

# Survey of Critical Wetlands and Riparian Areas in La Plata County



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# **Survey of Critical Wetlands and Riparian Areas in La Plata County**

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May 2004**

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Cover photograph: Riparian area dominated by sub-alpine fir – Engelmann spruce / Drummond's willow.  
Photo taken by Maggie March

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## ACKNOWLEDGEMENTS

The Colorado Department of Natural Resources and the Bureau of Land Management provided financial support for this study. We thank the Colorado Department of Natural Resources Division of Wildlife Wetlands Program and Alex Chappel (retired) for their continuing support. Thanks to the following people who provided inkind match towards the wetlands survey; La Plata County, Fort Lewis College, The Nature Conservancy, and the Division of Wildlife. We greatly appreciate the support and assistance Catherine Ortega, biology professor for Fort Lewis College and Coordinator for the Southwest Wetlands Focus Area Committee, Kimberly Seymour of the Colorado Department of Natural Resources, and Sarah Fowler, Brent Truskowski, Glenn Rodriguez and Ed Sterns (retired) of the EPA, Region 8.

This project would not have been possible without the help of many dedicated individuals. We appreciate the support of the members of the Southwest Wetlands Focus Area Committee for providing their local knowledge of important wetlands in La Plata County and for the suggestions of private properties to survey. Katherine Roser of La Plata Open Space Conservancy and Tami Graham of Animas Conservancy provided maps and/or lists of conservation easements to aid in assessing threats and targeting inventory areas. We appreciate Kevin Hall's input and assistance from the City of Durango. Our gratitude extends to Stacy Patton, formerly with La Plata County Planning Department, upon starting the project, and Curt Moore, the current Sr. Long Range Planner for La Plata County. We received help and advice from the San Juan National Forest staff, especially Jeff Redders, whose on going support is greatly valued. Much support has been provided by the Bureau of Land Management, especially Gary Thrash and Jay Thompson who also provide much appreciated on going support. We appreciate the Southern Ute Indian Tribe for permission to survey specific sites, expanding the scope of our survey in the county. We are also grateful to the landowners who gave us permission to survey their property. We enjoyed meeting them, and in some cases hiking with them on their property.

Jodie Bell meticulously reviewed a draft of this report adding many useful edits. however any errors in the final report are the authors.

Our staff and volunteers in Fort Collins, including Jodie Bell, Jill Handwerk, Jeremy Seimers, Amy Lavender, Alison Loar, Barbara Brayfield, and Michelle Fink (volunteer) all worked with us patiently.

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## EXECUTIVE SUMMARY

Although the rate of wetland loss in La Plata County is difficult to quantify, it is clear that many wetlands have been lost or profoundly altered from their pre-settlement state. Agriculture, grazing, development, construction of reservoirs, water diversions, and mining have had many impacts on wetlands throughout the study area. Fertile soils and available water for irrigation make floodplains productive areas for agriculture. Since the nineteenth century, hydrological diversions have been developed for irrigation and drinking water supplies. Such activities have eliminated or altered some wetlands, and created other wetlands very different from those in existence prior to European settlement.

It is clear that with the current rate of land use conversion and the lack of comprehensive wetland protection programs, wetlands will continue to be lost or dramatically altered. However, the likelihood for human conflicts with biologically important wetlands is minimized if there is the opportunity to proactively plan for managing human activity or managing for the species or habitat of interest. The purpose of this project is to provide a data resource for the Colorado Division of Wildlife and the Southwest Wetland Focus Area Committee in conducting proactive planning. This document should be considered a tool for managing lands that support rare wetland species and plant associations within La Plata County.

In 2003, the Colorado Natural Heritage Program (CNHP) received funding from the Colorado Department of Natural Resources (CDNR) through a grant from the U.S. Environmental Protection Agency (EPA), Region VIII to survey for critical wetlands within La Plata County. The goal of the project was to systematically identify the localities of rare, threatened, or endangered species dependent on wetland and riparian areas and the locations of significant natural wetland and riparian plant communities.

