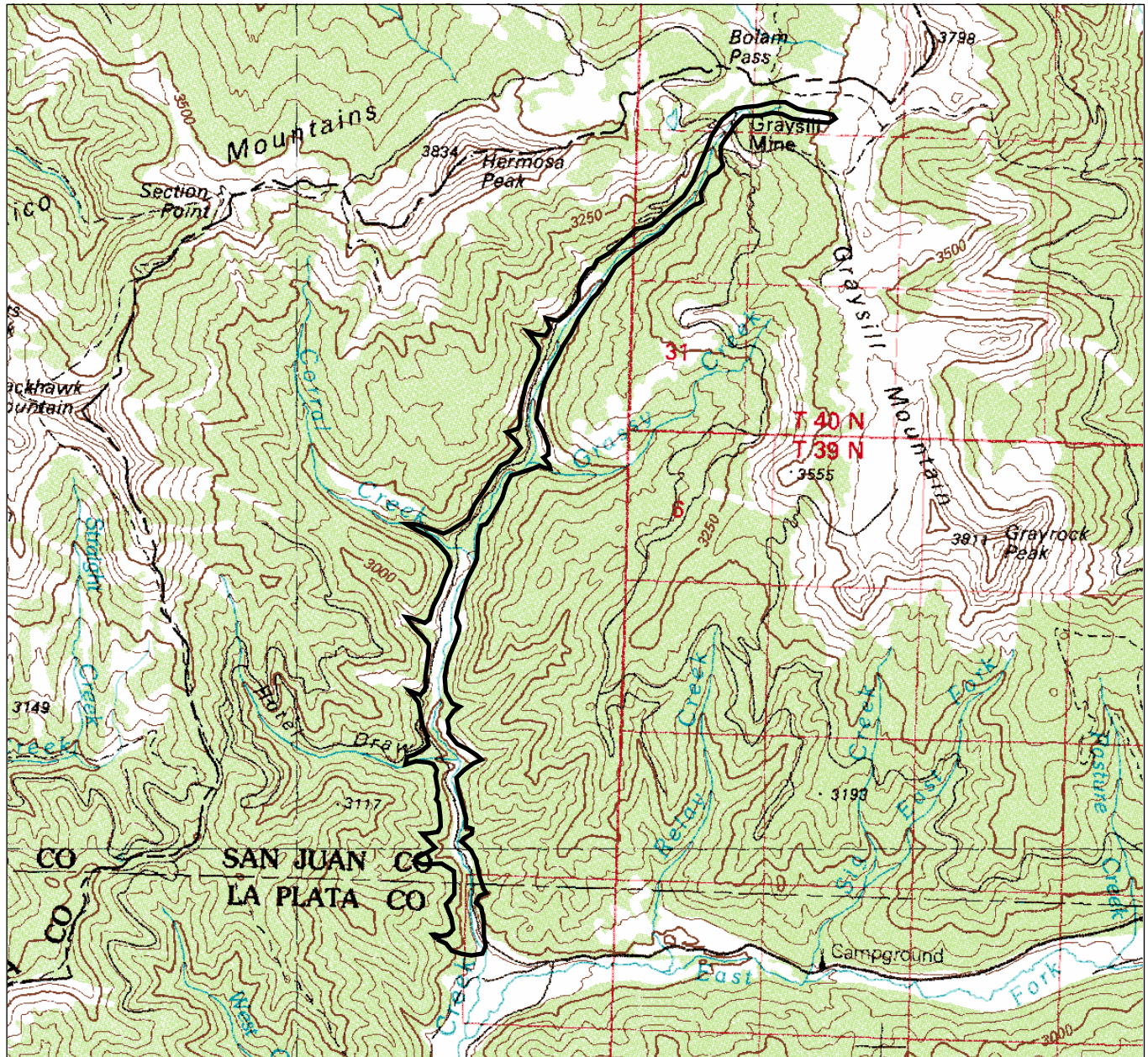
Restoration Potential: The site is functioning as expected. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the title PCA:
Proposed HGM Class: Riverine **Subclass:** R2
Cowardin System: Palustrine
CNHP's Wetland Classification: *Picea pungens/Alnus incana*


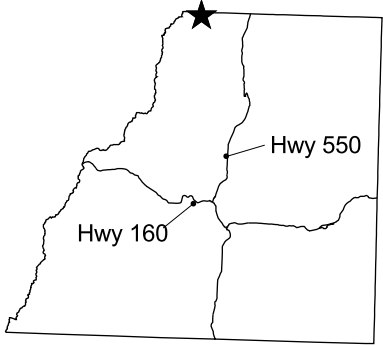
Table 54. Wetland functional assessment for the riverine wetland at the Upper Hermosa Creek PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland is functioning at potential.
Hydrological Functions		
Flood Attenuation and Storage	High	The wetland is large > 20 acres, vegetation is dense, presence of microtopography, presence of ponds, sloughs, and pools, low to moderate gradient
Sediment/Shoreline Stabilization	High	Hermosa Creek is moderately vegetated with shrubs and herbaceous species, some evidence of bank erosion due to recreational and grazing activity
Groundwater Discharge/Recharge	High	Several springs observed.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	Wetland is located in the mineral belt of the San Juan Mountains, and therefore is naturally acidic; however because of current and past mining activities the acidity has probably increased due to leaching from tailing piles.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	Wetland does not contain peaty soils, high flushing due to flooding.
Biological Functions		
Habitat Diversity	Moderate	Wetland supports 2 Cowardin Classes
General Wildlife Habitat	High	Deer and elk sign
General Fish/Aquatic Habitat	High	Native and non-native fish observed.
Production Export/Food Chain Support	High	Wetland receives flushing of organic material, nutrients, supports overhanging vegetation, outlet for flushing flows.
Uniqueness	Moderate	Wetland type is common, but the plant community is globally rare.

Figure 33. Upper Hermosa Creek Potential Conservation Area, B3: High Biodiversity Significance



0.5 0 0.5 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Silverton, 37107-E1 30x60 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	--	--

Vallecito Creek - Johnson Creek PCA

Biodiversity Rank: B3: High biodiversity significance. The PCA supports an excellent example of a globally imperiled (G2G3) montane riparian forest, an excellent (A ranked) example of a globally vulnerable (G3) montane riparian forest, a good example (B ranked) of a globally vulnerable (G3) montane forest and excellent (A ranked) examples of two globally secure (G4) montane riparian forests. The site also contains a good example (B ranked) of a state rare (G5 S1) plant and a good example (B ranked) of a state imperiled (G4 S2) plant and an existing record (E – extant) of a state rare (G5 S1S2) plant.

Protection Urgency Rank: P4: No threat is known for the foreseeable future. The site is within the San Juan National Forest and the Weminuche Wilderness.

Management Urgency Rank: M2: New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA. Non-native species are prevalent in high impact areas. The area receives heavy recreation including horse use.

Location: The Vallecito Creek PCA surrounds the Vallecito Creek north of Vallecito Reservoir to the confluence with Johnson Creek.

U.S.G.S. 7.5-min. quadrangles: Vallecito Reservoir; Columbine Pass

Legal Description: T37N R6W Section 3, 4, 5, 8, 9, 16, 17, 29

T38N R6W Section 15, 16, 21, 22, 27, 28, 32, 33, 34, 9, 4, 5

Elevation: 8,800 – 9,600 ft.

Size: Approximately 4,050 acres

Redders, 2003, Community Type: Evergreen Forests: *Picea engelmannii* – *Abies lasiocarpa* / *Alnus incana*; *Picea engelmannii* – *Abies lasiocarpa* / *Salix drummondiana*; *Picea pungens* / *Alnus incana*.

General Description: This PCA encompasses an eight mile stretch of Vallecito Creek above the Vallecito Reservoir, and 4.5 miles of its tributary, Johnson Creek. The mixed montane forest along Vallecito Creek contains a mosaic of plant communities, depending on environmental variables such as slope, aspect, and moisture. Dominant trees include white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), blue spruce (*Picea pungens*), Engelmann spruce, subalpine fir, and aspen (*Populus tremuloides*). The site contains very lush riparian communities with many species of ferns, including New Mexican cliff fern (*Woodsia neomexicana*), maidenhair spleenwort (*Asplenium trichomanes*), northern hollyfern (*Polystichum lonchitis*), brittle fern (*Cystopteris fragilis*), American rock-brake (*Cryptogramma acrostichoides*), bracken fern (*Pteridium aquilinum* var. *pubescens*) and Western polypody (*Polypodium hesperium*). Granite outcrops provide crevices where several ferns that are rare in Colorado are found.

Johnson Creek extends from its headwaters at two alpine lakes, Columbine and Hazel, at over 12,000 ft., and joins Vallecito Creek at 9,200 ft. On its five-mile journey it passes through alpine tundra and moist subalpine forests. Several spectacular waterfalls are found along its route and were surveyed for black swifts, although no nests were located. A trail open to foot and horse travel follows the stream to Columbine Lake and continues west to Chicago Basin and the Animas River.

Barren scree slopes above Johnson Creek at timberline are home to a state rare plant, Altai chick weed (*Stellaria irrigua*), which grows with a few other species including Colorado ragwort (*Senecio soldanella*), American rock-brake (*Cryptogramma acrostichoides*), three-toothed groundsel (*Senecio tridenticulata*), silky phacelia (*Phacelia sericea*), brittle fern (*Cystopteris fragilis*), and false strawberry (*Sibbaldia procumbens*).

Biodiversity Rank Justification and Comments: The rank of this PCA is based on an excellent (A ranked) occurrence of a montane forest community that is considered globally vulnerable (G3). The site also contains excellent occurrences of three globally common riparian communities. Subalpine fir – Engelmann spruce / Drummond willow and Subalpine fir – Engelmann spruce / thinleaf alder plant associations occur in heavily forested stream channels where Engelmann spruce and subalpine fir are also the forest type on adjacent hillslopes. These associations are thought to be late-seral and long lived.

Subalpine fir – Engelmann spruce / Drummond willow occupies more territory than the Subalpine fir – Engelmann spruce / thinleaf alder association in the Vallecito Creek drainage.

There are two good occurrences of subalpine fir/Carolina tasselrue (*Trautvetteria caroliniensis*) forest. Until recently this association was known only from the northwestern U. S., in Washington, Oregon and Idaho, where it is considered vulnerable. Six plants that are rare in Colorado (S1 and S2) also are found within the PCA. There are good (B ranked) occurrences of New Mexico cliff fern (*Woodsia neomexicana*), birdbill dayflower (*Commelina dianthifolia*), and Altai chickweed (*Stellaria irrigua*); a fair (C) occurrence of showy whitlow-grass (since watchlisted), and unranked occurrences of western polypody (*Polypodium hesperium*) and hoary willow (*Salix candida*). The willow was documented in 1985, and was searched for but not found in 2003.

This site also supports a large riparian mosaic of two globally secure (G5) plant communities in excellent (A ranked) condition. Subalpine fir – Engelmann spruce / Drummond willow and Subalpine fir – Engelmann spruce / thinleaf alder plant associations occur in heavily forested stream channels where Engelmann spruce and subalpine fir are also the forest type on adjacent hillslopes. These associations are thought to be late-seral and long lived. Subalpine fir – Engelmann spruce / Drummond willow occupies more territory than the Subalpine fir – Engelmann spruce / thinleaf alder association in the Vallecito Creek drainage.

Table 55. Natural Heritage element occurrences at Vallecito Creek and Johnson Creek PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Communities					
<i>Pseudotsuga menziesii/Paxistima myrisoides</i> ***	Douglas fir/Mountain lover montane forest				
<i>Picea pungens / Alnus incana</i>	Montane riparian forest	G3	S3		A
<i>Picea engelmannii/Trautvetteria caroliniensis</i>	Engelmann spruce/Carolina tasselrue montane forest	G3	S2?		B
<i>Salix drummondiana</i> / mesic forbs	Shortfruit willow / mesic forbs	G4	S4		A
<i>Abies lasiocarpa – Picea engelmannii / Salix drummondiana</i>	Subalpine fir – Engelmann spruce / Drummond willow	G5	S4		A
<i>Abies lasiocarpa – Picea engelmannii / Alnus incana</i>	Subalpine fir – Engelmann spruce / thinleaf alder	G5	S5		A
Plants					
<i>Woodsia neomexicana</i>	New Mexico cliff fern	G4	S2		B
<i>Polypodium hesperium</i>	Western polypody	G5	S1S2		E
<i>Commelina dianthifolia</i>	Birdbill dayflower	G5	S1		B
<i>Stellaria irrigua</i>	Altai chickweed	G4?	S2		B
<i>Draba spectabilis var. oxyloba</i> **	Showy whitlow grass	G3?T3Q	S3S4		C
<i>Salix candida</i>	Hoary willow	G5	S2		E

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

**Showy whitlow-grass has been placed on CNHP's watchlist.

***This community is not included the PCA in the CNHP database, as its full extent is not mapped. It is included in the table above to further characterize the upland vegetation of the PCA.

Boundary Justification: The boundary is drawn to encompass a mosaic of montane forest communities that occur in the Vallecito Creek drainage. A complex intermingling of these communities results from their positions relative to moisture and aspect. The boundary incorporates the areas that will allow the

natural hydrological processes to continue. Seasonal flooding will help maintain a viable population of the elements along Vallecito Creek. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: Except for the area around the Vallecito Campground, the site is entirely within the Weminuche Wilderness of the San Juan National Forest, and is afforded good protection by that designation.

Management Comments: Some non-native species are prevalent in the campground area and along the lower part of the trail. Most have not advanced away from disturbed areas. However, a few could pose problems in the future, notably houndstongue (*Cynoglossum officinale*) and Canada thistle (*Cirsium arvense*). Other weeds observed, mostly on the lower trail, were *Dactylis glomerata*, *Bromus inermis*, *Agropyrum cristatum*, *Carduus nutans*, *Melilotus officinalis*, *Poa pratensis*, *Trifolium pratense*, *Medicago sativa*, and *Bromus tectorum*. Strict enforcement of weed-free hay requirements would help to prevent the spread of these species into the wilderness.

Soils Description: Soils for this wetland type are typically shallow, mineral soils with large coarse alluvial material.

Restoration Potential: The site is functioning as expected. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the Vallecito Creek PCA:

Proposed HGM Class: Riverine

Subclass: R3/4

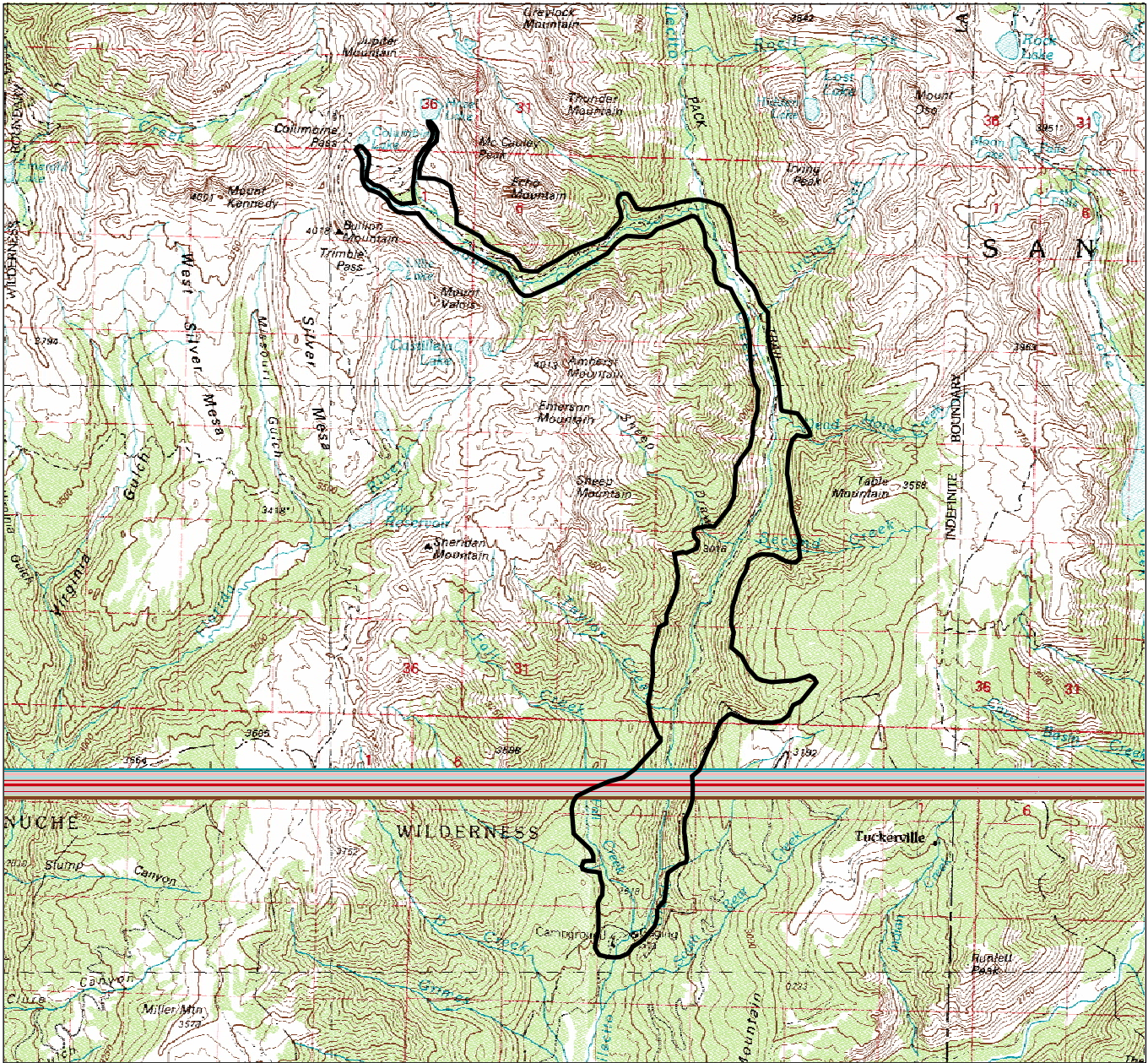
Cowardin System: Palustrine

CNHP's Wetland Classification: *Abies lasiocarpa* – *Picea engelmannii* / *Alnus incana*; *Abies lasiocarpa* – *Picea engelmannii* / *Salix drummondiana*; *Picea pungens* / *Alnus incana*


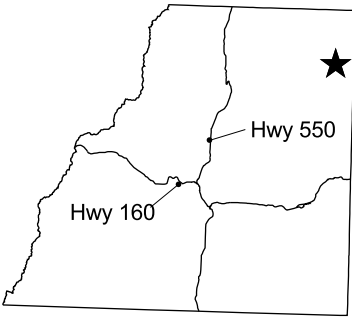
Table 56. Wetland functional assessment for the riverine wetland at the Vallecito Creek and Johnson Creek PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	High	This is a large watershed with 1 st order streams feeding the main stem. Gentle to steep gradients narrow to broad. Broad areas with willows can store run off.
Sediment/Shoreline Stabilization	High	Shoreline is stabilized by dense woody vegetation.
Groundwater Discharge/Recharge	Yes	Springs and seeps noted. Coarse alluvial soils indicate some recharge.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	Detritus and vigorous above ground growth indicate normal function for this wetland type.
Removal of Imported Nutrients, Toxicants, and Sediments.	Moderate	Dense, vigorous woody vegetation with localized areas of dense herbaceous layer indicate a moderate function. The flood plain opens in localized areas, otherwise the stream channel is straight with narrow riparian vegetation and shallow mineral soils.
Biological Functions		
Habitat Diversity	Moderate	The site contains two Cowardin classes (forested and scrub shrub wetland types).
General Wildlife Habitat	High	Extensive riparian mosaic with a high diversity shrubs provide much cover, browse, and nesting habitat for a variety of herbivores and birds.
General Fish/Aquatic Habitat	High	Habitat is available for fish.
Production Export/Food Chain Support	High	The densely vegetated area with overhanging shrubs supplies nutrients and carbon sources for invertebrates and fishes and downstream transport.
Uniqueness	High	The area supports a large riparian mosaic as well as a G2G3 montane forest and three state rare plants.

Figure 34. Vallecito Creek-Johnson Creek Potential Conservation Area, B3: High Biodiversity Significance



0.8 0 0.8 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Durango, 37107-A1 Silverton, 37107-E1 30x60 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey</p> <p>map created 2 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	---	--

Cascade Creek PCA

Biodiversity Rank: B4: Moderate biodiversity significance. The PCA has excellent occurrences of two plants that are imperiled in Colorado (S1).

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management appears to be successful.

Location: The Cascade Creek PCA is located in northern La Plata County, west of Durango Mountain Resort, and about 24 air miles north of Durango.

U.S.G.S. 7.5-min. quadrangles: Engineer Mountain and Electra Lake

LegalDescription: T39N R8W Sections 19, 30, 31; T39N R9W Section 24

Elevation: 8000 to 9200 feet

Size: Approximately 661 acres

General Description: The Cascade Creek PCA encompasses a section of Cascade Creek from about a mile from its confluence with the Animas River, upstream to Purgatory Flats. It includes the streamside and steep canyon walls, as well as level areas with small ponds. A pack trail provides access to the area from Highway 550 across from the Durango Mountain Resort. Wetlands in the northern part of the PCA support thousands of individuals of variegated scouring rush (*Hippochaete variegata*). Associated species include blue spruce (*Picea pungens*), Drummond's willow (*Salix drummondiana*), Rocky Mountain willow (*Salix monticola*), golden sedge (*Carex aurea*), cowbane (*Oxypolis fendleri*), horsetails (*Equisetum arvense*), bog orchid (*Habenaria hyperborea*), star gentian (*Swertia perennis*), fringed grass of Parnassus (*Parnassia fimbriata*), wintergreen (*Pyrola asarifolia*), twinberry honeysuckle (*Lonicera involucrata*), and black-eyed Susan (*Rudbeckia ampla*). New Mexico cliff ferns (*Woodsia neomexicana*) were found in crevices of large mossy boulders in both the northern and southern parts of the PCA. Much more habitat for the ferns that was not searched exists in the drainage. American spikenard (*Aralia racemosa*) was found in steep shaded areas in draws leading to the creek. Associated species in the riparian area included Rocky Mountain maple (*Acer glabrum*), twinberry honeysuckle (*Lonicera involucrata*), male fern (*Dryopteris felix-mas*, a fern that is infrequent in western Colorado), and serviceberry (*Amelanchier alnifolia*). Adjacent forested areas are dominated by Douglas fir (*Pseudotsuga menziesii*), with an understory of currant (*Ribes* sp.) and mountain lover (*Paxistima myrsinites*).

Biodiversity Rank Justification: The Cascade Creek PCA supports excellent (A ranked) occurrences of American spikenard (*Aralia racemosa*) and variegated scouring rush (*Hippochaete variegata*), two plants that are globally common (G4, G5) but very rare in Colorado (S1). *Aralia racemosa* is primarily known from the eastern states, and this is only one of two known locations of the species in Colorado. There is also a fair (C ranked) occurrence of New Mexican cliff fern (*Woodsia neomexicana*), a species that is globally common (G4) and rare in Colorado (S2).

Table #. Natural Heritage element occurrences at Cascade Creek PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Aralia racemosa</i>	American spikenard	G4G5	S1		A
<i>Hippochaete variegata</i>	Variegated scouring rush	G5	S1		A
<i>Woodsia neomexicana</i>	New Mexico cliff fern	G4	S2		C

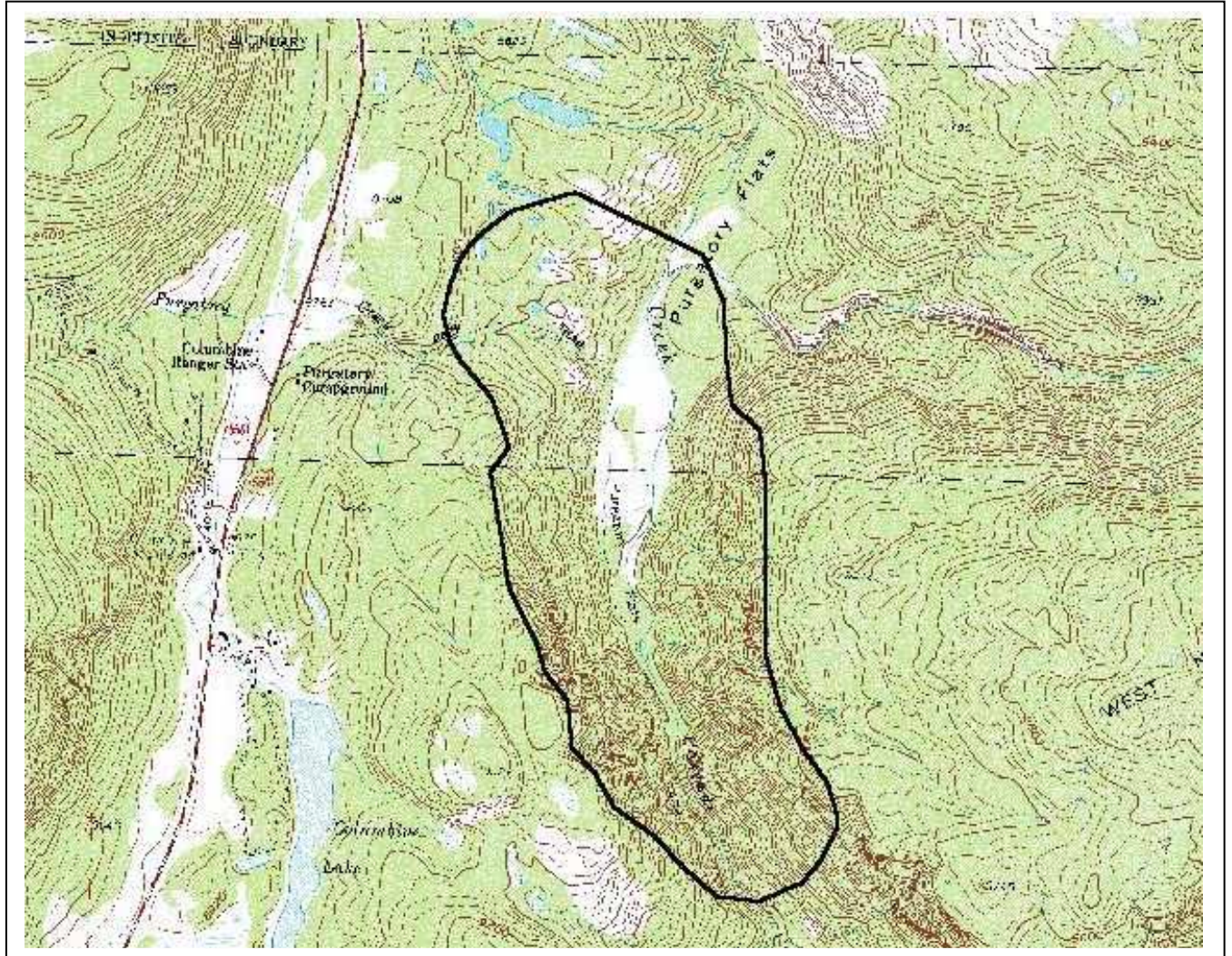
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary encompasses a section of Cascade Creek with rocky canyonsides that provides habitat for American spikenard and New Mexico cliff fern. It also includes a more level area with several small lakes that supports variegated scouring rush. A larger area may need to be considered for sustaining the hydrological setting of this PCA.

Protection Comments: The PCA is within the San Juan National Forest. Special designation as an area of botanical interest in the forest plan revision could afford protection for this unique area.

Management Comments: Although a public trail used by hikers and fishermen runs through the site, there does not appear to be any negative impact on the plant communities, and no exotic species were observed. Any alterations to the hydrology of the site, such as upstream water diversions, would be detrimental to the wetland plants. Periodic monitoring of rare plants to detect change in the overall quality of the occurrences would improve the ability to manage this site. Monitoring for weeds would allow early detection of invasive species.

Cascade Creek Potential Conservation Area. B4: Moderate Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



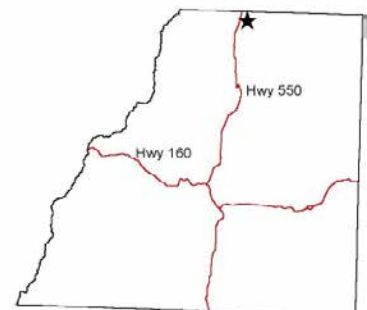
PCA Boundary

Electra Lake 37107-E7
 Engineer Mountain, 37107-F7

7.5 Minute Series

Digital Raster Graphics
 Produced by the U. S. Geological Survey
 Map created 10 April 2004

Location in Study Area



Endlich Mesa Basin PCA

Biodiversity Rank: B4: Moderate biodiversity significance. The PCA has an excellent occurrence of a plant that is very rare (S1) in Colorado.

Protection Urgency Rank: P5: Land protection is adequate. The PCA is located in the Weminuche Wilderness.

Management Urgency Rank: M5: No management needs are known.

Location: The Endlich Mesa Basin PCA is located in northeastern La Plata County, in the Weminuche Wilderness, about 20 miles northeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Columbine Pass

Legal Description: T38N R07W Sections: 34, 35; T37N R07W Sections 1, 2

Elevation: 11,760ft to 12,080ft

Size: Approximately 130 acres

General Description: The PCA comprises a peat bog on a glaciated mountain slope, located above timberline in a pristine basin. Vegetation is dominated by water sedge (*Carex aquatilis*). Other plants at the site include tufted hairgrass (*Deschampsia cespitosa*), tall cottongrass (*Eriophorum angustifolium*), Parry's primrose (*Primula parryi*), silvery sedge (*Carex canescens*), elephant head lousewort (*Pedicularis groenlandica*), and marsh marigold (*Caltha leptosepala*). Soils consist of 26 cm. of organic soil over mollic soils.

Biodiversity Rank Justification and comments: The biodiversity rank for the PCA is based on an excellent (A-ranked) occurrence of a plant that is globally secure (G5), but rare in Colorado (S1). Originally identified as Altai cottongrass (*Eriophorum altaicum* ssp. *neogaeum*), the specimen collected in 1995 was annotated to *E. chamissonis* in 2001. This species is known from the northern states, and Canada, with only five occurrences known in Colorado.

Table #. Natural Heritage element occurrences at Endlich Mesa Basin PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Eriophorum chamissonis</i>	Russet cottongrass	G5	S1	FS	A

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

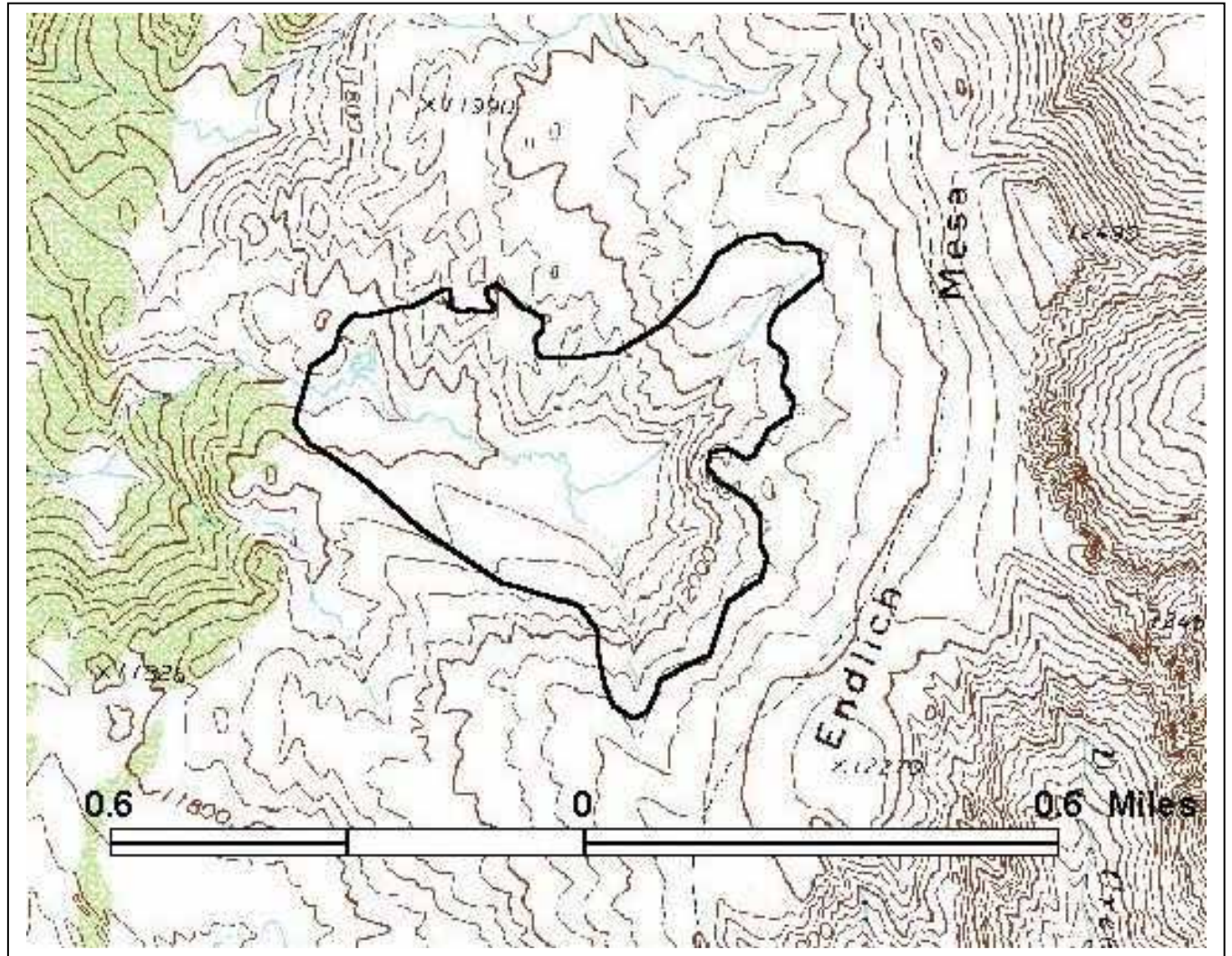
*EO=Element Occurrence.

Boundary Justification: This site includes the occurrence and a buffer of similar habitat. Limiting direct impacts such as trampling or erosion within this area would help to maintain the quality of the plant occurrence. The hydrology of the site is important to the element and should be considered during any modifications in the watershed.

Protection Comments: The PCA is U. S. Forest Service land within a Wilderness Area.

Management Comments: The PCA has no serious management needs known or anticipated. The area is well protected and away from activity.

Endlich Mesa Basin Potential Conservation Area. B4: Moderate Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Columbine Pass, 37107-E5
7.5 Minute Series

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

Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Los Pinos at Bayfield South

Biodiversity Rank: B4. Moderate biodiversity significance. The site contains a globally vulnerable (G3) plant community in fair (C ranked) condition.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The PCA is owned by the Southern Ute Indian Tribe and private landowners.

Management Urgency Rank: M1. Management actions may be required within one year or the element occurrences could be lost or irretrievably degraded. Altered hydrology, agricultural impacts and weed invasion are the main threats.

Location: This site is located south of Bayfield in a broad area along the Pine River.

U.S.G.S. 7.5-min. quadrangles: Bayfield

Legal Description: T34N R7W Section 3U, 10U, 11, 13, 14U, 15U, 22, 23

Elevation: 6850ft.

Size: Approximately 1,113 acres

Redders, 2003, Community Type: Deciduous Forest: *Populus angustifolia* / *Crataegus rivularis* and Other Shrublands: *Betula occidentalis* / mesic graminoids

General Description: This PCA is in a broad river valley with mature trees and shrubs covering a large area with an open canopy. Old oxbows and backwater sloughs are found adjacent to the river channel, receiving intermittent water and supporting sedges and rushes, some drier with upland species encroaching. Smaller river channels divide from the main stem, irrigating the riparian woodland. Cattle were noted on the west side of the river's main channel. Most of the site is owned by the Southern Ute Indian Tribe, where the tribe provides a fishing access. Los Pinos River is dammed upstream (Vallecito Reservoir) and serves the agricultural area via multiple ditch diversions, from the reservoir to the county line.

The open forest canopy is dominated by narrowleaf cottonwood (*Populus angustifolia*), with associated traces of ponderosa pine (*Pinus ponderosa*) and blue spruce (*Picea pungens*). Cottonwood regeneration is sparse. The shrub layer is more dense and is dominated by river birch (*Betula occidentalis*) and associated species, river hawthorn (*Crataegus rivularis*) occurs on more dry ground. The understory is sparse to moderate with a weedy composition (hounds tongue, Canada thistle, oxeye daisy, musk thistle, mullein) mixed with introduced grasses and few native graminoids. Emergent wetlands may have been more prominent in the past. Bald eagles (*Haliaeetus leucocephalus*) are known to occur in the area.

Biodiversity Rank Justification and Comments: The area supports the globally vulnerable (G3) narrowleaf cottonwood / river birch (*Populus angustifolia* / *Betula occidentalis*) plant community in fair condition. This association is considered to be early- to mid-seral. River birch occupies river banks with perennial flow and typically well aerated soils. The shrub layer can become so dense that cottonwood regeneration is affected and eventually the community may change to a river birch shrubland (Carsey et al. 2003). This site contains a more open canopy with some conifers situated in the riparian area as well. This association occurs in Colorado, Idaho, Nevada, Utah and Wyoming. It is uncommon, but occurs locally throughout its range (Nature Serve Explorer 2003).

Weeds and bank erosion have apparently increased since riparian survey in 1998 by CNHP where the condition rank of this stand has dropped from a B ranked occurrence (good viability) to a C ranked occurrence (fair viability).

Table 58. Natural Heritage element occurrences at Los Pinos at Bayfield South PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia</i> / <i>Betula occidentalis</i>	Narrowleaf cottonwood / river birch	G3	S2		C

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the natural hydrological processes from surrounding drainages as possible. Seasonal flooding and sediment deposition will help maintain a viable population of the element along Los Pinos River. The boundaries also provide a small buffer from nearby trails, roads and hay fields where heavy disturbance that causes erosion may contribute to excessive sediment deposition, elevated nutrient levels and weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries

Protection Comments: The Southern Ute Indian Tribe owns most of the area in the PCA. Other parts are privately owned. There is a gravel pit adjacent the PCA and a reclaimed gravel pit at the southern end, now an emergent wetland. Education regarding riparian ecology may encourage volunteer efforts toward conservation land practices. Placement of a conservation easement is one action that contributes to lasting conservation and may have benefits for the landowner.

Management Comments: Although the elements are surviving with currently altered hydrology, any more diversions or impoundments may negatively affect the elements. Weed control is strongly suggested. To help facilitate weed control and mitigate erosion and draining of backwater channels, it is strongly suggested to evaluate and improve grazing practices within the riparian area.

Soils Description: The Soil Survey of La Plata County Area, Colorado (USDA 1988) delineates most of the PCA site as Pescar fine sandy loam classified as coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Aquic Ustifluent.

Restoration Potential: Restoration opportunities include weed eradication and monitoring. Oxeye daisy, Canada thistle, musk thistle, mullein and hounds tongue are common throughout the PCA. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species. Given the elevation and position of the PCA, continual monitoring for exotic species is suggested to help eliminate the danger of invasion of tamarisk or Russian olive. No exotic shrubs were seen within the site in 2003, but are known to occur downstream.

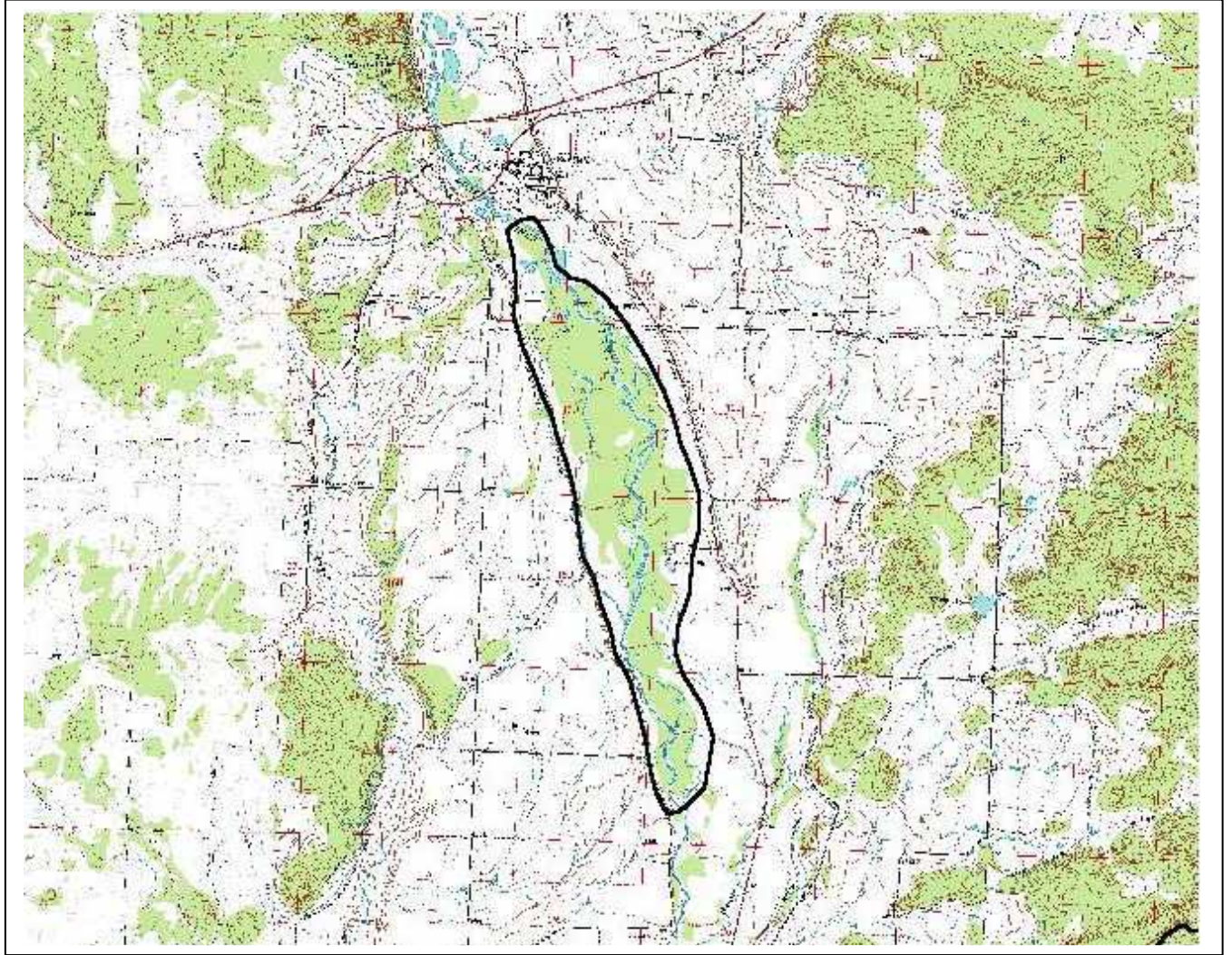
Wetland enhancement is an opportunity in this area where old back water sloughs provide shallow swales adjacent with the active river channel.

Wetland Functional Assessment for the Los Pinos at Bayfield South PCA:
Proposed HGM Class: Riverine **Subclass:** R3/4
Cowardin System: Palustrine
CNHP's Wetland Classification: *Populus angustifolia* / *Betula occidentalis*

Table 59. Wetland functional assessment for the riverine wetland at the Los Pinos at Bayfield South PCA.

Function	Rating	Comments
Overall Functional Integrity	Below Potential	This wetland appears to be functioning below its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	Riparian forest with large areas of sparse vegetation. The reach has little meanders, but islands and minor braiding, old backwater sloughs.
Sediment/Shoreline Stabilization	Low	River reach is wide and straight with eroding banks and cattle impact.
Groundwater Discharge/Recharge	Yes	Alluvial substrate indicates possible recharge with coarse material and somewhat poorly drained soils.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Disrupted	Agricultural run off and altered hydrology disrupt this function.
Removal of Imported Nutrients, Toxicants, and Sediments.	Low	Chanellized stream reach inhibits the amount of area for dense native vegetation, which perform this function. There are few signs of sediment trapping.
Biological Functions		
Habitat Diversity	Low	This riparian area supports a forested wetland and mesic meadows.
General Wildlife Habitat	High	The area supports waterfowl, songbirds, deer and elk.
General Fish/Aquatic Habitat	Moderate	The area is a popular fishing access provided by the Southern Ute Indian Tribe. Enhanced river morphology could increase aquatic habitat and restore emergent wetlands.
Production Export/Food Chain Support	Moderate	The dense shrub layer overhangs in places with moderate flushing flows supplies nutrients and carbon sources for invertebrates and fishes and downstream transport. High water is altered by dam upstream.
Uniqueness	Moderate	Although the wetland class is common, the PCA supports a G3 plant association.

Los Pinos at Bayfield South PCA B4: Moderate Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Bayfield 37107-B5
Gem Village 37107_B6

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Lower La Plata River PCA

Biodiversity Rank: B4: Moderate biodiversity significance. The PCA supports an unranked (E) occurrence of a globally vulnerable (G3) fish.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M2: New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA.

Location: The Lower La Plata River PCA is located in southern La Plata County, near the New Mexico border, about 20 air miles southwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Redmesa
 Legal Description: T33N R12W Sections 29-34; T33N R13W Sections 1, 2 and 10.

Elevation: 6000 to 6400 feet

Size: Approximately 4562 acres

General Description: The Lower La Plata River PCA includes the river and its floodplains, along with the immediate side slopes. The area is fairly level. Highway 140 runs through the site. The area is heavily developed for oil and gas production, with numerous wells, well pads and access roads throughout the site. Vegetation is primarily dry land agriculture, with some irrigated areas in the south. Adjacent slopes are pinyon-juniper woodlands, with some sagebrush shrubland. Ownership is mostly private land within the Southern Ute Indian Reservation. Although not monitored regularly, the chub are believed to be extant but declining in the river (Japhet 2004, pers. comm.). The La Plata River will often disappear south of Hesperus in middle to late summer. Some argue that this river has historically been ephemeral; however its natural flow is significantly altered by multiple ditch diversions for the largely agricultural area, such as Hay Gulch, and small impoundments such as the Mormon Reservoir. (See Middle La Plata River PCA for more details).

Biodiversity Rank Justification: The PCA supports an unranked (E) occurrence of roundtail chub, a globally vulnerable (G3) fish.

Table #. Natural Heritage element occurrences at Lower La Plata River PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Gila robusta</i>	Roundtail chub	G3	S2	FS	E

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

Boundary Justification: The boundary is drawn to include the stretch of the La Plata River where roundtail chubs have been documented, as well as the floodplain and some of the immediate side slopes that contribute to the quality of water in the river. It does not include all of the upland areas that contribute to maintaining water levels required for the fish. Any project that affects surface or ground water hydrology in the basin has the potential to affect the chub.

Protection Comments: The site is mostly on private land within the Southern Ute Indian Reservation.

Management Comments: Roundtail chubs are believed to be declining in the La Plata River (Japhet, pers. comm. 2003) This may be partly because of recent drought. The species was nearly lost because of low water levels in 2003 (Japhet, pers. comm. 2003). Other threats to Roundtail chub include interactions of watershed changes, such as reductions in suitable habitat due to impoundment, channel downcutting,

substrate sedimentation, water diversion, and groundwater pumping, with the invasion of non-native predatory and competitive species. About 75 roundtail chubs were removed from the La Plata River in 2003, and will be used as brood stock to re-populate the river (Japhet, pers. comm.) Restoring a natural flow regime to the La Plata River would benefit roundtail chubs.

Mitchell Lakes PCA

Biodiversity Rank: B4. Moderate biodiversity significance. This PCA contains an apparently globally secure (G4) herbaceous vegetation wetland in fair (B ranked) condition.

Protection Urgency Rank: P2. Protection action may be needed within 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA within this approximate timeframe. There is a private inholding within the PCA where home and road development is a possibility.

Management Urgency Rank: M3. New management action may be needed within 5 years to maintain current quality of the element occurrence in the PCA. Improper grazing and weed invasion are the main threats.

Location: The Mitchell Lakes PCA is located about three air miles north of Hermosa.

U.S.G.S. 7.5-min. quadrangles: Hermosa
 Legal Description: T37N R9W Section 23

Elevation: 8,576 ft.

Size: 283 acres

Redders, 2003, Community Type: Not Applicable: there are no classifications that fit the high density of bulrush in this publication.

General Description: Mitchell Lakes occur on a broad, flat area within the mountain range that stretches northward, eventually forming the Hermosa Cliffs and the east side of the Hermosa Creek drainage. The lake area occurs in a flat to sloping bowl with higher benches on three sides. It consists of a series of at least three isolated depressions with ephemeral to year round water input, supporting either wetland plants or mesic meadows depending on water availability. The northern most area supports a depression wetland dominated by bulrush (*Schoenoplectus acutus*). This pond appears to have a consistent water supply. There is a small open water area adjacent the solid stand of bulrush with aquatic vegetation including great bladderwort (*Utricularia macrorhiza*), pondweed (*Potamogeton* sp.) and water plantain (*Alisma triviale*). Water input is thought to be from precipitation, sheetflow and groundwater.

Uplands consist of ponderosa pine (*Pinus ponderosa*) forests with juniper (*Juniperus scopulorum*) and Gambel oak (*Quercus gambelii*). Meadows surrounding the lakes are weedy, including mullein, hound's tongue, butter and eggs and Canada thistle.

The southern two depressions comprising Mitchell Lakes is in a private inholding within the San Juan National Forest. A portion of the bulrush-dominated pond is within the private property and was not surveyed.

Biodiversity Rank Justification and Comments: This PCA supports a globally vulnerable (G3) plant community in fair (C) condition. The hardstem bulrush – softstem bulrush plant community is usually found in small patches below 10,000 feet. This community is threatened by development, agricultural conversion, stream flow alterations, and wetland filling activities. Hardstem bulrush (*Schoenoplectus acutus* var. *acutus*) stands are important to wildlife for habitat -- especially birds for nesting and cover (Rondeau 2001).

Table 60. Natural Heritage element occurrences at Mitchell Lakes PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Schoenoplectus acutus</i> var. <i>acutus</i> – <i>Schoenoplectus tabernaemontani</i>	Hardstem bulrush – softstem bulrush	G4	S2S3		B

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. The boundaries also provide a small buffer from nearby trails, roads and grazing fields where heavy disturbance that causes erosion may contribute to excessive sediment deposition, elevated nutrient levels and weed invasion. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: There is a private inholding claiming a large portion of the Mitchell Lakes area. It is otherwise surrounded by San Juan National Forest. Permission to survey private property was denied. Further conversation with property owner indicates possible home development in the future.

Management Comments: The uplands surrounding Mitchell Lakes contain a high density of weed composition including mullein, houndstongue, butter and eggs and Canada thistle. It is suggested to evaluate the current grazing practices in the area. Sign of current grazing was moderate, however there are indications of heavy grazing in the past. The most common threats to hardstem bulrush – softstem bulrush plant community are development, agricultural conversion, stream flow alterations, and wetland filling activities (Rondeau 2001).

Soils Description: Soils sampled are saturated gleyed clay. Soils of this association are typically deep heavy clays and silty loams with a high organic matter content and are usually saturated for most of the growing season (Carsey *et al.* 2002).