This project supports the CDNR's effort to strategically protect Colorado's wetland resources. The results of this survey support **six** statewide wetland efforts:

- (1) The Colorado Wetlands Partnership, a wetlands protection partnership that includes the Colorado Division of Wildlife, the Colorado Office of The Nature Conservancy, Colorado State Parks, Partners for Wildlife, Ducks Unlimited, and Great Outdoors Colorado;
- (2) The Southwest Wetland Focus Area Committee's effort to identify protection and restoration priorities;
- (3) CNHP's Comprehensive Statewide Wetland Classification and Characterization Project;
- (4) The Nature Conservancy's Southern Rocky Mountain Ecoregion Project
- (5) The hydrogeomorphic (HGM) wetland functional assessment program.
- (6) Index of Biological Integrity (IBI) project.

This project supports the IBI and HGM development process by identifying potential reference wetlands and the range of variation and potential subclasses within La Plata County, and by performing a qualitative wetland functional assessment to guide future quantitative efforts in assessing the range of variation within a subclass. CNHP's wetland work provides input to the Colorado Wetlands Initiative Partners by identifying potential sites for protection and restoration. Finally, the results of this survey will be incorporated into CNHP's Comprehensive Statewide Wetlands Classification.

Field surveys began in June 2003 and continued through September 2003. High quality examples of wetlands and riparian areas and those supporting populations of rare wetland-dependent species were given highest priority. Such locations were identified by: (1) examining existing

biological data for rare or imperiled plant and animal species and significant plant communities (collectively called **elements**) from the Colorado Natural Heritage Program's database, (2) accumulating additional existing information on these elements, (3) input from local citizens of La Plata County and more specifically, the Southwest Wetland Focus Area Committee, and, (4) conducting extensive field surveys. Areas that were found to contain significant elements were delineated as Potential Conservation Areas (PCA). These areas were prioritized by their biological urgency (the most rare or imperiled) and their ability to maintain viable populations of the elements (degree of threat). A qualitative functional assessment was conducted at most of the wetland and riparian areas visited. The restoration potential of each PCA was also noted.

Results of the wetland and riparian survey confirm that La Plata County contains areas with high biological significance and a diverse array of wetlands that support a wide variety of plants, animals, and plant associations. At least 32 major wetland/riparian plant communities, 9 plants, one bird, two fish from CNHP's Tracking List of plants, animals, and plant communities are known to occur in, or are associated with, wetlands in La Plata County.

Thirty-four wetland and riparian sites of biodiversity significance are profiled in this report as Potential Conservation Areas (PCAs). These PCAs represent the best examples of wetland and riparian communities observed on the private and public lands visited. Some sites visited have been combined with others in a PCA, where possible, to encourage conservation success along a continuum in riparian zones. Two major drainages are profiled as Network of Conservation Areas (NCAs), which contain several PCAs sharing significant ecological processes, such as hydrology. CNHP believes the PCAs profiled include those wetlands that most merit conservation efforts, while emphasizing that protecting only these PCAs will, in no way, adequately protect all the functions and values associated with wetlands in La Plata County. Despite the best efforts during one field season, it is likely that some elements that are present were not documented during the survey due to either lack of access, phenology (reproductive timing) of species, or time constraints. Future surveys will likely identify additional areas of biological significance that have not been identified in this report. The delineation of PCA boundaries in this report does not confer any regulatory protection on recommended areas, rather are intended to support wise planning and decision making for the conservation of these significant areas. Additional information may be requested from Colorado Natural Heritage Program, Colorado State University, 8002 Campus Delivery, Fort Collins, CO 80523-8002.

Protection and/or proper management of the PCAs would help to conserve the biological integrity of La Plata County, and Colorado. Of these PCAs, several stand out as very significant such as the riparian plant community white fir – blue spruce - narrowleaf cottonwood / Rocky Mountain maple (*Abies concolor* – *Picea pungens* – *Populus angustifolia* / *Acer glabrum*) occurring at Elbert Creek, Madden Creek and Junction Creek sites. Another significant site to La Plata County are the wetlands at Haviland Lake. This site supports diverse vegetation structure, including emergent sedge wetlands, bog birch (*Betula glandulosa*) / mesic graminoid – mesic forbs plant community and several imperiled plant species.

Of the 34 PCAs, we identified five as being **nearly irreplaceable biodiversity significance** (B2), 19 of **high biodiversity significance** (B3), five of **moderate biodiversity significance** (B4), and five of **general biodiversity significance** (B5). The highest ranking PCAs are the highest priorities for conservation action. Overall, the concentration and quality of imperiled elements and habitats attest to the fact that wetland conservation efforts in La Plata County will have both state and global significance.

The results of the survey will be provided to the Colorado Division of Wildlife's Wetlands Program, EPA Region VIII Wetlands Division, La Plata County, The Nature Conservancy, Colorado State University, and the Southwest Wetland Focus Area Committee and will be available to the public on CNHP's website (<http://www.cnhp.colostate.edu>)



## CONSERVATION STRATEGIES

**Conservation strategies can be classified as three major types:**

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

The first necessary step, identification of the significant elements of biodiversity in the county, and their locations, has been taken with this survey. The next step is to use this information to conserve these elements and Potential Conservation Areas (PCA). Specific protection and management needs are addressed under the descriptions of individual PCAs. 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 Potential Conservation Areas profiled in this report, with most attention directed toward PCAs with biodiversity rank (B-rank) B2 and B3.** The PCAs in this report provide a basic framework for implementing a comprehensive conservation program. The B2 and B3 PCAs, because they have global significance, are in need of priority attention. Consider purchasing development rights or outright purchase from willing owners of land for significant PCAs that are in need of protection. Support local organizations, such as land trusts, in purchasing or acquiring conservation easements for protection of biological diversity or open space. Explore opportunities to form partnerships to access federal funding for conservation projects. Continue to promote cooperation among local entities to preserve the county's biodiversity.

**2. Use this report in the review of proposed activities in or near Potential Conservation Areas to determine whether activities do or do not adversely affect elements of biodiversity.** All of the areas presented contain natural heritage elements of state or global significance. Also, consider the potential natural heritage values of all other PCAs for which land use decisions are made, using this report as a guide for values to be considered. Insist on careful assessments of potential damages, including weed invasion and fragmentation.

Certain land use activities in or near a PCA may affect the element(s) present. Wetland and riparian areas are particularly susceptible to impacts from off-site activities if the activities affect water quality or hydrologic regimes. In addition, cumulative impacts from many small changes can have effects as profound and far-reaching as one large change. As proposed land use changes within La Plata County are considered, they should be compared to the maps presented herein. If a proposed project has the potential to impact a PCA, planning personnel should contact persons, organizations, or agencies with the appropriate biological expertise for input in the planning process. The Colorado Natural Heritage Program routinely conducts site-specific environmental reviews and should be considered a valuable resource. To contact CNHP's Environmental Review Coordinator call 970-491-7331. In addition, one of our key partners, the Colorado Division of Wildlife, should be consulted.

**3. Recognize the importance of all natural communities and lands at all elevations.**

Although much effort in the past has been directed at protecting the most scenic, high elevation areas, the lower elevations have received less attention. While the specific PCAs identified here contain the known locations of significant elements of natural diversity, protection of large areas

in each vegetation type, especially where these are connected, may ensure that we do not lose species that have not yet been located. Work to protect large blocks of land in each of the major vegetation types in the county, and avoid fragmenting large natural areas unnecessarily with roads, trails, etc. Although large migrating animals like deer and elk are not tracked by CNHP as rare species, they are a part of our natural diversity, and their needs for winter range and protected corridors to food and water should be taken into consideration. Fragmentation of the landscape also affects smaller animals and plants, opening more edge habitats and introducing exotic species. Encourage cluster developments that designate large common areas for preservation of natural communities, as an alternative to scattering residences over the landscape with one house on each 35-acre parcel. Work with developers early in the planning process to educate them about the benefits of retaining natural areas. Locate trails and roads to minimize impacts on native plants and animals. See Forman and Alexander (1998) for an excellent review of the literature on the ecological effects of roads. See the booklet published by the State Trails Program (Colorado Department of Natural Resources 1998) for suggestions regarding planning trails with minimum impacts to wildlife.

**4. Develop and implement comprehensive programs 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 (e.g., fens, 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 County. 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. Countywide 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 Southwest Wetland Focus Area Committee. The Colorado Natural Areas Program has published a book entitled, **Best Management Practices for Wetlands**. This book can be download at [http://parks.state.co.us/cnap/Wetlands\\_BMP/BMPindex.Htm](http://parks.state.co.us/cnap/Wetlands_BMP/BMPindex.Htm)

**5. Increase efforts to protect biodiversity, promote cooperation and incentives among landowners, pertinent government agencies, and non-profit conservation organizations, and increase public awareness of the benefits of protecting significant natural areas.** Involve all stakeholders in land use planning. The long-term protection of natural diversity in La Plata County will be facilitated with the cooperation of many 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. Expand public and staff awareness of La Plata County's natural heritage and its need for protection by providing community education and forums where protection of our natural heritage is discussed.