Restoration Potential: Restoration opportunities include weed eradication and monitoring. Canada thistle, mullein, houndstongue, and butter and eggs are common on the uplands. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Wetland Functional Assessment for the Mitchell Lakes PCA:

Proposed HGM Class: Riverine

Subclass: D1

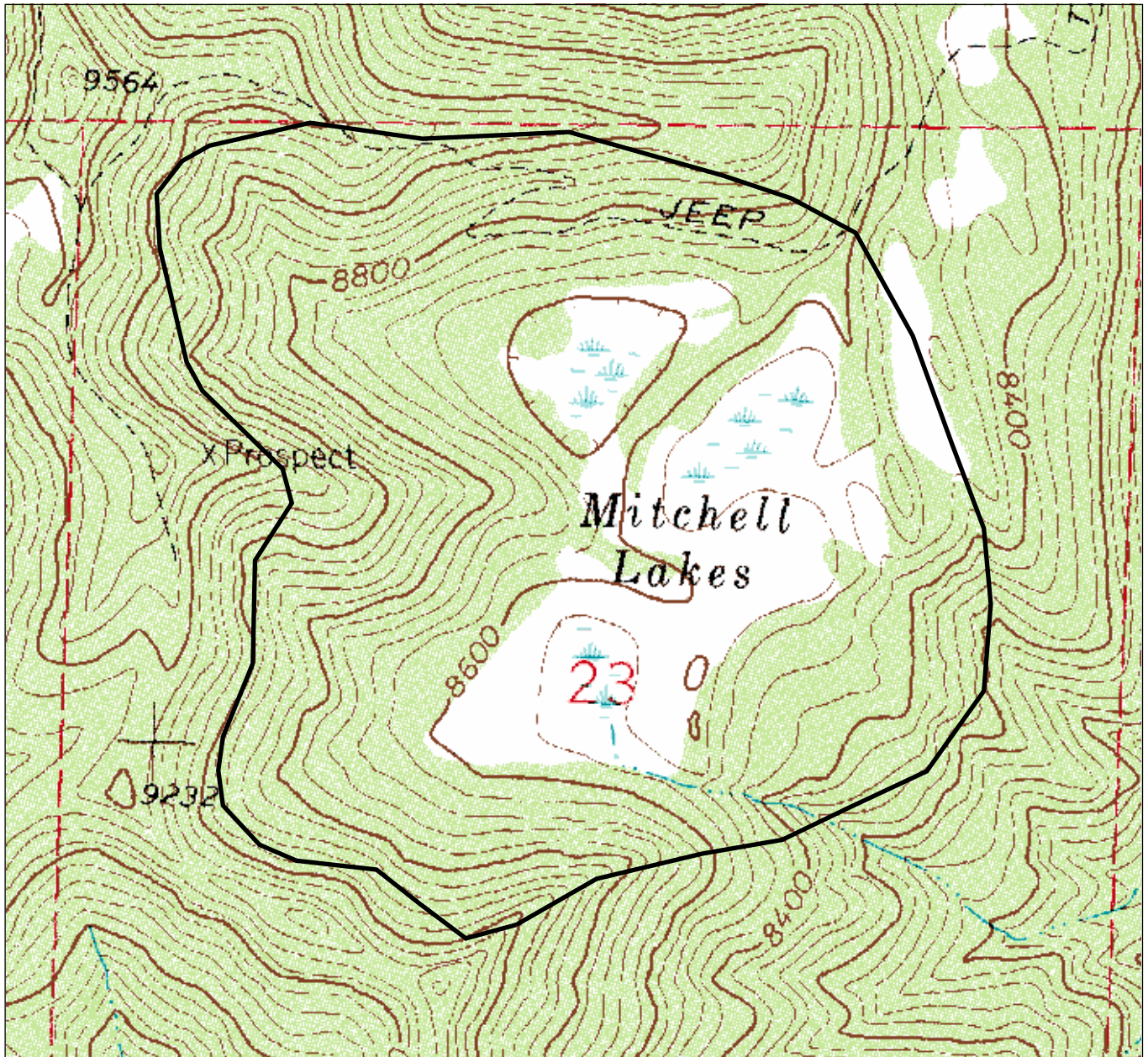
Cowardin System: Palustrine

CNHP's Wetland Classification: *Schoenoplectus acutus* var *acutus* – *S. tabernaemontani*

Table 61. Wetland functional assessment for the riverine wetland at the Mitchell Lakes PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	N/A	This wetland receives groundwater and sheetflow inputs and thus does not experience large, short-term fluctuations in water levels.
Sediment/Shoreline Stabilization	N/A	This wetland is in a bowl at the bottom of converging of hillslopes, with very shallow water and no strong shoreline development.
Groundwater Discharge/Recharge	Yes	Groundwater discharges to help fill the lake and small ponds. The perennial waters of the lake may not recharge groundwater, due to the clay soil.
Dynamic Surface Water Storage	High	The wetland lies in a low area, catching sheetflow from higher benches surrounding it.
Biogeochemical Functions		
Elemental Cycling	Normal	Wetland is not demonstrating any sign of nutrient disturbance.
Removal of Imported Nutrients, Toxicants, and Sediments.	Low	The soil is a dark clay with little organic matter, however the vegetation is vigorous, providing some removal/transformation.
Biological Functions		
Habitat Diversity	Low	Area supports one Cowardin class: emergent wetland.
General Wildlife Habitat	Moderate	Habitat for wildlife/waterfowl.
General Fish/Aquatic Habitat	Low	This area is not able to support fish populations, though may provide habitat for other aquatic organisms.
Production Export/Food Chain Support	Low	This wetland has low water inputs, low plant species diversity with no observable outlet.
Uniqueness	Moderate	The steep forest canyons and mesa/canyon topography within the arid environment of La Plata County creates riparian or riverine wetlands more commonly than isolated herbaceous wetlands such as this.

Figure 37. Mitchell Lakes Potential Conservation Area, B4: Moderate Biodiversity Significance



0.1 0 0.1 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

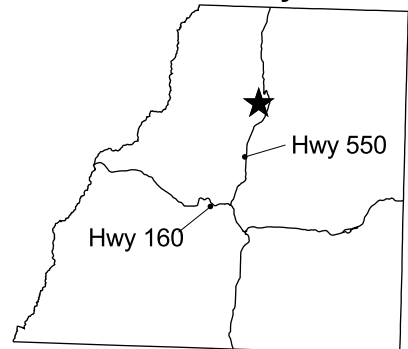
Hermosa, 37107-D7
 7.5 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Orphan Butte PCA

Biodiversity Rank: B4: Moderate biodiversity significance. The PCA supports a fair occurrence of a globally vulnerable (G3) fern.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years. .

Management Urgency Rank: M4: Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

Location: The Orphan Butte PCA is located in northwestern La Plata County and northeastern Montezuma County, along the ridge that defines the county lines. It is approximately 20 miles north-northwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Orphan Butte

Legal Description: T38N R11W Sections: 1, 2, 11-14, 23, 24; T38N R10W Sections 7,18,19

Elevation: 9,600ft to 11,121ft

Size: Approximately 1679 acres

General Description: The site occupies a dry, open clearcut area on a glaciated mountain slope. Spruce and fir were cut in the 1960's, and there are now some young Engelmann spruce (*Picea engelmannii*) accounting for about 1% tree cover. Shrubs cover about 5%, forbs 60% and graminoids 30%. Associated species include Gooseberry currant (*Ribes montigenum*), elderberry (*Sambucus racemosa*), Franciscan bluebells (*Mertensia franciscana*), sedges (*Carex spp.*), strawberry (*Fragaria virginiana*), and false strawberry (*Sibbaldia procumbens*). The rare ferns inhabited old skid roads that were created during the timber harvest. Reflected moonwort occurred on the west side of the ridge, in Montezuma County, while northern moonwort was on the east side in La Plata County. However, it is common for several species of moonworts to grow together, and either one may also occur on the opposite side of the divide. In fact, two other species of moonwort, *B. lanceolatum* and *B. lunaria*, both on CNHP's watchlist, were found at the site. Boreal owls were observed at this location in 1997, but breeding has not been confirmed.

Biodiversity Rank Justification and comments: The Orphan Butte PCA supports a fair (C) occurrence of reflected moonwort (*Botrychium echo*), a globally vulnerable (G3) fern, and an unranked (E) occurrence of northern moonwort (*Botrychium pinnatum*), a species that is globally common but extremely rare (S1) in Colorado.

Table #. Natural Heritage element occurrences at Orphan Butte PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Botrychium echo</i>	Reflected moonwort	G3	S3		C
<i>Botrychium pinnatum</i>	Northern moonwort	G4?	S1		E

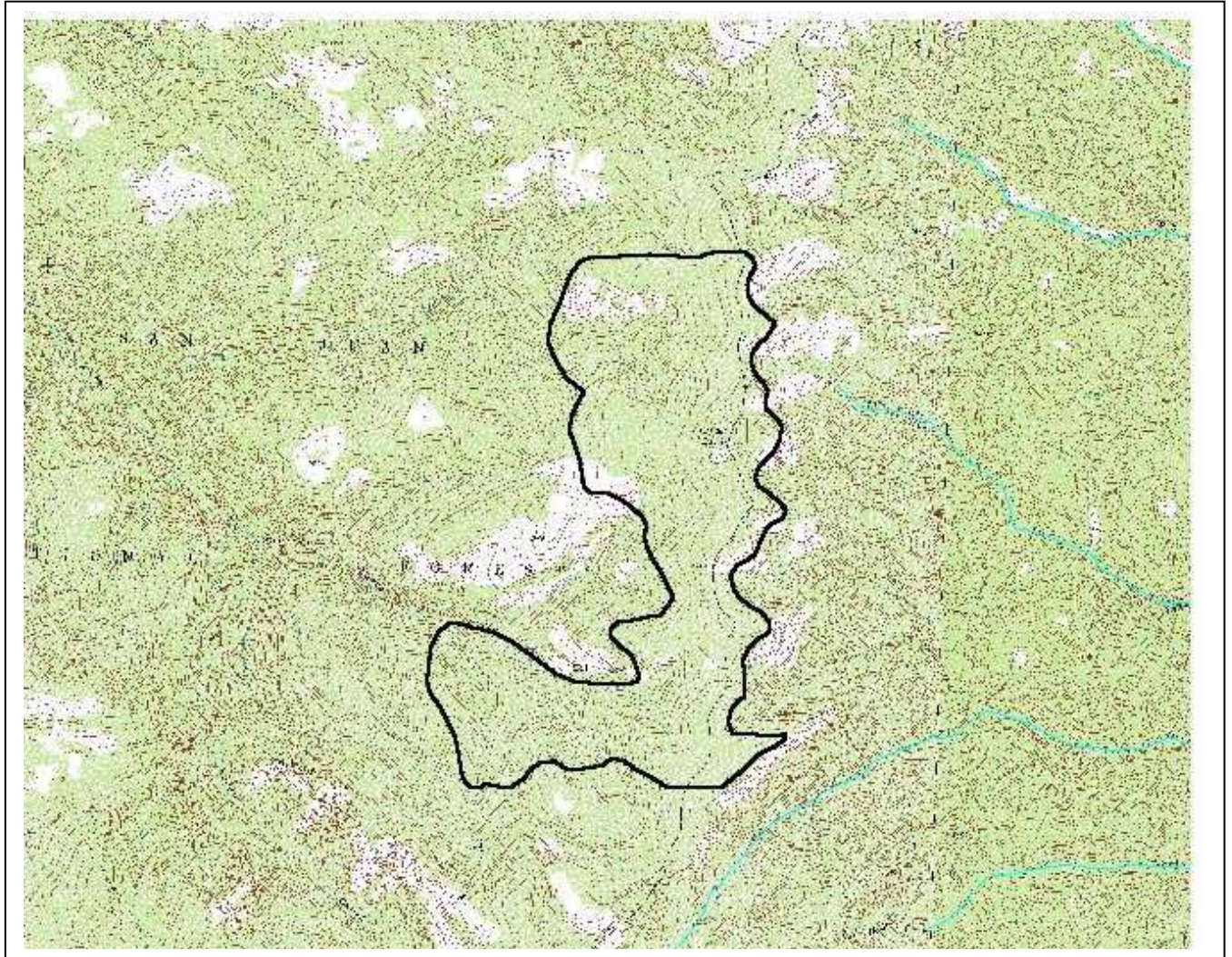
*EO=Element Occurrence.

Boundary Justification: The site includes the occurrences of two rare moonworts and adjacent similar habitat. Limiting direct disturbances to the plants, but allowing natural disturbance such as erosion, fire, and tree-fall in this area would help to maintain the habitat and allow for movement of the species over time.

Protection Comments: The PCA is within the San Juan National Forest.

Management Comments: Moonworts prefer naturally or human disturbed sites; however, trampling, road/trail maintenance, or other continued impacts could threaten the occurrence. The PCA site was scheduled to be planted in 1996. Digging and vehicles may disturb the site; however, the plants were tagged so that crews could avoid them. No information is known on the success of this attempt. Since 2003 was a drought year and *Botrychium*s were scarce throughout Colorado, the site was not visited during this survey. However, a site visit during a wetter year is recommended, and is planned for 2004.

Orphan Butte Potential Conservation Area. B4: Moderate Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Orphan Butte 37107-E1

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Animas City Mountain PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports unranked breeding occurrences of American peregrine falcon, a globally vulnerable subspecies.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: Animas City Mountain PCA is bisected by Highway 550, and surrounds the city of Durango in La Plata County.

U.S.G.S. 7.5-min. quadrangles: Durango West

Legal Description: T35N R10W Sections 1-4, 9-16, 23, 24; T35N R9W Sections 2-24, 26-30, 32-34; T36N R8W Sections 19, 30, 33; T36N R10W Section 12-14, 22, 24, 26, 27, 34-36; T36N R9W Sections 1-12, 19-35; T37N R9W Sections 33, 34.

Elevation: 6420 to 9722 feet

Size: Approximately 48,978 acres

General Description: The PCA lies between Buck Creek to the north and the city of Durango to the south, and extends east to west from Missionary Ridge to Lightner Creek. Because of its large size the PCA includes a diverse array of topography including gentle to steep slopes, vertical cliffs and the valley floor along the Animas River. The PCA is within a large area that includes ponderosa pine (*Pinus ponderosa*) with an understory of Gambel oak (*Quercus gambellii*), conifers and aspen occupy narrow drainages, and a diverse number of grasses and forbs are found throughout the PCA. The five peregrine falcon nests occupy vertical rock cliffs, some of light colored sandstone, that occur throughout the PCA. A CNHP zoologist observed two falcons at one aerie in July, 2003. Nesting was verified at most of the other aeries as recently as 2001 during monitoring by the Colorado Division of Wildlife.

Biodiversity Rank Justification: The PCA includes five nesting sites of Peregrine Falcons, a subspecies that is globally vulnerable (T3) and for which breeding populations are rare in Colorado (S2B). All five Peregrine Falcon sites were active when last monitored in 2001 (Bibles 2004).

Table #. Natural Heritage element occurrences at Animas City Mountain PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Falco peregrinus anatum</i>	Peregrine falcon	G4T3	S2B, SZN	FS/BLM	E

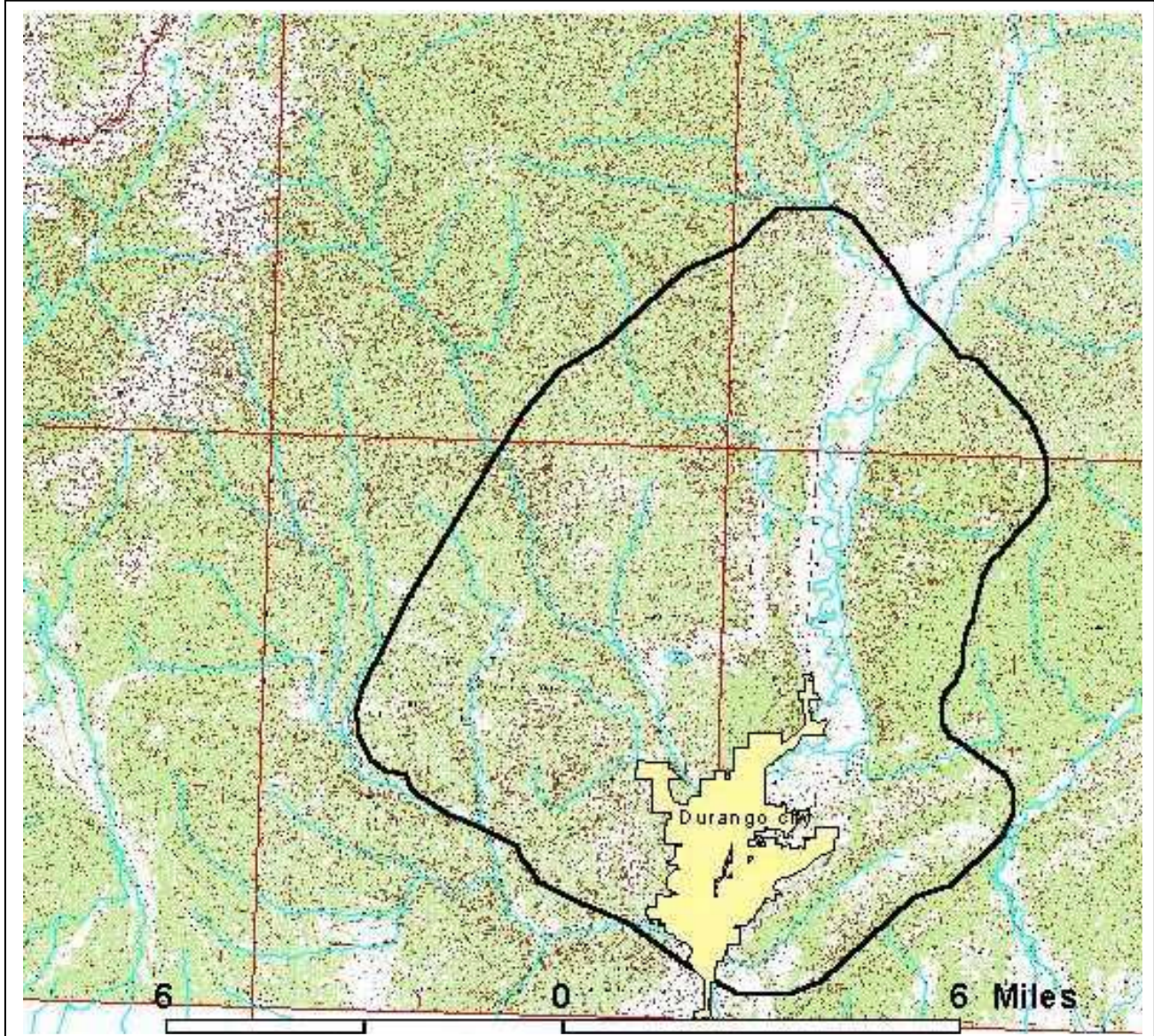
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary of this PCA is designed to conserve the nesting aeries and not to include the full extent of the foraging area required to maintain the viability of the peregrine population. The boundary is drawn to encompass all five active peregrine falcon nests and includes additional areas to disguise the exact locale of each aerie. The added areas do supply foraging habitat for the peregrines, but the boundary accommodates only a small percentage of the foraging area required to support all five nesting pairs.

Protection Comments: The site has mixed ownership, consisting of part of the Perins Peak State Wildlife Area, San Juan National Forest, BLM land and private lands.

Management Comments: The State Wildlife Area, west of the Dry Fork Road, is closed to all visitors from November to July, to protect breeding wildlife. Limiting direct disturbance is critical to nesting success of the falcons.

Animas City Mountain Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



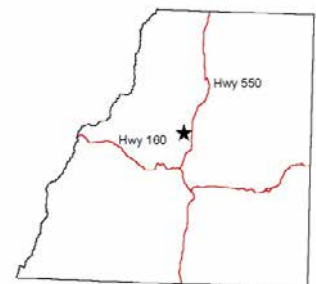
PCA Boundary

Durango West 37107-C8
Durango East 37107-C7
Monument Hill 37107-D8
Hermosa 37107-D7

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004

Location in Study Area



Animas River at Goat Canyon PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA contains a fair occurrence of a plant that is rare (S2) in Colorado.

Protection Urgency Rank: P3. Protection actions may be needed, but probably not within the next 5 years.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Animas River at Goat Canyon PCA is located in La Plata County, west of the Animas River between Goat Canyon and Sawmill Canyon, about 8 air miles south of Durango.

U.S.G.S. 7.5-min. quadrangles: Basin Mountain

Legal Description: T34N R10W Sections 25, 26, 35, 36

Elevation: 6200 to 6600 feet

Size: Approximately 423 acres

General Description: This PCA is in a pinyon-juniper woodland on clay soils derived from the Animas Formation. Eroded microsites with little competing vegetation support the Abajo beardtongue (*Penstemon lentus*). Associated species include bitterbrush (*Purshia tridentata*), galleta (*Hilaria jamesii*), blazing star (*Mentzelia sp.*), Spanish bayonet (*Yucca harrimanniae*), spearleaf buckwheat (*Eriogonum lonchophyllum*), whorled milkweed (*Asclepias subverticillata*), skunkbrush (*Rhus trilobata*), and Arboles milkvetch (*Astragalus oocalycis*). The presence of a previously reported population of the beardtongue on private land was confirmed from the public road, although the full extent is still unknown.

Biodiversity Rank Justification: The PCA has a fair (C ranked) occurrence of a state rare (S2) plant. The number of individuals visible from the public road supports the C rank, but further survey with permission could raise this rank.

Table #. Natural Heritage element occurrences at Animas River at Goat Canyon PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Penstemon lentus</i>	Abajo beardtongue	G4Q	S2		C

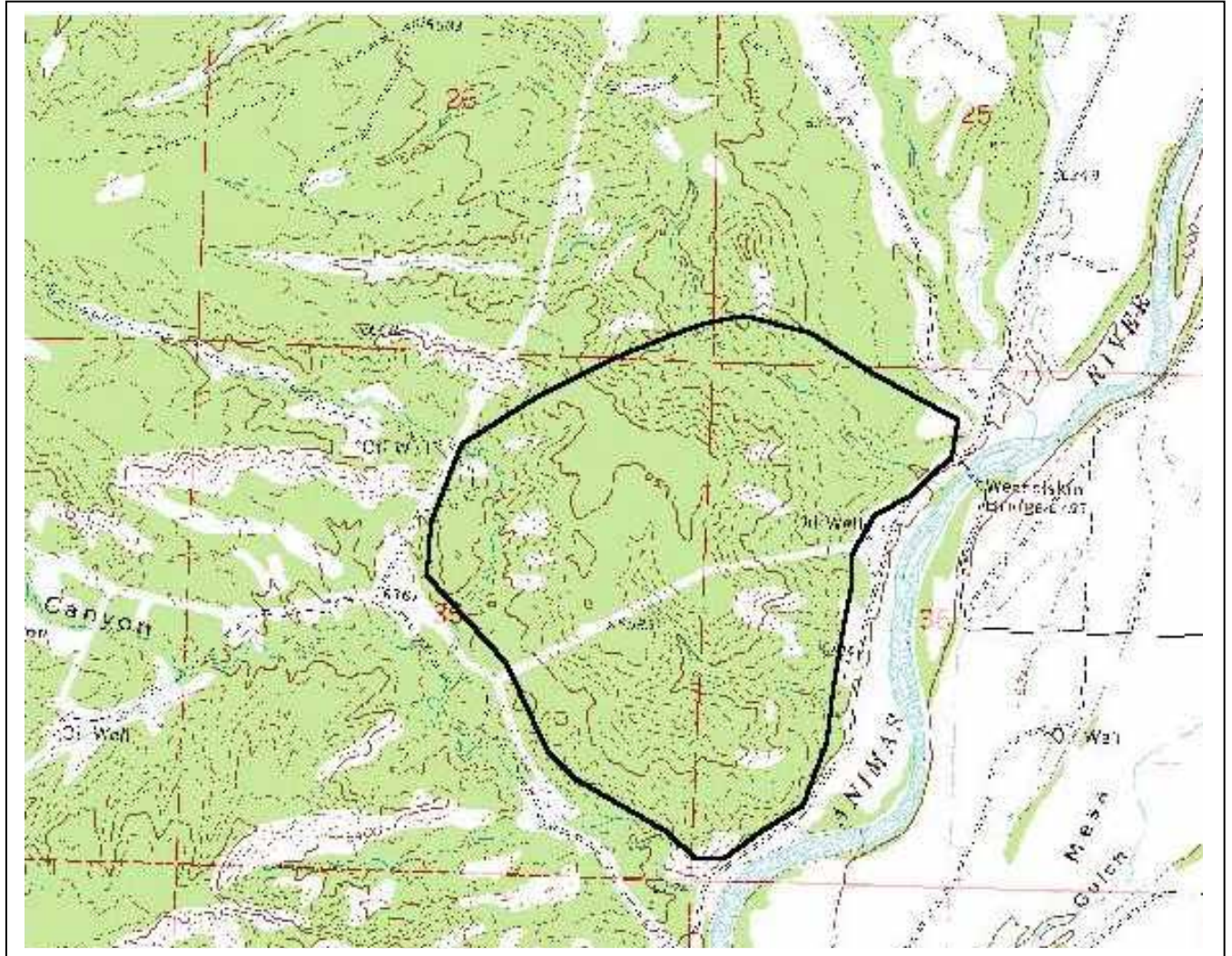
*EO=Element Occurrence. Multiple listings represent separate locations.


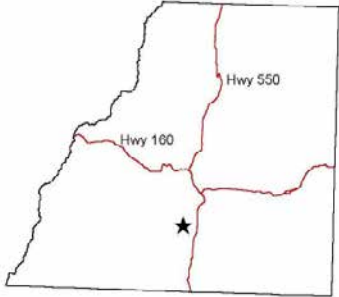
Boundary Justification: The boundary is drawn to incorporate the known location of the Abajo beardtongue, along with some additional similar habitat.

Protection Comments: The PCA is privately owned. Plans of private landowners are unknown.

Management Comments: No management needs are known. Further survey of the site with owner's permission would help to determine the size and condition of the penstemon population.

Animas River at Goat Canyon PCA. B5: General Biodiversity Significance



<p>Colorado Natural Heritage Program</p> <p>Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins CO 80523-8002</p> <p>Disclaimer</p> <p><i>Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</i></p>	<p></p> <p>PCA Boundary</p> <p>Basin Mountain 37107-B8</p> <p>7.5 Minute Series</p> <p>Digital Raster Graphics Produced by the U. S. Geological Survey Map created 10 April 2004 UTM Zone 13 NAD 27</p>	<p>Location in Study Area</p> 
---	---	--

Bayfield Northeast PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an unranked occurrence of Grace’s warbler, a bird that is vulnerable in Colorado.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Bayfield Northeast PCA is located in La Plata County about three miles northeast of Bayfield.

U.S.G.S. 7.5-min. quadrangles: Bayfield, Ludwig Mountain, Baldy Mountain

Legal Description: T34N R6W Sections 3-5; T35N R6W Sections 13-15, 17, 20-23, 25-28, 30, 31, 33-35.

Elevation: 7120 to 8200 ft.

Size: Approximately 10,643 acres

General Description: The PCA occupies a mature ponderosa pine forest with Gambel oak in the understory in the San Juan National Forest. It includes forest both north and south of Highway 160, which runs through the PCA. The trees are moderately spaced, and there are open grassy areas interspersed. Other plant species present are typical of ponderosa pine forests in La Plata County. Adjacent vegetation was pinyon-juniper woodland and sagebrush shrubland. Singing male Grace’s warblers were located near an unimproved road that runs through the southeastern part of the site and in the northern part of the site near Shamrock Mine.

Biodiversity Rank Justification: The site supports at least two unranked (E) breeding territories of Grace’s warbler, a bird that is vulnerable in Colorado.

Table #. Natural Heritage element occurrences at Bayfield Northeast PCA. Elements in bold are those upon which the PCA’s B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Dendroica graciae</i>	Grace’s warbler	G5	S3B		E

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

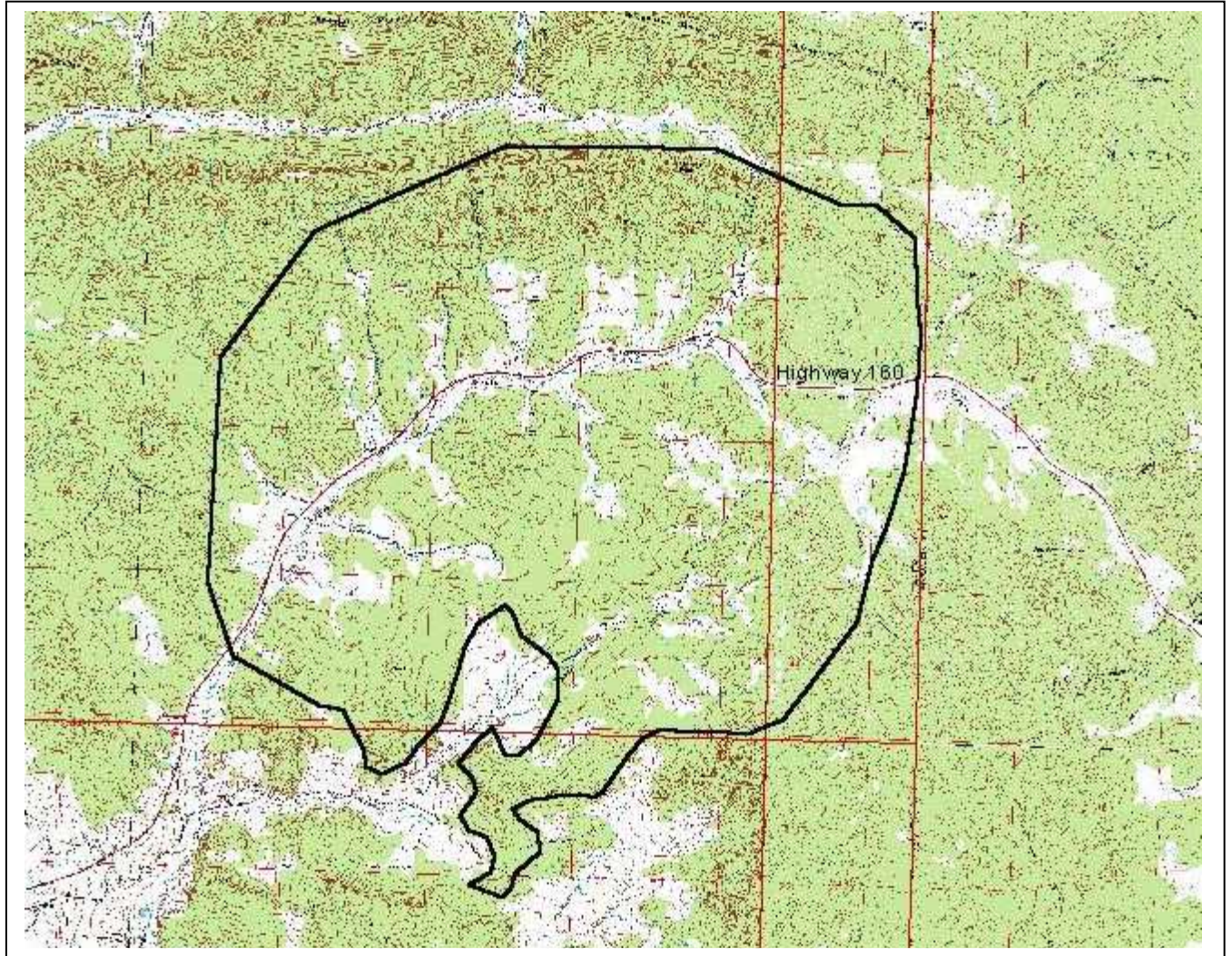
Boundary Justification: The boundary is drawn to include the locations of singing male Grace’s warblers and adjacent areas mapped as ponderosa pine forest. Although the size of the local population is unknown, a sufficient area of suitable habitat in ponderosa pine forest has been included in the PCA to support a viable population of Grace’s warblers.

Protection Comments: The site is partly within the San Juan National Forest with no special designation and partly on private land.

Management Comments: The area is used for grazing and hunting. Grace’s warblers primarily use the upper canopy of ponderosa pine forests for foraging and nesting. Large-scale clear-cutting and extensive overstory removal by logging or fire are detrimental to the species. Activities that reduce or remove understory shrubs and other vegetation (e.g. shrub eradication, grazing, fire) may have less impact, but the importance of understory vegetation to this species is poorly understood. Szaro and Balda (1979a), however, found that Gambel oak on open forest sites was used more often than predicted based on the

shrub's availability. In addition, Brawn and Balda (1988) reported higher breeding densities in plots with moderate or high oak density than in plots with no oak or low oak density.

Bayfield Northeast Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



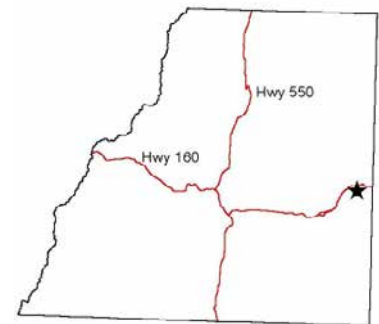
PCA Boundary

Ludwig Mt. 37107-C5
Baldy Mt. 37107-C4
Bayfield 37107-B5
Pargin Mt. 37107-B4

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004

Location in Study Area



Big Bend Creek PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an unranked population of Colorado River cutthroat trout, a globally vulnerable subspecies (G4T3)

Protection Urgency Rank: P5: Land protection is adequate.

Management Urgency Rank: M3: New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA.

Location: The Big Bend Creek PCA is located in northwestern La Plata County, approximately 21 air miles north-northwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Elk Creek/ Orphan Butte

Legal Description: T38N R10W/ T38N R11W/ T39N R10W Sections: 3,4,5,6,7,8,9,10/1/31

Elevation: 8,600ft to 10,400ft

Size: Approximately 1767 acres

General Description: The Big Bend Creek PCA encompasses approximately 1.5 miles of the headwaters and major tributaries of Big Bend Creek. A waterfall at the downstream end of the PCA prevents the migration of non-native fish, preserving the genetic purity of the native cutthroat trout (*Oncorhynchus clarki pleuriticus*). Cutthroat trout were observed in the creek by CNHP researchers in 2003. The Colorado Division of Wildlife plans a follow-up survey in 2004 to determine the current status of the trout there (Japhet, pers. comm.). Vegetation of the PCA is primarily spruce-fir forest, with openings of Thurber fescue (*Festuca thurberi*) meadows.

Biodiversity Rank Justification and comments: The PCA supports and unranked (E) occurrence of a globally vulnerable (G4T3) subspecies.

Table #. Natural Heritage element occurrences at Big Bend Creek PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T3	S3	FS/BLM	E

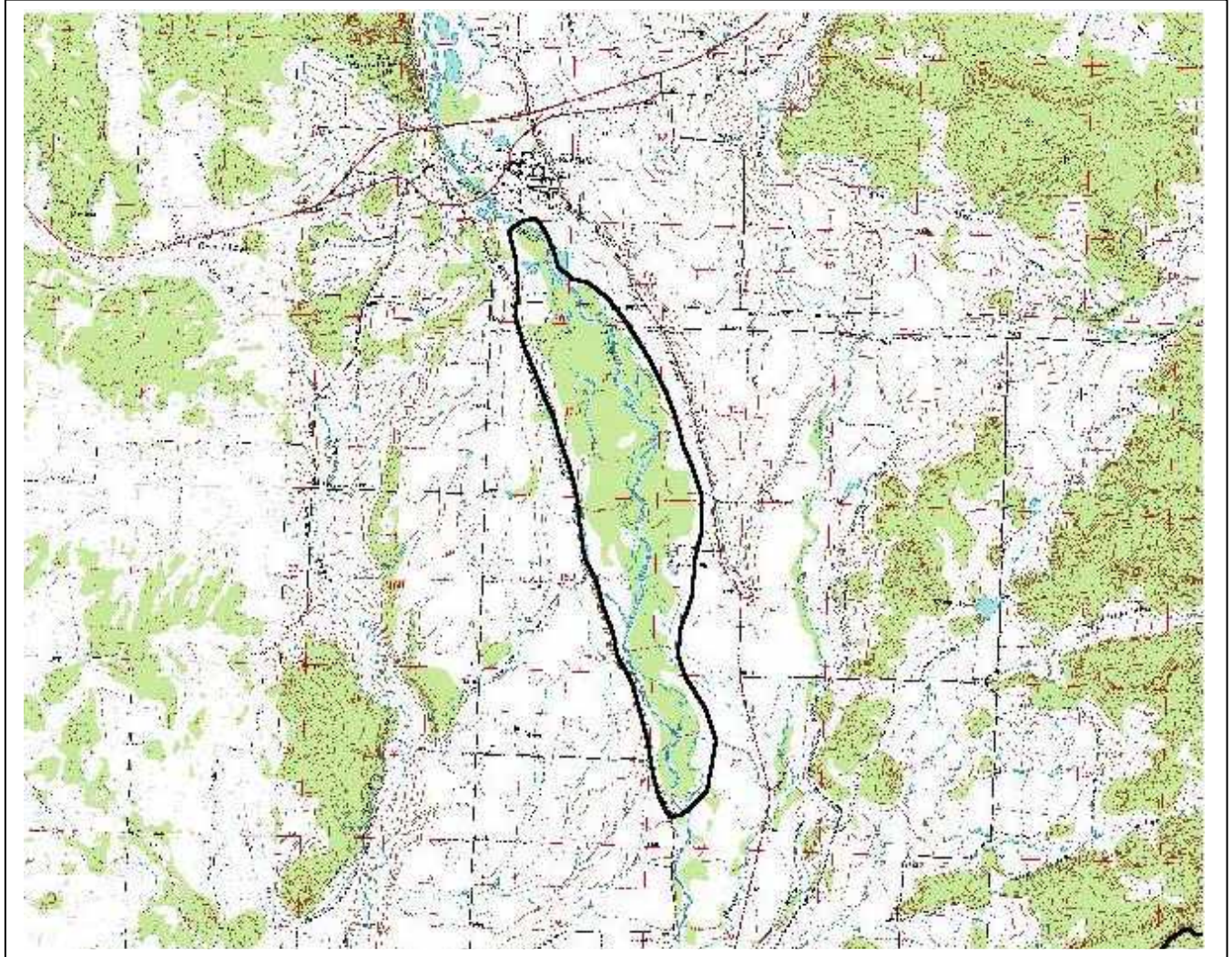
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The planning boundary encompasses the headwaters and major tributaries of Big Bend Creek above a barrier that prevents non-native fish migration. A 1000-foot upland buffer is provided to limit direct physical disturbances and local hydrologic alteration. However, alterations to the hydrology of Big Bend Creek originating anywhere in the watershed could pose a threat to the fish.

Protection Comments: The U. S. Forest Service manages this PCA.

Management Comments: The PCA is part of a sheep grazing allotment that is currently inactive but may be resumed in the future. A potential threat to the fish is sedimentation from erosion. The Colorado Division of Wildlife plans to survey this site in 2004 (Japhet, pers. comm.)

Los Pinos at Bayfield South PCA B4: Moderate Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Bayfield 37107-B5
Gem Village 37107_B6

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Cherry Creek PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports two unranked occurrences of a globally secure bird species.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Cherry Creek PCA is located in the San Juan National Forest in western La Plata County, approximately 14 miles west of Durango.

U.S.G.S. 7.5-min. quadrangles: Thompson Park and Hesperus

Legal Description: T36N R11W Section 5, 31, 32; T36N R12W, Sections 21, 28, 29, 32-36.

Elevation: 7800 to 8600 feet

Size: Approximately 5367 acres

General Description: This PCA is within a ponderosa pine (*Pinus ponderosa*) forest, north of Highway 160 in western La Plata County. Three tributaries of Cherry Creek run north to south through the PCA. There are several pipelines and trails within the site. Grace's warblers were observed in an area with large mature pines and a thick, short Gambel oak (*Quercus gambellii*) understory.

Biodiversity Rank Justification: The Cherry Creek PCA supports two unranked (E) occurrences of Grace's warbler, and bird that is globally common (G5), but vulnerable (S3) in Colorado. Grace's warblers are neo-tropical migrants that winter in New Mexico and Mexico, but breed in Colorado.

Table #. Natural Heritage element occurrences at Cherry Creek PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Dendroica graciae</i>	Grace's warbler	G5	S3B		E

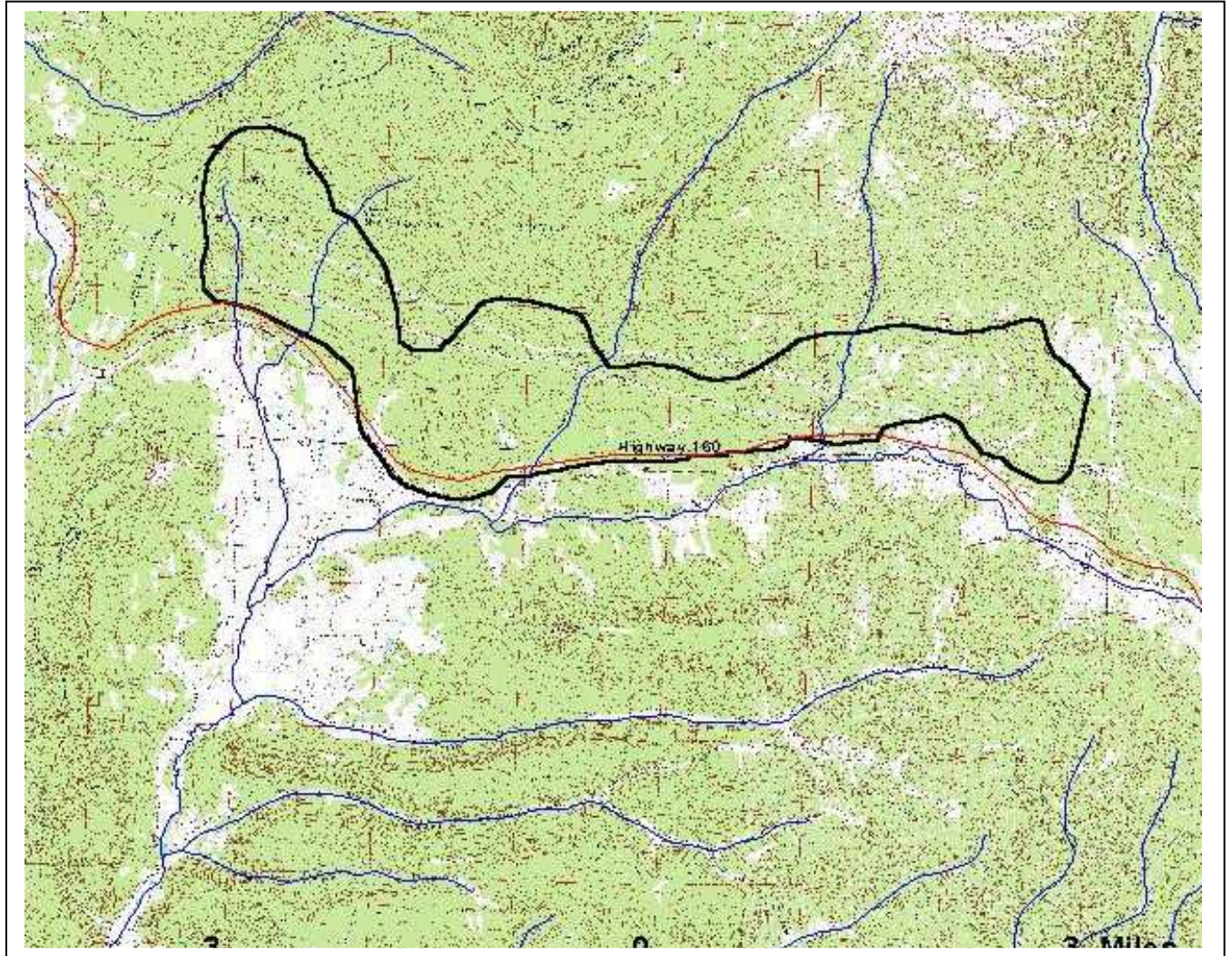
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary is drawn to encompass two occurrences of Grace's warbler and the adjacent ponderosa pine forest that they require for foraging. The PCA is bordered by aspen forest on the north, Gambel oak shrubland on the south and east, and irrigated agricultural land on the southwest.

Protection Comments: The northern part of the PCA is within the San Juan National Forest and is well protected. A small area in the southern part of the PCA is privately owned and may be subject to development that would reduce the potential habitat for Grace's warblers.

Management Comments: Maintaining large undisturbed areas of ponderosa pine forest is beneficial to Grace's warblers. Grace's warblers primarily use the upper canopy of ponderosa pine forests for foraging and nesting. Large-scale clear-cutting and extensive overstory removal by logging or fire are detrimental to the species. Activities that reduce or remove understory shrubs and other vegetation (e.g. shrub eradication, grazing, fire) may have less impact, but the importance of understory vegetation to this species is poorly understood. Szaro and Balda (1979a), however, found that Gambel oak on open forest sites was used more often than predicted based on the shrub's availability. In addition, Brawn and Balda (1988) reported higher breeding densities in plots with moderate or high oak density than in plots with no oak or low oak density.

Cherry Creek Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



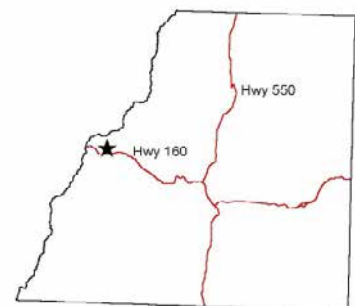
PCA Boundary

Thompson Park 37108-C2
Hesperus 37108-C1

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Clear Creek La Plata PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA has an unranked occurrence of Colorado River cutthroat trout, a fish subspecies that is globally vulnerable (T3).

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Clear Creek La Plata PCA is located in northwestern La Plata County, about 12 air miles north-northwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Monument Hill

Legal Description: T37N R10W Sections: 11,14,15,16,21,22,23,26,27

Elevation: 8,240 to 10,600

Size: Approximately 2228 acres

General Description: Clear Creek is a tributary of Hermosa Creek, beginning high in the La Plata Mountains in the San Juan National Forest. It is surrounded by forests of Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*) and aspen (*Populus tremuloides*). Colorado cutthroat trout were in good condition when last sampled by the Colorado Division of Wildlife in 1996 (Bibles, 2004).

Biodiversity Rank Justification and comments: The PCA has an unranked (E) occurrence of a globally vulnerable (G5T3) subspecies.

Table #. Natural Heritage element occurrences at Clear Creek La Plata PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River Cutthroat Trout	G4T3	S3	FS/BLM	E

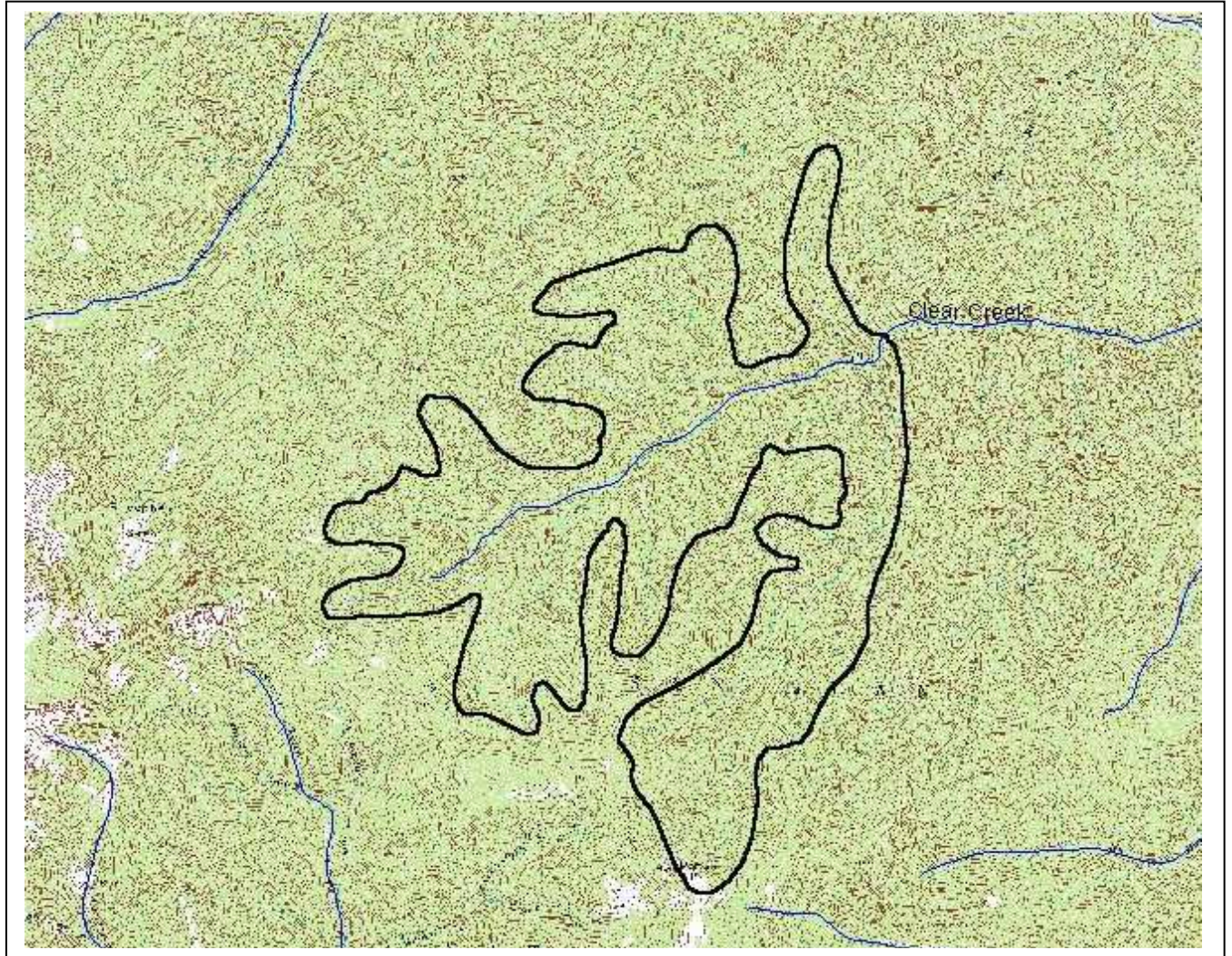
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The planning boundary encompasses a stretch of Clear Creek between two barriers and includes all tributaries to that section. A 1000-foot upland buffer is provided to limit direct physical disturbance and local hydrologic alteration. However, alterations to the hydrology of Clear Creek originating anywhere in the watershed could pose a threat to the fish.

Protection Comments: The U. S. Forest Service manages this PCA.

Management Comments: The PCA has very low usage and no serious management needs are known or anticipated at the site. Maintaining the barriers that prevent migration of non-native trout is critical to preserving the genetic purity of this population. Periodic monitoring is recommended to assure that any negative changes in the trout population are addressed by management.

Clear Creek La Plata Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

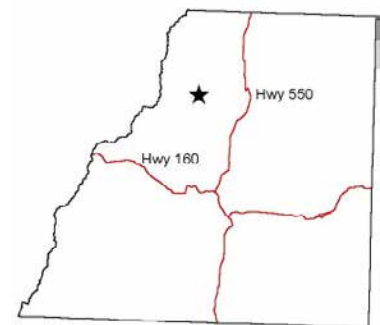
Monument Hill 37107-D8

7.5 Minute Series

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

Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Coal Gulch PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an unranked breeding occurrence of a bald eagle, a bird for which breeding sites are very rare (S1B) in Colorado.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years. Plans for the private land in the PCA are not known.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Coal Gulch PCA is located in La Plata County about four air miles west of Durango.

U.S.G.S. 7.5-min. quadrangles: Durango West
Legal Description: T35N R10W Sections 7-9, 16-21

Elevation: 7600 to 7950 feet

Size: Approximately 659 acres

General Description: The Coal Gulch PCA lies southwest of Lightner Creek and north of Highway 160, mostly within the Perins Peak State Wildlife Area. Coal Gulch and Cherry Gulch run northwest to southeast through the PCA. Most of the PCA has relatively gentle slopes. Vegetation consists of a mosaic of medium aged to mature ponderosa pine (*Pinus ponderosa*) forest with an understory of Gambel oak (*Quercus gambellii*) and Gambel oak shrublands. There are a few Rocky Mountain junipers (*Juniperus scopulorum*) and Douglas firs (*Pseudotsuga menziesii*) mixed with the pine. This is one of three recognized territories for bald eagles in the county. The nest in this PCA has been used regularly for many years, and was successful in 2003, with one fledgling produced (Bibles 2003 pers. comm.). This was the only bald eagle reproduction known to be successful in La Plata County in 2003. The ponderosa pine forest and Gambel oak shrublands also provide excellent habitat for Grace's warblers (See Durango West PCA).

Biodiversity Rank Justification: The Coal Gulch PCA supports an unranked (E) breeding occurrence of bald eagle, a bird for which breeding populations are rare in Colorado (S1B). The bald eagle is currently listed as threatened (LT) under the Endangered Species Act, but has been proposed for de-listing (PDL).

Table #. Natural Heritage element occurrences at Coal Gulch PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Haliaeetus leucocephalus</i>	Bald eagle	G4	S1B, S3N	PS:LT,PDL	E

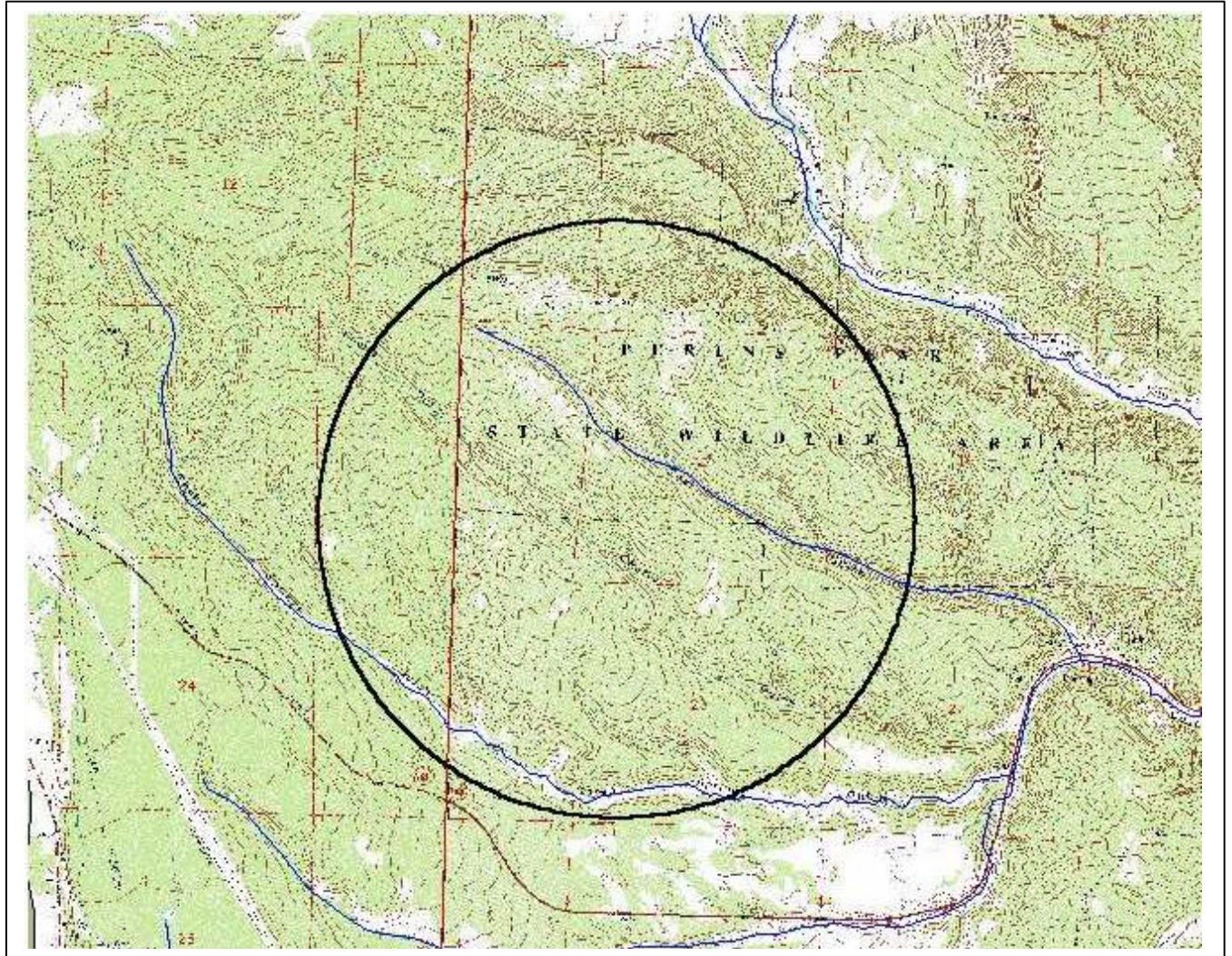
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary is drawn to encompass a nesting occurrence of bald eagle, with adjacent suitable habitat. A buffer of one kilometer is included around the eagle nest. It does not include the entire foraging area that is required for the eagles.