**6. Promote wise management of the biodiversity resources that exist within La Plata County, recognizing that delineation of potential conservation areas does not by itself provide protection of the plants, animals, and plant communities.** Development of a site-specific conservation plan is a necessary component of the long-term protection of a Potential Conservation Area. Because some of the most serious impacts to La Plata County's ecosystems are at a large scale (e.g., altered hydrology, residential encroachment, and non-native species invasion), considering each area in the context of its surroundings is critical. Several organizations and agencies are available for consultation in the development of conservation plans, including the Colorado Natural Heritage Program, the Colorado Division of Wildlife, 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 continue to decline if not given appropriate protection. Increasing the public's knowledge of the remaining significant areas will build support for the initiatives necessary to protect them, and allow proactive planning. Encourage good management by supporting incentives to landowners for improvements such as fencing riparian areas, controlling weeds, and restoring wildlife habitat.

**7. Stay informed and involved in public land management decisions.** Some of the PCAs identified here are on public land that may be protected from development, but not from incompatible uses. Even ownership is not always secure, since the federal and state agencies are becoming more and more involved in land exchanges. Encourage protection for the most biologically significant PCAs on public lands by implementation of compatible management designated in Forest Management Plans, Grazing Management Plans, etc.

**8. Continue inventories where necessary, including inventories for species that cannot be surveyed adequately in one field season and inventories on lands that CNHP could not access in 2003.** Not all targeted inventory areas can be field surveyed in one year due to either lack of access, phenology of species, 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 that are present were not documented during the survey and other important sites have not been identified in this report.

**9. Continue to take a proactive approach to weed control in the County.** Give adequate support, in funding and staff, to the county Weed Management offices for weed control. Recognize that weeds affect both agriculture and native plant communities. Discourage the introduction and/or sale of non-native species that are known to significantly impact natural areas. Encourage the use of native species for revegetation and landscaping efforts. Ideally, seed should be locally harvested. This includes any seeding done on county road right-of ways. The Colorado Natural Areas Program has published a book entitled *Native Plant Revegetation Guide for Colorado* that describes appropriate species to be used for revegetation. Please visit [http://www.parks.state.co.us/cnap/revegetation\\_Guide/Reveg\\_index.html](http://www.parks.state.co.us/cnap/revegetation_Guide/Reveg_index.html) for further details.

**10. Encourage public education.** 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 wetland animal and plant diversity and houses some of the most unique environments in Colorado as well as the nation. 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.

## INTRODUCTION

Wetlands are places where soils are inundated or saturated with water long enough and frequently enough to significantly affect the plants and animals that live and grow there. Until recently, most people viewed wetlands as a hindrance to productive land use. Consequently, many wetlands across North America were purposefully drained. Since 1986, wetlands have been lost at a rate of 58,500 acres/year (Dahl 2000). In Colorado an estimated 1 million acres of wetlands (50% of the total for the state) were lost prior to 1980 (Dahl 1990).

Although the rate of wetland loss in La Plata County is difficult to quantify, it is clear that many wetlands have been lost or profoundly altered from their pre-settlement state. Agriculture, grazing, development, construction of reservoirs, water diversions, and mining have had many impacts on wetlands throughout the study area. Fertile soils and available water for irrigation make floodplains productive areas for agriculture. Since the nineteenth century, hydrological diversions have been developed for irrigation and drinking water supplies. Such activities have eliminated or altered some wetlands, and created other wetlands very different from those in existence prior to European settlement. For example, the development of an extensive network of canals and irrigation agriculture has created irrigation-induced wetlands where none previously existed. This same activity has altered many natural wetlands by changing hydrological patterns across the landscape. It is clear that with the current rate of land use conversion and the lack of comprehensive wetland protection programs, wetlands will continue to be lost or dramatically altered.

Because of the profound hydrological alterations within La Plata County, restoring degraded wetlands and riparian areas to pre-settlement conditions is probably not realistic. However, by enacting a watershed level wetland protection and enhancement program, many of the beneficial functions and values performed by wetlands could be enhanced or restored.

Increasingly, local Colorado governments, federal agencies, and non-profit organizations, particularly in rapidly growing parts of the state, are expressing a desire to better understand their natural heritage resources, including wetlands. The Colorado Natural Heritage Program approached this project with the intent of addressing this desire. Rare plants, animals, and plant associations 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. 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 Survey of Critical Wetlands and Riparian Areas in La Plata County, conducted by the Colorado Natural Heritage Program (CNHP), is a part of ongoing wetland surveys of Colorado counties by CNHP. To date, similar surveys have been conducted in all or parts of 20 counties. CNHP has completed the Comprehensive Statewide Wetland Characterization and Classification Project (Carsey et al. 2003). This project compiled data from multiple sources, including CNHP's Riparian Classification (Kittel et al. 1999), to produce a comprehensive wetland classification for the State of Colorado.

The purpose of this project is to provide a data resource for the Southwest Wetland Focus Area Committee, federal, state, and local agencies in conducting proactive planning for wetland conservation in La Plata County. This document should be considered a tool for managing lands that support rare wetland species and plant associations within La Plata County. There are

limitations to the information within it. In particular, the survey work was conducted for one growing season. The distribution and abundance of all organisms change with time, and it is anticipated that the conservation areas described in the report will also change with time and additional survey work. Also, all areas of La Plata County were not surveyed. Due to limitations of 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 wetland species or associations found within La Plata County. This project specifically targeted the organisms that are tracked by CNHP (see Methodology Section). The primary objective was to identify biologically significant wetlands within La Plata County. The *Survey of Critical Wetlands and Riparian Areas in La Plata County* used the methodology that is used throughout Heritage Programs in North, South, and Central America. The primary focus was to identify the locations of the wetland plant and animal populations, and plant associations on CNHP's list of rare and imperiled elements of biodiversity, assess their conservation value, and to systematically prioritize these for conservation action. Wetland functions and restoration potential for each site visited was also assessed.

The locations of biologically significant wetlands were identified by:

- Examining existing biological data for rare or imperiled plant and animal species, and significant plant associations (collectively called **elements**);
- Accumulating additional existing information from local knowledgeable citizens, National Wetland Inventory maps, and aerial photographs;
- Conducting extensive field surveys.

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

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

CNHP uses the Heritage Ranking Methodology to prioritize conservation actions by identifying those areas that have the greatest chance of conservation success for the most imperiled elements. The PCAs are prioritized according to their **biodiversity significance rank**, or B-rank, which ranges from B1 (irreplaceable) to B5 (general or statewide biodiversity significance). These ranks are based on the conservation (imperilment or rarity) ranks for each element and the element occurrence ranks (quality rank) for that particular location. Therefore, the highest quality

occurrences (those with the greatest likelihood of long-term survival) of the most imperiled elements are the highest priority (receive the highest B-rank). See the section on Natural Heritage Ranking System in this document for more details. The B1-B3 PCAs are the highest priorities for conservation actions. The sum of all the PCAs in this report represents the area CNHP recommends for protection in order to preserve the natural heritage of La Plata County's wetlands.

## **WETLAND DEFINITIONS, REGULATIONS, AND FUNCTIONAL ASSESSMENTS**

### ***Wetland Definitions***

The federal regulatory definition of a jurisdictional wetland is found in the regulations used by the U.S. Army Corps of Engineers (Corps) for the implementation of a dredge and fill permit system required by Section 404 of the Clean Water Act Amendments (Mitsch and Gosselink 1993). According to the Corps, wetlands are “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstance do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” For Corps programs, a wetland boundary must be determined according to the mandatory technical criteria described in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987). In order for an area to be classified as a jurisdictional wetland (i.e., a wetland subject to federal regulations), it must have **all** three of the following criteria: (1) wetland plants; (2) wetland hydrology; and (3) hydric soils.

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

CNHP prefers the wetland definition used by the U.S. Fish and Wildlife Service, because it recognizes that some areas display many of the attributes of wetlands without exhibiting all three characteristics required to fulfill the Corps' criteria. Additionally, riparian areas, which often do not meet all three of the Corps' criteria, should be included in a wetland conservation program. Riparian areas perform many of the same functions as other wetland types, including maintenance of water quality, storage of floodwaters, and enhancement of biodiversity, especially in the western United States (National Research Council 1995).