Protection Comments: The northern half of the PCA is within the Perins Peak State Wildlife Area. Private lands in the southern half may be subject to development.

Management Comments: The Perins Peak area is closed to all visitors for part of the year to protect nesting and wintering wildlife.

Coal Gulch Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Hesperus 37108-C1
Durango West 37107-C8

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Durango West PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an unranked occurrence of Grace’s warbler, a bird that is vulnerable in Colorado.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Durango West PCA is located immediately northwest of Durango and extends about 7 miles to the west and four miles to the north.

U.S.G.S. 7.5-min. quadrangles: Durango East, Durango West

Legal Description: T36N R9W Sections 28, 29, 31-33; T35N R9W Sections 4-6, 8, 9, 17-19; T36N R10W Sections 33-36; T35N R10W Sections 1-5, 7-10, 12-15, 17-20, 22-24.

Elevation: 6700 to 8723 ft.

Size: Approximately 17,483 acres

General Description: This extremely large site encompasses six known nesting territories of Grace’s warbler, within a forest dominated by ponderosa pine and Gambel oak. The site includes most of the Perins Peak State Wildlife Area, as well as adjacent National Forest, BLM and private lands.

Biodiversity Rank Justification: The site supports at least six unranked (E) breeding territories of Grace’s warbler, a bird that is vulnerable in Colorado.

Table #. Natural Heritage element occurrences at Durango West PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Dendroica graciae</i>	Grace’s warbler	G5	S3B		E

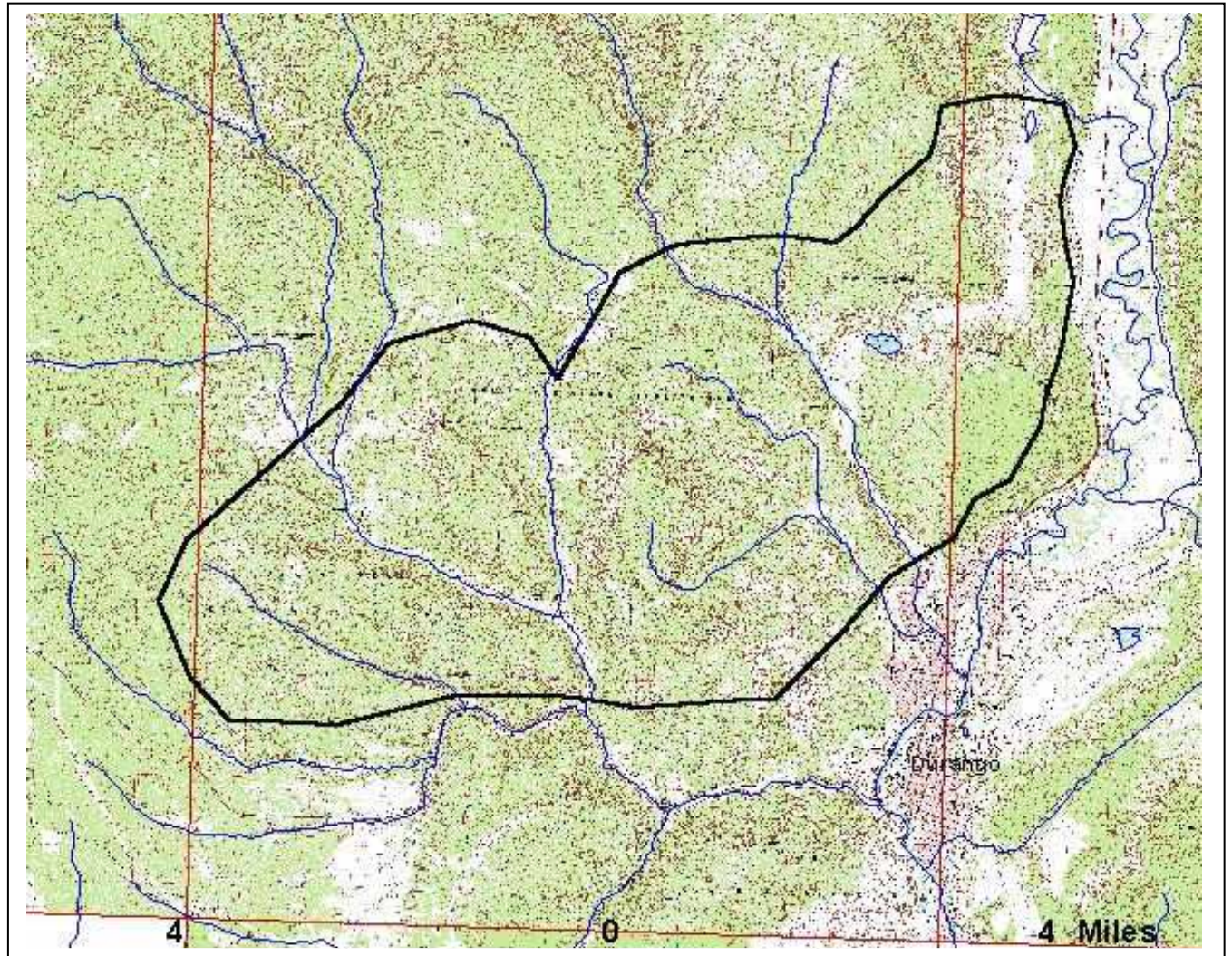
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary is drawn to include the locations of singing male Grace’s warblers and adjacent areas mapped as ponderosa pine forest. Although the size of the local population is unknown, a sufficient area of suitable habitat in ponderosa pine forest has been included in the PCA to support a viable population of Grace’s warblers.

Protection Comments: No protection needs are known. The Perins Peak State Wildlife Area, BLM and National Forest lands provide good protection for this site.

Management Comments: Much of the public land is managed to protect wildlife habitat. Grace’s warblers primarily use the upper canopy of ponderosa pine forests for foraging and nesting. Large-scale clear-cutting and extensive overstory removal by logging or fire are detrimental to the species. Activities that reduce or remove understory shrubs and other vegetation (e.g. shrub eradication, grazing, fire) may have less impact, but the importance of understory vegetation to this species is poorly understood. Szaro and Balda (1979a), however, found that Gambel oak on open forest sites was used more often than predicted based on the shrub's availability. In addition, Brawn and Balda (1988) reported higher breeding densities in plots with moderate or high oak density than in plots with no oak or low oak density.

Durango West Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Durango East 37107-C7
Durango West 37107-C8

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



East Fork Hermosa Creek PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA is one of several designated “conservation sites” for Colorado River cutthroat trout, a globally vulnerable subspecies.

Protection Urgency Rank: P5: Land protection is adequate.

Management Urgency Rank: M3: Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

Location: The East Fork Hermosa Creek PCA is located in San Juan and La Plata counties, about 24 miles north of Durango.

U.S.G.S. 7.5-min. quadrangles: Engineer Mountain/ Electra Lake/ Hermosa Peak/ Elk Creek
 Legal Description: T39N R09W Sections: 10, 14-16, 20-23, 27-29

Elevation: 9,340ft to 9,600ft

Size: Approximately 3277 acres.

General Description: This PCA straddles the border of San Juan and La Plata counties. It includes the East Fork of Hermosa Creek from its headwaters near Durango Mountain Resort, to the confluence of Sig Creek. It also includes a major tributary, Pasture Creek, which is primarily in San Juan County. The cutthroat trout (*Onchorhynchus clarki pleuriticus*) population in this stream was introduced, and is genetically pure, according to biologists from the San Juan National Forest. Barriers to the migration of non-native trout preserve the integrity of this population. The San Juan County portion of the PCA does not support trout because the stream is intermittent in the upper reaches. However, the upper portion of the watershed is critical for maintaining the habitat for the fish downstream.

Biodiversity Rank Justification and comments: The PCA has an introduced (I) occurrence of a globally vulnerable (G5T3) subspecies.

Table #. Natural Heritage element occurrences at East Fork Hermosa Creek PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animal					
<i>Onchorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T3	S3	FS/BLM	I

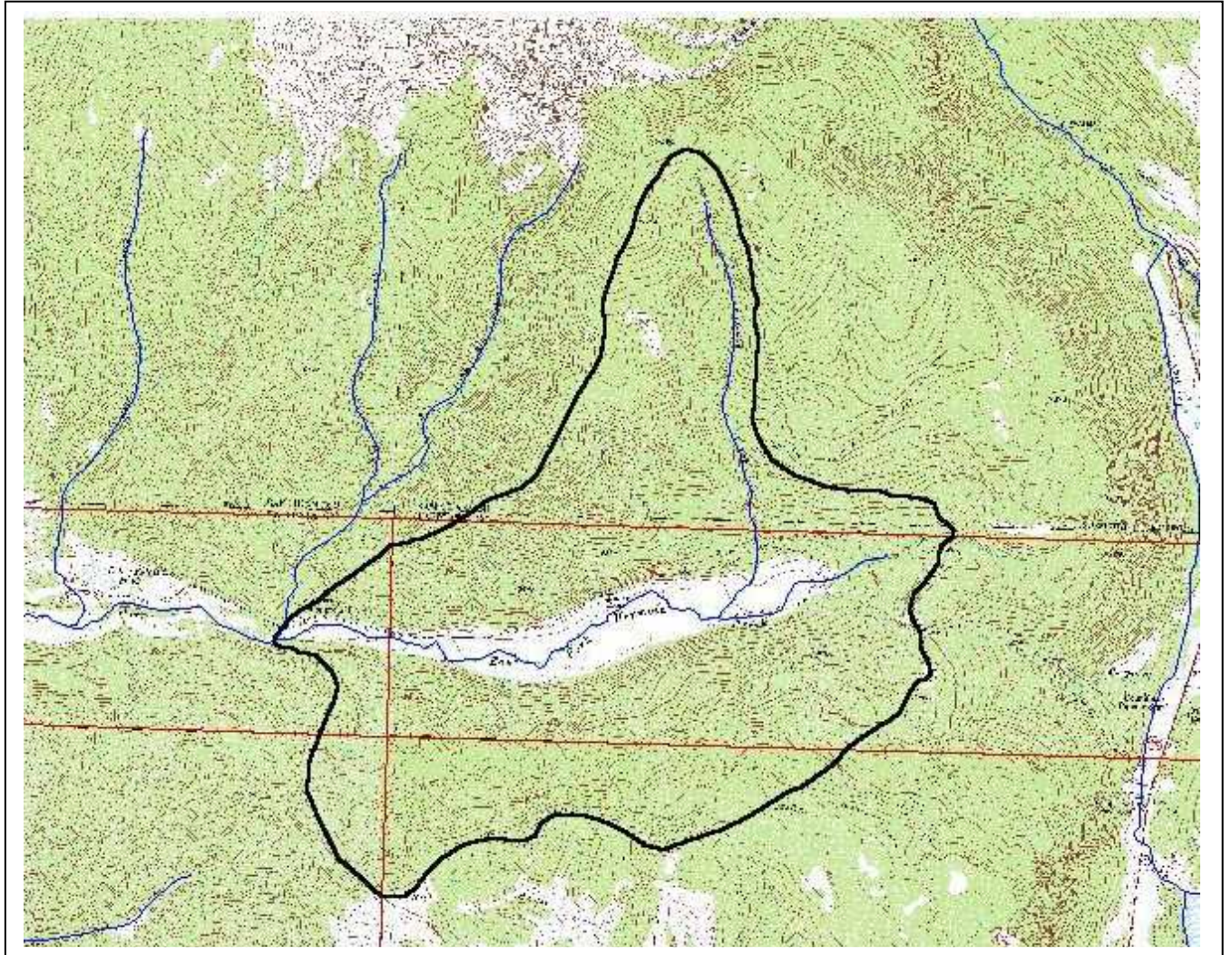
*EO=Element Occurrence.

Boundary Justification: The planning boundary includes the entire stretch of the stream and all of its major tributaries between two barriers that prevent contamination by non-native fish. A 1000-foot buffer is provided to limit direct physical disturbances and local hydrologic alteration. However, alterations to the hydrology of East Fork Hermosa Creek originating anywhere in the watershed could pose a threat to the fish.

Protection Comments: The U. S. Forest Service manages this PCA.

Management Comments: Management may be needed at the PCA within 5 years to maintain the current quality of element occurrences. Recreational use is light and cattle grazing is excluded from the area. Durango Mountain Resort Ski Area is located at the headwaters. Road building and camping could cause minor siltation in the stream. Colorado Division of Wildlife biologists sampled this stream in 2003, and found that the cutthroat population is stable and thriving (Japhet, pers. comm.)

East Fork Hermosa Creek Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Elk Creek 37107-E8
Hermosa Peak 37107-F8
Electra Lake 37107-E7
Engineer Mountain
37107F7

7.5 Minute Series

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

Location in Study Area



Electra Lake PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports a good example of a state rare (S2) plant.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M3: Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

Location: The Electra Lake PCA is located in northern La Plata County, about 20 air miles north of Durango.

U.S.G.S. 7.5-min. quadrangles: Electra Lake

Legal Description: T38N R8W Sections 6, 7, 18, 19, 30; T38N R9W Sections 1, 2, 11-14, 23-25

Elevation: 8320 to 8800 feet

Size: Approximately 3858 acres

General Description: This PCA surrounds Electra Lake, a large reservoir fed by Elbert and Little Cascade Creeks. The plant community documented at this site is an example of a common mixed montane forest, typical of large areas of the San Juan National Forest in La Plata County. It is co-dominated by white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), and ponderosa pine (*Pinus ponderosa*). Understory species include Rocky Mountain maple (*Acer glabrum*), mountain lover (*Paxistima myrsinites*), sweet cicely (*Osmorhiza depauperata*), Oregon grape (*Mahonia repens*), common juniper (*Juniperus communis*), false solomonseal (*Maianthemum stellatum*), heartleaf arnica (*Arnica cordifolia*), ragweed sagebrush (*Artemisia franserioides*), Richardson's geranium (*Geranium richardsonii*), muttongrass (*Poa fendleriana*), elk sedge (*Carex geyeri*), and twinberry honeysuckle (*Lonicera involucrata*). (See complete species list in Appendix.) The community is similar to the white fir/Oregon grape and Douglas fir /mountain lover plant associations that occur in somewhat drier sites. New Mexican cliff fern (*Woodsia neomexicana*) was found in crevices of rock outcrops on the east side of the lake. These rocks are mapped as 1700 to 1800 million year old metamorphic gneisses derived from volcanoes. Two bald eagle nests are documented from the site. The site was occupied by eagles in 2003, but reproduction was not successful (Bibles pers. comm.)

Biodiversity Rank Justification: The PCA supports good (B ranked) occurrences of a state rare (S2) plant, New Mexico cliff fern, and a plant community that is globally common but vulnerable in Colorado (G4S3). There are two bald eagle (*Haliaeetus leucocephalus*) nests within the PCA. In addition to the elements listed below, there is also a historic record of lesser yellow lady's slipper (*Cypripedium calceolus*) in the vicinity.

Table #. Natural Heritage element occurrences at Electra Lake PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Haliaeetus leucocephalus</i>	Bald eagle	G4	S1B, SZN	PS:LT,PDL	E
<i>Haliaeetus leucocephalus</i>	Bald eagle	G4	S1B, SZN	PS:LT,PDL	E
Plants					
<i>Woodsia neomexicana</i> **	New Mexico cliff fern	G4?	S2		B
Plant communities					
<i>Abies concolor/Acer glabrum</i> **	Mixed montane forest	G4	S3		B

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

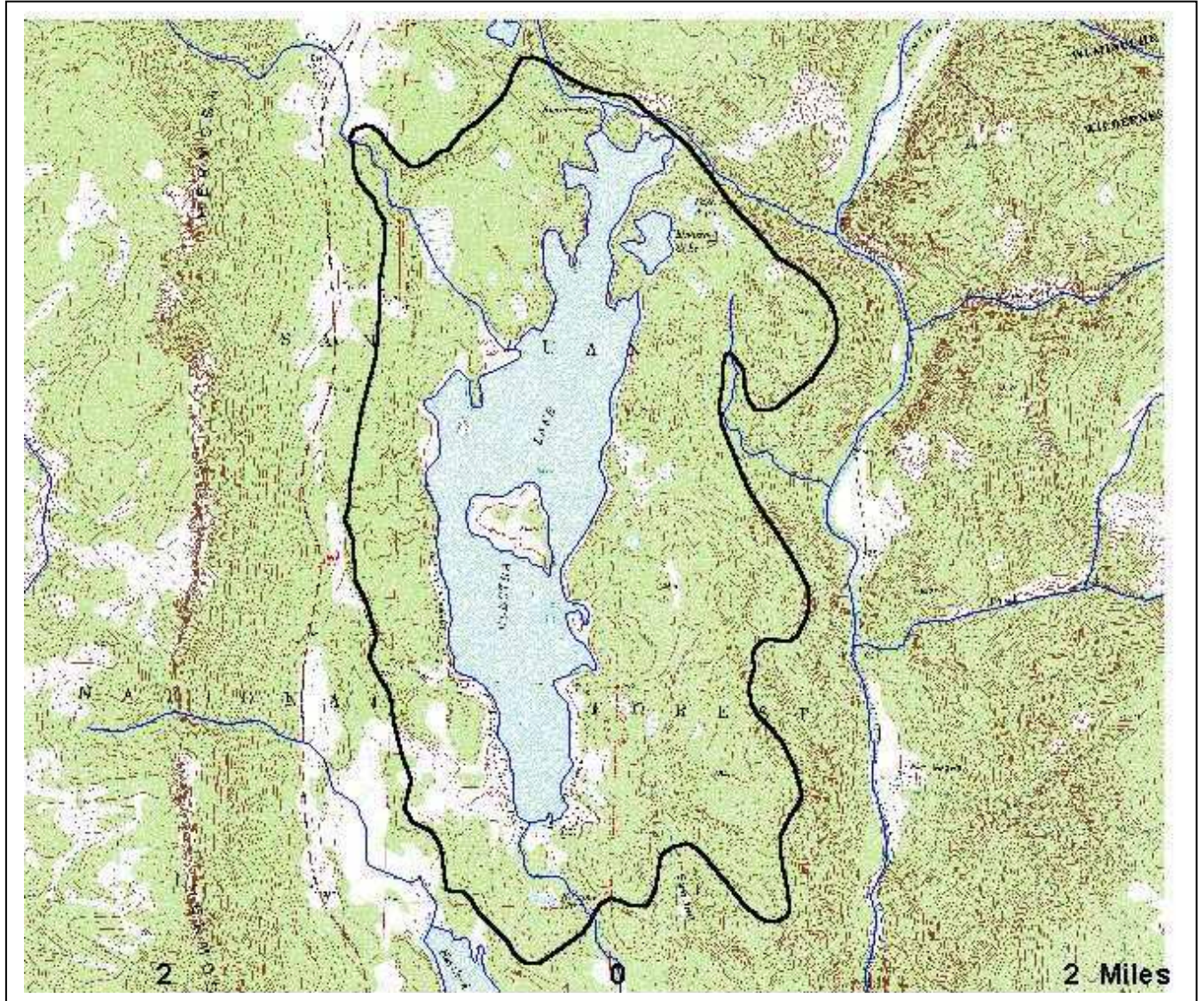
** The PCA does not include the entire extent of the plant community, which is common and widespread in La Plata County; nor does it include an adequate area necessary to support the ecological processes that the community depends on. *Woodsia neomexicana* occurs within the boundaries drawn for the bald eagle.

Boundary Justification: This PCA was originally drawn for two bald eagle nesting sites. The plant community and the New Mexico cliff fern documented in 2003 fall within the boundaries of the original site. The site includes a buffer around the eagle nests, but does not include the larger foraging area that is needed to support the eagles. It also does not include the full extent of the plant community, but rather an area surveyed to represent the community in La Plata County.

Protection Comments: Approximately half of the PCA is within the San Juan National Forest. The area directly around Electra Lake is privately owned.

Management Comments: Areas near the bald eagle nests have been signed to keep boaters at a distance. Disturbances near the nest can compromise the success of the eagles' reproduction. Weed control on the private land would help to maintain the quality of the plant communities at this site. Oxeye daisy (*Leucanthemum vulgare*) is abundant along roads. Canada thistle (*Cirsium arvense*) was found in wet areas around the lake. Other exotic plants noted were Kentucky bluegrass (*Poa pratensis*), orchard grass (*Dactylis glomerata*), and curly dock (*Rumex crispus*).

Electra Lake Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Electra Lake 37107-E7

7.5 Minute Series

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

Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Florida River Uplands PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports a good (B) example of a plant that is rare in Colorado (S2).

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M3: Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

Location: The Florida River Uplands PCA is located in central La Plata County, about 4 air miles east of Durango.

U.S.G.S. 7.5-min. quadrangles: Durango East
Legal Description: T35N R8W Section 19, 30

Elevation: 7048 to 7760 feet

Size: Approximately 169 acres

General Description: This PCA is located on a small isolated parcel of BLM land east of the Florida River. Lower elevations on the south and west facing slopes support a pinyon-juniper community. Large eroded areas within this community provide the habitat for the Abajo beardtongue (*Penstemon lentus*), which is locally abundant. Higher elevations and north facing slopes support mixed conifers and Gambel oak (*Quercus gambelii*). Other plants observed in the PCA include Western wheatgrass (*Pascopyrum smithii*), Colorado barberry (*Berberis fendleri*), hairy golden aster (*Heterotheca villosa*), redroot buckwheat (*Eriogonum racemosum*), rock jasmine (*Androsace septentrionalis*), two grooved milkvetch (*Astragalus bisulcatus*), foothill sagewort (*Artemisia ludoviciana*), winged buckwheat (*Eriogonum alatum*), Elk sedge (*Carex geyeri*), wild rose (*Rosa woodsii*), alyssum (*Alyssum parviflorum*), toadflax beardtongue (*Penstemon linarioides*), king's lupine (*Lupinus kingii*), needle and thread (*Stipa comata*), cheatgrass (*Bromus tectorum*), and spreading fleabane (*Erigeron flagellaris*).

Biodiversity Rank Justification: The PCA rank is based on a good (B ranked) occurrence of a state rare (S2) plant.

Table #. Natural Heritage element occurrences at Florida River Uplands PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Penstemon lentus</i>	Abajo beardtongue	G4Q	S2		B

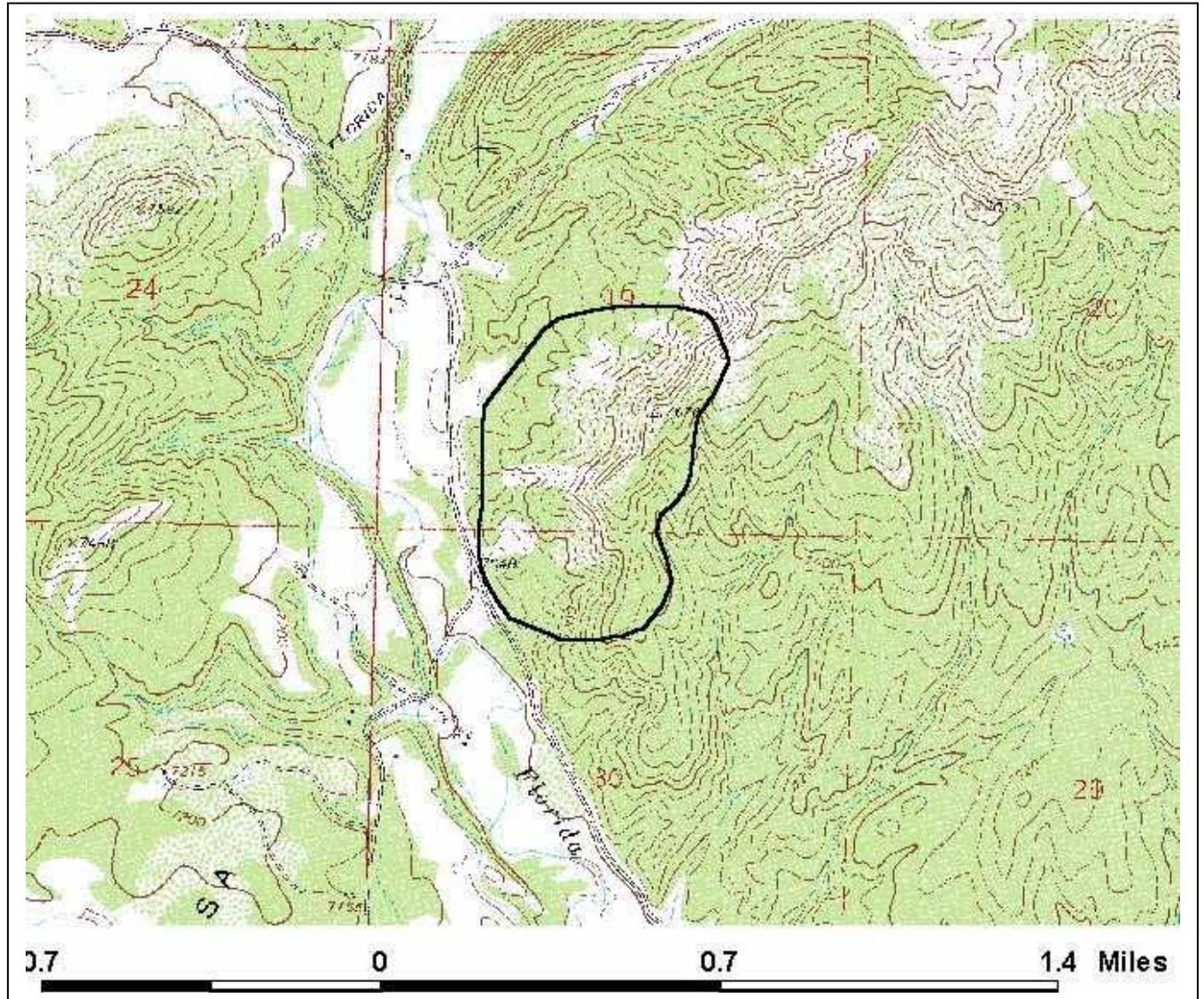
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary encompasses several barren eroded areas that support the Abajo beardtongue.

Protection Comments: The site is owned by the BLM, with active gas leases. It is surrounded by private land. Wells are already in place, and additional disturbance is not anticipated.

Management Comments: The BLM parcel contains roads and gas wells, but they are not included in the PCA. The area is not heavily used, as public access is available at only a few points where the BLM property intersects the county road. Although there are some weedy disturbed areas next to the road, the majority of the site is pristine.

Florida River Uplands PCA. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Durango East, 37107-C7
7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Gaines Canyon PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an unranked occurrence of Gray vireo, a bird that is rare (S2B) in Colorado.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Gaines Canyon PCA is located in southern La Plata County, east of the Florida River, and about 14 miles south of Durango.

U.S.G.S. 7.5-min. quadrangles: Bondad

Legal Description: T33N R9W Sections 4-6, 16-22, 26-34

Elevation: 6000 to 6700 ft.

Size: Approximately 7659 acres

General Description: The Gaines Canyon PCA is located in pinyon-juniper woodlands that provide breeding habitat for gray vireos. Warm south facing slopes with open stands of Utah juniper (*Juniperus osteosperma*) are the vireos' preferred habitat in Colorado. At this site, the understory was mostly barren with large boulders. Two singing males and one female vireo were observed at the site. The males were in separate washes that should separate their breeding territories.

Biodiversity Rank Justification: The site contains an unranked occurrence of a bird that is rare (S2B) in Colorado. Gray vireos summer and breed in this area, and migrate south to Mexico for the winter.

Table #. Natural Heritage element occurrences at Gaines Canyon PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Vireo vicinior</i>	Gray vireo	G4	S2B, SZN		E

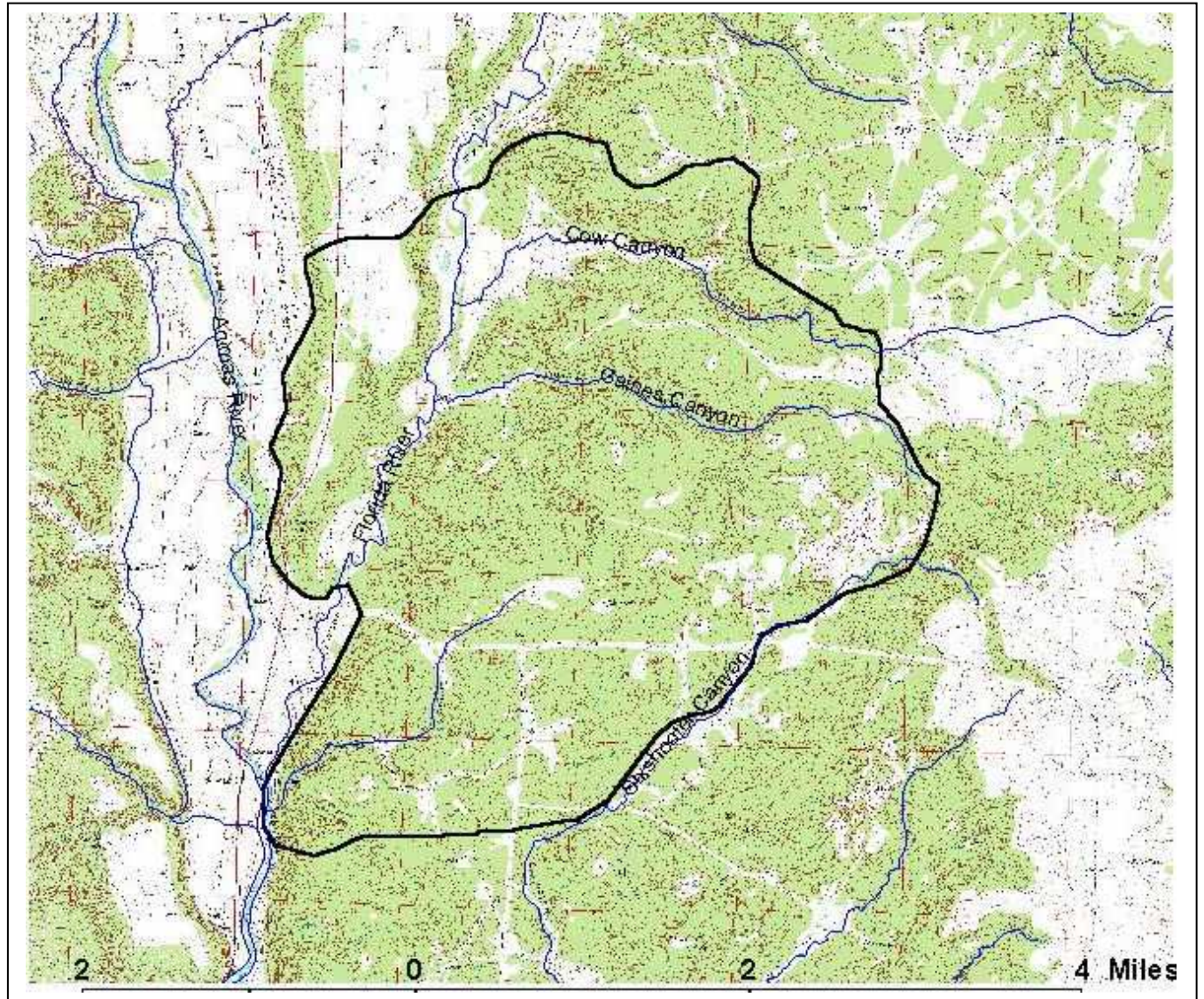
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary encloses two observations of singing male gray vireos, and adjacent suitable habitat. The site was mapped to include contiguous pinyon-juniper vegetation below 6700 ft. This area is believed to be large enough to support a minimum viable population of 100 pairs, although the actual current population size is unknown. Based on a breeding/foraging territory of ten acres per pair, minimum size would be 1000 acres. However, not all of the area within the boundaries is expected to be suitable habitat, as it includes patches of bare ground (gas well pads) and patches with canopy cover that is too dense (especially north-facing slopes). Although PCAs were drawn only for areas where gray vireos were observed in 2003, there is much additional suitable habitat in southern La Plata County.

Protection Comments: No protection actions are needed. The PCA is located on Southern Ute Tribal Land. Permission is required for access.

Management Comments: Clearing of trees or other major disturbances to the pinyon-juniper woodland would be detrimental to the breeding of the Gray vireo. Brown cowbirds were observed at the site, and may pose a threat to nesting vireos.

Gaines Canyon Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



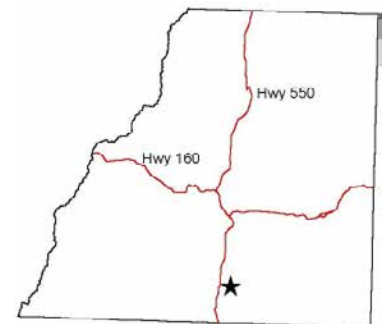
PCA Boundary

Bondad Hill 37107-A7
Long Mountain 37107-A8

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Heramosa Cliffs PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA contains four nesting sites of American peregrine falcon, a globally vulnerable subspecies.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

Location: The Heramosa Cliffs PCA is located in northern La Plata County, west of Highway 550, about 21 miles north of Durango.

U.S.G.S. 7.5-min. quadrangles: Electra Lake

Legal Description: T39N R09W Sections: 34, 35; T38N R09W Sections 2, 3, 10, 11, 14, 15, 22, 23, 26, 27, 34, 35; T37N R9W Sections 2, 3.

Elevation: 8,600ft to 10,532ft

Size: Approximately 5464 acres

General Description: The steep, east-facing Heramosa Cliffs are composed of sandstones, conglomerates and shales of the Rico and Heramosa formations. There are four peregrine falcon nests within the PCA, last observed in 2001, and registered as occupied sites (Bibles, pers. comm.)

A hiking trail begins at Needles, crosses Elbert Creek and switchbacks up the east facing slopes through a mature aspen (*Populus tremuloides*) forest to the top where it again comes close to Elbert Creek. Understory species in the aspen forest include western aster (*Aster ascendens*), Utah serviceberry (*Amelanchier utahensis*), aspen peavine (*Lathyrus leucanthus*), aspen daisy (*Erigeron speciosus*), chokecherry (*Prunus virginiana*), Parry's goldenrod (*Oreochrysum parryi*), fireweed (*Epilobium angustifolium*), Bebb willow (*Salix bebbiana*), Canby's aster (*Aster foliaceus*), Rocky Mountain maple (*Acer glabrum*), Wyoming paintbrush (*Castilleja linariifolia*), and little sunflower (*Helianthella quinquenervis*). A luxuriant riparian zone with Douglas fir (*Pseudotsuga menziesii*) and Rocky Mountain maple is found along Elbert Creek. Other species here include white fir (*Abies concolor*), blue spruce (*Picea pungens*), aspen (*Populus tremuloides*), snowberry (*Symphoricarpos oreophilus*), Colorado columbine (*Aquilegia coerulea*), fendler meadowrue (*Thalictrum fendleri*), Scouler's willow (*Salix scouleriana*), sweet cicely (*Osmorhiza depauperata*), thinleaf alder (*Alnus incana*), tall ragwort (*Senecio serra*), sprucefir fleabane (*Erigeron eximius*), heartleaf arnica (*Arnica cordifolia*), thimbleberry (*Rubus parviflorus*), baneberry (*Actaea rubra*), and elderberry (*Sambucus racemosa*).

Biodiversity Rank Justification and comments: The PCA supports four unranked (E) occurrences of the American peregrine falcon (*Falco peregrinus anatum*), a globally vulnerable subspecies (G4T3) for which breeding populations are rare in Colorado. A good (B) occurrence of a state rare (S1) plant community and an excellent (A) occurrence of a common (G5) community fall within the site.

Table #. Natural Heritage element occurrences at Hermosa Cliffs PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Falco peregrinus</i>	American peregrine falcon	G4T3	S2B, SZM	FS/BLM	E
Plant communities					
<i>Pseudotsuga menziesii/Acer glabrum</i> **	Lower montane forests	G4?	S1		B
<i>Populus tremuloides/tall forbs</i> **	Montane aspen forests	G5	S5		A

*EO=Element Occurrence.

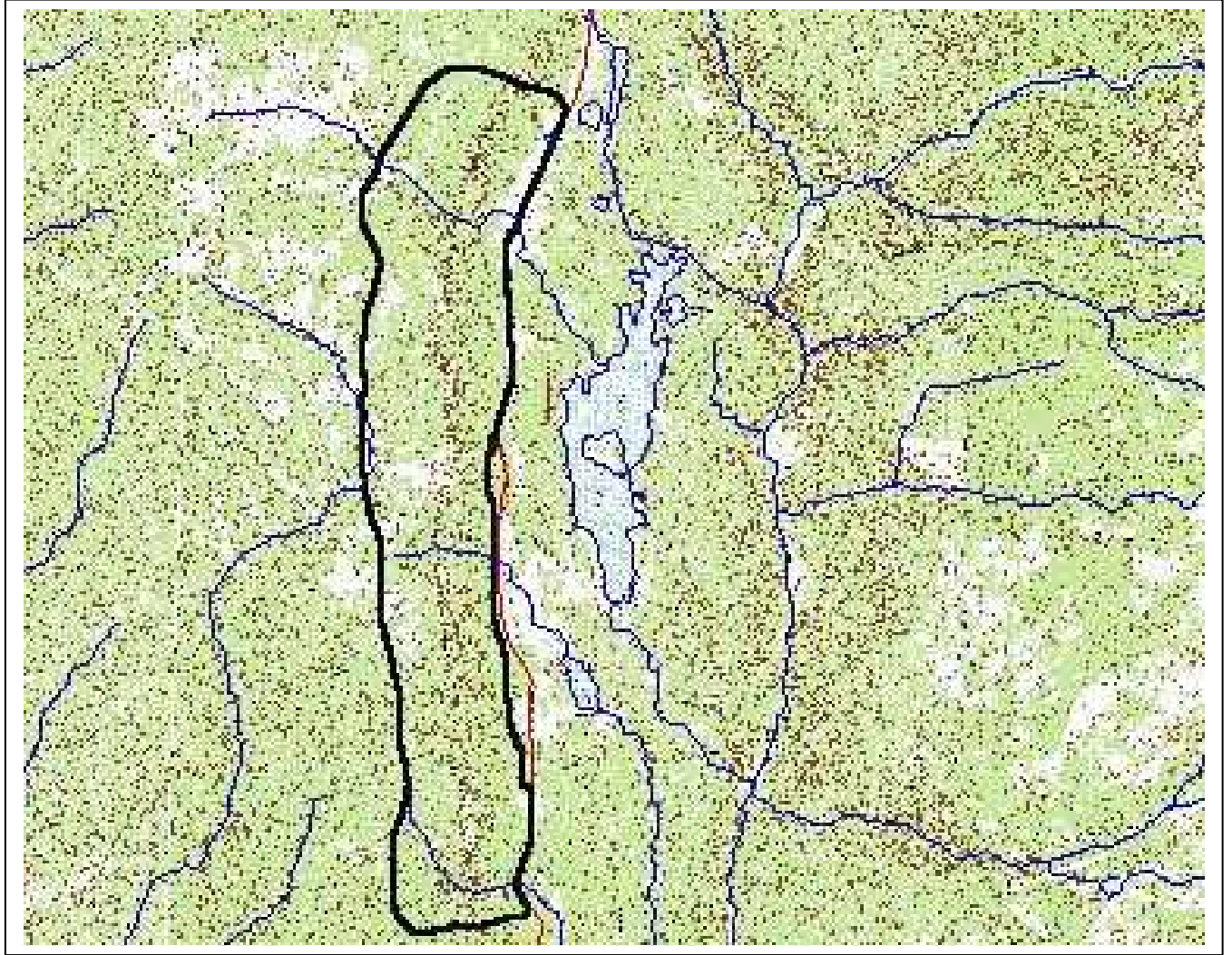
** The PCA does not include the entire extent of the plant communities, which are common and widespread in La Plata County; nor does it include an adequate area necessary to support the ecological processes that the communities depend on.

Boundary Justification: The planning boundary includes four known peregrine falcon nesting sites and the entire cliff complex where they are found, including a buffer of 1 km around each nest. Feeding areas extend far outside of the site boundaries. The plant communities that fall within the boundaries represent common plant communities of La Plata County. Their full extent is not included in the PCA.

Protection Comments: There is mixed ownership between the U. S. Forest Service and private land in this PCA.

Management Comments: Moderate recreational use occurs at this site. Limiting direct disturbance within a one-kilometer radius of the peregrine falcon nests will enhance the probability of successful reproduction. The falcon nests are monitored periodically by the Colorado Division of Wildlife. Oxeye daisy (*Leucanthemum vulgare*), a noxious weed that could spread, was present in the PCA.

Hermosa Cliffs Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



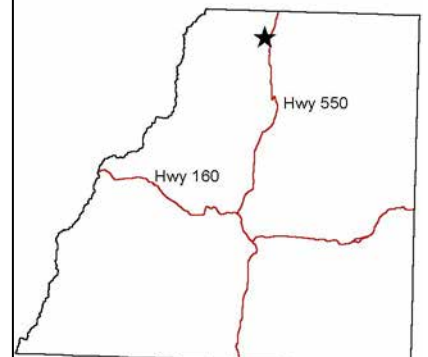
PCA Boundary

Electra Lake, 37107-E7
7.5 Minute Series

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

Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Lake Marie PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an excellent example of an apparently secure (G4?T3T4) plant.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future. The PCA is almost entirely managed by the U.S. Forest Service with private lands in the southern portion.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the current quality of the element occurrence.

Location: The Lake Marie PCA is located 18 miles northeast of Durango, in the Weminuche Wilderness.

U.S.G.S. 7.5-min. quadrangles: Columbine Pass

Legal Description: T38N R7W Sections 11, 12, 13, 23, 24

Elevation: 11,600 ft.

Size: Approximately 777 acres

Redders, 2000, Community Type: *Deschampsia cespitosa*

General Description: Lake Marie is located in Crystal Valley, a narrow, glacial valley that is oriented from north to south. The headwaters for the Florida River are located at Lillie Lake in the northern most part of the PCA. Crystal Valley is bordered by Silver Mesa to the west and Mount Valois, 13,185 ft, to the immediate east. Lillie Lake and Lake Marie are likely tarn lakes, created by past glacial and mass wasting activities. The PCA is located above treeline within the subalpine zone. Short-fruited willow (*Salix brachycarpa*) dominates the drier slopes with scattered stunted Engelmann spruce (*Picea engelmannii*). The wetlands along the Florida River are dominated by plane-leaf willow (*Salix planifolia*), tufted hairgrass (*Deschampsia cespitosa*), tall cottongrass (*Eriophorum angustifolium*) and several sedges (*Carex canescens*, *Carex vernacula*, *Carex aquatilis*, *Carex chalciolepis*). Lake Marie is located on granite bedrock. The lake supports a population of an aquatic plant, quillwort (*Isoetes bolanderi*).

Biodiversity Rank Justification: This site supports an excellent example of an apparently globally secure (G4?T3T4) plant. *Eriophorum altaicum* var. *neogeum* is documented in British Columbia, Montana, Wyoming, Utah, and Colorado. CNHP has 32 known locations for *Eriophorum altaicum* var. *neogeum* (CNHP 2003).

Table 62. Natural Heritage element occurrences at Lake Marie PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Eriophorum altaicum</i> var. <i>neogeum</i>	<i>Altai cottongrass</i>	G4?T3T4	S3	FS	A

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. The boundaries encompass the headwaters of the Florida River, including Lillie Lake and Lake Marie. Boundaries also include potential habitat for the cottongrass. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: The City of Durango manages the majority of the PCA. The San Juan National Forest Service, Weminuche Wilderness owns and operates the adjacent lands.

Management Comments: Possible threats to the occurrence include improper grazing by sheep or horses that would create paths and eventually drain portions of the wetland. Altered hydrology from dams or ditching to improve water supply to the City of Durango may be a threat. Increased beaver activity could create dams and flood the occurrence of the Altai cottongrass.

Soils Description: Soils are shallow, located on granite bedrock. Soils are peaty to mucky in vegetated areas. This portion of La Plata County is not included in the County's soil survey.

Restoration Potential: Currently the wetland and its hydrology are intact.

Wetland Functional Assessment for the Lake Marie PCA:
Proposed HGM Class: River **Subclass:** R2R3
Cowardin System: Palustrine
CNHP's Wetland Classification: *Salix planifolia/Carex aquatilis*


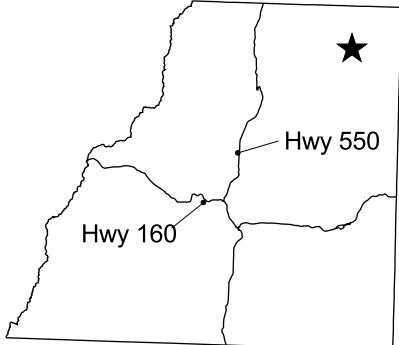
Table 63. Wetland functional assessment for the riverine wetland at the Lake Marie PCA.

Function	Rating	Comments
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
Hydrological Functions		
Flood Attenuation and Storage	Moderate	The high stream order limits attenuation. There are some areas with small beaver ponds and broad alluvial areas for moderate function.
Sediment/Shoreline Stabilization	Moderate	The banks of Lake Marie are moderately vegetated, but there is bare ground and rock present. The vegetation present is native with fibrous roots.
Groundwater Discharge/Recharge	Yes	Likely springs and seeps feed Lake Marie. Groundwater recharge is low due to presence of peaty soils and bedrock near surface
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Normal	No disruptions noted. The wetland is functioning similar to other subalpine riparian wetlands.
Removal of Imported Nutrients, Toxicants, and Sediments.	High	Wetland is moderately to highly vegetated, with peaty soils and emergent and submerged vegetation.
Biological Functions		
Habitat Diversity	Moderate	The area supports a willow and herbaceous habitat.
General Wildlife Habitat	High	Wildlife sign noted. Diverse tree and shrub layer provide dynamic habitat for a variety of birds and herbivores.
General Fish/Aquatic Habitat	High	Low flows for most of the year, but diversity in aquatic habitat available. Fish observed.
Production Export/Food Chain Support	High	Presence of inlet and outlet, > 5 acres vegetated with diverse composition of vegetation and structure.
Uniqueness	Low	Wetland type is abundant in the subalpine of the San Juan Mountains.

Figure 38. Lake Marie Potential Conservation Area, B5: General Biodiversity Interest



0.2 0 0.2 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Columbine Pass, 37107-E5 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	---	--

Lange Canyon PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an excellent example of a plant that is vulnerable (S3) in Colorado.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years. Plans for the private land are not known.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Lange Canyon PCA is located in La Plata County, just west of the Archuleta County line, about 6.5 air miles east-northeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Baldy Mountain
Legal Description: T35N R6W S25, 26

Elevation: 7400 to 7600 feet

Size: Approximately 51 acres

General Description: This PCA encompasses a sagebrush opening in a ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*) forest. Mountain big sage (*Artemisia tridentata* ssp. *vaseyana*) and black sage (*Artemisia nova*), dominate the small opening. Other species present were Arboles milkvetch (*Astragalus oocalycis*), yellow milkvetch (*Astragalus flavus*), longflower rabbitbrush (*Chrysothamnus depressus*), rubber rabbitbrush (*Chrysothamnus nauseosus*), Sandburg bluegrass (*Poa secunda*), Louisiana sagewort (*Artemisia ludoviciana*), redroot buckwheat (*Eriogonum racemosum*), tapertip onion (*Allium acuminatum*), and Gray's biscuitroot (*Lomatium grayi*). The milkvetches are indicators of soils containing selenium.

Biodiversity Rank Justification: This PCA supports an excellent (A ranked) occurrence of a plant that is considered vulnerable in Colorado (S3). The species is also known from New Mexico. Of the 29 known occurrences in Colorado, two are in La Plata County, and all the others in Archuleta County. When this site was surveyed on June 20, 2001, most of the plants were past flowering and drying up. There were thousands of individuals present.

Table #. Natural Heritage element occurrences at the Lange Canyon PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Phlox caryophylla</i>	Pagosa phlox	G4	S3		A

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

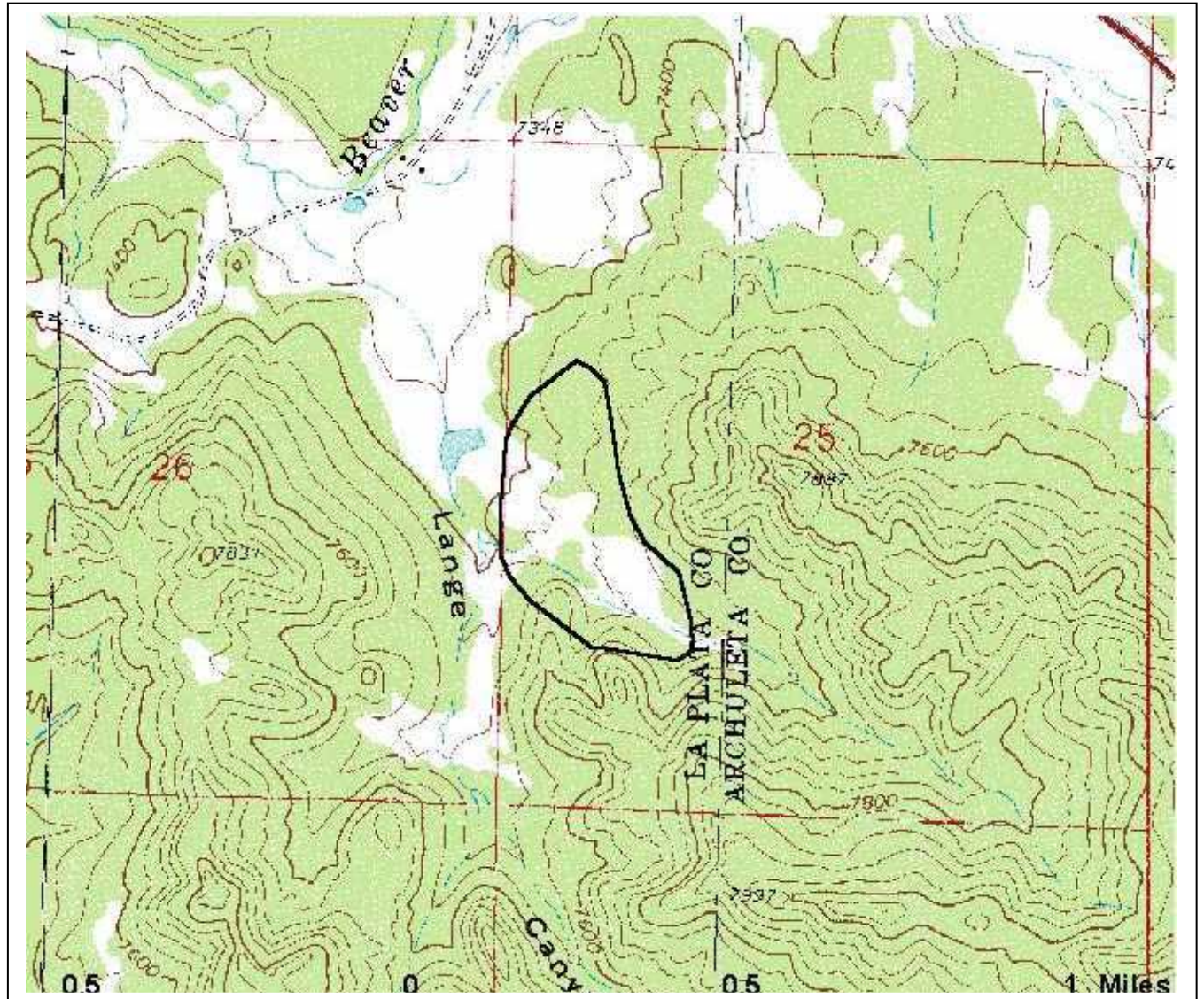
Boundary Justification: The PCA boundary represents the area around the occurrence of the Pagosa phlox and adjacent similar habitat that was not surveyed. It includes the entire sagebrush dominated opening in the forest, allowing for expansion of the population over time.

Protection Comments: The PCA includes both San Juan National Forest land and adjacent private land that was not surveyed. It is expected that the Pagosa phlox population continues on the private land.

Management Comments: Although a road runs through the site, no non-native species were observed in the PCA. Further surveys for the Pagosa phlox during the flowering season (April and May) could reveal

that the population is more extensive. Monitoring for early detection of weeds would assure that management action could be taken if non-native species invade the site.

Lange Canyon Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

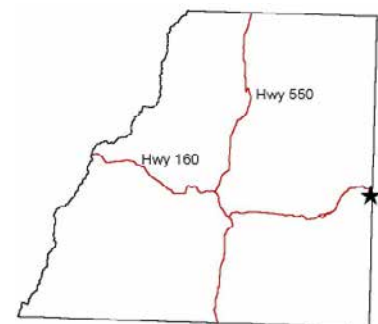
Baldy Mountain 37107-C4

7.5 Minute Series

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

Map created 10 April 2004
 UTM Zone 13 NAD 27

Location in Study Area



Loma Linda PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports a population of Gunnison’s prairie dog, a globally secure species.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M2: Education of landowners to prevent poisoning and otherwise killing Gunnison’s prairie dogs is needed.

Location: The Loma Linda PCA is located north and south of Highway 160, east of Highway 172, about five miles southeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Loma Linda and Gem Village
 Legal Description: T34N R8W Sections 4-9, 16-19; T34N R9W Sections 1-3, 10-14, 23, and 24.