### ***Wetland Regulation in Colorado***

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

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

The U.S. Fish and Wildlife Service has conducted inventories of the extent and types of our nation's wetlands. The Cowardin et al. (1979) classification system provides the basic mapping units for the U.S. National Wetlands Inventory (NWI). Photo-interpretation and field reconnaissance was used to refine wetland boundaries according to the wetland classification system. The information is summarized on 1:24,000 and 1:100,000 maps.

The NWI maps provide important and accurate information regarding the location of wetlands. They can be used to gain an understanding of the general types of wetlands in the county and their distribution. The NWI maps cannot be used for federal regulatory programs that govern wetlands for two reasons. First, the U.S. Fish and Wildlife Service uses a definition for a wetland that differs slightly from Corps, the agency responsible for executing federal wetland regulations. Secondly, there is a limit to the resolution of the 1:24,000 scale maps. For example, at this scale, the width of a fine line on a map represents about 5 m (17 ft) on the ground (Mitsch and Gosselink 1993). For this reason, precise wetland boundaries must be determined on a project-by-project basis. Colorado's state government has developed no guidelines or regulations concerning the management, conservation, and protection of wetlands, but a few county and municipal governments have, including the City of Boulder, Boulder County, and San Miguel County.

### ***Wetland Functions and Values***

Wetlands perform many functions beyond simply providing habitat for plants and animals. It is commonly known that wetlands act as natural filters, helping to protect water quality, but it is less well known that wetlands perform other important functions. (Adamus et al. 1991) list the following functions performed by wetlands:

- Groundwater recharge--the replenishing of below ground aquifers.
- Groundwater discharge--the movement of ground water to the surface (e.g., springs).
- Floodflow alteration--the temporary storage of potential flood waters.
- Sediment stabilization--the protection of stream banks and lake shores from erosion.
- Sediment/toxicant retention--the removal of suspended soil particles from the water, along with toxic substances that may be adsorbed to these particles.
- Nutrient removal/transformation--the removal of excess nutrients from the water, in particular nitrogen and phosphorous. Phosphorous is often removed via sedimentation; transformation includes converting inorganic forms of nutrients to organic forms and/or the conversion of one inorganic form to another inorganic form (e.g.,  $\text{NO}_3^-$  converted to  $\text{N}_2\text{O}$  or  $\text{N}_2$  via denitrification).
- Production export--supply organic material (dead leaves, soluble organic carbon, etc.) to the base of the food chain.
- Aquatic diversity/abundance--wetlands support fisheries and aquatic invertebrates.
- Wildlife diversity/abundance--wetlands provide habitat for wildlife.

(Adamus and Stockwell 1983) include two items they call “values” which also provide benefits to society:

- Recreation--wetlands provide areas for fishing, bird watching, etc.
- Uniqueness/heritage value--wetlands support rare and unique plants, animals, and plant associations.

“Values” are subject to societal perceptions, whereas “functions” are biological or physical processes, which occur in wetlands, regardless of the value placed on them by society (National Research Council 1995). The actual value attached to any given function or value listed above depends on the needs and perceptions of society.

### ***Wetland Functional Assessment***

For this project, CNHP utilized a qualitative, descriptive functional assessment based on the best professional judgment of CNHP ecologists while incorporating some of the principles of the hydrogeomorphic (HGM) assessment method. Each wetland was classified according to both the Cowardin et al. (1979) and hydrogeomorphic (HGM) (Brinson 1993) classification systems and twelve categories (listed below) were used to assess each wetland. Using the HGM method, wetland functions are evaluated or compared only with respect to other wetlands in the same subclass, because different subclasses often perform very different functions. For example, a montane kettle pond may provide habitat for rare plant associations never found on a large river but provides little in the way of flood control, while wetlands along a major river perform important flood control functions but may not harbor rare plant species. Thus, the category,

**Overall Functional Integrity** was included in the functional assessment to provide the user of some indication of how a particular wetland is functioning in comparison to its natural capacity, as opposed to comparing it to different wetland types.

The functional assessment assigns to most of the functions a value rating of “low,” “moderate,” or “high.” Overall Functional Integrity is given as either “At Potential” or “Below Potential.” Elemental Cycling is rated as either “Normal” or “Disrupted” depending on unnatural disturbances. The following functions were evaluated for most of the PCAs profiled in this report:

- Overall functional integrity
- Flood attenuation and storage
- Sediment/shoreline stabilization
- Groundwater discharge/recharge
- Dynamic surface water storage
- Elemental cycling
- Removal of imported nutrients, toxicants, and sediments
- Habitat diversity
- General wildlife habitat
- General fish/aquatic habitat
- Production export/food chain support
- Uniqueness



### **Overall Functional Integrity**

The overall functional integrity of each wetland is a rating indicating how a particular wetland is functioning in comparison to wetlands in its same hydrogeomorphic class and/or subclass. For example, mineral soil flats (salt meadows) do not typically function as high wildlife habitat but do have high capacity for storing surface/groundwater. Thus, a mineral soil flat that is given a low rating for General Wildlife Habitat, General Fish Habitat, and Production Export/Food Chain Support does not necessarily indicate that the wetland is not functioning to its capacity. These ratings may just reflect that mineral soil flats, because of their landscape position and soil chemistry, naturally perform fewer functions than a depressional wetland. However, this particular wetland may be functioning the 'best' that could be expected from a mineral soil flat. The Overall Functional Integrity rating would reflect this by giving this particular wetland an "At Potential" rating based on the best professional judgment of CNHP ecologists. In summary, a mineral soil flat wetland having more low ratings than a depressional wetland does not necessarily mean that it is functioning improperly. However, if this particular mineral soil flat was given an Overall Functional Integrity rating of "Below Potential," then it could be assumed that the wetland is not functioning to the capacity that it should (relative to other mineral soil flat wetlands).

### **Flood Attenuation and Storage**

Many wetlands have a high capacity to store or delay floodwaters that occur from peak flow, gradually recharging the adjacent groundwater table. Indicators of flood storage include: debris along streambank and in vegetation, low gradient, formation of sand and gravel bars, high density of small and large depressions, and dense vegetation. This field assesses the capability of the wetland to detain moving water from in-channel flow or overbank flow for a short duration when the flow is outside of its channel.

### **Sediment/Shoreline Stabilization**

Shoreline anchoring is the stabilization of soil at the water's edge by roots and other plant parts. The vegetation dissipates the energy caused by fluctuations of water and prevents streambank erosion. The presence of woody vegetation and sedges in the understory are the best indicator of good sediment/shoreline anchoring.

### **Groundwater Discharge/Recharge**

Groundwater recharge occurs when the water level in a wetland is higher than the surrounding water table resulting in the movement (usually downward) of surface water. Groundwater discharge results when the groundwater level of a wetland is lower than the surrounding water table, resulting in the movement (usually laterally or upward) of surface water (e.g., springs, seeps, etc.). Ground water movement can greatly influence some wetlands, whereas in others it may have minimal effect (Carter and Novitzki 1988).

Both groundwater discharge and recharge are difficult to estimate without intensive data collection. Wetland characteristics that may indicate groundwater recharge are: porous underlying strata, irregularly shaped wetland, dense vegetation, and presence of a constricted outlet. Indicators of groundwater discharge are the presence of seeps and springs and wet slopes with no obvious source.

### **Dynamic Surface Water Storage**

Dynamic surface water storage refers to the potential of the wetland to capture water from precipitation and upland surface (sheetflow). Sheetflow is nonchannelized flow that usually occurs during and immediately following rainfall or a spring thaw. Wetlands can also receive surface inflow from seasonal or episodic pulses of floodwaters from adjacent streams and rivers

that may otherwise not be hydrologically connected with a particular wetland (Mitsch and Gosselink 1993). Spring thaw and/or rainfall can also create a time-lagged increase in groundwater flow. Wetlands providing dynamic surface water storage are capable of releasing these episodic pulses of water at a slow, stable rate thus alleviating short term flooding from such events. This function is applicable to wetlands that are not subject to flooding from in-channel or overbank flow (see Flood Storage and Attenuation). Indicators of potential surface water storage include flooding frequency, density of woody vegetation (particular those species with many small stems), coarse woody debris, surface roughness, and size of the wetland.