Elevation: 6800 to 7040 feet

Size: Approximately 9913 acres

General Description: This large PCA consists of a central area that contains five sub-populations of Gunnison’s prairie dogs, and six satellite areas with one sub-population each. Most of the area is mapped as irrigated agricultural and pasture land, with numerous water developments (irrigation ditches and stock ponds) scattered throughout. Two of the smaller satellite areas are mapped as foothills grassland. Prairie dog colonies in the large central area were observed from Highways 160 and 172, with 42 individuals counted. There were both young and mature dogs present. Soils of the area are derived from quaternary alluvium and gravels. Vegetation is patchy grass and shrubs, and has been disturbed by the prairie dogs.

Biodiversity Rank Justification: The PCA supports an unranked (E) population of Gunnison prairie dog, a globally secure (G5) species that is nonetheless of concern because of recent reduction in numbers due to plague and poisoning.

Table #. Natural Heritage element occurrences at Loma Linda PCA.
 Elements in bold are those upon which the PCA’s B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Cynomys gunnisoni</i>	Gunnison’s prairie dog	G5	S5	FS	E

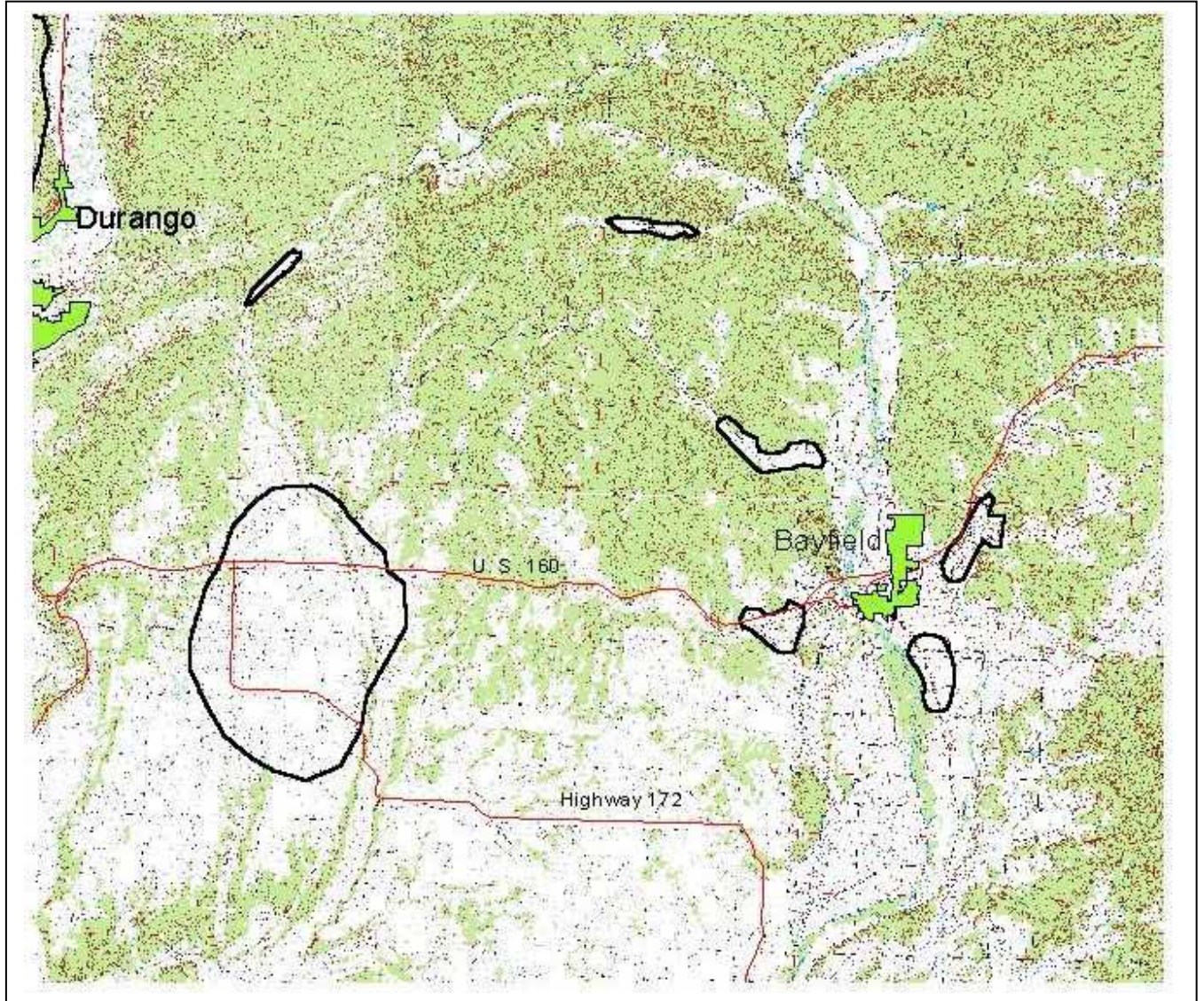
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The boundary is drawn to incorporate five colonies comprising the Gunnison’s prairie dog complex and open grassland and pasture that provides additional potential habitat between the occurrences, allowing for expansion and movement of the colonies in the future.

Protection Comments: The PCA is on private land, observed from public roads, mostly within the Southern Ute Tribal Lands. There are two small parcels managed by the Bureau of Indian Affairs (BIA) included in the site.

Management Comments: Gunnison’s prairie dogs are susceptible to plague, and their numbers have been greatly reduced in recent years. Crowding due to lack of sufficient habitat exacerbates this problem. Indiscriminate poisoning and shooting has also threatened the species. Public education is probably the management action that will most likely benefit this species on private land.

Loma Linda Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

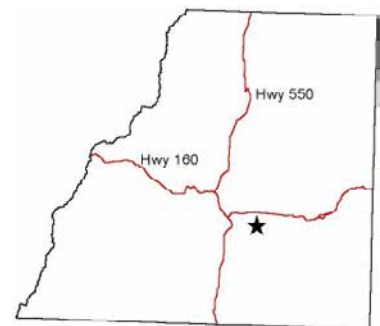


PCA Boundary

- Loma Linda 37107-B7
- Rules Hill 37107-C6
- Gem Village 37107-B6
- Durango East 37107-C7
- Ludwig Mt. 37107-C5
- Bayfield 37107-B5
- 7.5 Minute Series

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

Location in Study Area



Middle La Plata River PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports a poor example of globally vulnerable (G3/S2) montane riparian forest.

Protection Urgency Rank: P1: Protection actions needed immediately. It is estimated that current stresses may continue to reduce the viability of the element in the PCA within 1 year. The PCA is located on properties owned by several private landowners, State of Colorado (CSU Experimental Station), Ute Mountain Ute Tribe, and the Southern Ute Tribe.

Management Urgency Rank: M1: Management actions may be required within one year or the element occurrence could be lost or irretrievably degraded. Extensive hydrologic alterations, weed invasion, improper grazing regimes, and management of recreational activities are the main threats.

Location: The Middle La Plata River PCA is located approximately 7 air miles west of Durango.

U.S.G.S. 7.5-min. quadrangle: Hesperus, Kline

Legal Description: T34N R11W Sections 3, 2, 7, 8, 10
T34N R12W Sections 13, 18, 19, 24
T35N R11W Sections 14, 23, 26, 35

Elevation: 7,200 ft. – 8,110 ft

Size: Approximately 1,207 acres

Redders, 2000, Community Type: not available

General Description: The Middle La Plata River PCA is located south of the Town of Hesperus. The headwaters of the La Plata River are within the Cumberland Basin in the La Plata Mountains. The La Plata River flows through a moderately steep canyon that follows USFS Road 571/County Road 124 and then State Highway 140. The first large ditch on the La Plata River is just south of Mayday. Several other ditches are located along its course including the Big Stick Ditch and Hay Gulch Ditch. Due to the intensive irrigation demand, the La Plata River is an intermittent stream after Hesperus, and is completely dry by mid-summer. Several other anthropogenic forces threaten the viability of the La Plata River, e.g., residential development, gravel pits and improper grazing. Additionally, the southwestern portion of Colorado has experienced a severe drought over the past years and this cumulative lack of precipitation has exacerbated the problem of keeping a constant flow in the La Plata River.

The element of concern, *Populus angustifolia/Betula occidentalis* plant community, is indicative of high groundwater levels or presence of springs. The fact that this plant community is still present, albeit degraded, does indicate a high groundwater table. Cottonwood regeneration and saplings were also observed during the field visit.

The sparse (~15% cover) tree canopy is dominated by narrowleaf cottonwood (*Populus angustifolia*) with lanceleaf cottonwood (*Populus acuminata*). The shrub layer, ~ 50% cover, consists of river birch (*Betula occidentalis*), alder (*Alnus incana*), river hawthorn (*Crataegus rivularis*), Rocky Mountain juniper (*Juniperus scopulorum*), and Russian olive (*Elaeagnus angustifolia*). The forb layer is very sparse dominated by non-natives: mullein (*Verbascum thapsus*), houndstongue (*Cynoglossum officinale*), butter and eggs (*Linaria vulgaris*), Dalmation toadflax (*Linaria dalmatica*), spotted knapweed (*Acosta maculosa*), and musk thistle (*Cardus nutans*). The graminoid layer is also sparse and dominated by hay grasses e.g., timothy (*Phleum pratense*), Kentucky blue grass (*Poa pratensis*), and orchard grass (*Dactylis glomerata*).

The uplands are dominated Gambels oak (*Quercus gambelii*) and big sagebrush (*Artemisia tridentata*) with cheatgrass (*Bromus tectorum*).

Biodiversity Rank Justification: This site supports a degraded (D) example of a globally vulnerable (G3/S2) narrowleaf cottonwood/river birch plant community (*Populus angustifolia/Betula occidentalis*). The narrowleaf cottonwood/river birch plant association is documented for Idaho, Nevada, Utah, and Wyoming. This riparian woodland is uncommon and occurs locally throughout much of its range.

Although this association appears globally stable, the condition of high quality occurrences is extremely threatened because of easy access to this relatively low elevation community. Development, heavy recreation use, expansion and maintenance of roads and railroads, improper grazing, and modification of the hydrologic processes threaten this community with the introduction of non-native species, accelerated erosion, and damage to native vegetation. Hydrologically modified streams may lack the processes necessary to regenerate the *Populus angustifolia* tree canopy

Table 64. Natural Heritage element occurrences at Middle La Plata River PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus angustifolia/ Betula occidentalis</i>	Montane riparian forest	G3	S2		D

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

Boundary Justification: The boundaries incorporate an area that will allow the natural hydrological processes from surrounding drainages. The boundaries encompass the occurrence with a 500 – 1,000 foot buffer that follows the stream channel from the Town of Hesperus to south of Breen. Highway 140 is used as a boundary as well as natural topographic features. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

Protection Comments: This PCA has a diverse landownership pattern. At Hesperus there are many private landowners, portions are owned by the Ute Mountain Ute Tribe and the Southern Ute Tribe. A large portion is owned by the State of Colorado and is managed by the Colorado State Extension Service.

Management Comments: Possible threats to the occurrence include increased demand from irrigation companies, continued expansion of non-natives e.g., Canada thistle (*Cirsium arvense*), hay grasses (*Poa pratensis*, *Phleum pratense*) that are located throughout the PCA. Improper grazing has been more of a factor in the past, but there is still evidence of heavy grazing by livestock.

Soils Description: Soils within the Middle La Plata PCA are characteristic of a moderately wide floodplain with soils derived from alluvium. The soils are sandy loam with coarse gravel. This soil type is Pescar fine sandy loam. It is poorly drained forming in stratified calcareous alluvium (USDA 1988).

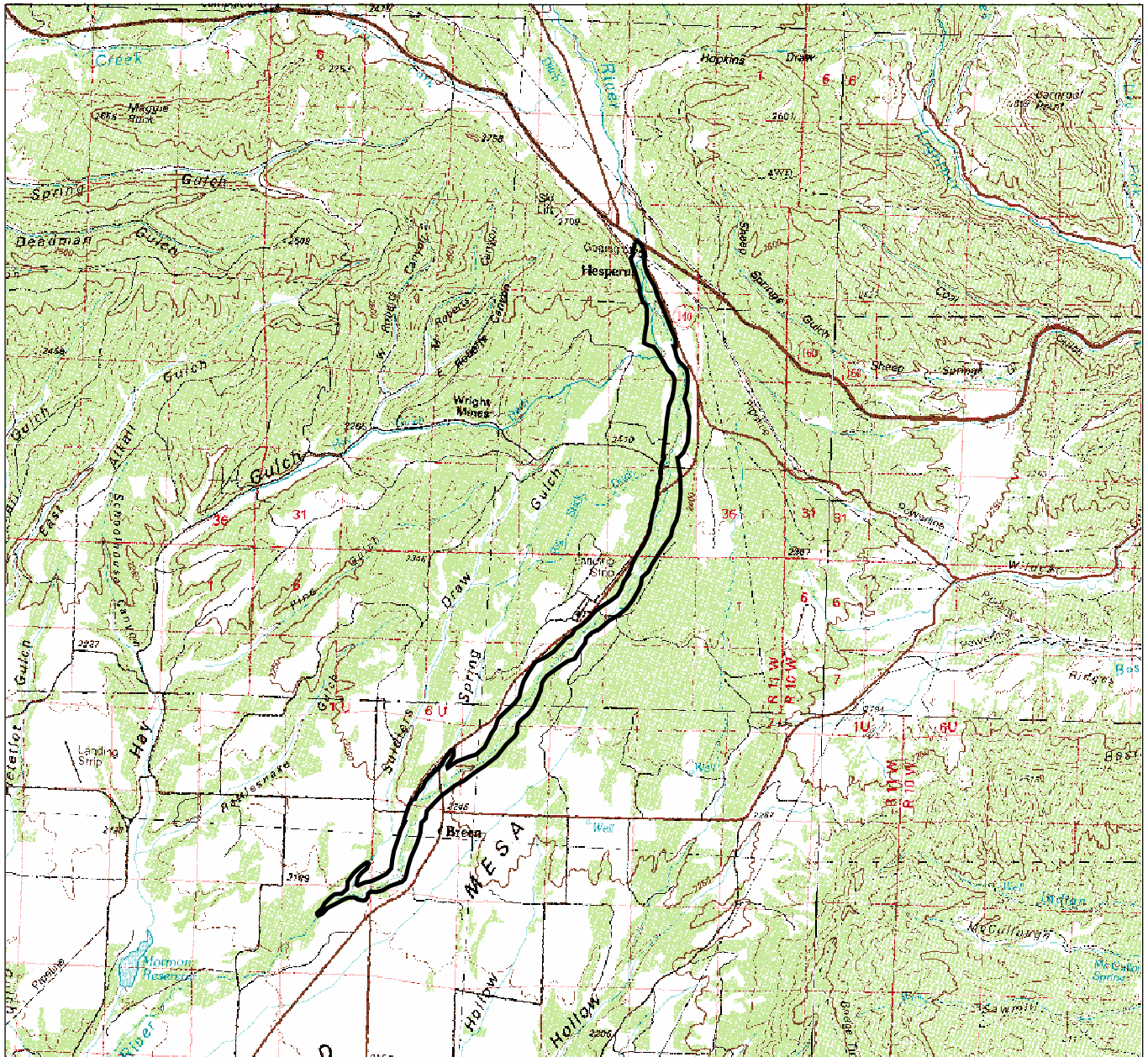
Restoration Potential: River hydrology is completely impacted by water diversions. Restoration could include returning a portion of stream flow to ensure regeneration of vegetation and health of invertebrates. Stream bank erosion and undercutting was common throughout the PCA. Non-native plants would be another restoration effort. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species. For suggestions on native plant revegetation, the Colorado Natural Area Program offers advice in their website, <http://www.parks.state.co.us/cnap/index.html>.

Wetland Functional Assessment for the Middle La Plata River PCA:
Proposed HGM Class: Riverine **Subclass:** R3/4
Cowardin System: Palustrine
CNHP's Wetland Classification: *Populus angustifolia/Betula occidentalis*


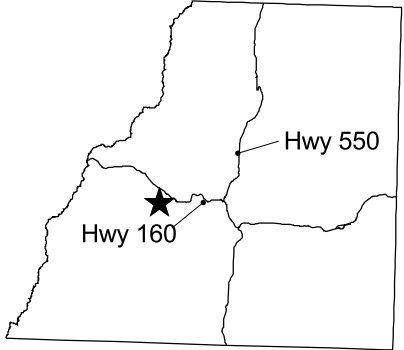
Table 65. Wetland functional assessment for the slope wetland at the Middle La Plata River PCA.

Function	Rating	Comments
Overall Functional Integrity	Below Potential	This wetland is functioning below the range of variability for corresponding HGM subclass.
Hydrological Functions		
Flood Attenuation and Storage	High	The riparian wetland is located in a moderately wide floodplain with porous soils. The potential for attenuation and storage is high, but due to hydrologic alterations, this function is not being performed.
Sediment/Shoreline Stabilization	Low	The wetland is experiencing streambank erosion from undercutting, likely due to the die back of vegetation and accelerated by cattle grazing.
Groundwater Discharge/Recharge	Yes	Likely springs and seeps feed the wetland. Groundwater recharge is low due to lack of perennial water, but soils are composed of gravel and sand.
Dynamic Surface Water Storage	N/A	
Biogeochemical Functions		
Elemental Cycling	Disrupted	Nutrient cycling is disrupted by water diversions, drought, improper grazing, and non-native plants.
Removal of Imported Nutrients, Toxicants, and Sediments.	Low	Wetland is characterized by open tree canopy with low % cover of shrubs or herbaceous cover. Soils are sandy therefore little opportunity to remove sediments and toxicants.
Biological Functions		
Habitat Diversity	Moderate	The area supports two Cowardin classes.
General Wildlife Habitat	Moderate	Deer and elk were observed. Song birds and raptors were also observed.
General Fish/Aquatic Habitat	Low	No fish observed.
Production Export/Food Chain Support	Low	There is little to no water during the growing season. Presence of an outlet and inlet. Wetland not permanently flooded and vegetation does overhang bank
Uniqueness	Low	Plant community is globally vulnerable but is highly degraded.

Figure 39. Middle La Plata River Potential Conservation Area, B5: General Biodiversity Interest



1 0 1 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Cortez, 37108-A1 30x60 Degree Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	---	--

Needle Creek at Emerald Lake PCA

Biodiversity Rank: B5. General biodiversity significance. The site supports an excellent (A ranked) occurrence of a state vulnerable (G4T? S3) plant species.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The area has mixed ownership between the San Juan National Forest, Weminuche Wilderness and private property.

Management Urgency Rank: M5. There are no serious management needs known or anticipated at the site. The area is in a pristine alpine basin.

Location: This PCA is located in the basin upstream from Emerald Lake east of Mountain View Crest.

U.S.G.S. 7.5-min. quadrangles: Mountain View Crest

Legal Description: T38N R7W Section 5, 6, 8

Elevation: 11,276 – 11,480 ft.

Size: Approximately 97 acres

Redders, 2003, Community Type: Not Applicable. This PCA is based a plant species, not a wetland plant community.

General Description: The Needle Creek at Emerald Lake PCA is in a high mountain valley with pristine mountain lakes. Altai cottongrass (*Eriophorum altaicum* var *neogaeum*) occupies the shore of Emerald Lake and part of the Needle Creek drainage. This population is healthy, vigorous and large -- consisting of more than 300 individuals. The only threats to this particular population is recreation, but there appears to be little impact.

Biodiversity Rank Justification and Comments: This site supports an excellent example of an apparently globally secure (G4?T3T4) plant. *Eriophorum altaicum* var. *neogaeum* is documented in British Columbia, Montana, Wyoming, Utah, and Colorado. CNHP has 32 known locations for *Eriophorum altaicum* var. *neogaeum* (CNHP 2003).

Table 66. Natural Heritage element occurrences at Needle Creek at Emerald Lake PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Eriophorum altaicum</i>	Altai cottongrass	G4T3T4	S3	FS	A

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

Boundary Justification: The PCA boundary contains the population of Altai cottongrass and a buffered area of similar habitat. The boundaries incorporate an area that will allow natural hydrological processes from surrounding drainages. It should be noted that the hydrological processes necessary to the element are not fully contained by the PCA boundaries.

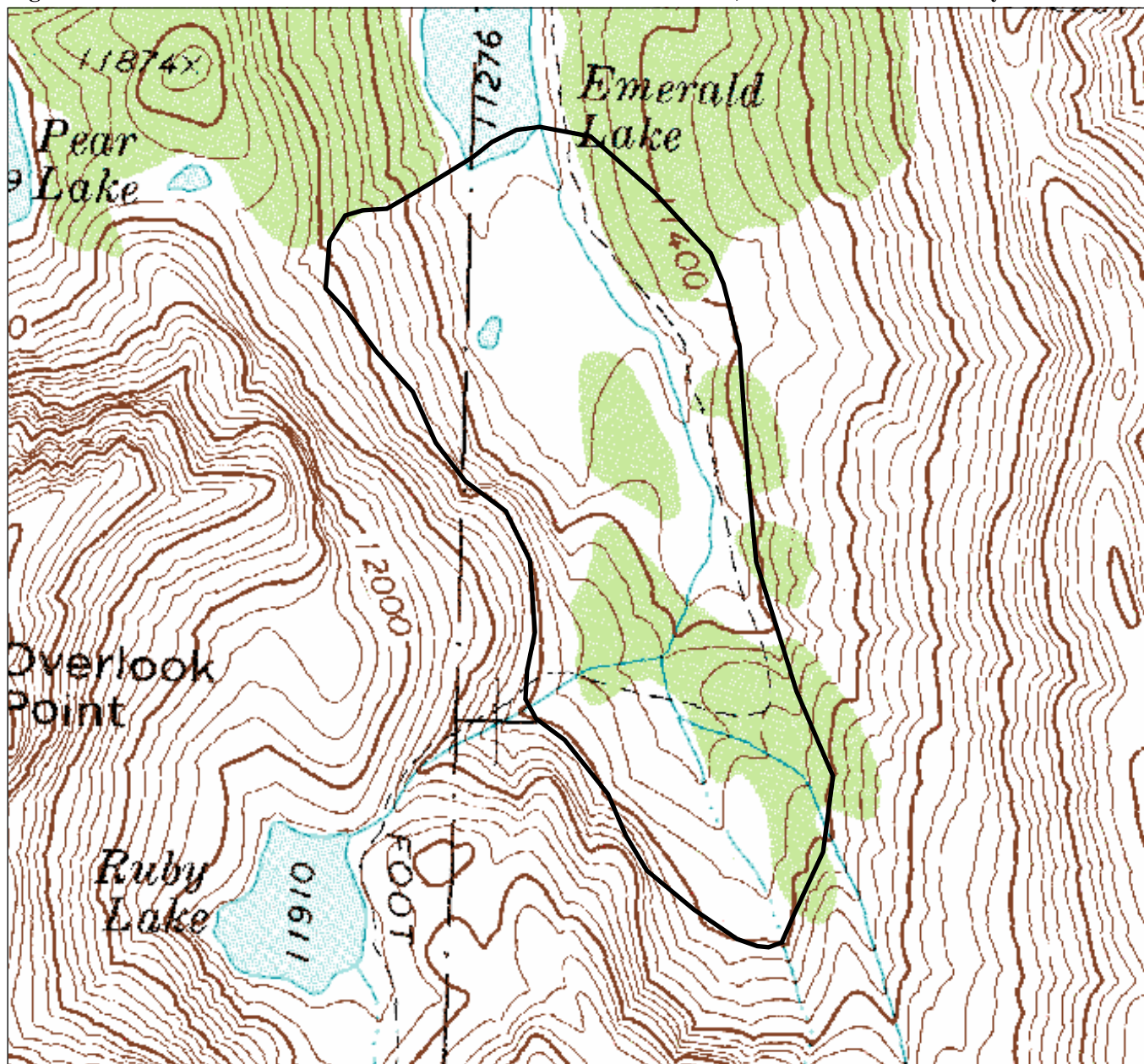
Protection Comments: The PCA is within the Weminuche Wilderness and private property. Public education regarding wetland ecology may encourage volunteer efforts toward conservation. Placement of conservation easements on private property is one action that promotes the lasting conservation of an area and may benefit the landowner.

Management Comments: There are no serious management needs known for this site. Recreation is the predominant land use.


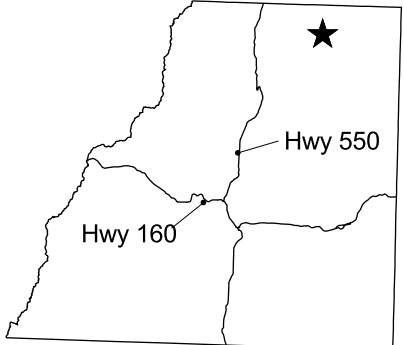
Restoration Potential: The area is functioning as expected.

Wetland Functional Assessment for the Needle Creek at Emerald Lake PCA: CNHP wetland ecologists did not visit this drainage in the 2003 field season. Thus, a functional assessment could not be conducted.

Figure 40. Needle Creek at Emerald Lake Potential Conservation Area, B5: General Biodiversity Interest



0.1 0 0.1 Miles

<p>Colorado Natural Heritage Program</p> <p>Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Mountain View Crest, 37107-E6 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey</p> <p>map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	--	--

Pastorius Reservoir PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports unranked occurrences of four waterfowl species.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M3: New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA.

Location: The Pastorius Reservoir PCA is located south of Highway 160 and east of Highway 550, about six miles southeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Loma Linda

Legal Description: T34N R9W Sections 10 and 15

Elevation: 6840-6900 feet

Size: Approximately 276 acres

General Description: Pastorius Reservoir captures water from Florida Mesa, in the Florida River drainage. The site is a State Wildlife Area, owned by the Colorado Division of Wildlife, and lies within the Southern Ute Indian Reservation. The reservoir supports submerged aquatic plants and a narrow transitional zone with cattails and sedges. Surrounding land is primarily devoted to grazing or hay meadows, and contains numerous smaller water impoundments. Some pinyon and juniper, as well as a few narrowleaf cottonwoods add to the diversity of the site. A large number of waterfowl use the reservoir and its shoreline for breeding and foraging. Some of the species observed there in 2003, in addition to those tracked by CNHP below, include mallards, blue winged teal, long-billed dowitchers, bald eagles and spotted sandpipers.

Biodiversity Rank Justification: Four unranked (E) occurrences of globally common water fowl have been documented from this PCA. Breeding populations of snowy egret and black-necked stilt are rare (S2B) in Colorado.

Table #. Natural Heritage element occurrences at Pastorius Reservoir PCA.

Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Egretta thula</i>	Snowy egret	G5	S2B, SZN		E
<i>Sterna forsteri</i>	Forster's tern	G5	S2B, S4N		E
<i>Himantopus mexicanus</i>	Black-necked stilt	G5	S3B, S2N		E
<i>Phalaropus tricolor</i>	Wilson's phalarope	G5	S4B, S4N		E

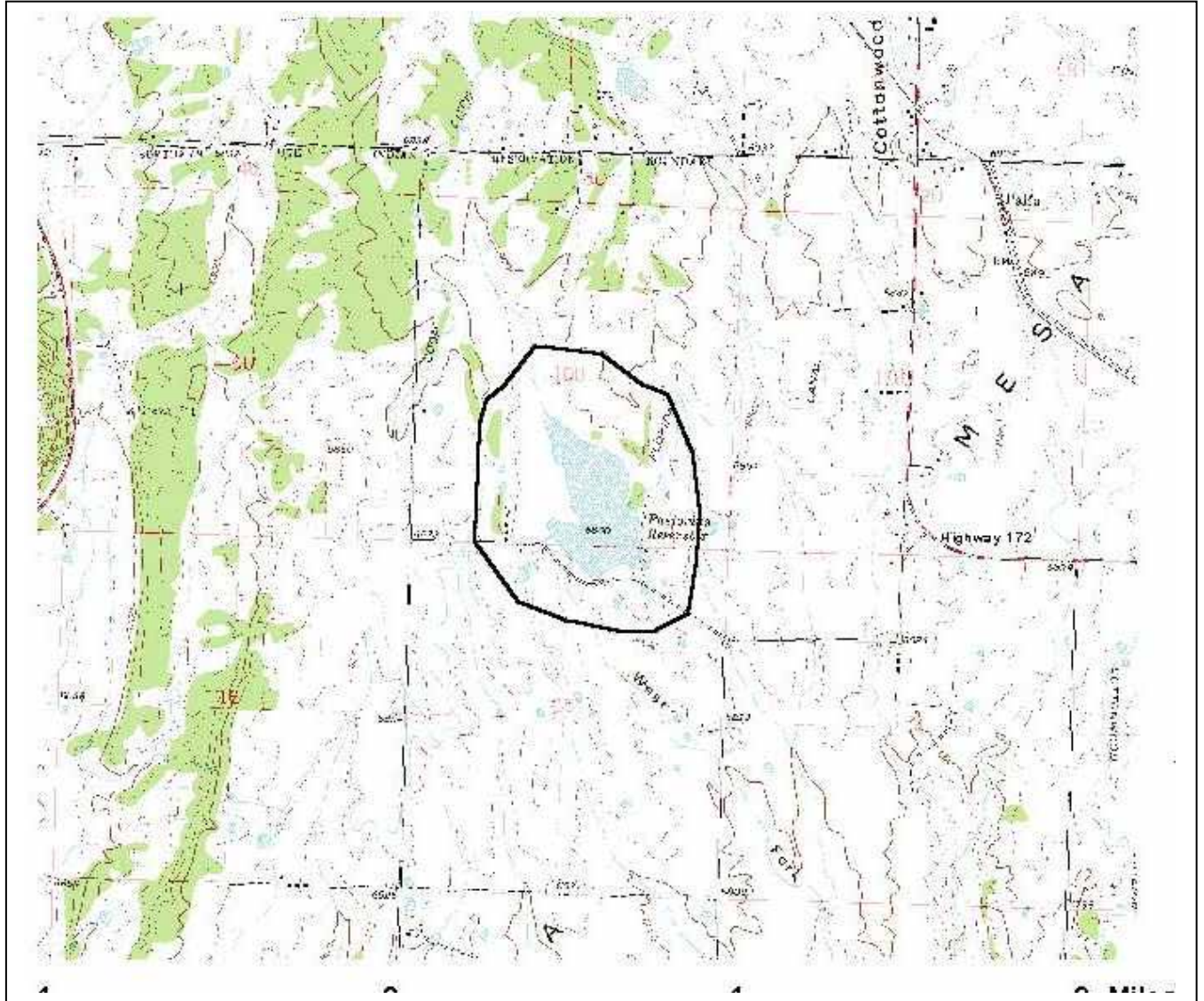
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The PCA contains the reservoir and a narrow band of shoreline used by waterfowl. It does not include the entire area that would be necessary to support these birds during migration.

Protection Comments: The Colorado Division of Wildlife has a perpetual easement on the water and owns a few acres around the shore that are managed as a state wildlife area.

Management Comments: The reservoir is primarily intended for irrigation, and is drained for part of the year for agricultural purposes. It is unknown what effect drying the reservoir has on the birds.

Pastorius Reservoir Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

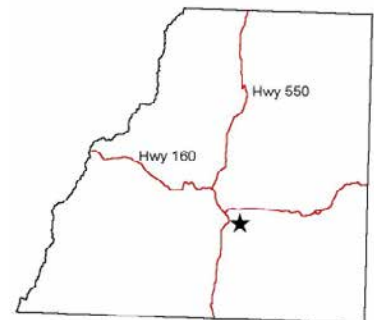
Loma Linda 37107-B7

7.5 Minute Series

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

Map created 10 April 2004
 UTM Zone 13 NAD 27

Location in Study Area



Pine River Canal PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports good examples of a plant that is rare (S2) in Colorado, and contains part of a common (G5) plant community.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years. .

Management Urgency Rank: M3: Several exotic plant species were found in the PCA. Weed control would help to maintain the quality of the forest.

Location: The Pine River Canal PCA is located in La Plata County, east of Highway 151, about 10 miles south of Ignacio and 24 miles southwest of Durango.

U.S.G.S. 7.5-min. quadrangle: Tiffany
 Legal Description: 33N R6W Sections 20, 21

Elevation: 6200 to 7236 feet

Size: Approximately 331 acres

General Description: This PCA occupies a pinyon pine (*Pinus edulis*)- Utah juniper (*Juniperus osteosperma*) woodland on south facing slopes of soils derived from sandstones and shales of the Animas Formation. Barren eroded areas within the woodland support a large population of Abajo beardtongue (*Penstemon lentus*). Associated species include mountain mahogany (*Cercocarpus montanus*), bitterbrush (*Purshia tridentata*), banana yucca (*Yucca baccata*), junegrass (*Koeleria macrantha*), James buckwheat (*Eriogonum jamesii*), bottlebrush squirreltail (*Elymus elymoides*), and Indian rice grass (*Oryzopsis hymenoides*). See Appendix for complete species list.

Biodiversity Rank Justification: The PCA includes a good (B ranked) occurrence of a state rare (S2) plant.

Table #. Natural Heritage element occurrences at Pine River Canal PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Penstemon lentus</i>	Abajo beardtongue	G4Q	S2		B

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

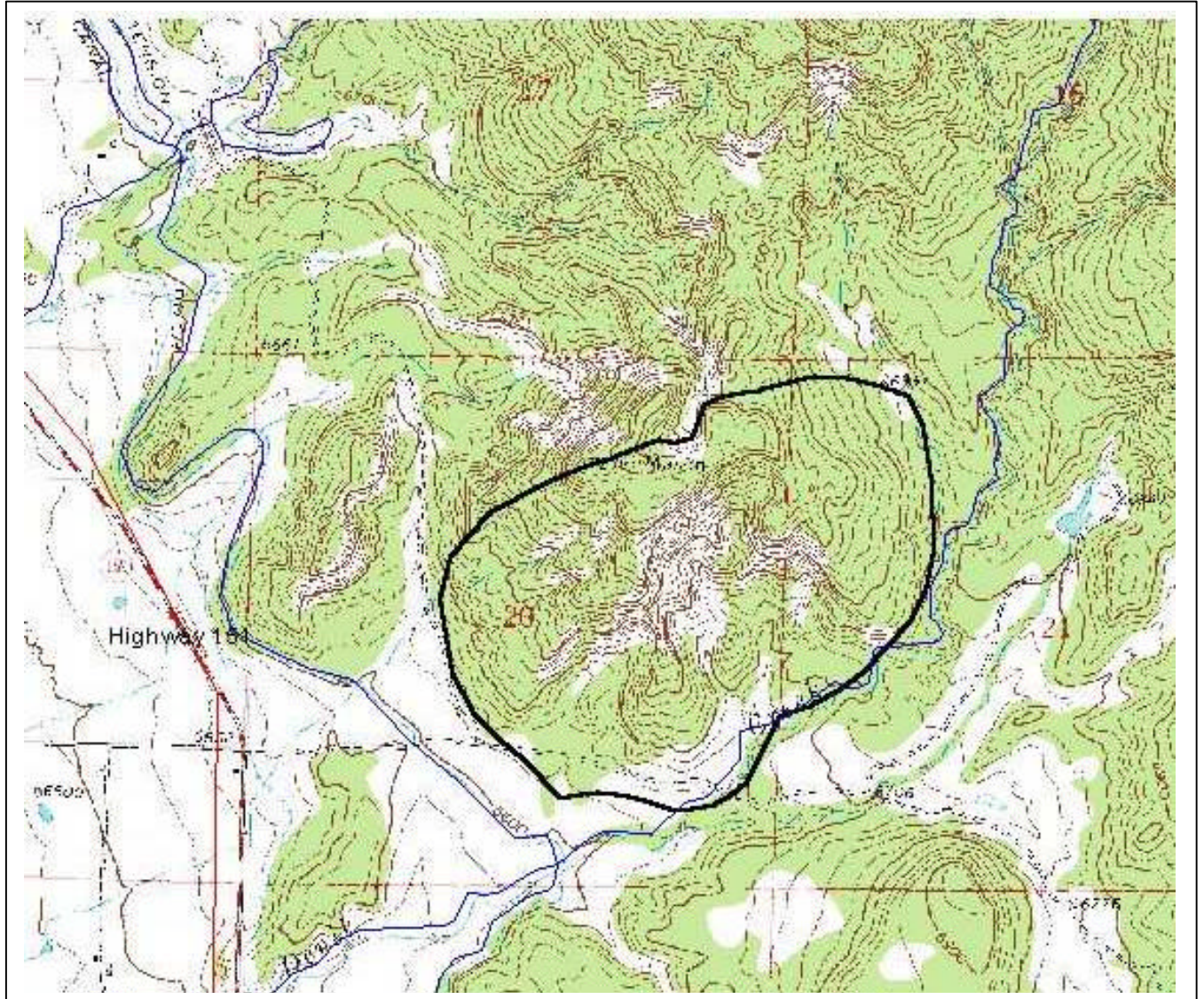
** The PCA does not include the entire extent of the pinyon-juniper community, which is common and widespread in southern La Plata County; nor does it include an adequate area necessary to support the ecological processes that the community depends on.

Boundary Justification: The boundary is drawn to enclose the Abajo beardtongue (*Penstemon lentus*) population and the surrounding area of the pinyon-juniper/mountain mahogany community that characterizes the habitat of the penstemon.

Protection Comments: The PCA is on Southern Ute Indian Tribal land, and written permission of the tribe is required to access it. Plans for development of the site are not known.

Management Comments: Although the hillsides in the pinyon-juniper woodland are in good condition, bottom areas are weedy with Russian knapweed (*Acroptilon repens*), cheatgrass (*Bromus tectorum*), cranesbill (*Erodium cicutarium*), and alyssum (*Alyssum parviflorum*).

Pine River Canal Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Tiffany 37107-A5

7.5 Minute Series

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

Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Red Mesa PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports three sub-populations of Gunnison’s prairie dog, a common species that is of special concern because of recent declines.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Red Mesa PCA is located in southwestern La Plata County about 12 miles southwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Kline, Mormon Reservoir, Redmesa, and Pinkerton Mesa
 Legal Description: T34N R11W Sections 6-8, 16-18, 20, 21, 29-32; T34n R12W Sections 24-27, 34 36; T33N R12W Sections 1-3, 10-12.

Elevation: 6800 to 7466 feet

Size: Approximately 11,063 acres

General Description: The PCA is located on open, primarily agricultural land within the pinyon-juniper zone. Most of the area has been mapped as dryland agricultural. It also includes some natural openings in pinyon-juniper woodland. There are many roads and oil wells in the area. The PCA comprises one large central area that contains three prairie dog towns and five satellite areas with one town each.

Biodiversity Rank Justification: The Red Mesa PCA supports four unranked (E) sub-populations of Gunnison’s prairie dog, a species that is globally secure (G5), but of concern because of recent declines. This is one of ten populations documented in 2003. It is included to represent the species in the western part of the county on non-irrigated agricultural land.

Table #. Natural Heritage element occurrences at Red Mesa PCA.
 Elements in bold are those upon which the PCA’s B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Cynomys gunnisoni</i>	Gunnison’s prairie dog	G5	S5	FS	E

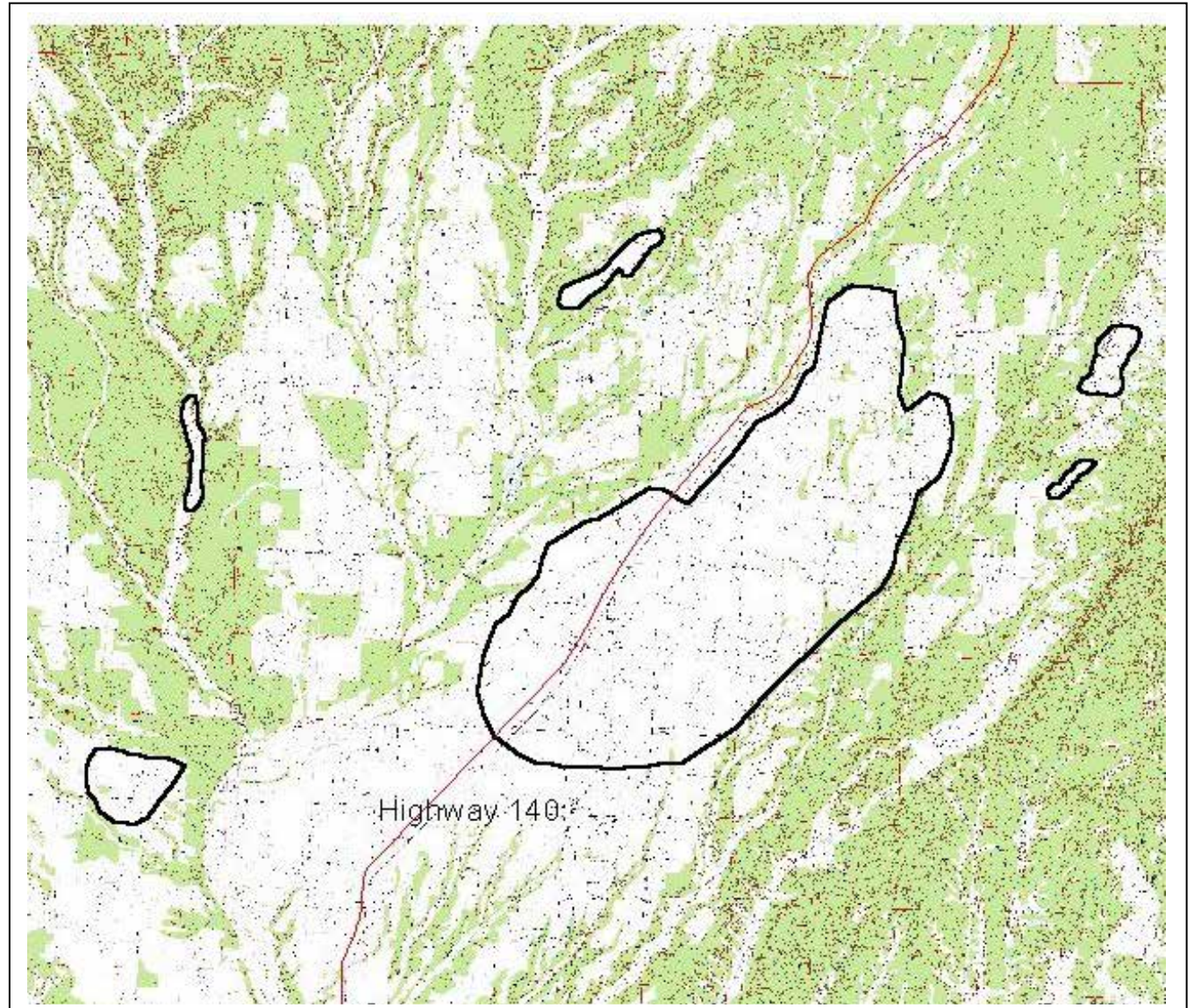
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The PCA comprises one large central area that contains three prairie dog towns and five satellite areas with one town each. This represents areas that are occupied by prairie dogs and adjacent open level areas that may be colonized in the future.

Protection Comments: The PCA is on Southern Ute Indian Tribal land, and written permission of the tribe is required to access it. Plans for development of the site are not known.

Management Comments: Gunnison’s prairie dogs are susceptible to plague, and their numbers have been greatly reduced in recent years. Crowding due to lack of sufficient habitat exacerbates this problem. Indiscriminate poisoning and shooting has also threatened the species. Public education is probably the management action that will most likely benefit this species on private land.

Red Mesa Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



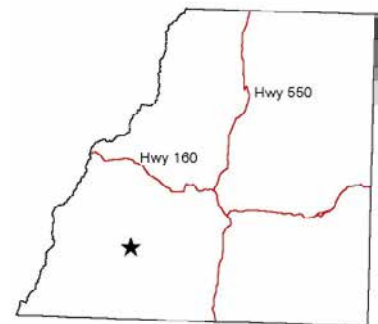
PCA Boundary

Mormon Res. 37108-B2
Kline 37108-B1
Red Mesa 37108-A1
Pinkerton Mesa 37108-A1

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004

Location in Study Area



Road 136 PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an unranked occurrence of Gray vireo, a bird that is rare (S2B) in Colorado.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The Road 136 PCA is located in southwestern La Plata County east of the La Plata River, about 22 miles southwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Red Mesa
 Legal Description: T32N R13W Sections 1, 2

Elevation: 6200 to 6500 feet

Size: Approximately 2306 acres

General Description: This area of pinyon-juniper woodlands has moderately spaced junipers (*Juniperus osteosperma*) with a few pinyon pines (*Pinus edulis*). Ground cover is minimal, with some sagebrush and other shrubs present. A Gray vireo male was heard singing, and answered a taped call, coming within 10 meters of the researcher. Broad-tailed hummingbirds and mountain bluebirds were also observed at the site. Land uses include oil and gas drilling and hunting.

Table #. Natural Heritage element occurrences at Road 136 PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Vireo vicinior</i>	Gray vireo	G4	S2B, SZN		E

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

Boundary Justification: The boundary encloses an observation of a singing male gray vireo, and adjacent suitable habitat. The site was mapped to include contiguous pinyon-juniper vegetation below 6700 ft. This area is believed to be large enough to support a minimum viable population of 100 pairs, although the actual current population size is unknown. Based on a breeding/foraging territory of ten acres per pair, minimum size would be 1000 acres. However, not all of the area within the boundaries is expected to be suitable habitat, as it includes patches of bare ground (gas well pads) and patches with canopy cover that is too dense (especially north-facing slopes). Although PCAs were drawn only for areas where gray vireos were observed in 2003, there is much additional suitable habitat in southern La Plata County.

Protection Comments: No protection actions are needed. The PCA is located on Southern Ute Tribal Land. Permission is required for access.

Management Comments: Clearing of trees or other major disturbances to the pinyon-juniper woodland would be detrimental to the breeding of the Gray vireo.

Biodiversity Rank Justification: The Red Mesa PCA supports eight unranked (E) sub-populations of Gunnison's prairie dog, a species that is globally secure (G5), but of concern because of recent declines. This is one of 20 sub-populations documented in La Plata County in 2003 (see also Loma Linda PCA). It is included to represent the species in the western part of the county on non-irrigated agricultural land.

Table #. Natural Heritage element occurrences at Red Mesa PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Cynomys gunnisoni</i>	Gunnison's prairie dog	G5	S5	FS	E

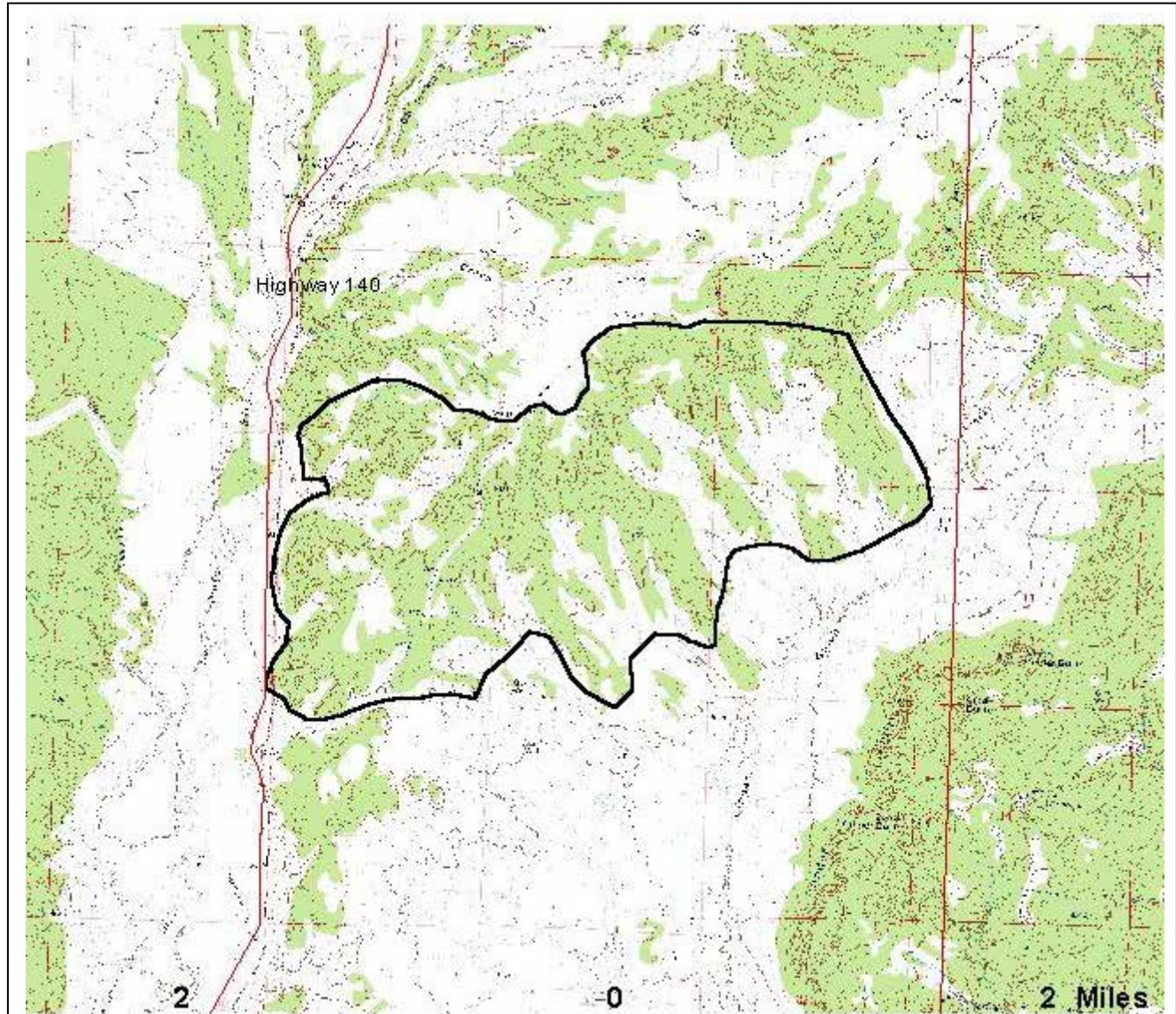
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: The PCA comprises one large central area that contains three prairie dog towns and five satellite areas with one town each. This represents areas that are occupied by prairie dogs and adjacent open level areas that may be colonized in the future.

Protection Comments: The PCA is entirely on private land within the Southern Ute Indian Reservation.

Management Comments: Gunnison's prairie dogs are susceptible to plague, and their numbers have been greatly reduced in recent years. Crowding due to lack of sufficient habitat exacerbates this problem. Indiscriminate poisoning and shooting has also threatened the species. Public education is probably the management action that will most likely benefit this species on private land.

Road 136 Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
College of Natural Resources
8002 Campus Delivery
Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



PCA Boundary

Red Mesa 37108-A1
Pinkerton Mesa 37108-A1

7.5 Minute Series

Digital Raster Graphics
Produced by the U. S. Geological
Survey
Map created 10 April 2004
UTM Zone 13 NAD 27

Location in Study Area



Spring Creek at Ignacio PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA contains excellent to good occurrences of three plants that are rare or vulnerable in Colorado.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years.

Management Urgency Rank: M3: New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA.

Location: The Spring Creek at Ignacio PCA is located in southeastern La Plata County, about 7 air miles southeast of Bayfield, 7 miles east-southeast of Ignacio, and 21 air miles southeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Bayfield/ Pargin Mountain

Legal Description: T34N R06W Sections: 27-34; T33N R06W Section 6

Elevation: 6,700ft to 7,200ft

Size: Approximately 1134 acres

General Description: Spring Creek, a tributary of Los Pinos River, flows through an area of gentle clay hills clothed with Utah juniper (*Juniperus osteosperma*) and mixed shrubs. The PCA encompasses parts of Zabel Canyon and Salt Canyon, tributaries of Spring Creek. Typical plant species in the area are big sagebrush (*Artemisia tridentata* ssp. *tridentata*), bitterbrush (*Purshia tridentata*), Gambel oak (*Quercus gambellii*), cliff fendlerbush (*Fendlera rupicola*) and galleta (*Hilaria jamesii*). Aztec milkvetch (*Astragalus proximus*) was found at the site in 1994 in disturbed or eroding soil, following an unusually wet winter. No milkvetch plants were found in 2003; however, they may yet reappear in a wetter year. A survey of Archuleta County in 2001 yielded the occurrence of Pagosa phlox (*Phlox caryophylla*), while the Abajo beardtongue (*Penstemon lentus*) was located in 2003. All three species share similar habitat requirements. In addition to the three rare plants that have been documented, this site also contains suitable habitat for Gray's Easter daisy (*Townsendia glabella*) and Missouri milkvetch (*Astragalus missouriensis* var *humistrata*), two more rare species that failed to appear in known sites in 2003.

Biodiversity Rank Justification and comments: The PCA was drawn for three rare plant occurrences: an excellent to good (AB) occurrence of Aztec milkvetch (*Astragalus proximus*), a plant that is apparently secure globally (G4), but rare (S2) in Colorado; and good occurrences of Abajo beardtongue and Pagosa phlox, also globally secure but rare (S2) or vulnerable (S3) in Colorado.

Table #. Natural Heritage element occurrences at Spring Creek at Ignacio PCA.

Elements in bold are those upon which the PCA's B-rank is based.

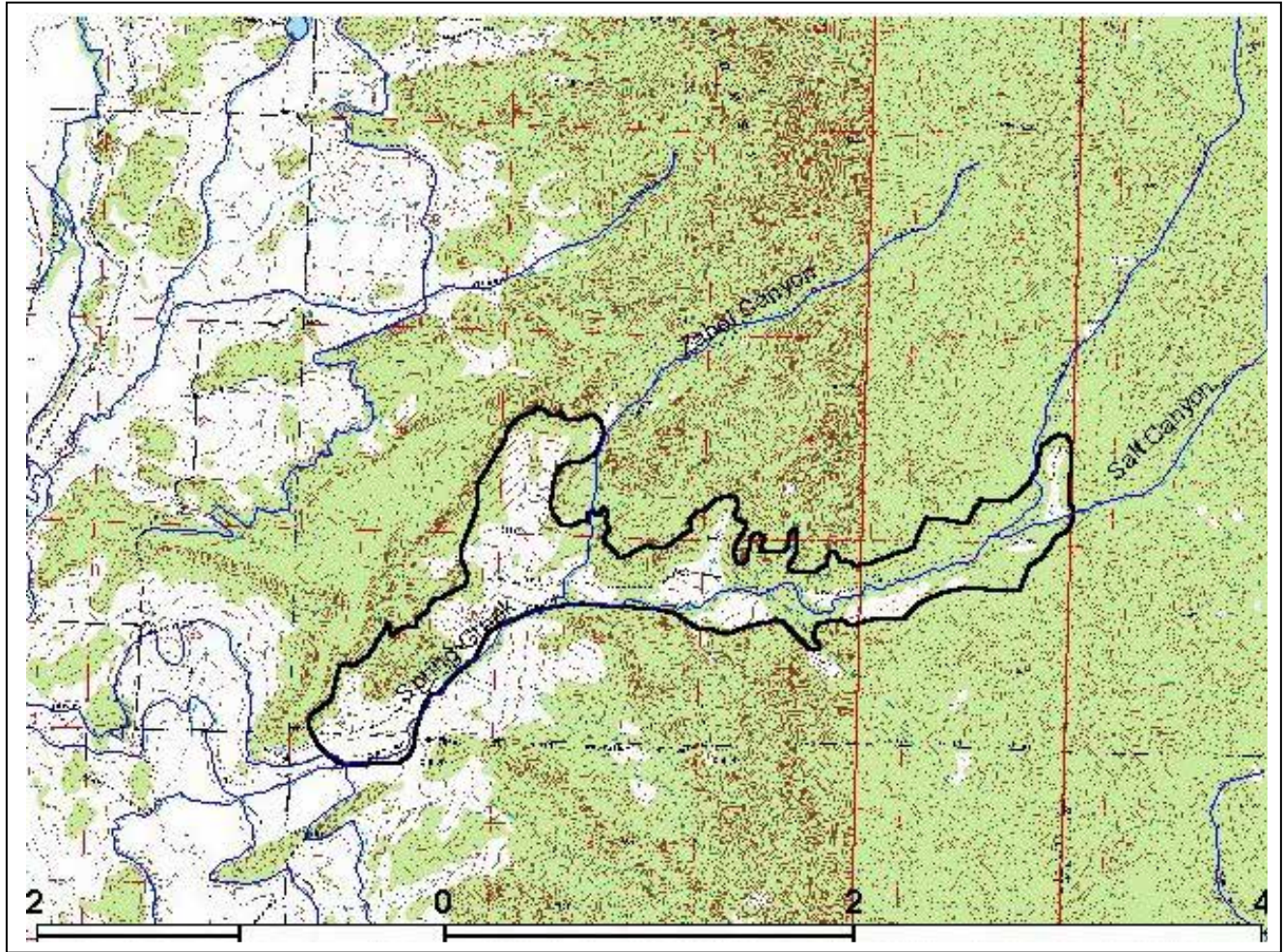
Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Astragalus proximus</i>	Aztec milkvetch	G4	S2	FS	AB
<i>Penstemon lentus</i>	Abajo beardtongue	G4Q	S2		B
<i>Phlox caryophylla</i>	Pagosa phlox	G4	S3		B


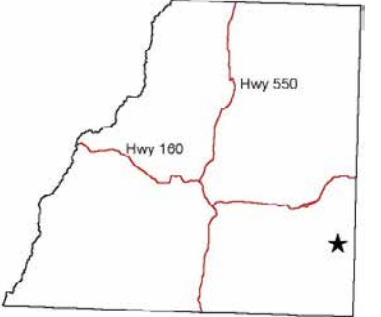
Boundary Justification: The PCA boundary includes the three element occurrences and surrounding potential habitat of Utah juniper woodland, which also serves as a buffer to limit direct disturbance.

Protection Comments: The U. S. Forest Service manages this PCA. Special designation in the forest management plan may help to protect this site.

Management Comments: The PCA has been grazed consistently for many years. There are several gas wells in the area. Surveys in wetter years are recommended for Aztec milkvetch, Abajo beardtongue, Pagosa phlox, Townsend's Easter daisy and Missouri milkvetch.

Spring Creek at Ignacio Potential Conservation Area. B5: General Biodiversity Significance



<p>Colorado Natural Heritage Program</p> <p>Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins CO 80523-8002</p> <p>Disclaimer</p> <p><i>Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</i></p>	<p></p> <p>PCA Boundary</p> <p>Bayfield 37107-B5 Pargin Mountain 37107-B4</p> <p>7.5 Minute Series</p> <p>Digital Raster Graphics Produced by the U. S. Geological Survey Map created 10 April 2004 UTM Zone 13 NAD 27</p>	<p>Location in Study Area</p> 
--	--	--

Sunlight Basin PCA

Biodiversity Rank: B5. General biodiversity. This site contains an unranked occurrence (E) of an apparently globally secure (G5) plant species. The plant species is on the U.S. Forest Service Sensitive Species List.

Protection Urgency Rank: P5. Land protection is complete and no protection actions are needed. The area is within the Weminuche Wilderness.

Management Urgency Rank: M5. No management needs are known or anticipated in the PCA.

Location: The Sunlight Lake PCA is located below Sunlight Lake in the Sunlight Creek headwaters in the Weminuche Wilderness.

U.S.G.S. 7.5-min. quadrangles: Storm King Peak
 Legal Description: T39N R6W Section 19
 T39N R7W Section 24

Elevation: 12,360 ft.

Size: Approximately 58 acres

Redders, 2003, Community Type: Insufficient information to classify this wetland within this classification.

General Description: The Sunlight Basin PCA is in a high elevation talus basin southeast of Sunlight Lake. The area supports hydric soils in an alpine wetland with a ~75% graminoid canopy cover. Species include rock sedge (*Carex saxatilis*) and Altai cottongrass (*Eriophorum altaicum*) with associated forb species elephant head (*Pedicularis groenlandica*). CNHP database records show at least 25 individuals of Altai cottongrass observed in bloom in 1996. The area was not visited in 2003.

Biodiversity Rank Justification and Comments: The area supports an apparently globally secure (G5), state vulnerable (S3) plant species. The element occurrence rank, E stands for “extant” – the element exists in the location stated, however there is insufficient information to rank the occurrence. *Eriophorum altaicum* var. *neogeum* is documented in British Columbia, Montana, Wyoming, Utah, and Colorado. CNHP has 32 known locations for *Eriophorum altaicum* var. *neogeum* (CNHP 2003).

Table 67. Natural Heritage element occurrences at Sunlight Basin PCA.
 Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Eriophorum altaicum</i>	Altai cottongrass	G4?T3	S3	FS	E

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

Boundary Justification: The site encompasses the plant species population and surrounding hydrology thought to support the alpine wetland.

Protection Comments: The area is within the Weminuche Wilderness. Land protection is complete.

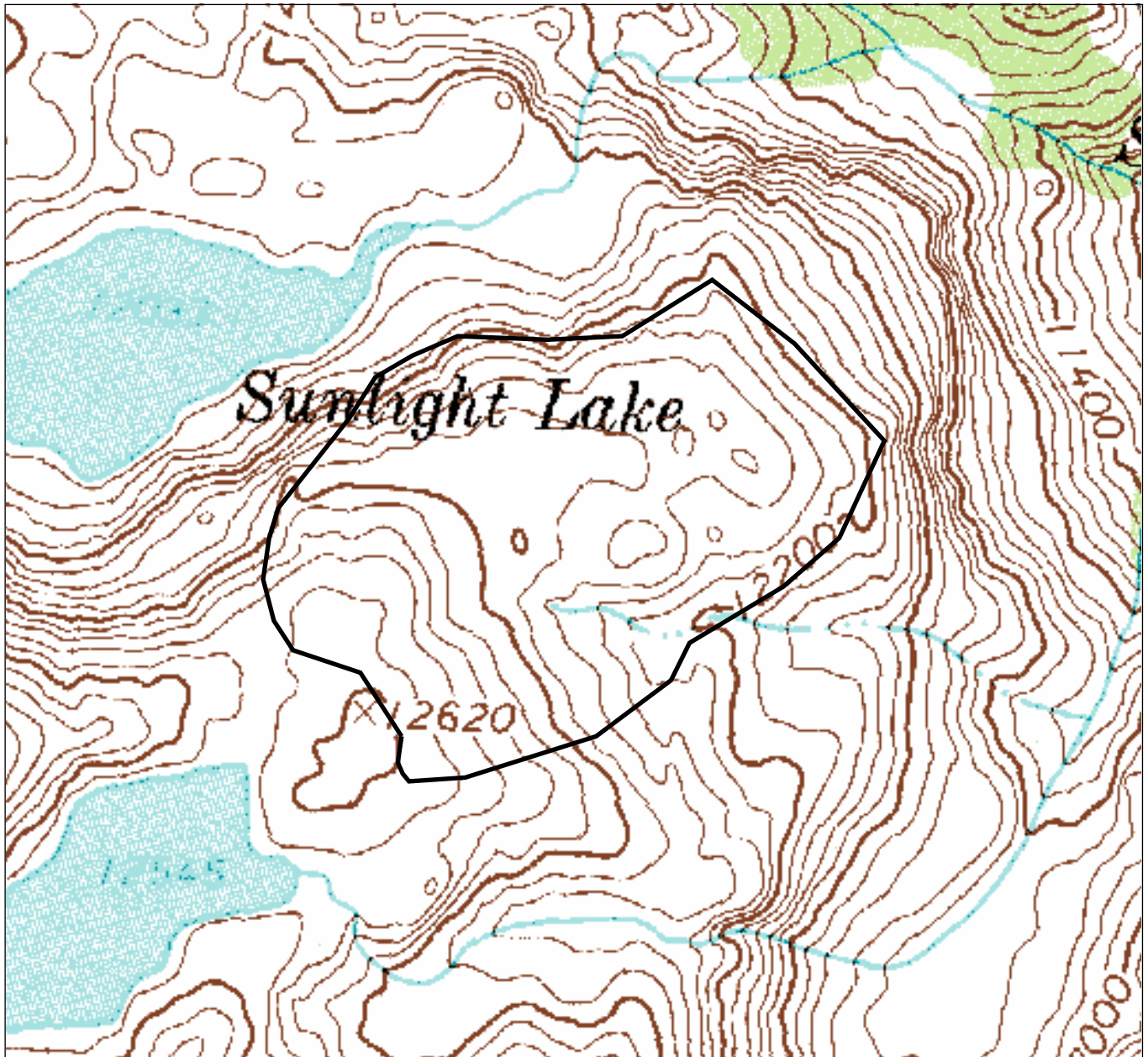
Management Comments: There are no serious management needs known or anticipated at this site.

Soils Description: Soils are described as hydric.


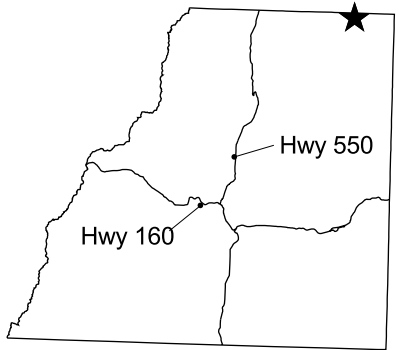
Restoration Potential: There are apparently no restoration needs.

Wetland Functional Assessment for the Sunlight Basin PCA: CNHP wetland ecologists did not visit this drainage in the 2003 field season. Thus, a functional assessment could not be conducted.

Figure 41. Sunlight Basin Potential Conservation Area, B5: General Biodiversity Interest



0.1 0 0.1 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Storm King Peak, 37107-F5 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey</p> <p>map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	--	--

Tuckerville PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an unranked occurrence of American peregrine falcon (*Falco peregrinus anatum*), a globally vulnerable subspecies (G4T3). Breeding populations are rare (S2B) in Colorado.

Protection Urgency Rank: P3: Protection actions may be needed, but probably not within the next 5 years.

Management Urgency Rank: M2: New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA.

Location: The Tuckerville PCA is located in eastern La Plata County, northeast of Vallecito Reservoir, about 24 air miles northeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Granite Peak and Vallecito Reservoir
Legal Description: T37N R6W Sections 23, 24.

Elevation: 8000 to 10,000 feet

Size: Approximately 252 acres

General Description: The Tuckerville PCA comprises steep southeast facing cliffs above the headwaters of the Pine River. The cliffs are composed of granite dating to about 1,700 million years, and exceed 600 feet. Vegetation at the cliff top is dominated by aspen and mixed conifers, while at the bottom ponderosa pine (*Pinus ponderosa*) is dominant. The Colorado Division of Wildlife documented an American peregrine falcon in 1994. The Pine River, a quarter mile to the southeast of the eyrie and Vallecito Reservoir, four miles southwest, provide permanent water for the falcons. Primary land uses of the area are recreation and ranching.

Biodiversity Rank Justification: The PCA supports an unranked (E) occurrence of the American peregrine falcon, a globally vulnerable (G4T3) subspecies. Breeding pairs are rare (S2B) in Colorado.

Table #. Natural Heritage element occurrences at Tuckerville PCA.
Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Animals					
<i>Falco peregrinus anatum</i>	American peregrine falcon	G4T3	S2B,SZN	FS/BLM	E

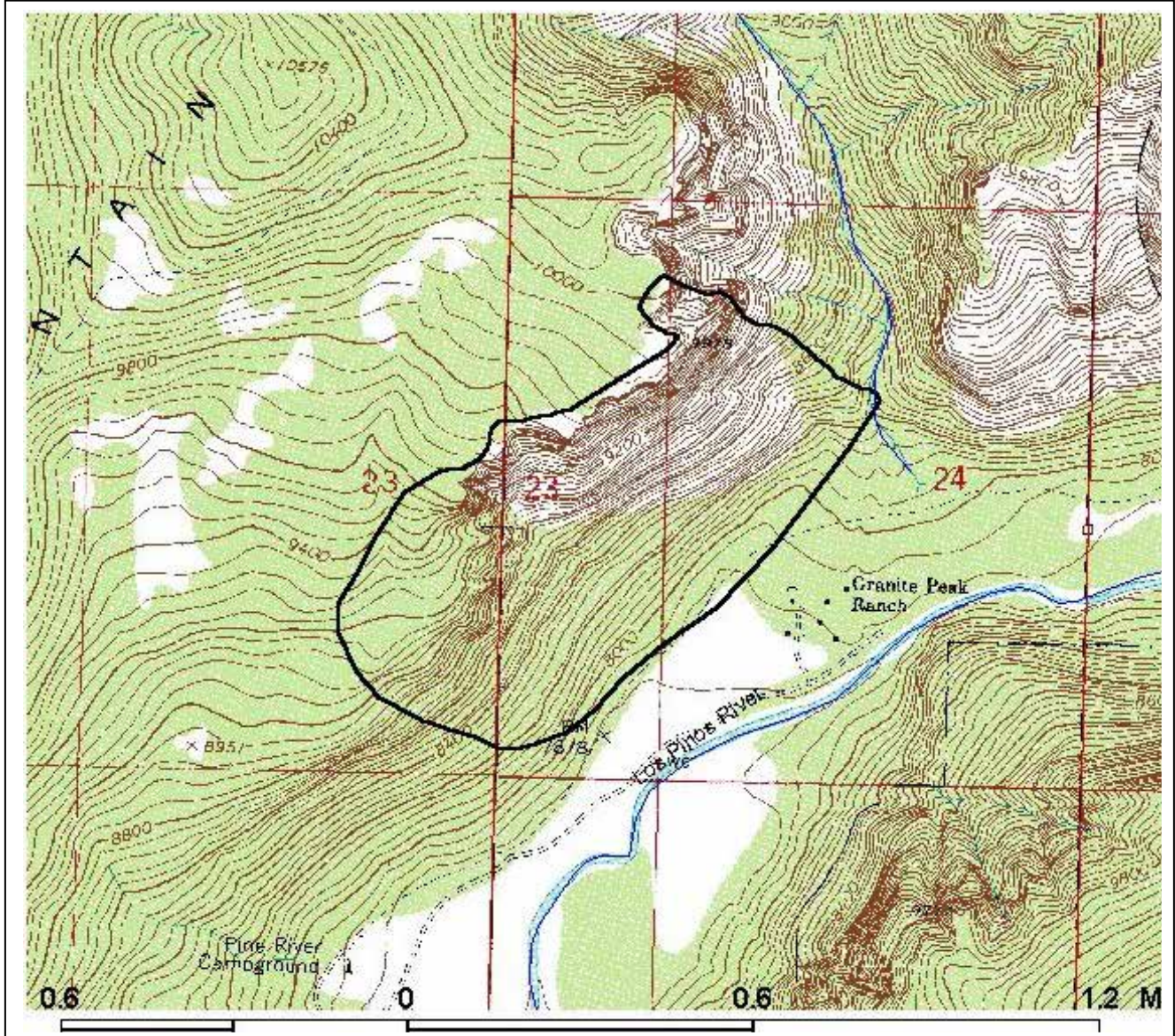
*EO=Element Occurrence. Multiple listings represent separate locations.

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

Protection Comments: Although the cliff faces are within the San Juan National Forest, there is private land along the river at their base.

Management Comments: Disturbance of the American peregrine falcon by hikers is a potential threat. Limiting direct disturbance in a one-kilometer radius of the peregrine falcon nest will enhance the probability of successful reproduction.

Tuckerville Potential Conservation Area. B5: General Biodiversity Significance



Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.



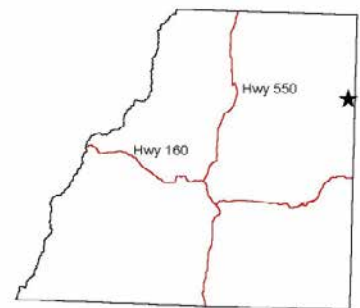
PCA Boundary

Vallecito Res. 37107-D5
 Granite Peak 37107-D4

7.5 Minute Series

Digital Raster Graphics
 Produced by the U. S. Geological Survey
 Map created 10 April 2004
 UTM Zone 13 NAD 27

Location in Study Area



West Virginia Gulch PCA

Biodiversity Rank: B5: General biodiversity significance. The PCA supports an excellent example of a plant variety that is vulnerable in Colorado and an unranked occurrence of Colorado River cutthroat trout, a globally vulnerable subspecies.

Protection Urgency Rank: P4: No protection actions are needed in the foreseeable future.

Management Urgency Rank: M4: Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the quality of the element occurrences.

Location: The West Virginia Gulch PCA is located in the San Juan National Forest in northeastern La Plata County, about 21 air miles northeast of Durango.

U.S.G.S. 7.5-min. quadrangle: Mountain View Crest
Legal Description: T38N R7W Sections 7, 8, 17-20

Elevation: 11,480 to 12,440 feet

Size: Approximately 692 acres

General Description: The West Virginia Gulch PCA encompasses a 1.6-mile stretch of the gulch, and adjacent small wet depressional areas in alpine tundra. The Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) at this location were rated A- for purity, based on morphology, although no genetic testing has been done on the population. This population was last sampled by the Colorado Division of Wildlife in 2000, and was found to be stable and thriving. During CNHP's 1994 riparian survey, researchers found a vigorous population of Altai cottongrass (*Eriophorum altaicum* var. *neogaena*) estimated at over 1000 individuals in several patches. They noted that they were most abundant in standing water in areas with a high cover of mosses and little other competing vegetation.

Biodiversity Rank Justification: The PCA supports an excellent (A ranked) occurrence of Altai cottongrass, a plant variety that is vulnerable (T3T4) globally and in Colorado (S3).

Table 68. Natural Heritage element occurrences at West Virginia Gulch PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plants					
<i>Eriophorum altaicum</i> var. <i>neogaena</i>	Altai cottongrass	G4? T3T4	S3	FS	A
Animals					
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T3	S3	FS/BLM	E

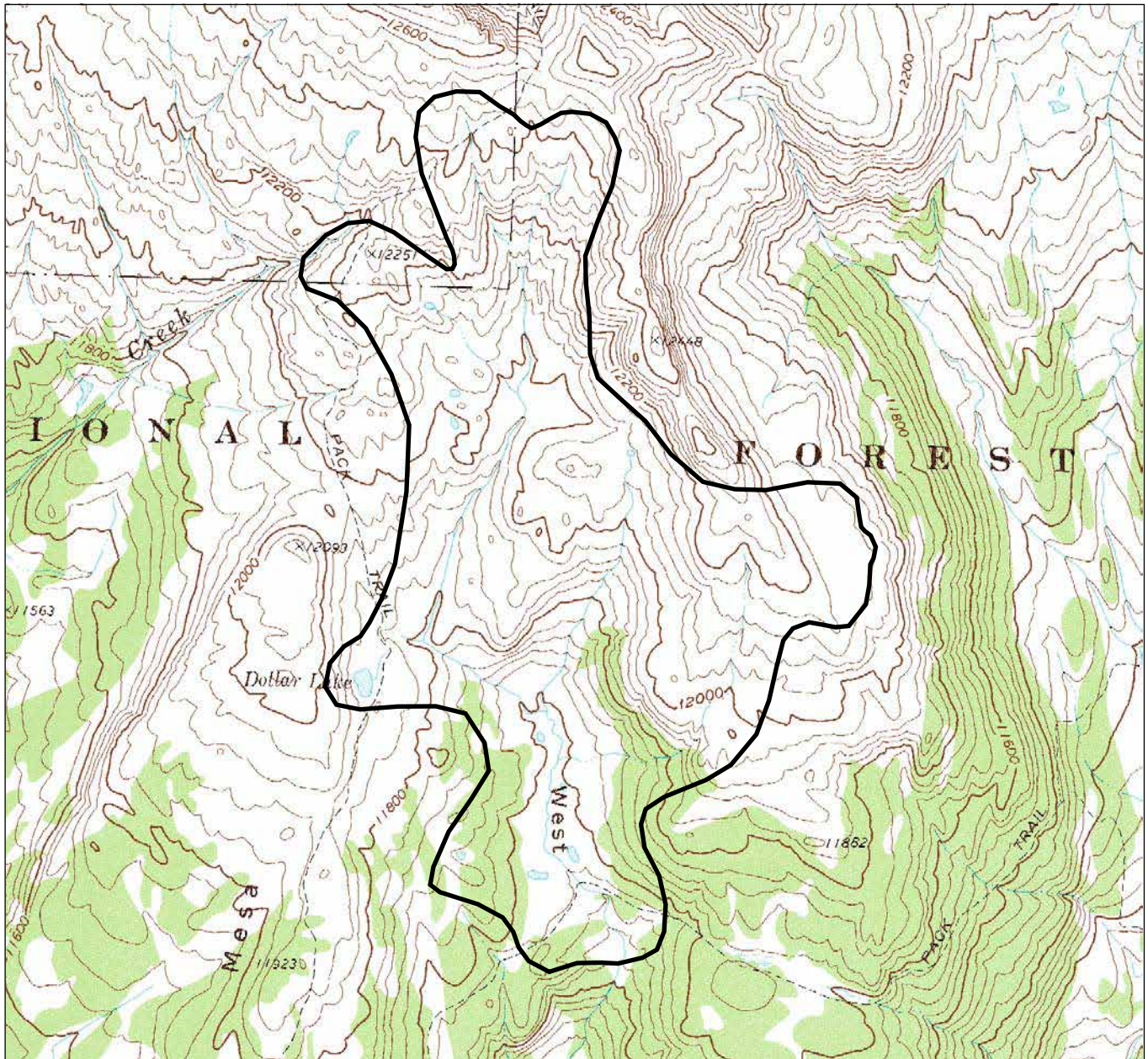
*EO=Element Occurrence. Multiple listings represent separate locations.

Boundary Justification: This site includes the occurrence of Altai cottongrass and a buffer of similar habitat within which limiting direct impacts such as trampling or erosional disturbances would be beneficial to the population. The buffer also provides suitable habitat where additional individuals can become established over time. The hydrology of the site is important to the elements and should be considered during any modifications in the watershed. The boundary also encompasses the headwaters and its tributaries that are essential for the trout, extending to the downstream barrier. A 1000-foot upland buffer is provided to limit direct physical disturbance and local hydrological alteration.


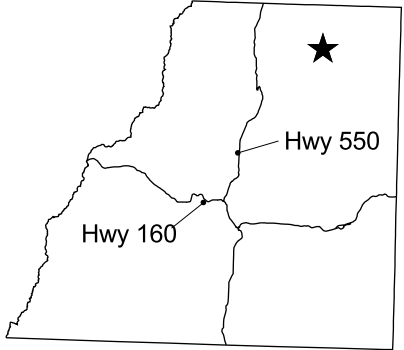
Protection Comments: Protection is adequate as the PCA is within the Weminuche Wilderness of the San Juan National Forest.

Management Comments: The site is located next to a trail that is used by hikers and horses. Although no exotic species were noted, enforcement of weed-free hay regulations would help to maintain the condition of this PCA.

Figure 42. West Virginia Gulch Potential Conservation Area, B5: General Biodiversity Interest



0.2 0 0.2 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Mountain View Crest, 37107-E6 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey</p> <p>map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	--	--

Missionary Ridge Wildfire Area

The Missionary Ridge wildfire of 2002 started in La Plata County on Missionary Ridge, June 9, affecting more than 70 thousand acres until containment on about July 28. The fire was concentrated in the San Juan National Forest, but moved through private property as well, destroying 56 residences and 27 outbuildings. The wildfire cost was over \$40 million. The affected areas extended from Missionary Ridge to the north and east in mottled severity. (Durango Herald, June 29 2003, NWCG 2002)

During the La Plata County Survey of Critical Resources field survey of 2003, CNHP scientists studied GIS maps of burn severity provided by the San Juan National Forest Service. CNHP then targeted priority areas to update existing element occurrence records within the wildfire area. The following sites are either treated as a Potential Conservation Area or simply as a report of current condition.

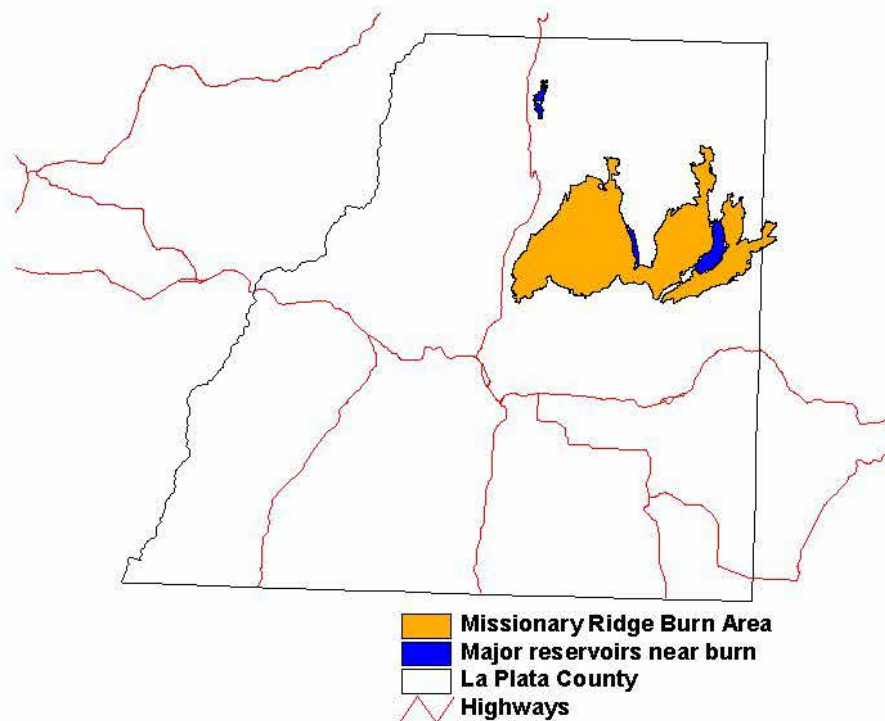


Figure 85. Perimeter of Missionary Ridge Wildfire Area

Lower Coon Creek PCA

Biodiversity Rank: B4. General biodiversity significance. The site supports an apparently globally secure (G4) plant community in partially damaged condition previously ranked as excellent (A ranked) in 1995.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The site is within the San Juan National Forest.

Management Urgency Rank: M1. Management action may be required within one year or the element occurrence could be lost or irretrievably degraded. Further research is needed to determine management needs for plant communities.

Location: The Lower Coon Creek PCA is located on Coon Creek east of County Road 250 and north of the lower reach of Missionary Ridge Road.

U.S.G.S. 7.5-min. quadrangles: Hermosa

Legal Description: T37N R8W Section 28, 29, 30, 31, 32, 33

Elevation: 7,040 – 8,080 ft.

Size: Approximately 284 acres

Redders, 2003, Community Type: Evergreen Forest: *Picea pungens* / *Cornus sericea*

General Description: The Lower Coon Creek PCA encompasses a steep canyon with talus cliffs supporting Engelmann spruce (*Picea engelmannii*) – subalpine fir (*Abies lasiocarpa*) forests. The canyon bottom is more moist and lush with much detritus and deadfall. The riparian tree canopy is dominated by blue spruce (*Picea pungens*) with the shrub layer dominated by red osier dogwood (*Cornus sericea*) and thinleaf alder (*Alnus incana*). Narrowleaf cottonwood (*Populus angustifolia*) occurs infrequently in the canyon. The riparian community was partially burned in 2002, with the plant community observed in 2003 as mostly intact in the lower reach, but mapped as a high burn severity area in the upper reach – the upper reach was inaccessible for detailed observation. Canada thistle (*Cirsium arvense*) occurs in the lower reach, especially adjacent with private lands. Upland forested slopes were reported in 1995 by CNHP riparian ecologists to be dense and continuous. The area now is mottled in burn severity with much aspen regeneration and charred coniferous snags. Burn severity maps delineate the area as moderate and high.

Biodiversity Rank Justification and Comments: This site supports the globally secure (G4) state imperiled (S2) blue spruce / red-osier dogwood plant community in damaged condition due to wildfire. Ranks have not been changed or updated from previously existing records. Blue spruce appears to be a climax species in riparian areas and will only disappear with a catastrophic event such as flooding (Carsey *et al.* 2002) or fire.

Table 69. Natural Heritage element occurrences at Lower Coon Creek PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Picea pungens</i> / <i>Cornus sericea</i>	Blue spruce / red-osier dogwood	G4	S2		A

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the available hydrological processes as possible. Seasonal flooding helps to maintain viable riparian populations of the element along Coon Creek. It should be noted that the hydrological processes necessary to the elements are not fully contained by the PCA boundaries.

Protection Comments: The site is within the San Juan National Forest and private property in the lower reaches.

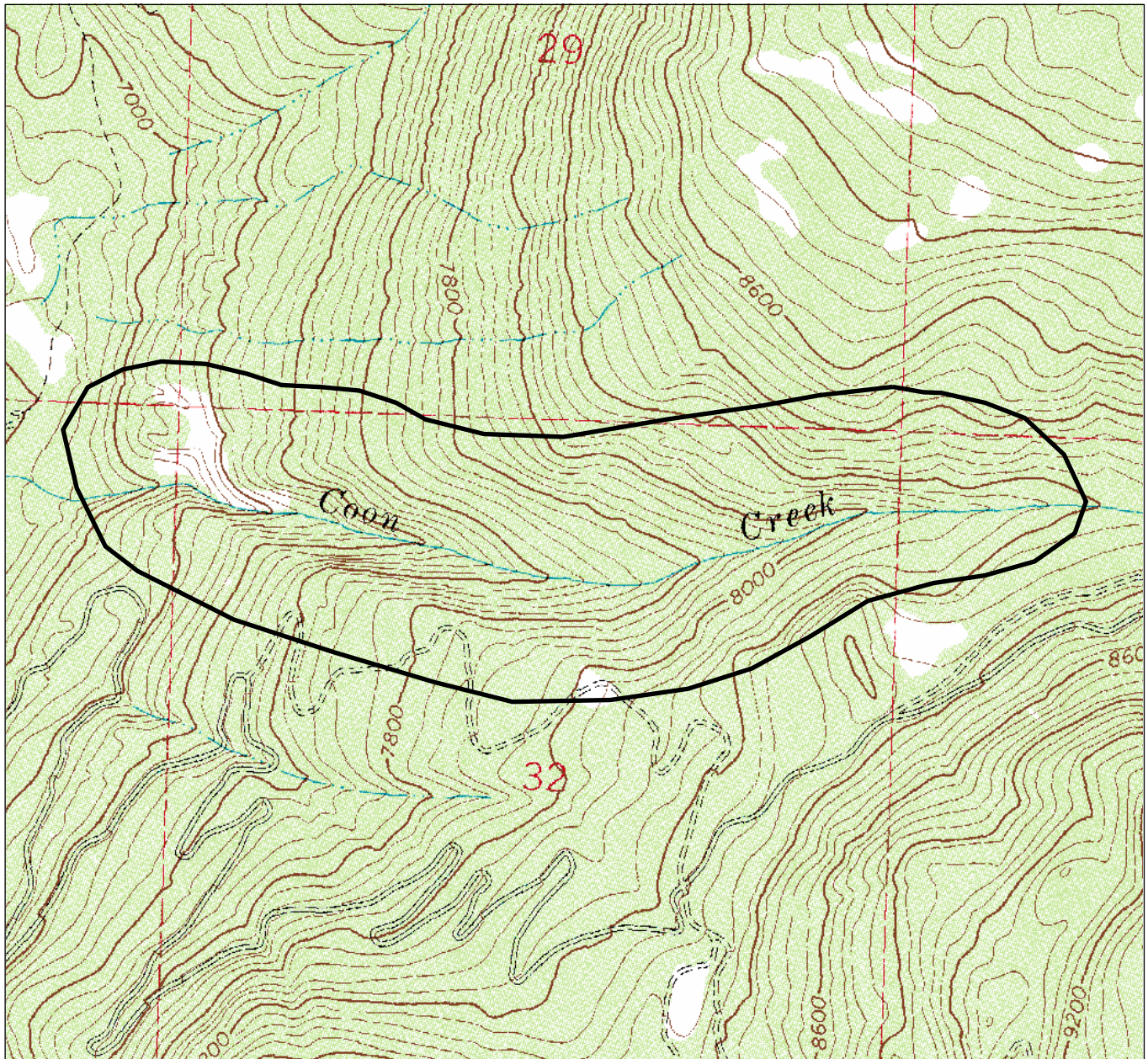
Management Comments: Red-osier dogwood (*Cornus sericea*) can survive all but the most severe fires. After fire, new shoots sprout from the surviving rhizomes. *Cornus sericea* is a very effective stream bank stabilizer and should be considered for revegetating degraded sites. The rapid growth following direct seeding or transplanting allows this shrub to quickly establish on stream banks (Hansen et al. 1995). Red osier dogwood appears to require a seasonally high water table (Carsey et al. 2002).

Soils Description: Soils for this community type are typically clay loams to sandy loams often with mottling (Carsey et al. 2002) indicating soils are saturated and then dry out.

Restoration Potential: The San Juan National Forest is implementing numerous fire rehabilitation projects in the burned area, such as revegetation/reseeding efforts; sediment re routing and control, protecting structures and roads (NWCG 2002). More research is needed to determine rehabilitation needs of the wetland plant communities in the damaged area.

Wetland Functional Assessment for the title PCA: A wetland functional assessment was not performed at this site. This PCA is within the Missionary Ridge Fire area and is not expected to be performing at its potential.

Figure 44. Lower Coon Creek Potential Conservation Area, B4: Moderate Biodiversity Significance



0.1 0 0.1 Miles

Colorado Natural Heritage Program

Colorado State University
 College of Natural Resources
 8002 Campus Delivery
 Fort Collins, CO 80523-8002

Disclaimer

Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.

 **PCA Boundary**

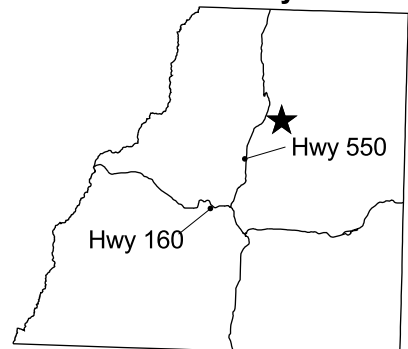
Hermosa, 37107-D7
 7.5 Minute Series

Digital Raster Graphics produced
 by the U.S. Geological Survey

map created 3 April 2004

UTM, Zone13, NAD27

Location in Study Area



Vallecito Reservoir Tributary PCA

Biodiversity Rank: B4. General biodiversity significance. The site supports an apparently globally secure (G4) plant community in partially damaged condition previously ranked as good (B ranked) condition.

Protection Urgency Rank: P4. No protection actions are needed in the foreseeable future. The site is within the San Juan National Forest.

Management Urgency Rank: M1. Management actions may be required within one year or the element occurrence could be lost or irretrievably degraded. Further research is needed to determine management needs for plant communities.

Location: The Vallecito Reservoir Tributary PCA is located at the northwest end of the reservoir northwest of Ho Hum Drive on Forest Land.

U.S.G.S. 7.5-min. quadrangles: Vallecito Reservoir

Legal Description: T37N R6W Section 29, 30, 31, 32

Elevation: 8,100 – 8,300 ft.

Size: Approximately 50 acres

Redders, 2003, Community Type: Deciduous Forests: *Populus tremuloides* / *Cornus sericea*; *Populus tremuloides* / tall forbs.

General Description: The Vallecito Reservoir Tributary PCA encompasses a rich riparian area of a small tributary that feeds into the reservoir. Uplands are much drier and are dominated by fir trees (*Abies concolor*, *Abies lasiocarpa*, *Pseudotsuga menziesii*) with smaller stands of aspen (*Populus tremuloides*). The small stream is incised in clay and limestone, creating a wide gully occupied by lush riparian forbs. Quaking aspen occur on the higher slopes adjacent the gully bottom while dense shrubs wind through the gully and limited floodplain. The shrub canopy is dominated by red-osier dogwood (*Cornus sericea*) and Drummond's willow (*Salix drummondiana*). At least half of the mature aspen in the riparian zone were killed or damaged by wildfire, decreasing the canopy cover since last surveyed in 1994. Wildfire appears to have missed the creek bed, however the area is indirectly affected. Damaged and dead trees have left soils unstable, and excessive erosion and sediment run off is occurring. Aspen regeneration is dense on surrounding uplands and moderate in the riparian area. Burn severity in the area is mapped as high and none.

Biodiversity Rank Justification and Comments: The site supports the state imperiled (S2S3) quaking aspen / red-osier dogwood (*Populus tremuloides* / *Cornus sericea*) plant community in partially damaged condition. The occurrence was reported in good (B ranked) condition in 1994. Ranks have not been changed from the previously existing rank.

Table 70. Natural Heritage element occurrences at Vallecito Reservoir Tributary PCA. Elements in bold are those upon which the PCA's B-rank is based.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
Plant Community					
<i>Populus tremuloides</i> / <i>Cornus sericea</i>	Quaking aspen / red-osier dogwood	G4	S2S3		B

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

Boundary Justification: The boundaries incorporate an area that will allow as much of the available hydrological processes as possible. Seasonal flooding helps to maintain a viable riparian plant community. It should be noted that the hydrological processes necessary to the elements are not fully contained by the PCA boundaries.

Protection Comments: This site is within the San Juan National Forest with private property adjacent.

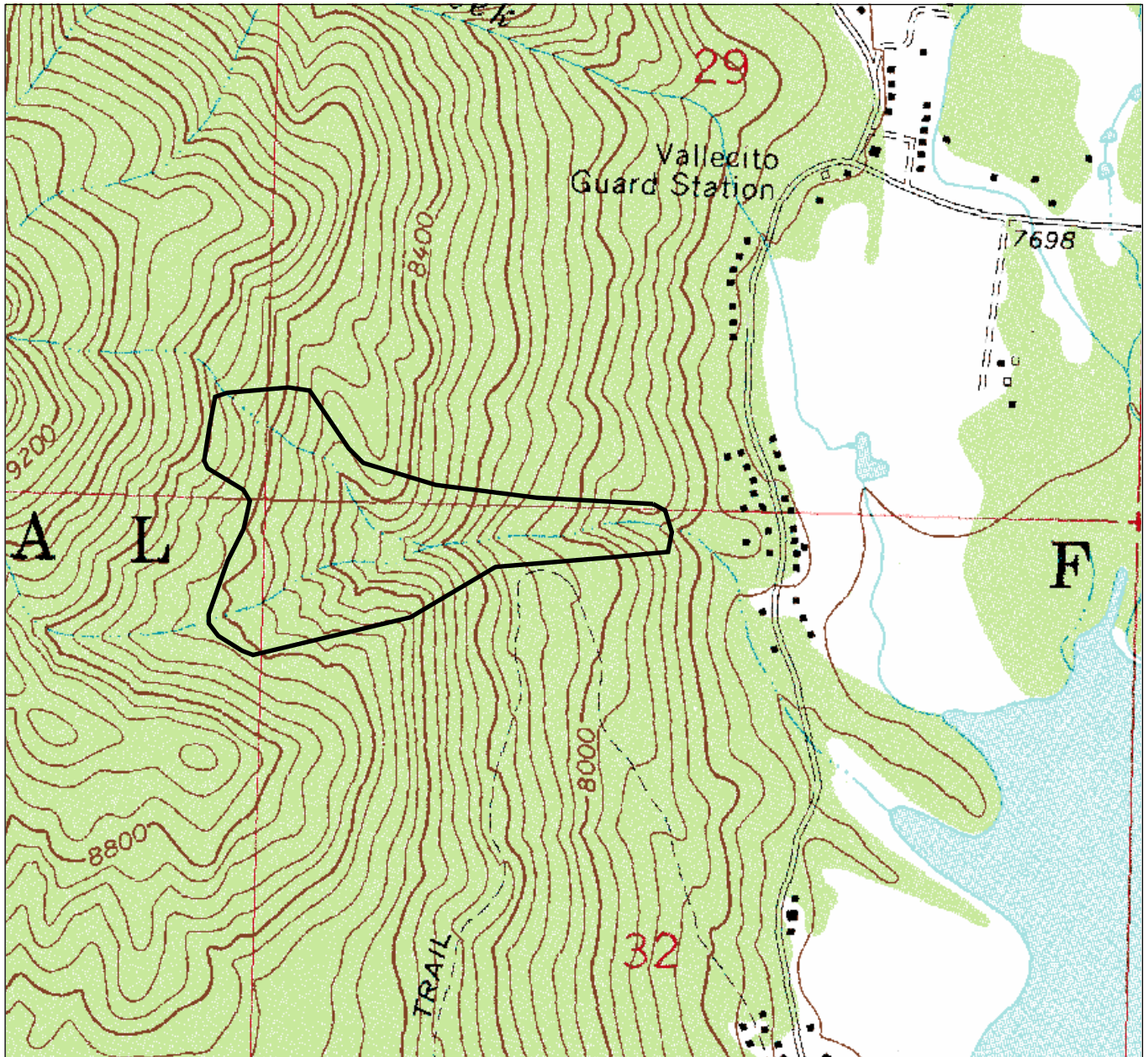
Management Comments: Red-osier dogwood (*Cornus sericea*) can survive all but the most severe fires. After fire, new shoots sprout from the surviving rhizomes. *Cornus sericea* is a very effective stream bank stabilizer and could be considered for revegetating degraded sites. The rapid growth following direct seeding or transplanting allows this shrub to quickly establish on stream banks (Hansen et al. 1995). Aspen (*Populus tremuloides*) vigorously sprouts after fire (Carsey et al. 2002). This is obvious in much of the Missionary Ridge burned area.

Soils Description: Soils for this community type are sandy to sandy clay loams and silty clay loams (Carsey et al. 2002).


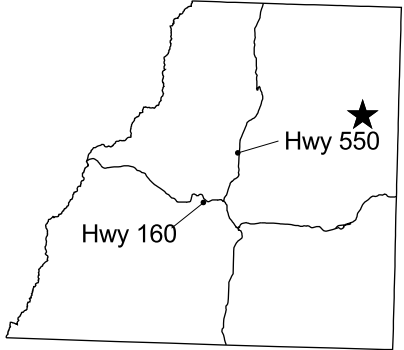
Restoration Potential: The San Juan National Forest is implementing numerous fire rehabilitation projects in the burned area, such as revegetation/reseeding efforts, sediment re routing and control, protecting structures and roads (NWCG 2002). More research is needed to determine rehabilitation needs of the wetland plant communities in the damaged area.

Wetland Functional Assessment for the Vallecito Reservoir Tributary PCA: A functional assessment was not performed at this site. The riparian area in this PCA is partially damaged due to the Missionary Ridge Fire, 2002, and is not expected to be functioning at its potential.

Figure 46. Vallecito Reservoir Tributary Potential Conservation Area, B4: Moderate Biodiversity Significance



0.1 0 0.1 Miles

<p>Colorado Natural Heritage Program Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p>Disclaimer Data are provided on an as-is, as-available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, Colorado State University and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied.</p>	<p> PCA Boundary</p> <p>Vallecito Reservoir, 37107-D5 7.5 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey</p> <p>map created 3 April 2004 UTM, Zone13, NAD27</p>	<p>Location in Study Area</p> 
--	--	--

Sites of Local Significance and Other Areas of Interest in La Plata County

These sites are presented to show examples of common plant communities occurring in La Plata County, but due to insufficient information as to their complete area and quality, Potential Conservation Areas were not drawn. They do not include the full extent of the communities, nor do they include an adequate area necessary to support the ecological processes that the communities depend on.

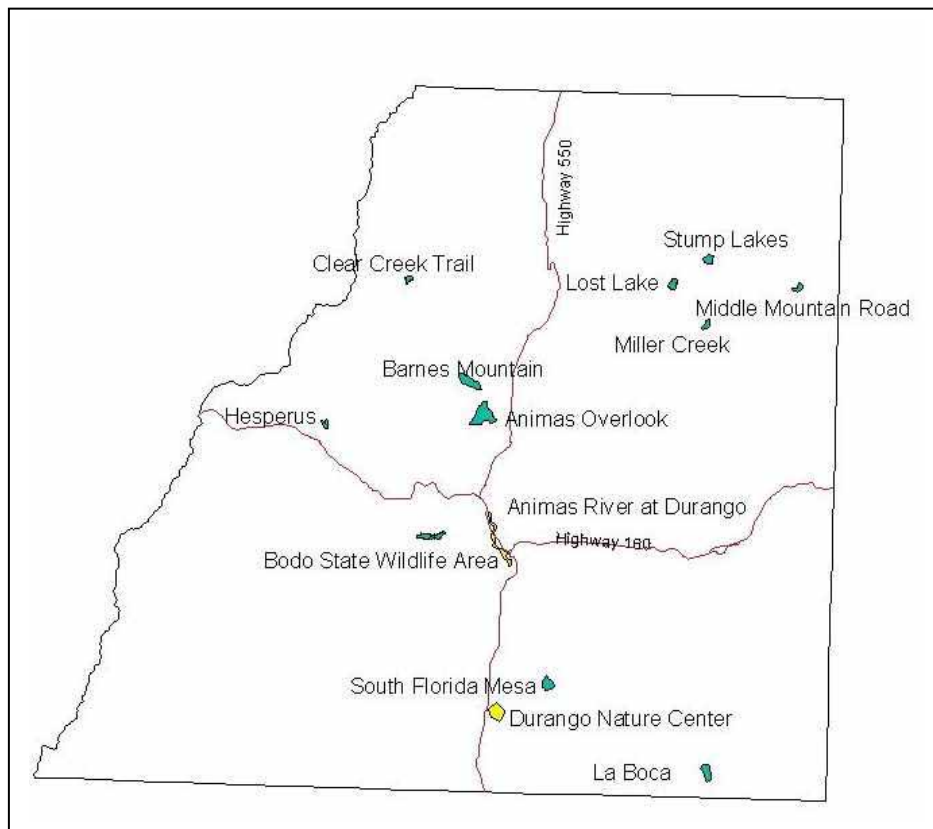


Figure 86. Other areas of interest in La Plata County

Animas Overlook

Location: The Animas Overlook is located in the San Juan National Forest in La Plata County, about 2.5 miles north of Durango.

U.S.G.S. 7.5-min. quadrangles: Durango East, Durango West
Legal Description: T35N R9W Sections 4-6; T36N R9W Section 29-33
Elevation: 7400 to 8600 feet

General Description: The forested area at the Animas Overlook, on gentle south and east facing slopes of the Junction Creek drainage, is an excellent example of ponderosa pine/Gambel oak (*Pinus ponderosa/Quercus gambelii*) forest, which is the most abundant forest type in La Plata County. This area can be accessed from the Junction Creek Road from Durango. A nature trail provides an opportunity for the public to view this plant community while enjoying a spectacular view of the Animas Valley. There are interpretive displays along the trail emphasizing history and wildlife. This would be an excellent location for additional interpretation focusing on the habitat and identification of plant species.

Plants found along the trail are typical of this community throughout the county. The site is dominated by ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*), although other trees, including white fir (*Abies concolor*), blue spruce (*Picea pungens*) and aspen (*Populus tremuloides*) are present. Shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos oreophilus*), mountain lover (*Paxistima myrsinites*), Oregon grape (*Mahonia repens*), chokecherry (*Prunus virginiana* var. *melanocarpa*). Thurber fescue (*Festuca thurberi*), Parry's oatgrass (*Danthonia parryi*), muttongrass (*Poa fendleriana*), mountain muhly (*Muhlenbergia montana*), western wheatgrass (*Pascopyrum smithii*) and elk sedge (*Carex geyeri*) are representative grasses in the community, while forbs include northern bedstraw (*Galium septentrionale*), New Mexican groundsel (*Senecio neomexicana*), little sunflower (*Helianthella quinquerervis*), aspen peavine (*Lathyrus leucanthus*), spreading fleabane (*Erigeron flagellaris*), fendler meadowrue (*Thalictrum fendleri*), aspen daisy (*Erigeron speciosus*), wild mountain parsley (*Pseudocymopterus montanus*), and mountain larkspur (*Delphinium ramosum*). (See Appendix for complete species list). A few introduced grasses are present in the PCA, including Kentucky bluegrass (*Poa pratensis*), orchard grass (*Dactylis glomerata*), and smooth brome (*Bromus inermis*).

Biodiversity Information: The site includes an excellent (A ranked) example of a common (G5) plant community that is typical of large areas of La Plata County. It does not include the entire extent of the ponderosa pine community, which is common and widespread in La Plata County; nor does it include an adequate area necessary to support the ecological processes that the community depends on.

Animas River at Durango

Location: The Animas River in Durango PCA is located along the banks of the Animas River at the southern end of Durango, Colorado.

U.S.G.S. 7.5-min. quadrangles: Loma Linda, Durango East
Legal Description: T34½N R9W Section 32
T34N R9W Sections 5, 8, 9
T35N R9W Section 32
Elevation: 6,400ft.

General Description: The city of Durango and the Animas River are located in a flat valley bottom created first by glaciation then flattened out by ancient lake deposition (Blair et al. 1996). The Animas River drains the middle portion of La Plata County and is its largest river. The deciduous riparian woodlands wind throughout the town in a continuous green belt, though on occasion become quite sparse

with little understory. Parks, bike trails, roads, angler and social trails, private and commercial development line the river throughout, fragmenting the natural plant communities.

The Animas River provides water for agriculture, recreation and supplements Durango's municipal water supply. The river's latest impact is a major water diversion for the filling of the Animas/La Plata Reservoir project beginning implementation fall of 2003. The water is being pumped from the river, not dammed. The pumping site is just north (upstream) of this PCA. The pumping station will have a total of eight pumps ranging from the smallest at 14 cubic feet per second and the largest at 56 cfs. The inlet conduit at Ridges Basin will have the capacity for 280 cubic feet per second. It is unclear at this time how the flow will be affected downstream from the pumping station, but the uptake is governed by 1)downstream senior water right demands; 2)the amount of water in the river; 3)seasonal minimum by-pass flows; 4)the pumping capacity of the Durango Pumping Plant; 5)design-based reservoir filling criteria (www.usbr.gov/uc/). The direct effects of this particular diversion on plant communities and riparian health are unknown to date. Because regeneration and establishment of new stands of cottonwood are dependent upon flooding events, any alteration to the natural flow regime of a river can affect the cottonwood ecosystem. One example is upstream dams stabilizing stream flows by reducing the frequency and magnitude of floods. This results in fewer flood events that would allow cottonwood stand regeneration. Without periodic disturbance by flooding, riparian areas become dominated by late-seral communities (Hansen et al. 1995).

Vegetation is dominated by narrow leaf cottonwood (*Populus angustifolia*) with associated species, box elder (*Acer negundo*) in the tree layer, skunkbush sumac (*Rhus trilobata*), river birch (*Betula occidentalis*), sandbar willow (*Salix exigua*) in the shrub layer, hay grasses and a mixture of non-native and native forb species in the understory. Associated species in the diverse shrub layer include river hawthorn (*Crataegus rivularis*), choke cherry (*Prunus virginiana*), snowberry (*Symphoricarpos rotundifolius*) Woods' rose (*Rosa woodsii*), Siberian elm (*Ulmus pumila*), and Russian olive (*Elaeagnus angustifolia*).

The central area of the PCA is managed by the City of Durango. Private property parcels, all smaller than 500 acres, line the Animas River from the Forest Service boundary north of Bakers Bridge south to the county and state line. There is currently no known threat to the ownership of the city owned parcels surveyed. Placement of conservation easements and riparian ecology education will benefit the landowner.

Exotic shrub invasion (Russian olive) is common throughout. Cooperative efforts toward restoration is ideal to complete the conservation of the entire river reach. The city of Durango owns several parcels along the Animas River throughout the city limits. The city is currently implementing exotic shrub (Russian olive) removal from the city owned properties. Eradication of noxious shrubs in the riparian area is strongly encouraged. The current level of invasion density is not high and represents a timely opportunity for eradication before invasion becomes overwhelming. Further, influx of non-native species requires continual monitoring. Controlling weed invasion on uplands is also suggested. Referring to such resources as the Nature Conservancy's web site on invasive species (<http://tncweeds.ucdavis.edu/index.html>) or <http://www.invasivespecies.gov/> may provide some assistance with control and eradication of non-native species.

Barnes Mountain

Location: The Barnes Mountain PCA is located in central La Plata County, in the San Juan National Forest, about 5 miles north of Durango.

U.S.G.S. 7.5-min. quadrangles: Durango West, Monument Hill
Legal Description: T36N R9W Section 19; T36N R10W Sections 13, 24.
Elevation: 9200 to 9654 feet

General Description: The Barnes Mountain Area of Interest occupies a forested area on gentle southwest facing slopes at the divide between Junction Creek and Falls Creek. It is bounded on the north by a steep drop to the Falls Creek drainage, and on the south by steep slopes above Junction Creek covered with Gambel oak (*Quercus gambelii*). The entire area encompasses a mosaic of plant communities, dominated by ponderosa pine (*Pinus ponderosa*), white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*) and Gambel oak. The area surveyed had 25% cover of white fir, 35% snowberry (*Symphoricarpos oreophilus*), 10% aspen and 5% Gambel oak. Other species present were

thurber fescue (*Festuca thurberi*) 10%; aspen peavine (*Lathyrus leucanthus*) 3%; Parry's oatgrass (*Danthonia parryi*) 15%; aspen daisy (*Erigeron speciosus*) 2%; and traces of prairie junegrass (*Koeleria macrantha*), streamside fleabane (*Erigeron glabellus*), yarrow (*Achillea lanulosa*), elk sedge (*Carex geyeri*), rosy pussytoes (*Antennaria rosea*), wild mountain parsley (*Pseudocymopterus montanus*), bottlebrush squirreltail (*Elymus elymoides*), nodding brome (*Bromus ciliatus*), strawberry (*Fragaria virginiana*), beautiful fleabane (*Erigeron formosissimus*), beautiful cinquefoil (*Potentilla pulcherrima*), Oregon grape (*Mahonia repens*), Saskatoon serviceberry (*Amelanchier alnifolia*), and dandelion (*Taraxacum officinale*). Nearby areas have been impacted by ATVs. The area has been previously logged. Common dandelion was the only exotic plant noted in the site.

Bodo State Wildlife Area

Location: The Bodo SWA is located in central La Plata County, about 4 air miles southwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Basin Mountain
Legal Description: T34N R10W Sections 2, 3
Elevation: 6849 to 7120 feet

General Description: This site supports a good example of a woodland plant community that is common in the lower elevations of La Plata County. The site occupies south facing slopes of sandstone and shale, just north of County Road 212. Dominated by Colorado pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*) and Rocky Mountain juniper (*Juniperus scopulorum*), it has a variety of shrubs, including bitterbrush (*Purshia tridentata*), cliff fendlerbush (*Fendlera rupicola*), squaw apple (*Peraphyllum ramosissimum*), snowberry (*Symphoricarpos oreophilus*), big sagebrush (*Artemisia tridentata*), fringed sage (*Artemisia frigida*), black sagebrush (*Artemisia nova*), broom snakeweed (*Gutierrezia sarothrae*) and Gambel oak (*Quercus gambellii*). The site shares many species with the Gambel oak/ mountain mahogany (*Cercocarpus montanus*) community that was documented on a north-facing slope in the Bodo SWA (Smelter Mountain PCA). However, the abundance of pinyon, juniper and squaw apple and scarcity of Gambel oak distinguishes this site from that more common mountain shrub community. Native grasses present were: Indian rice grass (*Oryzopsis hymenoides*), galleta (*Hilaria jamesii*), needle and thread (*Stipa comata*), elk sedge (*Carex geyeri*), western wheatgrass (*Pascopyrum smithii*), muttongrass (*Poa fendleriana*), blue grama (*Bouteloua gracilis*), and prairie junegrass (*Koeleria macrantha*). Forbs included: winged buckwheat (*Eriogonum alatum*), spreading fleabane (*Erigeron divergens*), Rocky Mountain penstemon (*Penstemon strictus*), redroot buckwheat (*Eriogonum racemosum*), wooly plantain (*Plantago patagonica*), pingue rubberweed (*Picradenia richardsonii*), hairspine prickly pear (*Opuntia polyacantha*), sulphur buckwheat (*Eriogonum umbellatum*), sand aster (*Chaetopappa ericoides*), hairy golden aster (*Heterotheca villosa*), scarlet globemallow (*Sphaeralcea coccinea*), toadflax penstemon (*Penstemon linarioides*), banana yucca (*Yucca baccata*), sharp-leaf twinpod (*Physaria acutifolia*), spreading fleabane (*Erigeron flagellaris*), tapertip onion (*Allium acuminatum*), Douglas' dusty maiden (*Chaenactis douglassii*), mesa pepperwort (*Lepidium montanum*), Michaux's wormwood (*Artemisia michauxiana*), thrift mock goldenweed (*Stenotus armerioides*), whit-margin pussytoes (*Antennaria marginata*), and Simpson hedgehog cactus (*Pediocactus simpsonii*). Disturbed areas along the road, outside the site boundaries, contain many exotic plants, including cheatgrass (*Bromus tectorum*), alyssum (*Alyssum parviflorum*), musk thistle (*Carduus nutans*), alfalfa (*Medicago sativa*), Scotch cottonthistle (*Onopordum acanthium*), and tumble mustard (*Sisymbrium altissimum*).

Clear Creek Trail

Location: The Clear Creek Trail area of interest is located in La Plata County, on the highlands between the Clear Creek and South Fork Hermosa Creek drainages, about 13 air miles north-northwest of Durango.

U.S.G.S. 7.5-min. quadrangles: Monument Hill
Legal Description: T37N R10W Sections 16, 21
Elevation: 9800 to 10,271 feet

General Description: This moist subalpine forest is included to represent a typical widespread plant community in La Plata County. This plant association occurs in a mosaic with similar subalpine forest types, including subalpine fir (*Abies lasiocarpa*)/ dwarf bilberry (*Vaccinium myrtillus*) which occupies drier sites. It is dominated by subalpine fir, Engelmann spruce (*Picea engelmannii*) and aspen (*Populus tremuloides*), with a rich understory of sprucefir fleabane (*Erigeron eximius*) and Parry's goldenrod (*Oreochrysum parryi*). The area sampled was on a steep, northeast-facing hillside at the trailhead of the Junction Creek and Clear Creek trails. Other plants found in the understory include heartleaf arnica (*Arnica cordifolia*), ragweed sagebrush (*Artemisia franserioides*), elk sedge (*Carex geyeri*), harebells (*Campanula rotundifolia*), blue wildrye (*Elymus glaucus*), wild geranium (*Geranium richardsonii*), aspen peavine (*Lathyrus leucanthus*) and osha (*Ligusticum porteri*). See Appendix for complete list. A few exotic species, the most important of which was houndstongue (*Cynoglossum officinale*) occurred along the road at the trailhead, but so far have not invaded the forested areas. Weed control at the trailhead and enforcement of weed-free hay regulations would help to preserve the pristine quality of this site. Conserving large areas of spruce-fir forest in good condition should serve as a coarse filter to protect this plant community as well as other related plant associations and associated species that have not been documented.

Durango Nature Center

Location: The Lower Florida River PCA is located along the Florida River at its lower reach before the confluence with the Animas River.

U.S.G.S. 7.5-min. quadrangles: Bondad Hill
Legal Description: T33N R9W Section 31
Elevation: 6,100ft.

General Description: The Florida River runs through an alluvial valley on Florida Mesa with smaller side canyons feeding into the river. Area locals describe flooding events from such canyons, especially in the fall. Otherwise the hydrology of the Florida is severely altered: Lemon Reservoir is upstream, the river provides the City of Durango its municipal supply, and there are several ditch diversions supplying the largely agricultural area.

The low mesa walls rising above the valley are part of the Nacimiento Formation, made up of shale and sandstone (Tweto, 1979). Cottonwood communities occupy the river for its entire length, however are not contiguous. Vegetation is characterized by mature cottonwoods with regeneration occurring only occasionally. The shrub layer is dense to sparse with sandbar willow (*Salix exigua*), silver buffaloberry (*Shepherdia argentea*), skunkbush sumac (*Rhus trilobata*), strapleaf willow (*Salix eriocephala* var. *ligulifolia*), river hawthorn (*Crataegus rivularis*) and Woods' rose (*Rosa woodsii*). The understory is largely introduced grasses and a mixture of native and non-native herbaceous species. There are fringes of spikerush (*Eleocharis palustris*) along the creek. Channel migration has occurred in several areas, leaving terraces that were once flood plain. Some of these areas contain Rocky Mountain Juniper (*Juniperus scopulorum*) and few decadent cottonwoods or hay fields. Many of these areas have made a complete transition to an upland community.

The Durango Nature Center is providing education to the public about environmental importance and ecological systems. There is a small, created wetland on the property. The public is invited to the area for nature tours with various nature-based subjects. Restoring and maintaining a natural riparian system is

important for the Nature Center to perform its function to its full potential. Education is a strong link in progressing toward the conservation of natural resources. Although land use is predominantly agricultural, land use trends are toward more home development and subdivisions, and expected continuing gas well development and infill.

La Boca

Location: The La Boca site is located in southern La Plata County, about one mile north of La Boca and two miles north of the New Mexico border, on Southern Ute Tribal Land. It is about 22 miles southeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Tiffany
Legal Description: T32N R7W Sections 8, 9, 16
Elevation: 6200 to 6600 feet

General Description: This area includes three small hills with scattered pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), surrounded by sagebrush shrublands and grasslands. Soils are rocky, derived from the San Juan Formation. The habitat is similar to that of the Knowlton cactus (*Pediocactus knowltonii*) site to the south, but a search of the area did not produce any of the cacti. It also appears to be good habitat for several other targeted plant species: Missouri milkvetch (*Astragalus missouriensis* var *humistrata*), Gray's Easter daisy (*Townsendia glabella*), and Pagosa phlox (*Phlox caryophylla*). None of these plants were found there in 2003, although the year was so dry that many early blooming low elevation plants failed to appear. A search in a wetter year could still be productive. There are numerous similar hills along the west side of the Los Pinos River corridor in this area that were not surveyed. The pinyon-juniper community is typical of large areas of La Plata County at lower elevations. Species in the plant community include pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), bitterbrush (*Purshia tridentata*), serviceberry (*Amelanchier utahensis*), black sagebrush (*Artemisia nova*), snakeweed (*Gutierrezia sarothrae*), blue gramma (*Bouteloua gracilis*), squirreltail (*Elymus elymoides*), galleta (*Hilaria jamesii*), Indian rice grass (*Oryzopsis hymenoides*), needle and thread (*Stipa comata*), and junegrass (*Koeleria macrantha*). (See the Appendix for a complete species list.) The area is heavily grazed, and fragmented by numerous gas wells and access roads. Exotic plants observed in the site include Russian knapweed (*Centaurea repens*), smooth brome (*Bromus inermis*), cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola australis*).

Hesperus

Location: The Hesperus Area of Interest is located along the La Plata River Road north of Hesperus, CO.

U.S.G.S. 7.5-min. quadrangles: Hesperus
Legal Description: T35N R11W S3, 4; T36N R11W S33, 34.
Elevation: 8400 to 8500 feet

General Description: This site is a grassland dominated by needle and thread (*Stipa comata*), with patches of Gambel oak (*Quercus gambelii*). The area is fragmented by development and some disturbed areas. However, it is apparently ungrazed, and there are few exotic species. It is expected that this plant community may occupy additional areas on adjacent private lands that were not surveyed. Associated species in the grassy areas include muttongrass (*Poa fendleriana*), redroot buckwheat (*Eriogonum racemosum*), woolly cinquefoil (*Potentilla hippiana*), rosy pussytoes (*Antennaria rosea*), sulphur-flower buckwheat (*Eriogonum umbellatum*), foothill sagewort (*Artemisia ludoviciana*), and rubber rabbitbrush

(*Chrysothamnus nauseosus*). Needle and thread is a cool-season bunchgrass that is a valuable forage species for wildlife and livestock. It begins annual growth in the early spring when most other grasses are still dry and generally remains green throughout a long growing season. However, its long awns make it unpalatable to livestock when mature. Although the species needle and thread grass is widespread and common, this is the best example of a community where it is dominant that was seen in La Plata County during this survey. The community differs from the needle and thread dominated grasslands of eastern Colorado in the composition of associated species. The long-term persistence of this grassland may depend on periodic fire to prevent expansion of the oak at the expense of the grass. The proximity to development may preclude natural fires. However, the bunch grasses can be damaged by fire. The best recovery occurs when burning takes place in late spring or fall. Burning after a fall rain can minimize the damage (FEIS).

Lost Lake

Location: Lost Lake is located in the San Juan National Forest in La Plata County, off Forest Road 597, north of Lemon Reservoir, about 15 air miles northeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Lemon Reservoir
Legal Description: T37N R7W Section 17, 19, 20
Elevation: 8600 to 9032 feet

General Description: Lost Lake occupies a bench east of the Florida River opposite the confluence of Burnt Timber Creek. The site represents a common upland forest community that is typical of large areas of La Plata County. The lake, which was dry during the summer of 2003, is surrounded by a mixed montane forest co-dominated by Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*) and white fir (*Abies concolor*). It has a rich understory consisting of Rocky Mountain maple (*Acer glabrum*), red-osier dogwood (*Cornus sericea*), snowberry (*Symphoricarpos oreophilus*), mosses, and ferns. Other species present include ponderosa pine (*Pinus ponderosa*), narrowleaf cottonwood (*Populus angustifolia*), tasselflower brickellbush (*Brickellia grandiflora*), giant hyssop (*Agastache pallidiflora*), Gambel's oak (*Quercus gambelii*), Saskatoon serviceberry (*Amelanchier alnifolia*), Scouler's willow (*Salix scouleriana*), chokecherry (*Prunus virginiana* var. *melanocarpa*), thimbleberry (*Rubus parviflorus*), ragweed sagebrush (*Artemisia franserioides*), heartleaf arnica (*Arnica cordifolia*), fendler meadowrue (*Thalictrum fendleri*), raspberry (*Rubus idaeus*), Richardson's geranium (*Geranium richardsonii*), and giant lousewort (*Pedicularis procera*). (For complete species list see Appendix). A hiking trail leads from Forest Road 597, north of Lemon Reservoir, to the lake. Cliffs along the southern part of the trail were the site of a small population of New Mexico cliff fern (*Woodsia neomexicana*). At the perimeter of Lost Lake was a small population of green sedge (*Carex viridula*). This damp area also contained rush (*Juncus* sp), common mare's-tail (*Hippuris vulgaris*), water smartweed (*Polygonum aquaticum*), narrowleaf bur-reed (*Sparganium angustifolium*), field mint (*Mentha arvensis*) and Hornemann's willow herb (*Epilobium hornemannii*).

Several exotic plant species were found in the site, mostly in disturbed areas along the trail and in recently dried up areas along the lake. These included Kentucky bluegrass (*Poa pratensis*), orchard grass (*Dactylis glomerata*), Canada thistle (*Cirsium arvense*), hound's tongue (*Cynoglossum officinale*), oxeye daisy (*Leucanthemum vulgare*), common plantain (*Plantago major*) and dandelion (*Taraxacum officinale*). The forested areas away from trails and the lake appear to be pristine.

Middle Mountain Road

Location: The Middle Mountain Road Area of Interest is located in the San Juan National Forest in La Plata County, northeast of Vallecito Reservoir, about 22 air miles northeast of Durango. It is approximately 4.2 miles from the beginning of the road.

U.S.G.S. 7.5-min. quadrangles: Vallecito Reservoir
Legal Description: T37N R6W Sections 15, 21, 22
Elevation: 9000 to 9400 feet

General Description: This site represents a moist montane forest that is typical of many forested areas of La Plata County. Large areas of the adjacent forest were burned in 2001. Dominant tree species are white fir (*Abies concolor*) and aspen (*Populus tremuloides*). The diverse understory includes Rocky Mountain maple (*Acer glabrum*), snowberry (*Symphoricarpos oreophilus*), sprucefir fleabane (*Erigeron eximius*), elk sedge (*Carex geyeri*), blue violet (*Viola adunca*), American vetch (*Vicia americana*), aspen peavine (*Lathyrus leucanthus*), yarrow (*Achillea lanulosa*), orange sneezeweed (*Dugaldia hoopsii*), spreading fleabane (*Erigeron flagellaris*), aspen daisy (*Erigeron speciosus*), Rocky Mountain iris (*Iris missouriensis*), whitestem gooseberry (*Ribes inerme*), elderberry (*Sambucus racemosa*), wild geranium (*Geranium richardsonii*), false hellebore (*Veratrum tenuipetalum*), Canby's Aster (*Aster foliaceus*), sweet cicely (*Osmorhiza depauperata*), and northern bedstraw (*Galium septentrionale*). (See Appendix for complete species list) The site is accessed from the Middle Mountain Road at the northeast shore of Vallecito Reservoir. The area is popular for camping and 4-wheel driving. There is an abundance of houndstongue (*Cynoglossum officinale*) along the road and in disturbed areas. Other exotics at the site include Kentucky bluegrass (*Poa pratensis*), orchard grass (*Dactylis glomerata*), white clover (*Trifolium repens*) and dandelion (*Taraxacum officinale*).

Miller Creek

Location: The Miller Creek Area of Interest is located in La Plata County east of Lemon Reservoir, about 16 air miles northeast of Durango.

U.S.G.S. 7.5-min. quadrangles: Lemon Reservoir
Legal Description: T37N R7W Sections 27, 33, 34
Elevation: 9400 to 9800 feet

General Description: The Miller Creek site encompasses the riparian zone and adjacent uplands of Miller Creek, beginning just inside the National Forest boundary, and continuing upstream for about 0.8 miles. The very moist mixed montane forest is co-dominated by Douglas fir (*Pseudotsuga menziesii*) and aspen (*Populus tremuloides*), with a rich understory of shrubs and mesic forbs. Common species in the community include snowberry (*Symphoricarpos oreophilus*), sweet cicely (*Osmorhiza depauperata*), blue wildrye (*Elymus glaucus*), wild rose (*Rosa woodsii*), wild geranium (*Geranium richardsonii*), meadowrue (*Thalictrum fendleri*), aspen daisy (*Erigeron speciosus*), fewleaf thistle (*Cirsium centaureae*), Canadian violet (*Viola canadensis*), gooseberry currant (*Ribes montigenum*), Parry's thistle (*Cirsium parryi*), orange sneezeweed (*Dugaldia hoopsii*), elderberry (*Sambucus racemosa*), baneberry (*Actaea rubra*), osha (*Ligusticum porteri*), Saskatoon serviceberry (*Amelanchier alnifolia*), tall larkspur (*Delphinium barbeyi*), fireweed (*Epilobium angustifolium*), green gentian (*Frasera speciosa*), and chiming bells (*Mertensia ciliata*). See Appendix for complete list. Several exotic species that thrive in wet places were observed in the site. These include Canada thistle (*Cirsium arvense*), Kentucky bluegrass (*Poa pratensis*) and red clover (*Trifolium pratense*). Although the site is within the San Juan National Forest, permission to access the area through private land is required. Adjacent private lands downstream of the site have been developed for vacation and primary homes.

South Florida Mesa

Location: The South Florida Mesa Area of Interest is located in La Plata County, about 12 air miles south-southeast of Durango. It can be accessed from dirt roads off County Road 310.

U.S.G.S. 7.5-min. quadrangle: Bondad
Legal Description: T33N R9W Sections 14, 15, 22, and 23
Elevation: 6625 to 6820 feet

General Description: The plant community at the South Florida Mesa Area of Interest is transitional between the pinyon-juniper woodlands found at slightly lower elevations, and the ponderosa pine/Gambel oak (*Pinus ponderosa/Quercus gambelii*) forests above. Rocky Mountain juniper (*Juniperus scopulorum*) replaces Utah juniper (*Juniperus osteosperma*) here. There are scattered large pinyon pines (*Pinus edulis*) and openings dominated by sagebrush. The highly diverse understory contains species that are typical of both higher and lower elevation communities. They include: Gambel oak, cliff fendlerbush (*Fendlera rupicola*), squaw apple (*Peraphyllum ramosissimum*), spineless horsebrush (*Tetradymia canescens*), big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), needle and thread (*Stipa comata*), Indian rice grass (*Oryzopsis hymenoides*), galleta (*Hilaria jamesii*), toadflax beardtongue (*Penstemon linarioides*), dwarf lousewort (*Pedicularis centranthera*), and New Mexico thistle (*Cirsium neomexicanum*). See the Appendix for a complete species list. The area is very fragmented by gas wells and access roads. Exotic species noted were cranesbill (*Erodium cicutarium*), Russian thistle (*Salsola australis*) and salsify (*Tragopogon dubius*).

Stump Lakes

Location: The Stump Lakes Area of Interest is located in the San Juan National Forest in northeastern La Plata County, about 17 miles northeast of Durango. It is accessible from Forest Road 597, north of Lemon Reservoir.

U.S.G.S. 7.5-min. quadrangles: Lemon Reservoir
Legal Description: T37N R7W Section 10
Elevation: 11,000 to 11,400 feet

General Description: The Stump Lakes site is comprised of a patchwork of subalpine forest and clearcut areas near timberline. A small creek runs through the site. The site is included here as representative of a forest type that is typical in La Plata County. The actual area occupied by this plant association is more extensive than the area mapped here, and it occurs in a mosaic with other subalpine forest associations such as Engelmann spruce (*Picea engelmannii*)/ dwarf bilberry (*Vaccinium myrtillus*) and Engelmann spruce/sprucefir fleabane (*Erigeron eximius*), and open subalpine meadows. Engelmann spruce is dominant. The forest is extremely species rich, and includes many species that also occur in the alpine zone such as alpine avens (*Geum rossii*) and false strawberry (*Sibbaldia procumbens*). Other common understory species include osha (*Ligusticum porteri*), Jacob's ladder (*Polemonium pulcherrimum*), whipple penstemon (*Penstemon whippleanus*), black sedge (*Carex nova*), scabrous black sedge (*Carex atrata*), strawberry (*Fragaria virginiana*), fireweed (*Chamerion danielsii*), Coulter daisy (*Erigeron coulteri*), orange sneezeweed (*Dugaldia hoopsii*), gooseberry currant (*Ribes montigenum*), candytuft (*Noccaea montana*), king's crown (*Rhodiola integrifolia*), rock jasmine (*Androsace septentrionalis*) and Parry's goldenrod (*Oreochrysum parryi*). (See Appendix for more complete list). The association appears to fit well with the Engelmann spruce/dwarf bilberry-Jacob's ladder plant association as described by De Velice et al. (1986). The area appears to have excellent habitat for moonworts (*Botrychium sp.*), although none were found in 2003, a poor year for moonworts throughout the area. No exotic species were encountered, although there is a potential for their introduction by vehicles and horses.

Literature Cited and Other References

- Alexander B. G. Jr., F. Ronco Jr., E. L. Fitzhugh and J. A. Ludwig. 1984. A classification of forest habitat types of the Lincoln National Forest, New Mexico. Gen. Tech. Rep. RM-104, USDA, For. Ser., Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 29 pp.
- American Ornithologists' Union (AOU), Committee on Classification and Nomenclature. 1983. Check-list of North American Birds. Sixth Edition. American Ornithologists' Union, Allen Press, Inc., Lawrence, Kansas.
- Anderson, M., P. Bourgeron, M.T. Bryer, R. Crawford, L. Engelking, D. Faber-Langendoen, M. Gallyoun, K. Goodin, D.H. Grossman, S. Landaal, K.D. Patterson, M. Pyne, M. Reid, L. Sneddon, and A.S. Weakley. 1998. International classification of ecological associations: terrestrial vegetation of the United States. Volume II. The National Vegetation Classification System: list of types. The Nature Conservancy, Arlington, Virginia.
- Andrew, J. M., and J. A. Mosher. 1982. Bald Eagle nest site selection and nesting habitat in Maryland. J. Wildl. Manage. 46:382-390.
- Andrews, R., and R. Righter. 1992. Colorado birds: a reference to their distribution and habitat. Denver Mus. Nat. Hist., Denver. 442 pp.
- Anthony, R. G., and F. B. Isaacs. 1989. Characteristics of Bald Eagle nest sites in Oregon. J. Wildl. Manage. 53:148-159.
- Bailey, A. M., and R. J. Niedrach. 1965. Birds of Colorado. Denver, Colo.: Denver Mus. Nat. Hist. 895 pp.
- Bailey, R. G., P. E. Avers, T. King, and W. H. McNab. 1994. Ecoregions and Subregions of the United States. Prepared for the USDA Forest Service by the U. S. Geological Survey, Fort Collins, CO.
- Barber, W. E., and W. L. Minckley. 1966. Fishes of Aravaipa Creek, Graham and Pinal Counties, Arizona. Southwestern Nat. 11:313-24.
- Barlow, J. C. 1977. Effects of habitat attrition on vireo distribution and population density in the northern Chihuahuan Desert. Pages 591-596 in R. H. Wauer and D. H. Riskind, editors. Trans. Symposium on the Biological Resources of the Chihuahuan Desert, United States and Mexico, Proceedings of a USDI National Park Service Transaction Series No. 3. 658 pp.
- Beatty, B.L., W.F. Jennings, and R.C. Rawlinson (2004, January 30). *Machaeranthera coloradoensis* (Colorado tansyaster): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/machaerantheracoloradoensis.pdf>
- Behnke, R. J. 1979. Monograph of the native trouts of the genus *Salmo* of western North America. U.S. Fish and Wildlife Service, Denver, Colorado.
- Behnke, R. J. 1992. Native trout of western North America. American Fisheries Society Monograph 6. xx + 275 pp.
- Bent, A. C. 1953. Life histories of North American wood warblers. U.S. Natl. Mus. Bull. 203. Washington, D.C.
- Berger, A. J. 1981. Hawaiian Birdlife. Second Edition. University Press of Hawaii, Honolulu, Hawaii. xv + 260 pp.

- Bestgen, K. R., and D. L. Propst. 1989. Distribution, status, and notes on the ecology of GILA ROBUSTA (Cyprinidae) in the Gila River drainage, New Mexico. *Southwestern Naturalist* 34:402-412.
- Bibles, Brent D. 2004. Raptor Research Biologist, Colorado Division of Wildlife. Pers. comm..
- Blackburn, W. H. and P. T. Tueller. 1970. Pinyon and Juniper Invasion in Black Sagebrush Communities in East-Central Nevada. *Ecology* 51(5):841-848
- Blair, Rob, (ed.), with Tom Ann Casey, William H. Romme and Richard N. Ellis, technical editors. 1996. The Western San Juan Mountains, Their Geology, Ecology, and Human History. University Press of Colorado, Fort Lewis College Foundation.
- Bond, R. M. 1946. The peregrine population of western North America. *Condor* 48:101-116.
- Brawn, J.D., and R.P. Balda. 1988. The influence of silvicultural activity on ponderosa pine forest bird communities in the southwestern United States. Pages 3-21 in J.A. Jackson, editor. *Bird Conservation 3*. University of Wisconsin Press, Madison, WI.
- Brown, L., and D. Amadon. 1968. *Eagles, hawks and falcons of the world*. 2 vols. New York: McGraw-Hill.
- Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In *The birds of North America*, No. 506 (A. Poole and F. Gill, editors). Philadelphia. 40 pp.
- Buehler, D. A., T. J. Mersmann, J. D. Fraser, and J. K. D. Seegar. 1991b. Nonbreeding Bald Eagle communal and solitary roosting behavior and roost habitat on the northern Chesapeake Bay. *J. Wildl. Manage.* 55:273-281.
- Bunting S. C., B. M. Kilgore and C. L. Bushey. 1987. Guidelines for prescribed burning sagebrush-grass rangelands in the northern Great Basin. U. S. Department of Agriculture Forest Service, Intermountain Research Station, Gen. Tech. Report INT-231. Ogden, UT. 33 pp.
- Byrd, M. A., and D. W. Johnston. 1991. Birds. Pages 477-537 in K. Terwilliger, coordinator. *Virginia's endangered species: proceedings of a symposium*. McDonald and Woodward Publ. Co., Blacksburg, Virginia.
- Cade, T. J. 1960. Ecology of the peregrine and gyrfalcon populations in Alaska. *Univ. Calif. Publ. Zool.* 63:151-290.
- Cade, T. J. 1971. Survival of the Peregrine Falcon: protection or management. *Raptor Res. News* 5:83-87.
- Cade, T. J., C. M. White, and J. R. Haugh. 1967. Peregrines and pesticides in Alaska. *Raptor Res. News* 1:23-38.
- Cade, T. J., J. H. Enderson, C. G. Thelander, and C. M. White, editors. 1988. *Peregrine Falcon populations: their management and recovery*. Boise, Idaho: The Peregrine Fund. 949 pp.
- Cade, T. J., M. Martell, P. Redig, G. Septon, and H. Tordoff. 1996. Peregrine Falcons in urban North America. Pages 3-13 in *Raptors in human landscapes: adaptations to built and cultivated environments* (D. Bird, D. Varland, and J. Negro, editors). San Diego: Academic Press.

- Carsey, K. and K. Decker. 1999a. Identification and Evaluation of Wetlands of Statewide Significance in Colorado. Report prepared *for* Colorado Department of Natural Resources and U.S. Environmental Protection Agency *by* the Colorado Natural Areas Program, Denver, Colorado.
- Carsey, K., J. Coles, K. Decker, and R. Fenwick. 1999b. Identification and Evaluation of Wetlands of Statewide Significance in Colorado. Report prepared *for* Colorado Department of Natural Resources and U.S. Environmental Protection Agency *by* the Colorado Natural Areas Program, Denver, Colorado.
- Carsey K., D. Cooper, K. Decker, G. Kittel and D. Culver. 2003. Statewide Wetlands Classification and Characterization: Wetland and Riparian Plant Associations of Colorado. Final report and CD-ROM. Colorado Natural Heritage Program, Colorado State University, Ft. Collins, CO.
- Chandler, S. K., J. D. Fraser, D. A. Buehler, and J. K. D. Seegar. 1995. Perch trees and shoreline development as predictors of Bald Eagle distribution on Chesapeake Bay. *J. Wildl. Manage.* 59:325-332.
- Chester, D. N., D. F. Stauffer, T. J. Smith, D. R. Luukkonen, and J. D. Fraser. 1990. Habitat use by nonbreeding Bald Eagles in North Carolina. *J. Wildl. Manage.* 54:223-234.
- Chien, N. 1985. Changes in river regime after the construction of upstream reservoirs. *Earth Surface Processes* 10, 143-159.
- Chronic, H. 1980. Roadside geology of Colorado. Mountain Press Publ., Missoula, MT. 344 pp.
- Clark, T. W., T. M. Campbell, III, D. G. Socha, and D. E. Casey. 1982. Prairie dog colony attributes and associated vertebrate species. *Great Basin Nat.* 42:572-582.
- Cole D.N. and R.L. Knight. 1990. Impacts of recreation on biodiversity in wilderness. *In: Proceedings of a Symposium on Wilderness Areas: Their Impact.* D.N. Cole and R.L. Knight, (editors).
- Coleman J.S. and S.A. Temple. 1994. How Many Birds Do Cats Kill? Unpublished Report. University of Wisconsin, Department of Wildlife Ecology, Madison, WI.
- Colorado Department of Natural Resources. 1998. Planning trails with wildlife in mind. Colorado Department of Natural Resources, Trails Program. Denver, CO.
- Colorado Natural Heritage Program (CNHP). 2003. Biological and Conservation Data (BCD) System. Data from field surveys. Colorado Natural Heritage Program, Colorado State University, Fort Collins, CO.
- Commons M. L., R. K. Baydack and C. E. Braun. 1999. Sage grouse response to pinyon-juniper management. Pages 238-239 in S. B. Monsen and R. Stevens, eds., *Proceedings: ecology and management of pinyon-juniper communities within the Interior West.* U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411 pp.
- Cowardin, L. M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States, U. S. Department of the Interior, Fish and Wildlife Services, Office of Biological Services, Washington D.C.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. L. Reveal, and P. K. Holmgren. 1977. Intermountain Flora; Vascular Plants of the Intermountain West, U.S.A., Volume 6. Hafner Publishing Co., Inc., New York.
- Cully, A. 1996. Knowlton's cactus (*Pediocactus knowltonii*) reintroduction. Restoring diversity: strategies for reintroduction of endangered plants. Washinton, D.C.: Island Press. p. 403-410.

- D'Antonio, C. M. and P. M. Vitousek. 1992. Biological invasions by exotic grasses: the grass/fire cycle and global change. *Ann. Rev. Ecol. and Syst.* 23:63-87.
- Day, E. 1996. Bark Beetles: Publication Number 444-216, August 1996. Insect Identification Laboratory, Virginia cooperative extension, VSU.
- DeByle N. V. and R. P. Winokur, Eds. 1985. Aspen: ecology and management in the western United States. USDA Forest Service General Technical Report RM-119, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 283 pp.
- DeSante, D.F., and T.L. George. 1994. Population trends in the landbirds of western North America. *Studies in Avian Biology* 15:173-190.
- DeVelice, Robert, John A. Ludwig, William H. Moir and Frnk ronco, Jr.. 1986. A Classification of Forest Habitat Types of Northern New Mexico and Southern Colorado. USDA Forest Service Gen. Tech. Report RM-131)
- Dieterich J. H. 1983. Fire history of southwestern mixed conifer: a case study. *Forest Ecology* 6: 13-31.
- Dorn, Robert D. 1984. Vascular Plants of Montana. Mountain West Publ, Cheyenne WY.
- Eager, T. J. 1999. Factors affecting the health of pinyon pine trees (*Pinus edulis*) in the pinyon-juniper woodlands of western Colorado. Page 397 in S. B. Monsen and R. Stevens, eds., Proceedings: ecology and management of pinyon-juniper communities within the Interior West. U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411.
- Eckert R. E. Jr., F. F. Peterson, M. S. Meurisse and J. L. Stephens. 1986. Effects of soil-surface morphology on emergence and survival of seedlings in big sagebrush communities. *J. Range Management* 39(5): 414-420.
- Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon and Shuster, Inc., New York. xxx + 785 pp.
- Enderson, J. H. 1965. A breeding and migration survey of the Peregrine Falcon. *Wilson Bull.* 77:327-339.
- Enderson, J. H. 1969. Population trends among Peregrine Falcons in the Rocky Mountain region. Pages 73-79 in *Peregrine Falcon populations: their biology and decline* (J. J. Hickey, editor). Madison: Univ. Wisconsin Press.
- Enderson, J. H., and G. R. Craig. 1997. Wide ranging by nesting Peregrine Falcons (*Falco peregrinus*) determined by radiotelemetry. *J. Raptor Res.* 31:333-338.
- FEIS. Fire Effects Information Services. Fire Effects Information System [Online] (1996, September). Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer). Available: www.FEIS.
- Ferguson-Lees, I. J. 1957. Peregrine (*Falco peregrinus*). *Brit. Birds* 50:149-155.
- Fernandez, C., and P. Azkona. 1993. Human disturbance affects parental care of marsh harriers and nutritional status of nestlings. *J. Wildl. Manage.* 57:602-608.
- Finch, D.M., J.L. Ganey, W. Yong, R.T. Kimball, and R. Sallabanks. 1997. Effects and interactions of fire, logging, and grazing. Pages 103-136 in *Songbird ecology in southwestern Ponderosa Pine forests: a literature review*, W.M. Block and D.M. Finch, technical editors. USFS, Rocky Mountain Forest and Range Experiment Station, Gen. Tech. Rep. RM-GTR-292.

- Findholt, S. L. 1984. Organochlorine residues, eggshell thickness, and reproductive success of snowy egrets nesting in Idaho. *Condor* 86:163-169.
- Fitzgerald, J. P., C. A. Meaney, and D. M. Armstrong. 1994. *Mammals of Colorado*. Niwot, Colo.: Univ. Press of Colo. 467 pp.
- Forman, R. T. T. and L.E. Alexander 1998. Roads and their major ecological effects. *Annual Reviews of Ecological Systems* 207-226.
- Forman, R. T. T. 1995. *Land Mosaics: The Ecology of Landscapes and Regions*. Cambridge Press, Cambridge, UK.
- Forman, R. T. T., and M. Godron. 1986. *Landscape Ecology*, John Wiley & Sons, New York, New York.
- Foutz, Dell R. 1994. *Geology of Colorado illustrated*. Your Geologist, Grand Junction, Colorado.
- Gerrard, J. M., P. N. Gerrard, P. N. Gerrard, G. R. Bortolotti, and E. H. Dzus. 1992a. A 24-year study of Bald Eagles on Besnard Lake, Saskatchewan. *J. Raptor Res.* 26:159-166.
- Gough, G.A., Sauer, J.R., Iliff, M. *Patuxent Bird Identification Infocenter*. 1998. Version 97.1. Patuxent Wildlife Research Center, Laurel, MD. <http://www.mbr-pwrc.usgs.gov/Infocenter/infocenter.html>
- Gray, M. T. 1995. DOW working for wildlife: Peregrine Falcon. Denver: Colorado's Wildlife Company, Colorado Division of Wildlife.
- Grubb, T. G., S. J. Nagiller, W. L. Eakle, and G. A. Goodwin. 1989. Winter roosting patterns of bald eagles (*Haliaeetus leucocephalus*) in north-central Arizona. *Southwestern Naturalist* 34:453-459.
- Hansen, A. J. 1986. Fighting behavior in Bald Eagles: a test of game theory. *Ecology* 67:787-797.
- Hansen, A. J., M. V. Stalmaster, and J. R. Newman. 1981. Habitat characteristics, function, and destruction of Bald Eagle communal roosts in western Washington. Pages 222-229 in *Proceedings of the Washington Bald Eagle symposium, 14-15 June 1980* (R. L. Knight, G. T. Allen, M. V. Stalmaster, and C. W. Servheen, editors). Seattle, Washington.
- Hansen, P.L., R.D. Pjister, K. Boggs, B.I.J. Cook, J. Joy, and D.K. Hinckley. 1995. *Classification and Management of Montana's Riparian and wetland Sites*. Montana Forest and Conservation Experiment Station Miscellaneous Publication No. 54. The University of Montana, Missoula, MT. 646 pp. + posters.
- Harmata, A. R., and D. W. Stahlecker. 1993. Fidelity of migrant Bald Eagles to wintering grounds in southern Colorado and northern New Mexico. *J. Field Ornithol.* 64:129-134.
- Harrington, Harold D. 1979. *Manual of the Plants of Colorado*. Reprinted for Grove Press by University Microfilms International, Ann Arbor Michigan.
- Harrison, C. 1978. *A Field Guide to the Nests, Eggs and Nestlings of North American Birds*. Collins, Cleveland, Ohio.
- Heil, K. 1985. *Recovery Plan for *Pediocactus knowltonii* (Knowlton's Cactus)*. Albuquerque, NM. U.S. Department of the Interior, Fish and Wildlife Service, New Mexico Ecological Services Field Office.
- Hepworth, D. K., M. J. Ottenbacher, and C. B. Chamberlain. 2001. Occurrence of native Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) in the Escalante River drainage, Utah. *Western North American Naturalist* 61:129-138.
- Herbert, R. A., and K. G. S. Herbert. 1965. Behavior of Peregrine Falcons in the New York City region. *Auk* 82:62-94.

- Herren, H. 1969. The status of the Peregrine Falcon in Switzerland. Pages 231-238 in Peregrine Falcon populations: their biology and decline (J. J. Hickey, editor). Madison: Univ. Wisconsin Press.
- Herrick, F. H. 1924. Daily life of the American eagle: late phase. *Auk* 41:389-422, 517-541.
- Hickey, J. J. 1942. Eastern population of the Duck Hawk. *Auk* 59:176-204.
- Hickey, J. J. 1969. Peregrine Falcon populations: their biology and decline. Madison: Univ. Wisconsin Press. 596 pp.
- Hickey, J. J., and D. W. Anderson. 1968. Chlorinated hydrocarbons and eggshell changes in raptorial and fish-eating birds. *Science* 162:271-273.
- Hohn, E.O. 1967. Observations on the breeding biology of Wilson's Phalaropes in central Alberta. *Auk* 84:220-244.
- Holm, L., D.L. Plunknett, J.V. Pancho, J.P. Herberger. 1977. The Worlds Worst Weeds: Distribution and Biology. University Press of Hawaii, Honolulu.
- Hopkins W. E. 1982. Ecology of white fir. Pages 35-41. In Oliver D. C., R. M. Kenady. Proceedings of the biology and management of true fir in the Pacific Northwest symposium, 1981 February 24-26, Seattle-Tacoma, WA. University of Washington, College of Forest Resources: Contribution No. 5, Seattle, WA.
- Hoogland, J. L. 1995. The black-tailed prairie dog. Chicago: Univ. Chicago Press. 557 pp.
- Isely, D. 1983. New combinations and two new varieties in *Astragalus*, *Orophaca* and *Oxytropis*. *Syst. Bot.* 8:422-423.)
- James, D. 1993. The threat of exotic grasses to the biodiversity of semiarid ecosystems. *Aridlands Newsletter* 37:6-7.
- Japhet, Michael. 2003. Colorado Division of Wildlife Fisheries Biologist. Pers. comm.
- Jenkins, J. M., and R. E. Jackman. 1993. Mate and nest site fidelity in a resident population of Bald Eagles. *Condor* 95:1053-1056.
- Johnsgard, P. A. 1979. Birds of the Great Plains: breeding species and their distribution. Lincoln: Univ. Nebr. Press. 539 pp.
- Johnson, N.K. 1994. Pioneering and natural expansion of breeding distributions in western North American birds. *Studies in Avian Biology* 15:27-44.
- Johnson, T., and R.H. Wauer. 1996. Avifaunal response to the 1977 La Mesa fire. Pages 70-94 in C.D. Allen, technical editor. Fire effects in southwestern forests. Proceedings of the second La Mesa fire symposium. USDA Forest Service, General Technical Report RM-GTR-286, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
- Johnston B. C. 1997. Ecological types of the Upper Gunnison Basin. Review draft. USDA, Forest Service, Gunnison, CO. 539 pp.
- Kantrud, H.A., and K.F. Higgins. 1992. Nest and nest site characteristics of some ground-nesting, non-passerine birds of northern grasslands. *Prairie Naturalist* 24:67-84. Renken, R. B. 1983. Breeding bird communities and bird-habitat associations on North Dakota waterfowl production areas of three

- habitat types. M.S. Thesis, Iowa State University, Ames, IA. 90 pp.
- Kartesz, J. T. 1999. A synonymized checklist and atlas with biological attributes for the vascular flora of the United States, Canada, and Greenland. 3rd edition, CD-ROM. North Carolina Botanical Garden, Chapel Hill, North Carolina.
- Keister, G. P., Jr., R. G. Anthony, and E. J. O'Neill. 1987. Use of communal roosts and foraging areas by Bald Eagles wintering in the Klamath Basin. *J. Wildl. Manage.* 51:415-420.
- King, J. A. 1955. Social behavior, social organization, and population dynamics in a black-tailed prairie dog town in the Black Hills of South Dakota. *Contributions from the Laboratory of Vertebrate Biology, University of Michigan* 67:1-123.
- Kingery, H. Ed., 1998. Colorado Breeding Bird Atlas. Published by Colorado Bird Atlas Partnership and Colorado Division of Wildlife. 636pp.
- Knight R.L. and D.N. Cole 1991. Effects of recreational activity on wildlife in wildlands. in: *Trans. 56th N.A. Wildl. and Nat. Res. Conf.*
- Kralovec, M. L., R. L. Knight, G. R. Craig, and R. G. McLean. 1992. Nesting productivity, food habits, and nest sites of Bald Eagles in Colorado and southeastern Wyoming. *Southwest. Nat.* 37:356-361.
- Kramer, J. L., and P. T. Redig. 1997. Sixteen years of lead poisoning in eagles, 1980-95: an epizootiologic view. *J. Raptor Res.* 31:327-332.
- La Plata County. 2003. website: <http://www.co.laplata.co.us/profile.htm>
- Lawson, R. 1930. The stoop of a hawk. *Bull. Essex (Mass.) Ornithol. Club* 12:79-80. [Cited by Terres 1980.]
- Lechleitner, R. R., L. Kartman, M. I. Goldenberg, and B. W. Hudson. 1968. An epizootic of plague in Gunnison's prairie dogs (*Cynomys gunnisoni*) in south-central Colorado. *Ecology* 49:734-743.
- Lechleitner, R.R., J. V. Tileston, and L. Kartman. 1962. Die-off of a Gunnison's prairie dog colony in central Colorado. I. Ecological observations and description of the epizootic. *Zoonoses Res.* 1:185-199.
- Lesica, P. and K. Ahlenslager. 1995. Demography and life history of three sympatric species of BOTRYCHIUM subg. BOTRYCHIUM in Waterton Lakes National Park, Alberta, Canada. Draft manuscript prepared in cooperation with Waterton National Park, U.S. Fish and Wildlife Service, and Montana Natural Heritage Program. 22 pp.
- Little E. L. Jr. 1971. Atlas of United States trees: Vol. 1. Conifers and important hardwoods. USDA For. Ser. Miscellaneous Publication 1146, Washington, D.C. 9p + 202 maps pp.
- Livingston, S. A., C. S. Todd, W. B. Krohn, and R. B. Owen, Jr. 1990. Habitat models for nesting Bald Eagles in Maine. *J. Wildl. Manage.* 54:644-653.
- Macalady, A. 2000. Draft Report: Sand and Gravel Mining in Colorado Rivers and Riparian Areas. Impacts, Regulations and Suggestions For the Future. Prepared for the Western Slope Environmental Resource Council and the Western Colorado Congress.
- Marzluff, J.M. 1997. Effects of urbanization and recreation on songbirds. Pages 89-102 in W.M. Block and D.M. Finch, technical editors. Songbird ecology in southwestern ponderosa pine forests: a literature review. USDA Forest Service, General Technical Report RM-GTR-292, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

- McGarigal, K., R. G. Anthony, and F. B. Isaacs. 1991. Interactions of humans and Bald Eagles on the Columbia River estuary. *Wildl. Monogr.* 115:1-47.
- Mebs, T. 1960. 'Probleme der Fortpflanzungsbiologie und Bestandserhaltung bei deutschen Wanderfalken *Falco peregrinus*.' *Volgelwelt* 81:47-56. [Cited by Olsen and Olsen 1980.]
- Mebs, T. 1969. Peregrine Falcon population trends in West Germany. Pages 193-207 in *Peregrine Falcon populations: their biology and decline* (J. J. Hickey, editor). Madison: Univ. Wisconsin Press.
- Mehl, M. S. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain region. *In*: Kaufmann MR, Moir WH, Bassett RL, Technical Coordinators. Old-growth forests in the southwest and Rocky Mountain regions. Proceedings of a workshop; Mar 9-13, 1992; Portal, Arizona. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO: USDA Forest Service, General Technical Report RM-213. 106-120.
- Miller, R. 1992. Preliminary results from Breeding Bird Survey data estimates of trends in bird populations in or near managed ponderosa pine in the Southwest. Unpubl. Report, Arizona Dept. of Game and Fish, Flagstaff, AZ. [Cited in Hall *et al.* 1997]
- Millsap, B. A. 1986. Status of wintering Bald Eagles in the conterminous 48 states. *Wildl. Soc. Bull.* 14:433-440.
- Minckley, W. L. 1973. *Fishes of Arizona*. Arizona Game and Fish Department, Phoenix, Arizona.
- Minckley, W. L. 1981. Ecological studies of Aravaipa Creek, central Arizona, relative to past, present, and future uses. Final Report. U.S. Bureau of Land Management, Safford, Arizona. Contract Number YA-512-CT6-98. 362 pp.
- Moir, W.H., B. Geils, M.A. Benoit, and D. Scurlock. 1997. Ecology of southwestern ponderosa pine forests. Pages 3-27 in W.M. Block and D.M. Finch, technical editors. *Songbird ecology in southwestern ponderosa pine forests: a literature review*. USDA Forest Service, General Technical Report RM-GTR-292, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
- Mueggler W. F. and R. B. Jr. Campbell. 1986. Aspen community types of Utah. U.S.D.A. Forest Service, Intermountain research Station, Research Paper INT-362, Ogden, UT. 69 pp.
- Muth, R. T., C. M. Haynes and C. A. Carlson, 1985. Culture of roundtail chubs, GILA ROBUSTA ROBUSTA (Cyprinidae), through the larval period. *Southwestern Naturalist* 30:152-4.
- National Geographic Society (NGS). 1983. *Field guide to the birds of North America*. National Geographic Society, Washington, DC.
- NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: February 6, 2004).
- Neely, B. P. Comer, C. Moritz, M. Lammert, R. Rondeau, C. Pague, G. Bell, H. Copeland, J. Humke, S. Spackman, T. Schulz, D. Theobald, and L. Valutis. 2001. *Southern Rocky Mountains: an ecoregional assessment and conservation blueprint*. The Nature Conservancy. 75 pp + tables, boxes and appendices.
- New Mexico Rare Plant Technical Council. 1999. *New Mexico Rare Plants*. Albuquerque, NM: New Mexico Rare Plants Home Page. <http://nmrareplants.unm.edu> (Version 15 March 2002).

- Nisbet, I. C. T. 1988. The relative importance of DDE and dieldrin in the decline of Peregrine Falcon populations. Pages 351-375 in *Peregrine Falcon populations: their management and recovery* (T. J. Cade, J. H. Enderson, C. G. Thelander, and C. M. White, editors). Boise, Idaho: The Peregrine Fund.
- Noss, R. F., M.A. O'Connell, and D.D. Murphy. 1997. *The science of conservation planning: Habitat conservation under the Endangered Species Act*. Island Press, Washington D.C.
- Nowak, R. M., editor. 1999. *Walker's mammals of the world, sixth edition*. Baltimore: Johns Hopkins Univ. Press. 1936 pp.
- O'Kane, S. L. 1988. Colorado's Rare Flora. *Great Basin Naturalist* 48(4): 434-484.
- Olsen, J., and P. Olsen. 1980. Alleviating the impact of human disturbance on the breeding Peregrine Falcon. II. Public and recreational lands. *Corella* 4:54-57.
- Oxley, D. J., M.B. Fenton, and G.R. Carmody. 1974. The effects of roads on populations of small animals. *Journal of Applied Ecology* 11, 51-59.
- Parson D. J. and S. H. DeBenedetti. 1979. Impact of fire suppression in a mixed-conifer forest. *Forest Ecology and Management* 2: 21-33.
- Paton, P. W., C. Kneedy, and E. Sorensen. 1992. Chronology of shorebird and ibis use of selected marshes at Great Salt Lake. *Utah Birds* 8(1):1-19.
- Peakall, D. B., and L. F. Kiff. 1988. DDE contamination in Peregrines and American Kestrels and its effect on reproduction. Pages 337-350 in *Peregrine Falcon populations: their management and recovery* (T. J. Cade, J. H. Enderson, C. G. Thelander, and C. M. White, editors). Boise, Idaho: The Peregrine Fund.
- Pearson L. C. 1965. Primary production in grazed and ungrazed desert communities of eastern Idaho. *Ecology* 46(3): 278-285.
- Peet R. K. 1981. Forest vegetation of the Colorado Front Range. *Vegetation* 45: 3-75.
- Pizzimenti, J. J. and R. S. Hoffmann. 1973. *Cynomys gunnisoni*. *Mammalian Species* 25:1-4.
- Portal, C. F. A. 1922. The speed of birds. *Field* [London] 139:233-234. [Cited by Terres 1980.]
- Porter, R. D., and C. M. White. 1973. The Peregrine Falcon in Utah. *Brigham Young Univ. Sci. Bull., Biol. Ser.* 18:1-74.
- Powell, G.V.N. 1987. Habitat use by wading birds in a subtropical estuary: implications of hydrography. *Auk* 104:740-749.
- Raffaele, H. A. 1983. *A guide to the birds of Puerto Rico and the Virgin Islands*. Fondo Educativo Interamericano, San Juan, Puerto Rico. 255 pp.
- Ratcliffe, D. A. 1969. Population trends of the Peregrine Falcon in Great Britain. Pages 239-269 in *Peregrine Falcon populations: their biology and decline* (J. J. Hickey, editor). Madison: Univ. Wisconsin Press.
- Rayor, L. S. 1985. Dynamics of a plague outbreak in Gunnison's prairie dog. *J. Mammal.* 66:194-196.
- Rayor, L. S. 1988. Social organization and space-use in Gunnison's prairie dog. *Behav. Ecol. Sociobiol.* 22:69-78.

- Rayor, L. S., A. K. Brody, and C. Gilbert. 1987. Hibernation in the Gunnison's prairie dog. *J. Mammal.* 68:147-150.
- Redders, Jeffery S. 2003. A Classification of Riparian Area and Wetland Vegetation Of the San Juan National Forest. USFS, San Juan National Forest.
- Redig, P. T., and H. B. Tordoff. 1994. Midwest Peregrine Falcon restoration project report. Univ. Minnesota, St. Paul. [Cited by Sweeney *et al.* 1997.]
- Reichel, W. L., L. N. Locke, and R. M. Prouty. 1974. Case report - peregrine falcon suspected of pesticide poisoning. *Avian Dis.* 18:487-489.
- Reichel, W. L., S. K. Schmelling, E. Cromarti, T. E. Kaiser, A. J. Krynitsky, B. G. Lamont, B. M. Mulhern, R. M. Prouty, C. J. Stafford, and D. N. Swineford. 1984. Pesticide, PCB, and lead residues and necropsy data for Bald Eagles from 32 states, 1978-81. *Environ. Monitoring and Assessment* 4:395-403.
- Reijnen R., R. Foppen, T.C. Braak, and J. Thissen. 1995. The effects of car traffic on breeding bird populations in woodland. *Journal of Applied Ecology* 32, 187-202.
- Renken, R. B., and J. J. Dinsmore. 1987. Nongame bird communities on managed grasslands in North Dakota. *Canadian Field-Naturalist* 101:551-557.
- Rice, J. 1969. The decline of the peregrine population in Pennsylvania. Pages 155-163 in *Peregrine Falcon populations: their biology and decline* (J. J. Hickey, editor). Madison: Univ. Wisconsin Press.
- Risebrough, R. W., and D. B. Peakall. 1988. Commentary - the relative importance of the several organochlorines in the decline of Peregrine Falcon populations. Pages 449-462 in *Peregrine Falcon populations: their management and recovery* (T. J. Cade, J. H. Enderson, C. G. Thelander, and C. M. White, editors). Boise, Idaho: The Peregrine Fund.
- Rollins, Reed. 1993. *The Cruciferae of Continental North America*. Stanford University Press.
- Romme, William H. 2003. Professor of Fire Ecology Department of Forest, Rangeland, and Watershed Stewardship Colorado State University Fort Collins, CO 80523. Letter to Anne Veneman and Gale Norton, Dec. 23, 2003.
- 2004. pers. comm..
- Rood, S. B. and J.M. Mahoney. 1993. River damming and riparian cottonwoods: Management opportunities and problems. *In: Riparian Management: Common Threads and Shared Interests* (Editors: B. Tellman, H.J. Cortner, M.G. Wallace, L. F. DeBano, R.H. Hamre) USDA Forest Service General Technical Report RM-226, Fort Collins, CO.
- Rosgen, D. 1996. *Applied River Morphology*. Wildland Hydrology, Pagosa Springs CO.
- Sauer, J. R., J. E. Hines, and J. Fallon. 2003. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2002. Version 2003.1*, [USGS Patuxent Wildlife Research Center](http://www.fws.gov/patuxent/), Laurel, MD
- Sauer, J.R., J.E. Hines, G. Gough, I. Thomas, and B.G. Peterjohn. 1997. *The North American Breeding Bird Survey Results and Analysis. Version 96.3*. Online. Patuxent Wildlife Research Center, Laurel, MD.
- Sivinski, Robert. 2004. New Mexico State Forest. Pers. comm.

- Snow, C. 1972. Habitat management series for endangered species. Report No. 1: American Peregrine Falcon *Falco peregrinus anatum* and Arctic Peregrine Falcon *Falco peregrinus tundrius*. U.S. Dept. Inter., BLM Tech. Note. 35 pp.
- Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado Rare Plant Field Guide. Prepared for the Bureau of Land Management, the U.S. Forest Service and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.
- Spahr, R., L. Armstrong, D. Atwood, and M. Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. U.S. Forest Service, Ogden, Utah.
- Stalmaster, M. V. 1983. An energetics simulation model for managing wintering Bald Eagles. *J. Wildl. Manage.* 47:349-359.
- Stalmaster, M. V., and J. L. Kaiser. 1998. Effects of recreational activity on wintering Bald Eagles. *Wildl. Monogr.* 137:1-46.
- Swenson, J. E., K. L. Alt, and R. L. Eng. 1986. Ecology of Bald Eagles in the Greater Yellowstone Ecosystem. *Wildl. Monogr.* 95:1-46.
- Szaro, R.C., and R.P. Balda. 1979. Bird community dynamics in a ponderosa pine forest. *Studies in Avian Biology* 3:1-66. Terres, J. K. 1980. *The Audubon Society encyclopedia of North American birds*. Alfred A. Knopf, New York.
- Theobald, W. L., C. C. Tseng, and M. E. Mathias. 1964. A revision of *Aletes* and *Neoparrrya*. *Brittonia* 16:296-315.
- Therres, G. D., M. A. Byrd, and D. S. Bradshaw. 1993. Effects of development on nesting Bald Eagles: case studies from Chesapeake Bay. *Trans. No. Amer. Wildl. and Nat. Resour. Conf.* 58:62-69.
- Todd, C. S., L. S. Young, R. B. Owen, and F. J. Gramlich. 1982. Food habits of Bald Eagles in Maine. *J. Wildl. Manage.* 46:636-645.
- Tordoff, H. B., and P. T. Redig. 1997. Midwest Peregrine Falcon demography, 1982-1995. *J. Raptor Res.* 31:339-346.
- Tordoff, H. B., M. S. Martell, and P. T. Redig. 1998. Midwest Peregrine Falcon restoration, 1998 report. St. Paul: The Raptor Center and The Bell Mus. *Nat. Hist.*
- Travis, S. E., C. N. Slobodchikoff, and P. Keim. 1997. DNA fingerprinting reveals low genetic diversity in Gunnison's prairie dog (*CYNOMYS GUNNISONI*). *Journal of Mammalogy* 78:725-732.
- Trotter, P. C. 1987. *Cutthroat: native trout of the west*. Boulder: Colo. Associated Univ. Press. 219 pp.
- Tweto, O. 1979. *Geologic Map of Colorado*. United States Geological Survey, Department of Interior, and Geologic Survey of Colorado.
- USDA Forest Service (USFS). 1994. *Neotropical Migratory Bird Reference Book*. USDA Forest Service, Pacific Southwest Region. 832 pp.
- USDA (United States Department of Agriculture) 1988. *Soil Survey of La Plata County Area*, Soil Conservation Service, in Cooperation with Colorado Agricultural Experiment Station.
- USDA-NRCS. 2004. *The PLANTS Database* (<http://plants.usda.gov/plants>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

- United States Department of Interior (USDI) Bureau of Land Management, 2000. Abandoned Mine Lands-Upper Animas River watershed. Online: <http://www.co.blm.gov/mines/upperanimas>.
- U.S. Fish and Wildlife Service. 1984. American Peregrine Falcon recovery plan (Rocky Mountain/Southwest population). Prepared in cooperation with the American Peregrine Falcon Recovery Team. Denver, Colo. 104 pp.
- U.S. Fish and Wildlife Service. 1998. Greenback cutthroat trout recovery plan. U.S. Fish and Wildlife Service, Denver, Colorado. 62 pp.
- U.S. Fish and Wildlife Service. 1999. Endangered and threatened wildlife and plants; final rule to remove the American Peregrine Falcon from the federal list of endangered and threatened wildlife, and to remove the similarity of appearance provision for free-flying peregrines in the conterminous United States; final rule. Federal Register 64(164):46542-46558.
- Usgaard, R. E., and K. F. Higgins. 1995. Availability and suitability of Bald Eagle and Osprey nesting habitat in the northern prairie region. Trans. No. Amer. Wildl. and Nat. Resour. Conf. 60:193-202.
- Wagner, W. H., Jr. and F. S. Wagner. 1986. Three new species of moonworts (*Botrychium* subg. *Botrychium*) endemic in western North America. American Fern Journal 76:33-47.
- Wambolt C. L., T. L. Hoffman, C. A. Mehus. 1999. Response of shrubs in big sagebrush habitats to fire on the northern Yellowstone winter range. Pages 238-242. In McArthur E. D., W. K. Ostler, C. L. Wambolt. Proceedings: shrubland ecotones, August 12-14 1998, Ephraim, UT. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-11, Ogden, UT. 299.
- Wang, L. 1989. Behavior and microhabitat competition of brown trout and greenback cutthroat trout in an artificial stream. M.S. thesis, Montana St. Univ., Bozeman. [Cited in U.S. Fish and Wildlife Service 1998.]
- Weber, W.A. and Ronald Wittmann. 1996. Colorado Flora: Western Slope. University Press of Colorado.
- Weekes, F. M. 1974. A survey of Bald Eagle nesting attempts in southern Ontario, 1969-1973. Can. Field-Nat. 88:415-419.
- West, N. E. 1999. Distribution, composition, and classification of current Juniper-Pinyon woodlands and savannas across western North America. Pages 20-23 in S. B. Monsen and R. Stevens, eds., Proceedings: ecology and management of pinyon-juniper communities within the Interior West. U.S. Dept. Agric., Forest Service, Rocky Mountain Research Station, Proc. RMRS-P-9 Ogden, UT . 411.
- White, C. M. and D. G. Rosseneau. 1970. Observation of food, nesting, and winter populations of large North American falcons. Condor 72:113-115.
- Wilcomb, M. J., Jr. 1954. A study of prairie dog burrow systems and the ecology of their arthropod inhabitants in central Oklahoma. Ph.D. dissertation, Univ. Oklahoma, Norman.
- Wilson, E. O. 1988. Biodiversity. National Academy Press, Washington D.C. 520 pp.
- Windell, J. T., B.E. Willard, D.J. Cooper, S.Q. Foster, C. Knud-Hansen, L.P. Rink, and

- G.N. Kiladis. 1986. An Ecological Characterization of Rocky Mountain Montane and Subalpine Wetlands. Fish and Wildlife Service, U. S. Department of the Interior, Biological Report 86 (11). U. S. Department of the Interior, Washington, D. C.
- Wright J. R., H. G. Fisser, C. L. Hanson. 1986. Biology and ecology of sagebrush in Wyoming: IV. Validation of a rangeland production model (ERHYM) for sagebrush sites. Pages 320-330. In McArthur E. D., B. L. Welch. Proceedings - Symposium on the biology of *Artemisia* and *Chrysothamnus*. U.S. Department of Agriculture, Forest Service, Gen. Tech. Report INT-200. Odgen, UT. 398.
- Yates, M. A., K. E. Riddle, and F. P. Ward. 1988. Recoveries of Peregrine Falcons migrating through the eastern and central United States, 1955-1985. Pages 471-483 in Peregrine Falcon populations: their management and recovery (T. J. Cade, J. H. Enderson, C. G. Thelander, and C. M. White, editors). Boise, Idaho: The Peregrine Fund.
- Young, J. A. 1981. Principles of weed control and plant manipulation. In: Managing Intermountain Rangelands--Improvement of Range and Wildlife Habitats. U.S.D.A. Forest Service Intermountain Forest and Range Experiment Station, Ogden, UT 84401. Gen Tech Report INT-157.
- Young, M. K. 1995. Colorado River cutthroat trout. Pages 16-23 in M. K. Young, technical editor. Conservation assessment for inland cutthroat trout. USDA Forest Service Gen. Tech. Re. RM-GTR-256. iv + 61 pp
- Young, M. K., R. N. Schmal, T. W. Kohley, and V. G. Leonard. 1996. Conservation status of Colorado River cutthroat trout. USDA Forest Service General Technical Report RM-GTR-282. 32 pp.
- Zwinger A., and B. Willard. 1972. Land above the trees: a guide to American alpine tundra. The University of Arizona Press, Tucson. References new 2003:

Appendix I.

Species Lists from selected locations in La Plata County

- Plants are listed alphabetically under life forms: tree; shrub and sub-shrub, including cacti; graminoid, including grasses, sedges, rushes; and forb or herbaceous plants, including ferns
- Non-native species are in italics
- Tracked species are in bold type

Contents:

1. Pine River at Ignacio
2. Rattlesnake Hill.
3. Bondad, County Road 310
4. South Florida Mesa
5. La Boca
6. Pine River Canal
7. Perins Peak State Wildlife Area, Dry Fork Road
8. Animas Overlook Nature Trail
9. Bodo SWA, at County Road 12.
10. Spring Creek
11. Florida River Uplands
12. Missionary Ridge Road
13. La Plata River, Snowslide Campground
14. La Plata River, Kroger Campground
15. Smelter Mountain
16. Vallecito Creek Trail by campground
17. Haviland Lake Forest
18. Haviland Lake Wetland
19. Cumberland Basin
20. Taylor Lake
21. Cox Canyon
22. Electra Lake
23. Elbert Creek South
24. Goulding Creek
25. Lost Lake Trail
26. Miller Creek
27. Stump Lakes
28. Vallecito Creek pond
29. Fall Creek
30. Perins Peak SWA-Dry Fork Lightner Creek
31. Upper La Plata Creek
32. Long Hollow North
33. Long Hollow South
34. Middle Mountain Road
35. Vallecito Reservoir, east side
36. Indian Creek at Tuckerville
37. Cave Basin Trail South

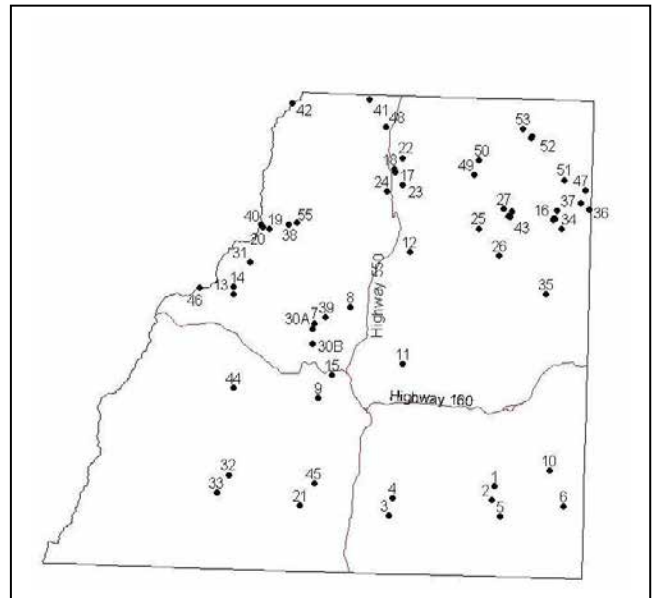


Figure --. Location of Species Lists in county.

38. Sheephead Basin
39. Colorado Trail at Junction Creek
40. Indian Trail Ridge
41. East Fork Hermosa Creek
42. Highline Trail
43. Endlich Mesa
44. CSU Research Station
45. High Flume Canyon
46. Madden Peak Road (FR 317)
47. Cave Basin Trail North
48. Elbert Creek North
49. Lime Mesa
50. Dollar Lake
51. Vallecito Creek
52. Johnson Creek
53. Columbine Lake
54. Vallecito Creek trail above Bear Creek
55. Clear Creek Trail trailhead

1. Pine River at Ignacio, bike trail to ponds

U. S. G. S. Quadrangle: Ignacio. T33N R7W S8. Elev. Approx. 6460 ft.

Owner: Southern Ute Tribe

Narrowleaf cottonwood riparian forest

Trees

Crataegus rivularis (River hawthorne)

Populus acuminata

Populus angustifolia

Populus deltoides

Shrubs and sub-shrubs

Chrysothamnus nauseosus

Lonicera morrowii (Introduced honeysuckle)

Prunus virginiana

Ribes aureum

Rosa woodsii

Salix exigua

Salix monticola

Shepherdia argentea

Graminoids

Agropyron cristatum

Bromus inermis

Dactylis glomerata

Elymus elymoides

Pascopyrum smithii

Phalaris arundinacea

Poa pratensis

Forbs

Centaurea repens
Apocynum androsaemifolium
Arctium minus
Asclepias speciosa
Carduus nutans
Chamerion danielsii
Cicorium intybus
Cirsium arvense
Clematis ligusticifolia
Erigeron divergens
Erodium cicutarium
Galium septentrionalis
Hedysarum occidentale
Heterotheca villosa
Hippochaete hyemalis
Leucanthemum vulgare
Medicago sativa
Melilotus officinalis
Sanguisorba minor
Shepherdia argentea
Thalictrum fendleri
Tragopogon dubius
Typha latifolia
Verbascum thapsus
Vicia americana

2. Rattlesnake Hill.

About 0.5 miles south of Ignacio,
U. S. G. S. Quadrangle: Ignacio. T33N R7W Section 17. Elev. Approximately 6500 ft.
Owner: Southern Ute Tribe
Pinyon-juniper/sagebrush woodland

Trees

Juniperus osteosperma
Pinus edulis

Shrubs and sub-shrubs

Artemisia tridentata ssp. tridentata
Cercocarpus montanus
Opuntia phaeocantha
Opuntia polyacantha
Peraphyllum ramosissimum
Purshia tridentata
Ribes inerme

Graminoids

Agropyron cristatum
Bouteloua gracilis
Bromus tectorum
Hilaria jamesii

Koeleria macrantha
Oryzopsis hymenoides
Poa fendleriana
Stipa comata

Forbs

Centaureai repens
Alyssum parviflorum
Artemisia ludoviciana
Asclepias cryptoceras
Astragalus oocalycis
Carduus nutans
Chaetopappa ericoides
Cirsium tracyi
Convolvulus arvensis
Cymopterus purpurascens
Erigeron divergens
Eriogonum racemosum
Erodium cicutarium
Gutierrezia sarothrae
Lomatium triternatum
Marrubium vulgare
Picradenia richardsonii
Plantago patagonica
Salsola australis
Sphaeralcea coccinea
Sphaeralcea parvifolia
Tetraneuris ivesiana
Tragopogon dubius

3. Bondad, County Road 310

U. S. G. S. Quadrangle: Bondad Hill. T33N R9W S27. Elev. Approx. 6700 ft.
Owner: Southern Ute Tribe
Pinyon-juniper/Mountain mahogany community

Trees

Juniperus osteosperma
Pinus edulis

Shrubs and sub-shrubs

Artemisia tridentata ssp. tridentata
Cercocarpus montanus
Gutierrezia sarothrae
Opuntia polyacantha
Purshia stansburiana
Yucca baccata
Yucca harrimanniae

Graminoids

Oryzopsis hymenoides

Forbs**Aletes sessiliflorus**

Astragalus lonchophyllus

Astragalus oocalycis

Castilleja linariifolia

Cryptantha sp.

Eriogonum lonchophyllum

Astragalus flavus

Gilia haydenii

Centaurea repens

Oenothera cespitosa

Physaria acutifolia

4. South Florida Mesa

USGS quad: Bondad Hill. T33N R9W S15. Elev. Approx. 6740 ft.

Rocky mountain juniper/big sagebrush community

Trees

Juniperus scopulorum

Pinus edulis

Shrubs and sub-shrubs

Artemisia frigida

Artemisia tridentata ssp. wyomingensis

Chrysothamnus depressus

Fendlera rupicola

Gutierrezia sarothrae

Peraphyllum ramosissimum

Purshia tridentata

Quercus gambellii

Tetradymia canescens

Graminoids

Hilaria jamesii

Oryzopsis hymenoides

Pascopyrum smithii

Stipa comata

Forbs

Androsace septentrionalis

Astragalus scopulorum

Calochortus gunnisonii

Cirsium neomexicanum

Cirsium tracyi

Erigeron divergens

Erigeron flagellaris

Eriogonum alatum

Eriogonum racemosum

Erodium cicutarium

Ipomopsis aggregata

Lappula redowskii

Lesquerella sp.
Lupinus ammophilus
Lupinus kingii
Machaeranthera grindelioides
Pedicularis centranthera
Penstemon linarioides
Picradenia richardsonii
Plantago patagonica
Psilochenia sp.
Salsola australis
Sphaeralcea coccinea
Tetraneuris ivesiana
Toxicoscordion venenosum
Tragopogon dubius

5. La Boca

USGS U. S. G. S. Quadrangle: Tiffany. T33N R7W S28. Elev. Approx. 6400 ft.
Owner: Southern Ute Tribe
Pinyon-juniper/Bitterbrush community

Trees

Juniperus osteosperma
Juniperus scopulorum
Pinus edulis

Shrubs and sub-shrubs

Amelanchier utahensis
Artemisia nova
Chrysothamnus depressus
Gutierrezia sarothrae
Opuntia phaeocantha
Opuntia polyacantha
Pediocactus simpsonii
Purshia tridentata
Yucca harrimaniae

Graminoids

Bouteloua gracilis
Bromus inermis
Bromus tectorum
Elymus elymoides
Hilaria jamesii
Koeleria macrantha
Oryzopsis hymenoides
Poa fendleriana
Stipa comata
Stipa neomexicana
Vulpia octoflora

Forbs

Centaureai repens
Androsace septentrionalis
Astragalus oocalycis
Castelleja chromosa
Chaetopappa ericoides
Convolvulus arvensis
Cymopterus purpurascens
Eriogonum racemosum
Gilia ophthalmoides
Ipomopsis congesta
Lappula redowskii
Leptodactylon pungens
Lesquerella sp.
Lupinus ammophilus
Mirabilis multiflora
Penstemon linarioides
Plantago patagonica
Psilochenia sp.
Salsola australis
Sphaeralcea coccinea
Tetraneuris ivesiana
Toxicoscordion venenosum
Trifolium gymnocarpon

6. Pine River Canal

U. S. G. S. Quadrangle: Tiffany. T33N R6W S20. Elev. Approx. 6800 ft.
Owner: Southern Ute Tribe
Pinyon-juniper/Mountain mahogany community

Trees

Juniperus osteosperma
Pinus edulis

Shrubs and sub-shrubs

Amelanchier utahensis
Artemisia nova
Artemisia tridentata
Atriplex sp.
Cercocarpus montanus
Purshia tridentata
Yucca baccata
Yucca harrimaniae

Graminoids

Bouteloua gracilis
Bromus tectorum
Elymus elymoides
Koeleria macrantha
Oryzopsis hymenoides

Forbs

Centaurea repens
Allium acuminatum
Alyssum parviflorum
Arabis selbyi
Artemisia ludoviciana
Asclepias cryptoceras
Astragalus lonchocarpus
Astragalus sp.
Chaetopappa ericoides
Cryptantha sp.
Cymopterus purpurascens
Erigeron sp.
Eriogonum cf. lonchophyllum
Eriogonum jamesii
Erodium cicutarium
Lappula redowskii
Mentzelia sp.
Oenothera cespitosa
Penstemon lentus
Penstemon linarioides
Phlox longifolia
Salsola australis
Sphaeralcea coccinea
Chenopodium sp.
Townsendia sp.
Trifolium gymnocarpon.

7. Perins Peak State Wildlife Area, Dry Fork Road

Pinus ponderosa/Quercus gambellii community
U. S. G. S. Quadrangle: Durango West. T36N R10W S34. Elev. Approx. 7480 ft.
Owner: State of Colorado
Ponderosa pine montane forest

Trees

Pinus ponderosa

Shrubs and sub-shrubs

Amelanchier utahensis
Berberis fendleri
Ceanothus fendleri
Mahonia repens
Prunus virginiana var. melanocarpa
Quercus gambellii
Rhus trilobata
Rosa woodsii
Symphoricarpos oreophilus

Graminoids

Bromus inermis
Carex geyeri

Carex sp.
Koeleria macrantha
Oryzopsis hymenoides
Poa fendleriana
Poa pratensis
Stipa nelsonii

Forbs

Achillea lanulosa
Allium cernuum
Antennaria marginata
Artemisia ludoviciana
Asclepias cryptoceras
Aster laevis
Astragalus bisulcatus
Astragalus lonchocarpus
Carduus nutans
Cirsium neomexicanum
Cirsium tracyi
Cynoglossum officinale
Dugaldia hoopesii
Eriogonum alatum
Fragaria virginiana
Heterotheca villosa
Iris missouriensis
Linum lewisii
Lithospermum multiflorum
Lupinus sp.
Maianthemum stellatum
Penstemon linarioides
Potentilla hippiana
Potentilla pulcherrima
Pseudocymopterus montanus
Senecio sp.
Thalictrum fendleri
Toxicoscordion venenosum
Tragopogon dubius
Vicia americana
Wyethia arizonica

8. Animas Overlook Nature Trail

U. S. G. S. Quadrangle: Durango West. T36N R9W S29. Elev. Approx. 8400 ft.
Owner: USFS, San Juan National Forest
Pinus ponderosa/Quercus gambellii forest

Trees

Abies concolor
Picea pungens
Pinus ponderosa
Populus tremuloides

Shrubs and sub-shrubs

Amelanchier alnifolia
Mahonia repens
Paxistima myrsinites
Prunus virginiana var. melanocarpa
Quercus gambellii
Symphoricarpos oreophilus

Graminoids

Bromus inermis
Carex geberi
Carex sp.
Dactylis glomerata
Danthonia parryi
Festuca thurberi
Muhlenbergia montana
Pascopyrum smithii
Poa fendleriana
Poa pratensis

Forbs

Alyssum parviflorum.
Antennaria marginata
Apocynum androsaemifolium
Arabis sp.
Artemisia ludoviciana
Castilleja linariifolia
Clematis sp
Comandra umbellata
Delphinium ramosum
Erigeron flagellaris
Erigeron speciosus
Galium septentrionale
Helianthella quinquenervis
Ipomopsis aggregata
Lathyrus leucanthus
Penstemon strictus
Pseudocymopterus montanus
Senecio neomexicana
Sphaeralcea coccinea
Thalictrum fendleri
Verbascum thapsus
Vicia americana
Wyethia X magna

9. Bodo SWA, at County Road 12.

U. S. G. S. Quadrangle: Basin Mountain. T34N R10W S2. Elev. 6960 ft.

Owner: Colorado

Pinus edulis/Purshia tridentata woodland on south facing slope, with very dry, weedy area at bottom.

Trees

Juniperus osteosperma
Juniperus scopulorum
Pinus edulis

Shrubs and sub-shrubs

Artemisia frigida
Artemisia nova
Artemisia tridentata ssp. tridentata
Artemisia tridentata ssp. wyomingensis
Fendlera rupicola
Gutierrezia sarothrae
Opuntia polyacantha
Pediocactus simpsonii
Peraphyllum ramosissimum
Purshia tridentata
Quercus gambellii
Symphoricarpos oreophilus
Yucca baccata

Graminoids

Bouteloua gracilis
Bromus tectorum
Carex geyeri
Hilaria jamesii
Koeleria macrantha
Oryzopsis hymenoides
Pascopyrum smithii
Poa fendleriana
Stipa comata

Forbs

Achillea lanulosa
Allium acuminatum
Alyssum parviflorum
Antennaria marginata
Artemisia michauxiana
Carduus nutans
Chaenactis douglasii
Chaetopappa ericoides
Erigeron divergens
Erigeron flagellaris
Eriogonum alatum
Eriogonum racemosum
Eriogonum umbellatum
Erodium cicutarium
Heterotheca villosa
Lepidium montanum
Lupinus sp.

Medicago sativa
Onopordum acanthium
Penstemon cf strictus
Penstemon linarioides
Physaria acutifolia
Picradenia richardsonii
Plantago patagonica
Sisymbrium altissimum
Sphaeralcea coccinea
Stenotus armerioides
Verbascum thapsus

10. Spring Creek

U. S. G. S. Quadrangle: Bayfield. T34N R6W Section 31. Elev. Approx. 6700 ft.
Owner: USFS, San Juan National Forest
Pinyon-Juniper woodland

Trees

Juniperus osteosperma
Pinus edulis

Shrubs and sub-shrubs

Artemisia tridentata ssp. tridentata
Chrysothamnus depressus
Chrysothamnus nauseosus
Echinocereus triglochidiatus
Opuntia polyacantha
Pediocactus simpsonii
Peraphyllum ramosissimum
Purshia tridentata
Quercus gambellii
Yucca baccata

Graminoids

Agropyrum cristatum
Bromus tectorum
Hilaria jamesii
Cylindropyrum cylindricum
Oryzopsis hymenoides

Forbs

Alyssum parviflorum
Asclepias cryptoceras
Astragalus lonchocarpus
Chaetopappa ericoides
Comandra umbellata
Convolvulus arvensis
Cymopterus purpurascens
Erigeron divergens
Erigeron speciosus
Eriogonum sp.

Erodium cicutarium
Gilia ophthalmoides
Gutierrezia sarothrae
Hymenopappus filifolius
Lactuca serriola
Lappula redowskii
Lupinus ammophilus
Mentzelia sp
Mirabilis multiflora
Penstemon lentus
Phlox longifolia
Psilochenia intermedia
Salsola australis
Sphaeralcea coccinea
Tetranuris ivesiana
Townsendia sp
Tragopogon dubius

11. Florida River Uplands

U. S. G. S. Quadrangle: Durango East T35N R8W Section 19, 30. Elev. Approx. 7048 to 7760 ft.
Owner: Bureau of Land Management
Pinyon-juniper woodland

Trees

Juniperus osteosperma
Juniperus scopulorum
Pinus edulis
Populus angustifolia
Pseudotsuga menziesii

Shrubs and sub-shrubs

Amelanchier utahensis
Berberis fendleri
Ceanothus fendleri
Cercocarpus montanus
Fendlera rupicola
Mahonia repens
Opuntia fragilis
Opuntia polyacantha
Peraphyllum ramosissimum
Prunus virginiana var. melanocarpa
Purshia tridentata
Quercus gambellii
Rhus trilobata
Rosa woodsii
Shepherdia argentea
Symphoricarpos oreophilus
Tetradymia canescens
Yucca baccata

Graminoids

Agropyrum cristatum
Bouteloua gracilis
Bromus inermis
Bromus tectorum
Carex geeyeri
Elymus elymoides
Koeleria macrantha
Oryzopsis hymenoides
Pascopyrum smithii
Poa fendleriana
Poa pratensis
Stipa comata
Aristida purpurea

Forbs

Achillea lanulosa
Allium cernuum
Alyssum parviflorum
Androsace septentrionalis
Antennaria marginata
Artemisia ludoviciana
Artemisia michauxiana
Asclepias cryptoceras
Aster laevis
Astragalus bisulcatus
Calochortus gunnisonii
Carduus nutans
Chaenactis douglassii
Chenopodium sp.
Cirsium neomexicanum
Cirsium tracyi
Clematis ligusticifolia
Descurainia pinnata
Descurainia sophia
Erigeron divergens
Erigeron flagellaris
Erigeron speciosus
Eriogonum alatum
Eriogonum racemosum
Eriogonum umbellatum
Geranium richardsonii
Heterotheca villosa
Lactuca serriola
Lappula redowskii
Lotus wrightii
Lupinus ammophilus
Lupinus kingii
Lupinus sp.
Machaeranthera gracilis
Maianthemum stellatum
Melilotus officinalis

Penstemon barbatus
Penstemon lentus
Penstemon linarioides
Penstemon strictiformis
Penstemon strictus
Prunella vulgaris
Pseudocymopterus montanus
Senecio neomexicana
Sphaeralcea coccinea
Tetraneuris ivesiana
Thermopsis montana
Toxicoscordion venenosum
Tragia ramosa
Tragopogon dubius
Vicia americana
Wyethia X magna
Xanthium strumarium

12. Missionary Ridge Road

U. S. G. S. Quadrangle: TN RW S. Elev. Approx. 7200 ft.

Owner: USFS, San Juan National Forest

Pinus ponderosa/Quercus gambellii forest (burned, with a few branches of Pinus ponderosa still green, lots of resprouting Quercus gambellii.)

Trees

Pinus ponderosa

Shrubs and sub-shrubs

Amelanchier utahensis
Ceanothus fendleri
Mahonia repens
Prunus virginiana var. melanocarpa
Quercus gambellii
Rosa woodsii
Symphoricarpos oreophilus

Graminoids

Bromus inermis
Carex geayeri
Carex sp.
Koeleria macrantha
Lolium perenne
Pascopyrum smithii
Poa fendleriana
Stipa nelsonii
Triticum aestivum

Forbs

Achillea lanulosa
Alyssum parviflorum
Androsace septentrionalis

Antennaria marginata
Arabis sp.
Artemisia ludoviciana
Calochortus gunnisonii
Chenopodium sp.
Cirsium neomexicanum
Comandra umbellata
Coriflora hirsutissima
Corydalis aurea
Descurainia sophia
Erigeron divergens
Erigeron flagellaris
Erigeron speciosus
Eriogonum racemosum
Geranium caespitosum
Heterotheca villosa
Ipomopsis aggregata
Lactuca serriola
Lithospermum multiflorum
Lupinus sp.
Melilotus officinalis
Penstemon barbatus
Penstemon strictus
Polygonum sp.
Senecio neomexicana
Solidago sp.
Tragopogon dubius

13. La Plata River, Snowslide Campground, and rocky flood plain across river
U. S. G. S. Quadrangle: Hesperus. T36N R11W Section 21. Elev. Approx. 8800 ft.
Owner: USFS, San Juan National Forest
Pinus ponderosa/Quercus gambellii forest

Trees

Abies concolor
Picea pungens
Pinus ponderosa
Populus angustifolia
Populus tremuloides

Shrubs and sub-shrubs

Ribes inerme
Rubus idaeus
Salix geyeriana
Symphoricarpos oreophilus

Graminoids

Bromus inermis
Dactylis glomerata
Festuca thurberi
Poa pratensis

Forbs

Acetosella vulgaris
Achillea lanulosa
Alyssum parviflorum
Anaphalis margaritacea
Aquilegia coerulea
Arabis drummondii
Brickellia grandiflora
Carduus nutans
Castilleja miniata
Cerastium strictum
Chamerion subdentatum
Dugaldia hoopesii
Erigeron coulteri
Erigeron flagellaris
Erigeron speciosus
Galium septentrionale
Geranium richardsonii
Heracleum lanatum
Ipomopsis aggregata
Mertensia ciliata
Osmorhiza depauperata
Penstemon strictus
Polemonium foliosissimum
Potentilla pulcherrima
Senecio atratus
Taraxacum officinale
Thalictrum fendleri
Urtica gracilis
Verbasum thapsus
Vicia americana

14. La Plata River at Kroger Campground

U. S. G. S. Quadrangle: La Plata. T36N R11W Section 16. Elev. Approx. 8870 ft.
Owner: USFS, San Juan National Forest
Montane riparian forest

Trees

Abies concolor
Picea pungens
Populus angustifolia
Populus tremuloides
Pseudotsuga menziesii

Shrubs and sub-shrubs

Acer glabrum
Cornus sericea
Dioscorea involucrata
Rhus glabra
Ribes sp.

Rubus idaeus
Rubus parviflorus
Sambucus racemosa

Graminoids

Bromus inermis
Dactylis glomerata
Poa pratensis
Symphoricarpos oreophilus

Forbs

Aconitum columbianum
Cardamine cordifolia
Cirsium arvense
Cirsium sp.
Cystopteris fragilis
Erigeron coulteri
Erigeron flagellaris
Fragaria virginiana
Galium septentrionale
Geranium richardsonii
Heracleum lanatum
Heuchera parviflora
Hydrophyllum fendleri
Maianthemum racemosum
Maianthemum stellatum
Mertensia ciliata
Osmorhiza depauperata
Pedicularis bracteosa
Penstemon whippleanus
Polemonium foliosissimum
Potentilla pulcherrima
Pseudocymopterus montanus
Taraxacum officinale
Thalictrum fendleri
Urtica gracilis
Viola canadensis

15. Smelter Mountain, by radio towers.

U. S. G. S. Quadrangle: Durango West. T35N R10W Section 25. Elev. Approx. 7600 ft.

Owner: State of Colorado, BODO SWA

Mixed mountain shrub (Gambel oak/Mountain mahogany)

Trees

Pinus edulis

Shrubs and sub-shrubs

Amelanchier utahensis
Cercocarpus montanus
Chrysothamnus depressus
Chrysothamnus nauseosus

Chrysothamnus viscidiflorus
Fendlera rupicola
Mahonia repens
Opuntia fragilis
Opuntia polyacantha
Paxistima myrsinites
Peraphyllum ramosissimum
Purshia tridentata
Quercus gambellii

Graminoids

Agropyrum cristatum
Bromus tectorum
Carex geeyeri
Carex sp.
Cylindropyrum cylindricum
Elymus elymoides
Koeleria macrantha
Oryzopsis hymenoides
Pascopyrum smithii
Poa fendleriana

Forbs

Achillea lanulosa
Allium acuminatum
Alyssum parviflorum
Artemisia tridentata ssp. vaseyana
Calochortus gunnisonii
Carduus nutans
Chenopodium sp.
Comandra umbellata
Descurainia pinnata
Descurainia sp.
Dracocephalum parviflorum
Erigeron flagellaris
Eriogonum jamesii
Eriogonum lonchophyllum
Eriogonum racemosum
Eriogonum umbellatum
Grindelia squarrosa
Gutierrezia sarothrae
Lappula redowskii
Lomatium triternatum
Lupinus ammophilus
Medicago sativa
Melilotus officinalis
Penstemon barbatus
Penstemon linarioides
Penstemon strictiformis
Phlox longifolia
Physaria acutifolia

Picradenia richardsonii
Prunella vulgaris
Salsola australis
Sisymbrium altissimum

South facing slope below towers, additions only:

Sphaeralcea coccinea
Stipa comata
Symphoricarpos oreophilus
Tetradymia canescens
Tetraneuris ivesiana
Vicia americana
Wyethia X magna
Yucca baccata

16. Vallecito Creek Trail (from trailhead to Wilderness boundary, including cliffs on west side of trail opposite campground.)

U. S. G. S. Quadrangle: Vallecito Reservoir T37N R6W Section 16. Elev. Approx. 7900 ft.

Owner: USFS, San Juan National Forest

Mixed montane forest

Trees

Abies concolor
Picea pungens
Pinus ponderosa
Pinus strobiformis
Populus angustifolia
Populus tremuloides
Pseudotsuga menziesii

Shrubs and sub-shrubs

Acer glabrum
Alnus incana
Amelanchier alnifolia
Arctostaphylos uva-ursi
Ceanothus fendleri
Cornus sericea
Distegia involucrata
Holodiscus dumosus
Juniperus communis
Mahonia repens
Paxistima myrsinites
Prunus virginiana var. melanocarpa
Quercus gambellii
Rhus glabra
Ribes inerme
Rosa woodsii
Rubus idaeus
Rubus parviflorus
Salix drummondiana
Salix monticola

Salix scouleriana
Sambucus racemosa
Shepherdia canadensis

Graminoids

Agropyrum cristatum
Bromus inermis
Bromus tectorum
Carex geeyeri
Carex occidentalis
Dactylis glomerata
Elymus elymoides
Glyceria striata
Koeleria macrantha
Luzula parviflora
Melica porteri
Oryzopsis micrantha (Piptatherum)
Poa pratensis
Poa secunda
Trisetum montanum

Forbs

Acetosella vulgaris
Actaea rubra
Achillea lanulosa
Aconitum columbianum
Alyssum parviflorum
Anaphalis margaritacea
Androsace septentrionalis
Antennaria marginata
Antennaria rosea
Anticlea elegans
Apocynum androsaemifolium
Arnica cordifolia
Artemisia franserioides
Asplenium trichomanes
Brickellia grandiflora
Campanula rotundifolia
Capsella bursa-pastoris
Cardamine cordifolia
Carduus nutans
Chamerion danielsii
Cirsium arvense
Corydalis aurea
Cryptogramma acrostichoides
Cynoglossum officinale
Cystopteris fragilis
Descurainia pinnata
Eremogone fendleri
Erigeron flagellaris
Erigeron speciosus

Fragaria vesca
Fragaria virginiana
Galium septentrionale
Geranium cespitosum
Geranium richardsonii
Heliomeris multiflora
Heracleum lanatum
Heterotheca villosa
Heuchera parvifolia
Lepidium sp.
Ligusticum porteri
Lilium philadelphicum
Lithospermum multiflorum
Maianthemum racemosum
Maianthemum stellatum
Medicago sativa
Melilotus officinalis
Mertensia ciliata
Mimulus guttatus
Oenothera caespitosa
Osmorhiza depauperata
Oxalis violacea
Oxypolis fendleri
Plantago lanceolata
Potentilla hippiana
Prunella vulgaris
Pseudocymopterus montanus
Pseudostellaria jamesii
Pteridium aquilinum var. pubescens
Pyrola rotundifolia
Senecio neomexicana
Senecio triangularis
Solidago simplex
Spergulastrum lanuginosum
Thalictrum fendleri
Toxicoscordion venenosum
Trifolium pratense
Trifolium repens
Verbascum thapsus
Veronica serpyllifolia var. humifusa
Veronicastrum serpyllifolia var. humifusa
Woodsia neomexicana

17. Haviland Lake (forested area above trail along west side)
U. S. G. S. Quadrangle: Electra Lake TN RW S. Elev. Approx. 8200 ft.
Owner: USFS, San Juan National Forest
Mixed montane forest

Trees

Abies concolor
Acer glabrum

Picea pungens
Pinus ponderosa
Pinus strobiformis
Populus tremuloides
Pseudotsuga menziesii

Shrubs and sub-shrubs

Alnus incana
Amelanchier alnifolia
Betula occidentalis
Cornus sericea
Distegia involucrata
Juniperus communis
Mahonia repens
Paxistima myrsinites
Prunus virginiana var. melanocarpa
Quercus gambellii
Ribes aureum
Ribes inerme
Rosa woodsii
Salix monticola
Symphoricarpos oreophilus

Graminoids

Bromus inermis
Carex utriculata
Dactylis glomerata
Phalaris arundinacea
Poa pratensis
Scirpus sp.
Carex geyeri
Koeleria macrantha

Forbs

Achillea lanulosa
Artemisia ludoviciana
Cirsium arvense
Clematis columbiana (Atragene occidentalis)
Comandra umbellata
Coriflora hirsutissima
Cynoglossum officinale
Equisetum arvense
Erigeron flagellaris
Erigeron speciosus
Fraseria speciosa
Galium septentrionale
Geum macrophyllum
Heterotheca villosa
Ipomopsis aggregata
Iris missouriensis

Leucanthemum vulgare
Maianthemum racemosum
Maianthemum stellatum
Medicago lupulina
Melilotus officinalis
Pedicularis bracteosa
Penstemon strictus
Potentilla fruticosa
Potentilla hippiana
Prunella vulgaris
Ranunculus alismaefolius
Solidago sp.
Streptopus fassettii
Taraxacum officinale
Thalictrum fendleri
Thermopsis montana
Trifolium pratense
Typha latifolia
Valeriana edulis
Veronica serpyllifolia var. humifusa

18. Haviland Lake Wetland

U. S. G. S. Quadrangle: Electra Lake. T38N R9W S25. Elev. Approx. 8120 ft.
Owner: USFS, San Juan National Forest

Trees

Abies concolor
Picea pungens

Shrubs and sub-shrubs

Betula occidentalis
Ceanothus fendleri
Chrysothamnus parryi
Distegia involucrata
Juniperus communis
Pentaphylloides floribunda
Rosa woodsii
Salix ligulifolia
Salix planifolia

Graminoids

Carex aurea
Carex microglochin
Carex utriculata

Carex viridula

Eleocharis palustris
Glyceria striata
Juncus balticus
Poa pratensis
Scirpus sp.

Stipa comata
Triglochin palustris

Forbs

Agoseris glauca
Allium geeyeri
Aster ascendens
Campanula rotundifolia
Carduus nutans
Cirsium arvense
Cirsium vulgare
Cynoglossum officinale
Erigeron flagellaris
Eriogonum racemosum
Galium septentrionale
Geranium richardsonii
Habenaria hyperborean
Hippochaete hyemalis
Hydrophyllum fendleri
Iris missouriensis
Lilium philadelphicum
Mentha arvensis
Mertensia ciliata
Noccaea Montana
Oreochrysum parryi
Pedicularis groenlandica
Persicaria amphibia
Potentilla fruticosa
Pseudocymopterus montanus
Rudbeckia laciniata
Rumex crispus
Scutellaria galericulata var. epilobifolia
Senecio neomexicana
Siddalcea neomexicana
Sisymbrium altissimum
Sisyrinchium montanum
Spergulastrum lanuginosum
Thermopsis montana
Vicia americana
Viola canadensis
Viola sororia

19. Cumberland Basin (Colorado Trail to Taylor Lake)

U. S. G. S. Quadrangle: La Plata. T37N R11W S24. Elev. Approx. 11,600 ft.
Owner: USFS, San Juan National Forest
Subalpine/alpine meadows

Trees

Picea engelmannii

Shrubs and sub-shrubs

Ribes montigenum
Salix brachycarpa
Salix planifolia

Graminoids

Bromus inermis
Carex sp.
Deschampsia cespitosa
Festuca brachyphylla
Festuca thurberi
Juncus drummondii
Phleum commutatum
Poa alpina
Trisetum spicatum

Forbs

Achillea lanulosa
Agoseris glauca
Allium geayeri
Androsace septentrionalis
Aquilegia coerulea
Arabis drummondiana
Arabis sp.

Besseyia ritteriana

Bistorta bistortoides
Castilleja miniata
Castilleja rhexifolia
Cerastium beeringianum
Cerastium strictus
Delphinium barbeyi
Draba spectabilis var. oxyloba
Dugaldia hoopesii
Epilobium hornemannii
Eremogone fendleri
Erigeron coulteri
Erigeron melanocephalus
Erigeron peregrinus
Erigeron ursinus
Erysimum capitatum
Erythronium grandiflorum
Geranium richardsonii
Geum rossii
Helianthella quinquenervis
Ligusticum porteri
Mertensia ciliata
Noccaea Montana
Oreobrama pygmaea
Oxypolis fendleri
Packera dimorphophyllus
Pedicularis bracteosa

Pedicularis groenlandica
Pedicularis procera
Penstemon whippleanus
Phacelia sericea
Pneumonanthe parryi
Podistera eastwoodiae
Polemonium viscosum
Potentilla pulcherrima
Pseudocymopterus montanus
Ranunculus sp (alismaefolius?)
Ranunculus sp.
Rhodiola integrifolia
Rydbergia grandiflora
Senecio crassulus
Senecio triangularis
Taraxacum officinale
Trifolium brandegei
Trifolium sp.
Trollius albiflorus
Valeriana edulis
Veratrum tenuipetalum

20. Taylor Lake

U. S. G. S. Quadrangle: La Plata T37N R11W S24. Elev. Approx. 11,600 ft.

Owner: USFS, San Juan National Forest

Subalpine/Alpine meadows

Shrubs and sub-shrubs

Juniperus communis
Vaccinium caespitosum

Graminoids

Deschampsia cespitosa
Juncus mertensianus

Forbs

Agoseris aurantiaca
Angelica grayi
Antennaria parvifolia
Cardamine cordifolia
Castilleja sulphurea
Cerastium beeringianum
Chamerion danielsii
Cilaria austromontana
Cirsium scopulorum
Claytonia megarhiza
Cystopteris fragilis
Erigeron simplex
Habenaria hyperborea
Heterotheca villosa
Heuchera parviflora

Micranthes rhomboidea
Oreochrysum parryi
Oxyria digyna
Pedicularis parryi
Phlox condensata
Polemonium viscosissimum
Potentilla sp.
Senecio fremontii
Senecio soldanella
Sibbaldia procumbens
Silene acaulis
Thalictrum fendleri
Trifolium longipes
Trifolium sp.
Veronica nutans
Viola adunca

21. Cox Canyon (at upper gas well)

U. S. G. S. Quadrangle: Long Mountain. T33N R10W S20. Elev. Approx. 6900 ft.

Owner: Southern Ute Indian Tribe

Mixed mountain shrub, Gambel oak, serviceberry

Trees

Juniperus osteosperma
Pinus edulis

Shrubs and sub-shrubs

Amelanchier utahensis
Cercocarpus montanus
Chrysothamnus nauseosus
Fendlera rupicola
Mahonia repens
Opuntia erinacea
Opuntia polyacantha
Peraphyllum ramosissimum
Purshia tridentata
Quercus gambellii
Symphoricarpos oreophilus

Graminoids

Agropyrum cristatum
Bromus inermis
Bromus tectorum
Carex occidentalis
Carex sp. coll
Elymus elymoides
Koeleria macrantha
Poa fendleriana

Forbs

Achillea lanulosa

Allium acuminatum
Arabis sp.
Artemisia ludoviciana
Aster glaucodes
Astragalus bisulcatus
Calochortus nuttallii
Carduus nutans
Convolvulus arvensis
Erigeron flagellaris
Erigeron speciosus
Eriogonum racemosum
Helianthus annuus
Lomatium dissectum
Medicago sativa
Penstemon barbatus
Petradoria pumila
Salsola australis
Senecio neomexicana
Sisymbrium altissimum
Thalictrum fendleri
Vicia americana

At lower gas well, S 19. PJ and barren sandy areas

Trees

Juniperus osteosperma
Pinus edulis

Shrubs and sub-shrubs

Artemisia tridentata ssp. tridentata
Cercocarpus montanus
Fendlera rupicola
Mahonia repens
Peraphyllum ramosissimum
Purshia tridentata
Quercus gambellii
Symphoricarpos oreophilus

Graminoids

Bromus tectorum
Elymus elymoides
Oryzopsis hymenoides

Forbs

Alyssum parviflorum
Androsace septentrionalis
Antennaria rosea
Artemisia ludoviciana
Aster glaucodes
Atriplex canescens
Carduus nutans

Castilleja linariifolia
Cirsium arvense
Cirsium tracyi
Comandra umbellata
Convolvulus arvensis
Descurainia pinnata
Dracocephalum parviflorum
Eriogonum jamesii
Eriogonum racemosum
Erodium cicutarium
Grindelia sp.
Gutierrezia sarothrae
Heterotheca villosa
Lappula redowskii
Linaria vulgaris
Machaeranthera gracilis
Melilotus officinalis
Mentzelia sp.
Pedicularis centranthera
Penstemon linarioides
Physaria acutifolia
Picradenia richardsonii
Solidago velutinus
Thermopsis montana
Thinopyrum sp.
Verbascum thapsus
Vicia americana

22. Electra Lake

U. S. G. S. Quadrangle: Electra Lake. T38N R9W Section 13. Elev. Approx. 8400 ft.

Owner: USFS, San Juan National Forest

Mixed montane forest

Trees

Abies concolor
Juniperus scopulorum
Pinus ponderosa
Populus tremuloides
Pseudotsuga menziesii

Shrubs and sub-shrubs

Acer glabrum
Amelanchier utahensis
Arctostaphylos uva-ursi
Distegia involucrata
Echinocereus triglochidiatus
Juniperus communis
Mahonia repens
Paxistima myrsinites
Prunus virginiana var. melanocarpa
Quercus gambellii

Graminoids

Bromus ciliata
Carex geeyeri
Dactylis glomerata
Elymus elymoides
Koeleria macrantha
Poa fendleriana
Poa pratensis
Stipa nelsonii

Forbs

Achillea lanulosa
Antennaria rosea
Apocynum androsaemifolium
Arabis drummondiana
Arnica cordifolia
Artemisia franserioides
Artemisia michauxiana
Castilleja linariifolia
Cirsium arvense
Clematis ligusticifolia
Coriflora hirsutissima
Epilobium hornemannii
Erigeron divergens
Erigeron flagellaris
Erigeron speciosus
Geranium richardsonii
Heterotheca villosa
Lathyrus leucanthus
Lepidium sp.
Leucanthemum vulgare
Maianthemum racemosum
Oenothera elata
Osmorhiza depauperata
Penstemon barbatus
Penstemon strictus
Potentilla hippiana
Potentilla pulcherrima
Rorippa sp.
Rumex crispus
Sedum lanceolatum
Senecio neomexicana
Solidago velutina
Streptopus fassettii
Thalictrum fendleri

23. Elbert Creek South (wetland and forest, access from side road to left off Chris Park Road. Broad beaver caused wetlands, creek spread out into several small rivulets. Uplands with *Pinus ponderosa*, *Picea pungens*, *Acer glabrum*.)
U. S. G. S. Quadrangle: Electra Lake T36N R9W S36. Elev. Approx. 7800 ft.

Owner: USFS, San Juan National Forest

A, Wetland

Shrubs and sub-shrubs

Betula occidentalis
Cornus sericea
Distegia involucrata
Salix eriocephala
Salix exigua
Salix lasiandra
Salix monticola

Graminoids

Carex utriculata
Eleocharis palustris
Glyceria striata
Juncus balticus

Forbs

Aconitum columbianum
Angelica pinnata
Cirsium arvense
Epilobium angustifolium
Epilobium hornemannii
Equisetum arvense
Galium septentrionale
Geranium richardsonii
Hypericum formosum
Iris missouriensis
Ligusticum porteri
Lilium philadelphicum
Maianthemum stellatum
Mentha arvensis
Mertensia ciliata
Rudbeckia ampla
Scutellaria galericulata var. epilobifolia
Sidalcea candida
Sidalcea neomexicana
Solidago sp
Typha latifolia
Vicia americana

B. Adjacent forested hillside, and some of ecotone

Trees

Juniperus scopulorum
Populus angustifolia
Populus tremuloides

Shrubs and sub-shrubs

Paxistima myrsinites

Graminoids

Bromus ciliatus

Carex occidentalis

Koeleria macrantha

Phleum pratense

Poa fendleriana

Forbs

Agrimonia striata (county record; infrequent on w. slope)

Achillea lanulosa

Apocynum androsaemifolium

Aralia racemosa

Campanula rotundifolia

Cirsium arvense

Erigeron flagellaris

Erigeron speciosus

Erigeron subtrinervis

Fragaria virginiana

Geranium richardsonii

Ligularia pudica

Maianthemum racemosum

Medicago lupulina

Osmorhiza depauperata

Potentilla pulcherrima

Pseudocymopterus montanus

Thalictrum fendleri

Tragopogon dubius

Trifolium pratense

Valeriana edulis

Viola canadensis

C. At creek above wetland; very tall, dense, lush vegetation**Trees**

Abies concolor

Pinus ponderosa

Pseudotsuga menziesii

Shrubs and sub-shrubs

Acer glabrum

Alnus incana

Betula occidentalis

Cornus sericea

Crataegus rivularis

Distegia involucrata

Ribes inerme

Rubus parviflorus

Salix bebbiana
Salix scouleriana

Graminoids

Carex aquatilis
Carex canescens
Carex microglochin
Carex microptera
Carex sp.
Glyceria striata
Phalaris arundinacea

Forbs

Actaea rubra
Agrimonia striata
Anaphalis margaritacea
Angelica pinnata
Cirsium arvense
Cirsium vulgare
Clematis ligusticifolia
Cystopteris fragilis
Dactylis glomerata
Delphinium nuttallianum
Disporum (Prosartes) trachycarpa
Equisetum arvense
Erigeron subtrinervis
Fragaria vesca
Galium triflorum
Geranium caespitosum
Habenaria hyperborean
Heracleum lanatum
Heuchera parvifolia
Ipomopsis aggregata
Rudbeckia ampla
Typha latifolia

24. Goulding Creek.

U. S. G. S. Quadrangle: Electra Lake T37N R9W S2. Elev. Approx. 8600 ft.
Owner: USFS, San Juan National Forest
Mixed conifer montane forest

Trees

Abies concolor
Abies lasiocarpa
Picea engelmannii
Picea pungens
Pinus ponderosa
Pinus strobiformis
Populus angustifolia
Populus tremuloides

Pseudotsuga menziesii

Shrubs and sub-shrubs

Amelanchier alnifolia
Ceanothus fendleri
Cornus sericea
Juniperus communis
Mahonia repens
Paxistima myrsinites
Prunus virginiana var. melanocarpa
Quercus gambellii
Ribes cereum
Ribes montigenum
Ribes wolfii
Rosa woodsii
Rubus idaeus
Rubus parviflorus
Salix drummondiana
Shepherdia canadensis
Sorbus scopulina
Symphoricarpos oreophilus

Graminoids

Bromus ciliatus
Carex geyeri
Elymus glaucus
Festuca thurberi
Koeleria macrantha
Poa pratensis

Forbs

Achillea lanulosa
Actaea rubra
Aquilegia coerulea
Arctium minus
Arnica cordifolia
Artemisia franserioides
Calochortus gunnisonii
Campanula rotundifolia
Clematis ligusticifolia
Disporum trachycarpa
Dugaldia hoopesii
Epilobium angustifolium
Erigeron coulteri
Erigeron flagellaris
Fragaria virginiana
Galium triflorum
Geranium caespitosum
Geranium richardsonii
Geum macrophyllum
Helianthella multiflora

Lithospermum multiflorum
Machaeranthera bigelovii
Mertensia ciliata
Mimulus guttatus
Noccaea Montana
Oreochrysum parryi
Osmorhiza depauperata
Oxybaphus linearis
Oxypolis fendleri
Polemonium foliosissimum
Pseudocymopterus montanus
Veronica serpyllifolia var. humifusa

25. Lost Lake Trail

U. S. G. S. Quadrangle: Lemon Reservoir. T37N R7W S19. Elev. Approx. 8880 ft.
Owner: USFS, San Juan National Forest
Mixed montane forest

Trees

Abies concolor
Pinus ponderosa
Populus angustifolia
Populus tremuloides
Pseudotsuga menziesii

Shrubs and sub-shrubs

Acer glabrum
Alnus incana
Juniperus communis
Amelanchier alnifolia
Arctostaphylos uva-ursi
Cornus sericea
Distegia involucrata
Mahonia repens
Paxistima myrsinites
Prunus virginiana var. melanocarpa
Quercus gambellii
Ribes sp.
Rubus idaeus
Rubus parviflorus
Salix drummondiana
Salix exigua
Salix lasiandra
Salix monticola
Salix scouleriana
Sambucus racemosa
Symphoricarpos oreophilus
Vaccinium myrtillus

Graminoids

Alopecurus aequalis

Bromus canadensis
Carex geberi
Carex occidentalis
Carex utriculata
Carex viridula
Dactylis glomerata
Eleocharis palustris
Elymus glaucus
Glyceria striata
Juncus sp.
Koeleria macrantha
Poa pratensis

Forbs

Achillea lanulosa
Aconitum columbianum
Actaea rubra
Agastache pallidiflora
Antennaria marginata
Apocynum androsaemifolium
Aquilegia coerulea
Arnica cordifolia
Artemisia franserioides
Aster foliaceus
Brickellia grandiflora
Campanula rotundifolia
Castilleja linariifolia
Castilleja miniata
Cirsium arvense
Cynoglossum officinale
Delphinium barbeyi
Epilobium angustifolium
Epilobium hornemannii
Equisetum arvense
Erigeron coulteri
Erigeron eximius
Erigeron flagellaris
Erigeron speciosus
Fragaria vesca
Fragaria virginiana
Galium triflorum
Geranium richardsonii
Geum macrophyllum
Heracleum lanatum
Heterotheca villosa
Hippuris vulgaris
Lathyrus leucanthus
Leucanthemum vulgare
Ligusticum porteri
Maianthemum racemosum
Maianthemum stellatum

Mentha arvensis
Noccaea Montana
Oreochrysum parryi
Osmorhiza depauperata
Pedicularis procera
Penstemon whippleanus
Plantago major
Polemonium foliosissimum
Polygonum aquaticum
Pteridium aquilinum var. pubescens
Ranunculus sp.
Rorippa sp.
Rudbeckia hirta
Rumex crispus
Sparganium sp.
Taraxacum officinale
Thalictrum fendleri
Typha latifolia
Verbascum thapsus
Veronica serpyllifolia var. humifusa
Vicia americana
Viola canadensis
Woodsia neomexicana
Zygadenus elegans

26. Miller Creek

U. S. G. S. Quadrangle: Lemon Reservoir T37N R7W S33. Elev. Approx. 9400 ft.
Owner: USFS, San Juan National Forest
Montane forest, *Pseudotsuga menziesii*/*Symphoricarpos oreophilus*

Trees

Abies concolor
Pseudotsuga menziesii
Populus tremuloides

Shrubs and sub-shrubs

Amelanchier alnifolia
Mahonia repens
Ribes montigenum
Rosa woodsii
Sambucus racemosa
Symphoricarpos oreophilus

Graminoids

Bromus canadensis
Dactylis glomerata
Elymus glaucus
Festuca thurberi
Koeleria macrantha
Poa pratensis
Triticum aestivum

Forbs

Achillea lanulosa
Actaea rubra
Calochortus gunnisonii
Campanula rotundifolia
Chenopodium sp.
Cirsium arvense
Cirsium centaureae
Cirsium parryi
Convolvulus arvensis
Delphinium barbeyi
Dracocephalum parviflorum
Dugaldia hoopesii
Epilobium angustifolium
Epilobium hornemannii
Erigeron speciosus
Fragaria virginiana
Frasera speciosa
Geranium richardsonii
Helianthella quinquenervis
Heracleum lanatum
Lathyrus leucanthus
Lepidium sp.
Ligusticum porteri
Mertensia ciliata
Noccaea montana
Osmorhiza depauperata
Pedicularis procera
Plantago major
Potentilla pulcherrima
Pseudocymopterus montanus
Taraxacum officinale
Thalictrum fendleri
Tragopogon dubius
Trifolium pratense
Viola canadensis

27. Stump Lakes

U. S. G. S. Quadrangle: Lemon Reservoir. T37N R7W S10. Elev. Approx. 11,200 ft.
Owner: USFS, San Juan National Forest
Subalpine forest, *Picea engelmannii*/*Polemonium pulcherrimum*

Trees

Picea engelmannii
Pinus contorta

Shrubs and sub-shrubs

Ribes inerme
Ribes montigenum
Vaccinium myrtillus

Graminoids

Alopecurus aequalis
Bromus canadensis
Calamagrostis canadensis
Carex atrata
Carex microptera
Carex nova
Dactylis glomerata
Deschampsia cespitosa
Elymus trachycaulus
Festuca brachyphylla
Juncus drummondii
Luzula parviflora
Phleum commutatum
Poa alpina
Poa pratensis

Forbs

Agoseris aurantiaca
Androsace septentrionalis
Angelica pinnata
Aquilegia coerulea
Bistorta bistortoides
Boechera sp.
Calochortus gunnisonii
Caltha leptosepala
Campanula rotundifolia
Cardamine cordifolia
Castilleja miniata
Chamerion angustifolium
Dugaldia hoopesii
Epilobium hornemannii
Erigeron coulteri
Erigeron peregrinus
Fragaria virginiana
Geum rossii
Hieracium gracile
Ligularia amplexans
Ligusticum porteri
Mertensia ciliata
Micranthes odontoloma
Mimulus guttatus
Noccaea Montana
Oreochrysum parryi
Oxypolis fendleri
Pedicularis groenlandica
Pedicularis racemosa
Penstemon whippleanus
Polemonium pulcherrimum
Polygonum viviparum

Primula parryi
Pseudocymopterus montanus
Rhodiola integrifolia
Sibbaldia procumbens
Taraxacum officinale
Trollius albicaulis
Veronica nutans

28. Vallecito Creek pond (additions to species list 16)

U. S. G. S. Quadrangle: Vallecito Creek. T37N R6W S16. Elev. Approx. 8000 ft.
Owner: USFS, San Juan National Forest
Wetland around pond

Trees

Populus angustifolia

Shrubs and sub-shrubs

Alnus incana

Graminoids

Carex canescens
Carex utriculata
Poa pratensis

Forbs

Anaphalis margaritacea
Cirsium arvense
Cirsium parryi
Cirsium vulgare
Galium triflorum
Hippochaete hyemalis
Ligusticum porteri
Mentha arvensis
Rudbeckia ampla
Solidago canadensis
Viola sororia

29. Fall Creek

U. S. G. S. Quadrangle: Vallecito Reservoir. TN RW S. Elev. Approx. 8000 ft.
Owner: USFS, San Juan National Forest
Montane riparian forest

Trees

Abies concolor
Pinus strobiformis
Populus tremuloides
Pseudotsuga menziesii

Shrubs and sub-shrubs

Juniperus communis
Mahonia repens.

Quercus gambellii

Graminoids

Melica porteri

Forbs

Agastache urticifolia
Antennaria marginata
Asplenium trichomanes
Cheilanthes fendleri
Chimaphila umbellata
Cilinia austromontana
Cryptogramma acrostichoides
Dryopteris felix-mas
Fragaria vesca
Goodyera oblongifolia
Orthilia secunda
Oxalis violacea
Pyrola rotundifolia
Sanicula marilandica
Woodsia neomexicana

30. Perins Peak SWA-Dry Fork Lightner Creek

U. S. G. S. Quadrangle: Durango West. T35N R10W S33. Elev. Approx. 7300 ft.

Owner: State of Colorado, Perins Peak SWA

A. Riparian willow shrubland

Shrubs and sub-shrubs

Alnus incana
Rosa woodsii
Salix exigua
Salix ligulifolia ssp. *eriocephala*
Salix monticola
Shepherdia argentea
Symphoricarpos oreophilus

Graminoids

Agrostis sp.
Bromus inermis
Eleocharis palustris
Glyceria striata
Juncus balticus
Phalaris arundinacea
Poa pratensis
Scirpus microcarpus

Forbs

Astragalus bisulcatus
Cirsium arvense
Epilobium hornemannii
Equisetum arvense

Eriogonum alatum
Galium septentrionalis
Geranium richardsonii
Humulus lupulus
Melilotus officinalis
Mentha arvensis
Rudbeckia ampla
Solidago sp.
Trifolium repens

30 B. Dry Fork Lightner Creek riparian 2

U. S. G. S. Quadrangle: Durango West. T35N R10W S10. Elev. Approx. 7040 ft.

Owner: State of Colorado, Perins Peak SWA

B. Riparian woodland, downstream from above

Trees

Juniperus scopulorum
Populus angustifolia

Shrubs and sub-shrubs

Alnus incana
Prunus virginiana
Quercus gambellii
Rhus trilobata
Rosa woodsii
Salix exigua
Shepherdia argentea

Graminoids

Bromus inermis
Carex sp.
Dactylis glomerata
Glyceria striata
Juncus sp.
Juncus balticus
Pascopyrum smithii
Phleum pratense
Poa pratensis

Forbs

Achillea lanulosa
Aster laevis
Carduus nutans
Cirsium arvense
Equisetum arvense
Erigeron speciosus
Fragaria virginiana
Iris missouriensis
Melilotus officinalis
Mentha arvensis
Taraxacum officinale

Thermopsis montana
Trifolium pratense

31. Upper La Plata Creek

U. S. G. S. Quadrangle: La Plata T36N R11W S3. Elev. Approx. 9417 ft.

Owner: USFS, San Juan National Forest

Moist subalpine spruce-fir forest

Trees

Abies lasiocarpa
Picea engelmannii
Picea pungens
Populus tremuloides
Pseudotsuga menziesii

Shrubs and sub-shrubs

Distegia involucrata
Paxistima myrsinites
Ribes inerme
Ribes wolfii
Rubus idaeus
Salix bebbiana
Salix brachycarpa
Salix drummondiana
Salix monticola
Salix scouleriana
Sorbus scopulina
Vaccinium myrtillus

Graminoids

Carex aquatilis
Carex geyeri
Carex nova
Elymus glaucus
Bromus lanatipes
Luzula parvifolia
Phleum pratensis
Poa alpina
Trisetum montanum

Forbs

Achillea lanulosa
Aconitum columbianum
Actaea rubra
Allium geyeri
Aquilegia coerulea
Arnica cordifolia
Artemisia franserioides
Campanula rotundifolia
Cardamine cordifolia

Castilleja miniata
Castilleja rhexifolia
Cilaria austromontana
Cirsium parryi
Cystopteris fragilis
Delphinium barbeyi
Dugaldia hoopesii
Epilobium angustifolium
Equisetum arvense
Eremogone fendleri
Erigeron coulteri
Erigeron elatior
Erigeron eximius
Erigeron speciosus
Fragaria virginiana
Frasera speciosa
Galium septentrionale
Geranium richardsonii
Goodyera oblongifolia
Helianthella quinquenervis
Heracleum lanatum
Hydrophyllum fendleri
Lathyrus leucanthus
Ligularia pudica
Ligusticum porteri
Maianthemum stellatum
Micranthes odontoloma
Mimulus guttatus
Mitella stauropetala
Oreochrysum parryi
Orthilia secunda
Osmorhiza depauperata
Oxypolis fendleri
Parnassia fimbriata
Pedicularis procera
Penstemon whippleanus
Phacelia heterophylla
Polemonium foliosissimum
Potentilla fruticosa
Potentilla pulcherrima
Primula parryi
Pseudocymopterus montanus
Rhodiola integrifolia
Senecio serra
Solidago sp.
Streptopus fassettii
Thalictrum fendleri
Tragopogon dubius
Trifolium sp.
Valeriana edulis
Viola canadensis

Zygadenus elegans

Riparian, by cliffs, downstream:

Trees

Picea pungens

Populus angustifolia

Shrubs and sub-shrubs

Alnus incana

Amelanchier alnifolia

Paxistima myrsinites

Graminoids

Carex microptera

Danthonia parryi

Deschampsia cespitosa

Festuca thurberi

Juncus mertensianus

Trisetum montanum

Trisetum spicatum

Forbs

Cilinia austromontana

Epilobium lactiflorum

Erigeron formosissimus

Hedysarum occidentale

Heuchera parviflora

Ipomopsis aggregata

Pedicularis groenlandica

Potentilla fruticosa

Potentilla hippiana

Rumex densiflorus

Senecio atratus

Senecio triangularis

Stellaria umbellata

32. Long Hollow North

U. S. G. S. Quadrangle: Pinkerton Mesa. T33N R11W S7. Elev. Approx. 6820 ft.

Owner: private

Pinyon-juniper woodland

A. Uplands, mesa top near road

Trees

Juniperus osteosperma

Pinus edulis

Shrubs and sub-shrubs

Artemisia tridentata ssp. *tridentata*

Cercocarpus montanus
Opuntia polyacantha
Peraphyllum ramosissimum
Quercus gambellii

Graminoids

Bromus tectorum
Elymus elymoides
Hilaria jamesii
Oryzopsis hymenoides
Poa fendleriana
Psathrostachys (Elymus) juncaea

Forbs

Alyssum parviflorum
Androsace septentrionalis
Carduus nutans
Chenopodium fremontii
Descurainia sophia
Draba cuneifolia
Erigeron divergens
Gutierrezia sarothrae
Halogeton glomerata
Helianthus annuus
Lactuca serriola
Lappula redowskii
Lepidium sp.
Penstemon linarioides
Picradenia richardsonii
Salsola australis
Sisymbrium altissimum
Sphaeralcea coccinea

B. west facing slope (additional species only)

Trees

Ulmus pumila

Shrubs and sub-shrubs

Amelanchier utahensis

Chrysothamnus depressus

Fendlera rupicola

Purshia tridentata

Rhus trilobata

Symphoricarpos oreophilus

Graminoids

Bouteloua gracilis

Bromus inermis

Stipa comata

Forbs

Achillea lanulosa

Centaurea repens

Centaurea maculosa

Lupinus caudatus var. argophyllus

Astragalus sp.

Castilleja linariifolia

Chaenactis douglassii

Cordylanthus wrightii

Cryptantha flavoculata

Eriogonum racemosum

Grindelia squarrosa

Heterotheca villosa

Lesquerella rectipes

Lupinus ammophilus

Lygodesmia juncea

Machaeranthera bigelovii

Machaeranthera gracilis

Medicago sativa

Melilotus officinalis

Opuntia phaeocantha

Pascopyrum smithii

Penstemon comarrhenus

Schoenocrambe linifolia

Townsendia incana

Tragopogon dubius

Verbascum thapsus

Yucca harrimanniae

C. North facing slope

Trees

Juniperus osteosperma

Pinus edulis

Shrubs and sub-shrubs

Quercus gambellii

Graminoids

Agropyrum cristatum

Dactylis glomerata

Elymus trachycaulus

Pascopyrum smithii

Poa pratensis

Psathrostachys (Elymus) juncaea

Forbs

Arctium minus

Chenopodium sp.

Cirsium tracyi

Convolvulus arvensis

Cynoglossum officinalis

Glycyrrhiza lepidota

Mahonia repens

Oligosporus dracunculus

Phlox hoodii

Polygonum arenastrum

D. South facing slope (PJ/Quercus gambellii/Artemisia tridentata ssp. tridentata)

Trees

Juniperus osteosperma

Pinus edulis

Shrubs and sub-shrubs

Artemisia tridentata ssp. tridentata

Atriplex canescens

Cylindropuntia whipplei

Quercus gambellii

Graminoids

Bromus tectorum

Forbs

Asclepias speciosa

Asclepias subverticillata

Conyza canadensis

Gilia ophthalmoides

Machaeranthera pinnatifida

Pedicularis centranthera

Pediocactus simpsonii

Polygonum ramosissimum

Yucca baccata

33. Long Hollow South

U. S. G. S. Quadrangle: Pinkerton Mesa. T33N R12W S13. Elev. Approx. 6700 ft.

Owner: Private

Pinyon-juniper woodland, some barren areas with clay soils

Trees

Juniperus osteosperma

Pinus edulis

Shrubs and sub-shrubs

Amelanchier utahensis

Artemisia tridentata ssp. *tridentata*

Atriplex canescens

Cercocarpus montanus

Chrysothamnus depressus

Cylindropuntia whipplei

Echinocereus triglochidiatus

Ephedra viridis

Fendlera rupicola

Lycium barbarum

Opuntia phaeocantha

Opuntia polyacantha

Rhus trilobata

Sclerocactus whipplei

Yucca baccata

Yucca harrimanniae

Graminoids

Bouteloua gracilis

Bromus inermis

Bromus tectorum

Elymus trachycaulus

Hilaria jamesii

Oryzopsis hymenoides

Poa fendleriana

Stipa comata

Forbs

Achillea lanulosa

Alyssum parviflorum

Artemisia ludoviciana

Astragalus sp. (*A. lentiginosus*?)

Chaenactis douglassii

Chaetopappa ericoides

Descurainia sophia

Eriogonum jamesii

Eriogonum lonchophyllum

Erodium cicutarium

Gilia subnuda

Gutierrezia sarothrae

Lupinus ammophilus

Machaeranthera canescens
Medicago sativa
Pedicularis centranthera
Penstemon barbatus
Penstemon comarrhenus
Penstemon linarioides
Petradoria pumila
Phlox hoodii
Picradenia richardsonii
Stanleya pinnata
Tetraneuris ivesiana
Verbena bracteata

34. Middle Mountain Road

U. S. G. S. Quadrangle: Vallecito Reservoir T37N R6W S22. Elev. Approx. 8722 ft.
Owner: USFS, San Juan National Forest
Mixed conifer forest

Trees

Abies concolor
Picea engelmannii
Populus tremuloides

Shrubs and sub-shrubs

Acer glabrum
Paxistima myrsinites
Ribes montigenum
Symphoricarpos oreophilus

Graminoids

Bromus ciliatus
Carex geveeri
Dactylis glomerata
Poa pratensis

Forbs

Achillea lanulosa
Aconitum columbianum
Actaea rubra
Aquilegia elegantula
Arnica cordifolia
Aster foliaceus
Campanula rotundifolia
Cynoglossum officinale
Descurainia pinnata
Dugaldia hoopesii
Erigeron coulteri
Erigeron eximius
Erigeron flagellaris
Erigeron speciosus
Fragaria virginiana

Galium septentrionale
Geranium richardsonii
Geum macrophyllum
Goodyera oblongifolia
Heracleum lanatum
Iris missouriensis
Lathyrus leucanthus
Ligusticum porteri
Lupinus sp.
Mertensia ciliata
Osmorhiza depauperata
Pseudocymopterus montanus
Ribes inerme
Rudbeckia ampla
Sambucus racemosa
Senecio serra
Streptopus fassettii
Taraxacum officinale
Thalictrum fendleri
Trifolium repens
Veratrum tenuipetalum
Vicia americana
Viola adunca
Viola canadensis

35. Vallecito Reservoir, east side, at closed campground in burned area

U. S. G. S. Quadrangle: Vallecito Reservoir T36N R6W S20. Elev. Approx. 7680 ft.

Owner: USFS, San Juan National Forest

Mixed conifer montane forest

Trees

Abies concolor

Pinus ponderosa

Populus tremuloides

Pseudotsuga menziesii

Shrubs and sub-shrubs

Alnus incana

Amelanchier alnifolia

Prunus virginiana var. *melanocarpa*

Quercus gambellii

Rosa woodsii

Salix monticola

Salix scouleriana

Sambucus racemosa

Symphoricarpos oreophilus

Graminoids

Bromus inermis

Phleum pratense

Forbs

Erigeron speciosus

Penstemon barbatus

Solidago velutina

36. Indian Creek at Tuckerville

U. S. G. S. Quadrangle: Vallecito Reservoir T37N R6W S12. Elev. Approx. 10,640 ft.

Owner: USFS, San Juan National Forest

Wet meadow

Trees

Picea engelmannii

Shrubs and sub-shrubs

Distegia involucrata

Ribes montigenum

Salix brachycarpa

Salix planifolia

Graminoids

Bromus inermis

Carex microptera

Deschampsia cespitosa

Elymus glaucus

Festuca thurberi

Glyceria striata

Forbs

Achillea lanulosa

Aconitum columbianum

Agoseris aurantiaca

Arabis drummondii

Besseyia ritteriana

Caltha leptosepala

Campanula rotundifolia

Cardamine cordifolia

Castilleja miniata

Cirsium centaureum

Cirsium parryi

Collomia linearis

Delphinium barbeyi

Draba spectabilis var. oxyloba

Dugaldia hoopesii

Epilobium angustifolium

Epilobium lactiflorum

Erigeron coulteri

Erigeron elatior

Fragaria virginiana

Frasera speciosa

Gastrolychnis drummondii

Geranium richardsonii

Helianthella quinquenervis

Heracleum lanatum

Hydrophyllum fendleri

Lathyrus leucanthus

Ligularia bigelovii

Ligusticum porteri

Maianthemum stellatum

Mertensia ciliata

Micranthes odontoloma

Oreochrysum parryi

Oxypolis fendleri

Pedicularis procera

Pneumonanthe parryi

Polygonum douglasii

Potentilla pulcherrima

Potentilla sp.

Pseudocymopterus montanus

Rhodiola integrifolia

Rudbeckia ampla

Senecio triangularis

Thalictrum fendleri

Valeriana edulis

Veratrum tenuipetalum

Vicia americana

37. Cave Basin Trail

U. S. G. S. Quadrangle: Granite Peak. T37N R6W S2. Elev. Approx. 11,160 ft.

Owner: USFS, San Juan National Forest

Spruce-fir forest, clear cut areas, streamsides and spruce-fir forest

A. Dry south facing hillside, clear cut

Trees

Picea engelmannii

Shrubs and sub-shrubs

Ribes inerme

Graminoids

Bromus ciliatus

Dactylis glomerata

Festuca brachyphylla

Poa pratensis

Forbs

Achillea lanulosa

Agoseris aurantiaca

Allium geayeri

Androsace septentrionalis

Anticlea elegans

Campanula rotundifolia

Castilleja miniata

Cirsium arvense

Cirsium parryi

Dugaldia hoopesii

Epilobium angustifolium

Erigeron coulteri

Fragaria virginiana

Geranium richardsonii

Ligusticum porteri

Maianthemum stellatum

Noccaea Montana

Oreochrysum parryi

Penstemon whippleanus

Pseudocymopterus montanus

Rhodiola integrifolia

Thalictrum fendleri

Trifolium repens

Veratrum tenuipetalum

Vicia americana

B. Along small streams in clear cut

Shrubs and sub-shrubs

Distegia involucrata

Salix brachycarpa

Salix planifolia

Graminoids

Carex microptera

Carex nova

Deschampsia cespitosa

Phleum commutatum

Poa alpina

Forbs

Aconitum columbianum

Bistorta bistortoides

Caltha leptosepala

Cardamine cordifolia

Cynoglossum officinalis

Epilobium hornemannii

Gentianella heterosepala

Gentianopsis thermalis

Habenaria hyperborean

Ligularia bigelovii

Mimulus guttatus

Moss

Oxypolis fendleri

Parnassia fimbriata

Senecio triangularis

Stellaria umbellate

Swertia perennis

Veronica nutans

38. Sheephead Basin

U. S. G. S. Quadrangle: Monument Hill T37N R10W S20. Elev. Approx. 10,400 ft.

Owner: USFS, San Juan National Forest

A. Wet meadow, Veratrum tenuipetalum dominant

Graminoids

Bromopsis canadensis

Calamagrostis canadensis

Elymus glaucus

Forbs

Aconitum columbianum

Castilleja miniata

Cirsium parryi

Delphinium barbeyi

Dugaldia hoopesii

Epilobium angustifolium (Chamerion danielsii)

Erigeron coulteri

Frasera speciosa

Geranium richardsonii

Heracleum lanatum

Hydrophyllum fendleri
Ligusticum porteri
Mertensia ciliata
Senecio serra
Veratrum tenuipetalum

B. Along intermittent stream

Shrubs and sub-shrubs

Ribes montigenum
Ribes wolfii
Sambucus racemosa

Graminoids

Bromopsis canadensis
Cystopteris fragilis
Glyceria striata
Luzula parviflora
Poa pratensis

Forbs

Achillea lanulosa
Aconitum columbianum
Castilleja rhexifolia
Delphinium barbeyi
Draba spectabilis var. oxyloba
Epilobium hornemannii
Erigeron coulteri
Erigeron elatior
Erigeron speciosus
Fragaria virginiana
Geranium richardsonii
Heracleum lanatum
Ligularia bigelovii
Ligusticum porteri
Micranthes odontoloma
Oxypolis fendleri
Penstemon whippleanus
Polemonium foliosissimum
Potentilla pulcherrima

39. Colorado Trail at Junction Creek

U. S. G. S. Quadrangle: Durango West. T36N R10W S35. Elev. Approx. 7200 ft.

Owner: USFS, San Juan National Forest

Montane riparian forest

Trees

Abies concolor
Acer negundo
Alnus incana subsp. tenuifolia
Picea pungens

Pinus ponderosa
Pinus strobiformis
Populus angustifolia
Pseudotsuga menziesii

Shrubs and sub-shrubs

Amelanchier alnifolia
Berberis fendleri
Cornus stolonifera
Distegia involucrata
Prunus virginiana
Quercus gambellii
Ribes inerme
Ribes wolfii
Ribes montigenum
Rosa woodsii
Salix bebbiana
Salix drummondiana
Salix exigua
Salix lasiandra
Salix monticola
Symphoricarpos oreophilus
Toxicodendron rydbergii

Graminoids

Bromopsis ciliatus
Hippochaete hyemalis

Forbs

Angelica pinnata
Aquilegia coerulea
Aster foliaceus
Aster laevis
Apocynum cannabinum
Cirsium vulgare
Epilobium angustifolium
Epilobium hornemannii
Equisetum arvense
Geranium richardsonii
Geranium caespitosum
Heterotheca villosa
Heuchera parviflora
Medicago lupulina
Melilotus officinale
Mimulus guttatus
Monarda fistulosa
Prunella vulgaris
Rudbeckia ampla
Solidago Canadensis

40. Indian Trail Ridge, Colorado Trail, Cumberland Basin

U. S. G. S. Quadrangle: La Plata. T37N R11W S24. Elev. Approx. 12,200 ft.
Owner: USFS, San Juan National Forest
Alpine tundra

Trees

Abies lasiocarpa

Shrubs and sub-shrubs

Salix brachycarpa

Salix planifolia

Salix reticulata

Graminoids

Carex chalceolepis

Carex elymoides

Carex microptera

Carex sp.

Cystopteris fragilis

Deschampsia cespitosa

Elymus trachycaulus

Festuca brachyphylla

Luzula spicata

Phleum commutatum

Poa alpina

Trisetum spicatum

Forbs

Achillea lanulosa

Aconitum columbianum

Agoseris glauca

Allium geoyeri

Androsace septentrionalis

Aquilegia coerulea

Arnica mollis

Artemisia scopulorum

Besseyia ritteriana

Bistorta bistortoides

Campanula rotundifolia

Castilleja occidentalis

Castilleja rhexifolia

Cerastium beeringianum

Cilaria austromontana

Claytonia megarhiza

Delphinium barbeyi

Draba aurea

Dugaldia hoopesii

Eremogone fendleri

Erigeron coulteri

Erigeron elatior

Erigeron peregrinus

Erigeron pinnatisectus

Erigeron vetensis
Fendlera rupicola
Gentianodes algida
Geum rossii
Helianthella quinquenervis
Ligularia bigelovii
Ligusticum porteri
Mertensia ciliata
Micranthes rhomboidea
Oreochrysum parryi
Oreoxis alpina
Oxyria digyna
Pedicularis parryi
Penstemon whippleanus
Phlox sp.
Pneumonanthe parryi
Podistera eastwoodiae
Polemonium viscosissimum
Potentilla diversifolia
Pseudocymopterus montanus
Rhodiola integrifolia
Rydbergia grandiflora
Senecio crassulus
Senecio dimorphophyllus
Senecio holmii
Sibbaldia procumbens
Silene acaulis
Smelowskia calycina
Solidago simplex var nana
Tonestus pygmaea
Trifolium attenuatum
Trifolium dasyphyllum
Trifolium nanum
Trifolium parryi
Vaccinium caespitosum
Valeriana capitata
Veronica nutans

41. East Fork Hermosa Creek

U. S. G. S. Quadrangle: Engineer Mountain. T39N R9W S21. Elev. Approx. 9320 ft.

Owner: USFS, San Juan National Forest

Montane sedge wetland

Shrubs and sub-shrubs

Salix brachycarpa
Salix monticola
Salix planifolia

Graminoids

Carex aquatilis

Carex lanuginosa
Carex utriculata
Deschampsia cespitosa
Hordeum brachyantherum
Juncus balticus
Juncus ensifolius
Phleum pratense
Poa pratensis

Forbs

Angelica pinnata
Cirsium arvense
Cirsium scariosum
Epilobium hornemannii
Gentianopsis thermalis
Geum macrophyllum
Leucanthemum vulgare
Ligularia bigelovii
Oreochrysum parryi
Pedicularis groenlandica
Plantago major
Polemonium foliosissimum
Potentilla fruticosa
Senecio pseud aurea
Swertia perennis
Taraxacum officinale
Valeriana edulis

42. Highline Trail

U. S. G. S. Quadrangle: Elk Creek. T39N R19W S29. Elev. Approx. 10,880 ft.
Owner: USFS, San Juan National Forest

A. Thurber fescue meadows

Shrubs and sub-shrubs

Sambucus racemosa

Graminoids

Bromus inermis
Carex sp.
Festuca thurberi
Poa leptocoma
Poa pratensis
Stipa lettermannii

Forbs

Achillea lanulosa
Besseyia ritteriana
Campanula rotundifolia
Collomia linearis
Delphinium barbeyi

Dugaldia hoopesii
Erigeron coulteri
Erigeron elatior
Erigeron flagellaris
Erigeron speciosus
Fragaria virginiana
Helianthella quinquenervis
Heliomeris multiflora
Heracleum lanatum
Lathyrus leucanthus
Ligusticum porteri
Oreochrysum parryi
Phacelia heterophylla
Pneumonanthe parryi
Polygonum douglasii
Potentilla pulcherrima
Pseudocymopterus montanus
Ranunculus alismaefolius
Taraxacum officinale
Thalictrum fendleri
Veratrum tenuipetalum
Viola adunca

B. Spruce-fir forest

Trees

Picea engelmannii
Abies lasiocarpa

Shrubs and sub-shrubs

Distegia involucrata
Ribes montigenum
Ribes wolfii
Sambucus racemosa

Graminoids

Carex geyeri
Carex microptera
Carex sp.
Elymus canadensis
Luzula parvifolia

Forbs

Androsace septentrionalis
Antennaria parvifolia
Arnica cordifolia
Cirsium centaureae
Draba spectabilis var. oxyloba
Dugaldia hoopesii
Erigeron coulteri
Erigeron eximius

Fragaria virginiana
Gastrolychnis drummondii
Geranium richardsonii
Lathyrus leucanthus
Ligusticum porteri
Oreochrysum parryi
Orthilia secunda
Osmorhiza depauperata
Pedicularis racemosa
Penstemon whippleanus
Phacelia heterophylla
Polemonium pulcherrimum
Pseudocymopterus montanus
Senecio serra
Solidago canadensis
Solidago multiradiata
Streptopus fassettii
Vaccinium myrtillus
Veronica nutans

43. Endlich Mesa

U. S. G. S. Quadrangle: Vallecito Reservoir. T37N R7W S14. Elev. Approx. 11,680 ft.
Owner: USFS, San Juan National Forest

A. Talus area:

Shrubs and sub-shrubs

Salix reticulata

Forbs

Angelica grayi
Aquilegia coerulea
Ligularia holmii
Sibbaldia procumbens

B. Fellfields, Townsendia rothrockii site

Trees

Abies lasiocarpa
Picea engelmannii

Graminoids

Elymus trachycaulus
Phleum commutatum
Poa alpina

Forbs

Agoseris glauca
Allium geayeri
Anemone multifida

Besseyia ritteriana

Bistorta bistortoides
Dugaldia hoopesii
Erigeron coulteri
Festuca brachyphylla
Geum rossii
Lidia obtusiloba
Ligularia holmii
Oreochrysum parryi
Oreoxis alpina
Rydbergia grandiflora
Sibbaldia procumbens
Silene acaulis
Solidago simplex var. nana
Thalictrum fendleri
Townsendia rothrockii

C. Wetland, Salix planifolia/Caltha leptosepala community

Trees

Picea engelmannii

Shrubs and sub-shrubs

Salix planifolia
Salix brachycarpa
Salix reticulata

Graminoids

Juncus drummondii
Phleum commutatum

Forbs

Achillea lanulosa
Angelica grayi
Artemisia scopulorum
Besseyia ritteriana
Caltha leptosepala
Castilleja rhexifolia
Draba spectabilis var. oxyloba
Erigeron coulteri
Geum rossii
Mertensia ciliata
Noccaea Montana
Pneumonanthe parryi
Podistera eastwoodiae
Potentilla sp.
Rhodiola integrifolia
Saxifraga rhomboidea
Trifolium sp.
Valeriana edulis
Veronica nutans

D. Marshy pond area

Graminoids

Calamagrostis canadensis
Carex sp.
Deschampsia cespitosa
Juncus sp.
Phleum commutatum

Forbs

Caltha leptosepala
Castilleja sulphurea
Clementsia rhodantha
Eriophorum angustifolium
Podistera eastwoodiae
Potentilla sp.
Senecio dimorphophyllus
Swertia perennis
Veronica nutans

44. CSU Research Station

U. S. G. S. Quadrangle: Kline. T35N R11W S33. Elev. Approx. 7700 ft.
Owner: State of Colorado

A. Wetland

Graminoids

Eleocharis palustris
Juncus balticus
Phleum pratense
Poa pratensis

Forbs

Achillea lanulosa
Carduus nutans
Epilobium lactiflorum
Iris missouriensis
Linaria vulgaris
Mimulus sp.
Rorippa sp.
Rumex crispus
Taraxacum officinale
Trifolium repens
Verbascum thapsus
Veronica americana

B. Adjacent shrublands

Shrubs and sub-shrubs

Artemisia frigida
Artemisia tridentata ssp. tridentata
Chrysothamnus nauseosus
Chrysothamnus viscidiflorus
Opuntia fragilis
Quercus gambellii

Graminoids

Bromus tectorum
Koeleria macrantha
Pascopyrum smithii
Stipa comata

Forbs

Artemisia michauxiana
Astragalus sp.
Carduus nutans
Descurainia sp.
Erigeron divergens
Erigeron flagellaris
Eriogonum jamesii
Eriogonum racemosum
Gutierrezia sarothrae
Heterotheca villosa
Lappula redowskii
Linaria vulgaris
Lupinus sp.
Medicago lupulina
Picradenia richardsonii
Potentilla fruticosa
Potentilla hippiana
Sphaeralcea coccinea
Tragopogon dubius

45. High Flume Canyon

U. S. G. S. Quadrangle: Long Mountain. T33N R10W S9. Elev. Approx. 6600 ft.

Owner: Private

Pinyon-juniper woodland

Trees

Juniperus osteosperma
Pinus edulis

Shrubs and sub-shrubs

Cercocarpus montanus
Opuntia polyacantha
Purshia tridentata
Quercus gambellii
Yucca baccata

Forbs

Eriogonum jamesii

Penstemon lentus

Penstemon linarioides

46. Madden Peak Road (FR 317)

U. S. G. S. Quadrangle: Thompson Park. T36N R12W 13S. Elev. Approx. 10,200 ft.

Owner: USFS, San Juan National Forest

Aspen forest (large trees, DBH 40 in., and clear cuts)

Trees

Populus tremuloides

Shrubs and sub-shrubs

Rosa woodsii

Symphoricarpos oreophilus

Graminoids

Carex geeyeri

Poa pratensis

Forbs

Achillea lanulosa

Allium geeyeri

Aquilegia coerulea

Calochortus gunnisonii

Campanula rotundifolia

Dugaldia hoopesii

Epilobium angustifolium

Erigeron coulteri

Fragaria virginiana

Frasera speciosa

Galium septentrionalis

Gentianella heterosepala

Iris missouriensis

Lathyrus leucanthus

Noccaea Montana

Osmorhiza depauperata

Pedicularis procera

Pseudocymopterus montanus

Taraxacum officinale

Thalictrum fendleri

Thermopsis montanus

Veratrum tenuipetalum

Viola sororia

47. Cave Basin Trail

U. S. G. S. Quadrangle: TN RW S. Elev. Approx. ft.

Owner: USFS, San Juan National Forest

A. Subalpine forest (*Picea engelmannii*/*Trautvetteria caroliniensis*)

Trees

Picea engelmannii

Abies lasiocarpa

Shrubs and sub-shrubs

Ribes montigenum

Graminoids

Carex geyeri

Deschampsia cespitosa

Festuca brachyphylla

Luzula parvifolia

Poa alpina

Forbs

Angelica grayi

Castilleja rhexifolia

Draba spectabilis var. *oxyloba*

Erigeron coulteri

Fragaria virginiana

Goodyera oblongifolia

Ligularia amplexans

Ligusticum porteri

Mertensia ciliata

Nocca Montana

Osmorhiza depauperata

Pedicularis procera

Pseudocymopterus montanus

Sibbaldia procumbens

Trautvetteria caroliniensis

Veronica nutans

B. Dry meadows

Graminoids

Bromopsis canadensis

Festuca brachyphylla

Phleum commutatum

Poa alpina

Trisetum spicatum

Forbs

Agoseris aurantiaca

Allium geyeri

Bistorta bistortoides

Draba spectabilis
Dugaldia hoopesii
Erigeron coulteri
Eriogonum racemosum
Fragaria virginiana
Geranium richardsonii
Ligularia bigelovii
Ligusticum porteri
Potentilla sp.
Pseudocymopterus montanus
Rhodiola integrifolia

C. wet meadow

Shrubs and sub-shrubs

Salix planifolia

Graminoids

Calamagrostis canadensis
Carex microptera
Danthonia intermedia
Deschampsia cespitosa
Phleum commutatum

Forbs

Agoseris aurantiaca
Allium geeyeri
Caltha leptosepala
Cardamine cordifolia
Castilleja rhexifolia
Castilleja sulphurea
Conioselinum scopulorum
Epilobium hornemannii
Erigeron coulteri
Gentianopsis thermalis
Ligusticum porteri
Pedicularis groenlandica
Rhodiola integrifolia
Sedum rhodanthum
Senecio triangularis
Swertia radiata
Trollius albiflorus
Veratrum tenuipetalum
Veronica nutans

D. Barren area with red soil

Shrubs and sub-shrubs

Salix planifolia

Graminoids

Carex nova
Elymus trachycaulus
Festuca brachyphylla
Poa alpina
Trisetum spicatum

Forbs

Allium geayeri
Androsace septentrionalis
Antennaria rosea
Aster foliaceus
Campanula rotundifolia
Dugaldia hoopesii
Eremogone fendleri
Fragaria virginiana
Ivesia gordonii
Lidia obtusiloba
Ligularia bigelovii
Mertensia ciliata
Noccaea montana
Oreochrysum parryi
Potentilla pulcherrima
Pseudocymopterus montanus
Rhodiola integrifolia
Saxifraga rhomboidea
Sedum lanceolatum
Selaginella densa
Sibbaldia procumbens
Solidago simplex
Trifolium parryi

E. East facing hillside

Opposite hillside, northeast facing: **Besseyia, Draba spect. EORS 32, 33**

Graminoids

Carex microptera
Danthonia intermedia
Deschampsia cespitosa
Festuca brachyphylla
Juncus drummondii

Forbs

Achillea lanulosa
Arabis drummondii
Besseyia ritteriana
Caltha leptosepala
Cerastium strictum
Draba spectabilis var. oxyloba
Erigeron coulteri
Fragaria virginiana
Ligularia bigelovii

Pneumonanthe parryi
Podistera eastwoodiae
Potentilla pulcherrima
Veronica nutans

48. Elbert Creek North

U. S. G. S. Quadrangle: Electra Lake. T38N R9W S2. Elev. Approx. 9400 ft.
Owner: USFS, San Juan National Forest

A. Montane riparian forest near trailhead

Trees

Abies concolor
Abies lasiocarpa
Picea engelmannii
Picea pungens
Populus tremuloides
Pseudotsuga menziesii

Shrubs and sub-shrubs

Acer glabrum
Alnus incana
Cornus sericea
Distegia involucreta
Paxistima myrsinites
Ribes montigenum
Rubus idaeus
Rubus parviflorus
Salix drummondiana
Salix monticola
Salix scouleriana
Sambucus racemosa
Sorbus scopulina
Symphoricarpos oreophilus

Forbs

Actaea rubra
Angelica pinnata
Aquilegia coerulea
Arnica cordifolia
Delphinium barbeyi
Erigeron eximius
Geranium richardsonii
Heracleum lanatum
Ligusticum porteri
Maianthemum racemosum
Mertensia ciliata
Osmorhiza depauperata
Pedicularis procera
Polemonium foliosissimum

Pyrola rotundifolia
Senecio serra
Senecio triangularis
Taraxacum officinale
Thalictrum fendleri
Viola canadensis

B. Aspen forest

Trees

Populus tremuloides

Shrubs and sub-shrubs

Acer glabrum
Amelanchier utahensis
Prunus virginiana
Salix bebbiana

Graminoids

Bromus inermis
Dactylis glomerata
Poa pratensis

Forbs

Achillea lanulosa
Aster ascendens
Aster foliaceus
Castilleja linariifolia
Epilobium angustifolium
Equisetum arvense
Erigeron speciosus
Fragaria virginiana
Helianthella quinquenervis
Lathyrus leucanthus
Leucanthemum vulgare
Oreochrysum parryi
Plantago major
Trifolium pratense
Vicia americana
Viola adunca

C. Subalpine riparian forest, upper Elbert Creek

Trees

Abies lasiocarpa
Picea engelmannii
Picea pungens

Shrubs and sub-shrubs

Distegia involucrata
Ribes montigenum

Ribes wolfii
Rubus idaeus
Salix drummondiana
Salix monticola

Graminoids

Calamagrostis canadensis
Carex microptera
Deschampsia cespitosa

Forbs

Actaea rubra
Angelica pinnata
Aquilegia coerulea
Artemisia franserioides
Astragalus alpinus
Caltha leptosepala
Cardamine cordifolia
Castilleja miniata
Cirsium parryi
Conioselinum scopulorum
Cystopteris fragilis
Draba streptocarpa
Epilobium hornemannii
Equisetum arvense
Erigeron elatior
Erigeron speciosus
Fragaria virginiana
Frasera speciosa
Habenaria hyperborea
Hedysarum boreale
Heterotheca villosa
Ligusticum porteri
Maianthemum stellatum
Mertensia ciliata
Mimulus guttatus
Oxypolis fendleri
Pedicularis groenlandica
Pseudocymopterus montanus
Saxifraga odontoloma
Senecio triangularis
Thalictrum fendleri
Viola adunca
Viola canadensis

49. Lime Mesa

U. S. G. S. Quadrangle: Mountain View Crest. T38N R7W S30. Elev. Approx. 11,600 ft.
Owner: USFS, San Juan National Forest

Graminoids

Carex ebenea
Juncus drummondii
Phleum commutatum
Poa alpina

Forbs

Achillea lanulosa
Allium geayeri
Aster ascendens
Aster foliaceus
Astragalus sp.
Bistorta bistortoides
Bistorta vivipara
Caltha leptosepala
Cerastium strictum
Cystopteris fragilis
Draba aurea
Dugaldia hoopesii
Erigeron coulteri
Erigeron pinnatisectus
Fragaria virginiana
Geranium richardsonii
Geum rossii
Heterotheca villosa
Ivesia gordonii
Lidia obtusiloba

Machaeranthera coloradoensis

Machaeranthera bigelovii
Machaeranthera grindelioides
Micranthes rhomboidea
Noccaea montana
Oreochrysum parryi
Oreoxis alpina
Oxytropis deflexa var. deflexa
Penstemon whippleanus
Podistera eastwoodiae
Potentilla fruticosa
Potentilla sp.
Rhodiola integrifolia
Senecio tridenticulata
Sibbaldia procumbens
Silene acaulis
Solidago simplex

Townsendia rothrockii

Trifolium parryi
Veratrum tenuipetalum
Veronica nutans

50. Dollar Lake

U. S. G. S. Quadrangle: Mountain View Crest. T38N R7W S18. Elev. Approx. 12,000 ft.

Owner: USFS, San Juan National Forest

A. Lake shore

Shrubs and sub-shrubs

Salix planifolia

Salix glauca

Graminoids

Carex nigricans

Carex vesicaria

Deschampsia cespitosa

Juncus drummondii

Poa alpina

Forbs

Bistorta vivipara

Caltha leptosepala

Geum rossii

Pedicularis groenlandica

Pneumonanthe parryi

Rhodiola integrifolia

Sedum rhodanthum

Sibbaldia procumbens

Veronica nutans

B. Tundra above lake

Graminoids

Poa leptocoma

Forbs

Besseyia ritteriana

Caltha leptosepala

Castilleja rhexifolia

Draba crassifolia

Draba streptobrachia

Erigeron coulteri

Geum rossii

Podistera eastwoodiae

Polemonium viscosissimum

Potentilla diversifolia

Potentilla pulcherrima

Rydbergia grandiflora

Saxifraga rhomboidea

Sedum lanceolatum

Sibbaldia procumbens

Trifolium nanum

Veronica nutans

Viola labradorica

C. Wetlands

Shrubs and sub-shrubs

Salix arctica
Salix planifolia

Graminoids

Calamagrostis canadensis
Carex aquatilis
Carex canescens
Carex ebenea
Carex microptera
Carex saxatilis
Carex scopulorum
Carex vernacula
Deschampsia cespitosa

Forbs

Caltha leptosepala
Castilleja sulphurea
Eriophorum angustifolium
Micranthes odontoloma
Pedicularis groenlandica
Podistera eastwoodiae
Sedum rhodanthum
Senecio dimorphophyllus
Swertia perennis

51. Vallecito Creek

U. S. G. S. Quadrangle: Columbine Pass T38N R6W S28. Elev. Approx. 8600 ft.
Owner: USFS, San Juan National Forest
Subalpine forest (*Picea engelmannii*/*Trautvetteria caroliniensis*)

Trees

Picea engelmannii

Shrubs and sub-shrubs

Acer glabrum
Paxistima myrsinites
Rubus parviflorus

Forbs

Actaea rubra
Geranium richardsonii
Oreochrysum parryi
Pteridium aquilinum var. *pubescens*
Thalictrum fendleri
Trautvetteria caroliniensis
Vaccinium myrtillus.

52. Johnson Creek

U. S. G. S. Quadrangle: Columbine Pass. T38N R7W S1. Elev. Approx. 11,200 ft.

Owner: USFS, San Juan National Forest, Weminuche Wilderness

A. Scree slopes

Forbs

Cryptogramma acrostichoides
Cystopteris fragilis
Phacelia sericea
Senecio soldanella
Senecio tridenticulata
Sibbaldia procumbens,
Stellaria irrigua

B. Wet meadow

Shrubs and sub-shrubs

Salix planifolia

Graminoids

Bromus ciliatus
Calamagrostis canadensis
Carex ebenea
Deschampsia cespitosa
Elymus trachycaulus

Forbs

Androsace septentrionalis
Arabis drummondii
Delphinium barbeyi
Draba spectabilis var oxyloba
Dugaldia hoopesii
Erigeron coulteri
Geranium richardsonii
Ligularia bigelovii
Ligusticum porteri
Mertensia ciliata
Noccaea montana
Oreochrysum parryi
Penstemon whippleanus
Potentilla diversifolia
Potentilla pulcherrima
Pseudocymopterus montanus
Rhodiola integrifolia
Sibbaldia procumbens
Valeriana edulis
Veratrum tenuipetalum

53. Columbine Lake, West side.

U. S. G. S. Quadrangle: Columbine Pass T39N R7W S35. Elev. Approx. 12,480 ft.

Owner: USFS, San Juan National Forest, Weminuche Wilderness

Alpine tundra

Shrubs and sub-shrubs

Vaccinium cespitosum

Graminoids

Calamagrostis canadensis

Forbs**Besseyia ritteriana**

Epilobium angustifolium

Geum rossii

Pneumonanthe parryi

Rhodiola integrifolia

Veratrum tenuipetalum

54.Vallecito Creek trail above Bear Creek

U. S. G. S. Quadrangle:Vallecito Reservoir. T37N R6W S9. Elev. Approx. 8300 ft.

Owner: USFS, San Juan National Forest, Weminuche Wilderness

Trees

Abies concolor

Picea engelmannii

Pinus ponderosa

Pinus strobiformis

Populus tremuloides

Shrubs and sub-shrubs

Distegia involucrata

Juniperus communis

Mahonia repens

Paxistima myrsinites

Prunus virginiana var. melanocarpa

Quercus gambellii

Ribes inerme

Rosa woodsii

Rubus idaeus

Salix bebbiana

Salix scouleriana

Vaccinium myrtillus

Graminoids

Bromus ciliatus

Carex geyeri

Elymus elymoides

Juncus sp.,

Poa fendleriana

Forbs

Agastache pallidiflora

Ageratina herbacea

Amelanchier alnifolia
Anaphalis margaritacea
Antennaria marginata
Antennaria rosea
Artemisia franserioides
Artemisia ludoviciana
Bahia dissecta
Brickellia sp.
Cheilanthes fendleri
Commelina dianthifolia
Cryptogramma acrosticoides
Cystopteris fragilis
Eremogone fendleri
Erigeron divergens
Erigeron speciosus
Fragaria vesca
Geranium cespitosum
Geranium richardsonii
Heliomeris multiflora
Heterotheca villosa
Maianthemum racemosum
Oenothera sp.
Oreochrysum parryi
Oxalis violacea
Oxybaphus linearis
Polygonum douglasii
Potentilla hippiana
Pseudognaphalium viscosum
Sedum lanceolatum
Senecio eremophilus
Senecio pseud aurea
Solidago sp.
Thalictrum fendleri

55. Clear Creek Trail trailhead

U. S. G. S. Quadrangle: Monument Hill. T37N R10W S21. Elev. Approx. 10,120 ft.

Owner: USFS, San Juan National Forest

Subalpine Forest

Trees

Abies lasiocarpa

Picea engelmannii

Populus tremuloides

Shrubs and sub-shrubs

Ribes montigenum

Sambucus racemosa

Sorbus scopulina

Symphoricarpos oreophilus

Vaccinium myrtillus

Graminoids

Bromus ciliatus

Carex geyeri

Elymus glaucus

Glyceria striata

Luzula parviflora

Trisetum montanum

Forbs

Achillea lanulosa

Arnica cordifolia

Artemisia franserioides

Campanula rotundifolia

Corallorhiza maculata

Cynoglossum officinale

Dugaldia hoopesii

Erigeron eximius

Fragaria virginiana

Geranium richardsonii

Goodyera oblongifolia

Heuchera parviflora

Lathyrus leucanthus

Ligusticum porteri

Mertensia ciliata

Noccaea montana

Oreochrysum parryi

Orthilia secunda

Osmorhiza depauperata

Pedicularis procera

Pedicularis racemosa

Penstemon whippleanus

Phacelia heterophylla

Pseudocymopterus montanus

Senecio serra

Thalictrum fendleri

Vicia americana

Viola canadensis

Zygadenus elegans