### **Elemental Cycling**

The cycling of nutrients, or the abiotic and biotic processes that convert elements from one form to another, is a fundamental ecosystem process, which maintains a balance between living biomass and detrital stocks (Brinson et al. 1985). Disrupting nutrient cycles could cause an imbalance between the two resulting in one factor limiting the other. Thus, impacts to aboveground primary productivity or disturbances to the soil, which may cause a shift in nutrient cycling rates, could change soil fertility, alter plant species composition, and affect potential habitat functions. Indicators of wetlands with intact nutrient cycling need to be considered relative to wetlands within the same hydrogeomorphic class/subclass. Such indicators include high aboveground primary productivity and high quantities of detritus, within the range expected for that particular hydrogeomorphic class of wetlands.

### **Removal of Imported Nutrients, Toxicants, and Sediments**

Nutrient retention/removal is the storing and/or transformation of nutrients within the sediment or vegetation. Inorganic nutrients can be transformed into an organic form and/or converted to another inorganic form via microbial respiration and redox reactions. For example, denitrification, which is a process that is mediated by microbial respiration, results in the transformation of nitrate ( $\text{NO}_3^-$ ) to nitrous oxide ( $\text{N}_2\text{O}$ ) and/or molecular nitrogen ( $\text{N}_2$ ). Nutrient retention/removal may help protect water quality by retaining or transforming nutrients before they are carried downstream or are transported to underlying aquifers. Particular attention is focused on processes involving nitrogen and phosphorus, as these nutrients are usually of greatest importance to wetland systems (Kadlec and Kadlec 1979). Nutrient storage may be for long-term (greater than 5 years) as in peatlands or depression marshes or short-term (30 days to 5 years) as in riverine wetlands. Some indicators of nutrient retention include: high sediment trapping, organic matter accumulation, presence of free-floating, emergent, and submerged vegetation, and permanently or semi-permanently flooded areas.

Sediment and toxicant trapping is the process by which suspended solids and chemical contaminants are retained and deposited within the wetland. Deposition of sediments can ultimately lead to removal of toxicants through burial, chemical break down, or temporary assimilation into plant tissues (Boto and Patrick 1979). Most vegetated wetlands are excellent sediment traps, at least in the short term. Wetland characteristics indicating this function include: dense vegetation, deposits of mud or organic matter, gentle sloping gradient, and location next to beaver dams or human-made detention ponds/lakes.

### **Habitat Diversity**

Habitat diversity refers to the number of Cowardin wetland classes present at each site. Thus, a site with emergent, scrub/shrub, and forested wetland habitat would have high habitat diversity. The presence of open water in these areas also increases the habitat diversity at a site.

### **General Wildlife and Fish Habitat**

Habitat includes those physical and chemical factors, which affect the metabolism, attachment, and predator avoidance of the adult or larval forms of fish, and the food and cover needs of wildlife. Wetland characteristics indicating good fish habitat include: deep, open, non-acidic water, no barriers to migration, well-mixed (high oxygen content) water, and highly vegetated. Wetland characteristics indicating good wildlife habitat are: good edge ratio, islands, high plant diversity, diversity of vegetation structure, and a sinuous and irregular basin.

### **Production Export/Food Chain Support**

Production export refers to the flushing of organic material (both particulate and dissolved organic carbon and detritus) from the wetland to downstream ecosystems. Production export emphasizes the production of organic substances within the wetland and the utilization of these substances by fish, aquatic invertebrates, and microbes. Food chain support is the direct or indirect use of nutrients, carbon, and even plant species (which provide cover and food for many invertebrates) by organisms, which inhabit or periodically use wetland ecosystems. Indicators of wetlands that provide downstream food chain support are: an outlet, seasonally flooded hydrological regime, overhanging vegetation, and dense and diverse vegetation composition and structure.

### **Uniqueness**

This value expresses the general uniqueness of the wetland in terms of relative abundance of similar sites occurring in the same watershed, size, geomorphic position, peat accumulation, mature forested areas, and the replacement potential.

### ***Hydrogeomorphic (HGM) Approach to Wetland Functional Assessment***

In an effort to provide a more consistent and logical basis for regulatory decisions about wetlands, a new approach to assessing wetland functions--the *hydrogeomorphic* approach is being developed. In Colorado, the hydrogeomorphic, or HGM, approach to wetland function assessment is being developed by the Colorado Geological Survey, with help from the U.S. Army Corps of Engineers, other government agencies, academic institutions, the Colorado Natural Heritage Program, and representatives from private consulting firms (Colorado Geological Survey et al. 1998).

This approach is based on a classification of wetlands according to their hydrology (water source and direction of flow) and geomorphology (landscape position and shape of the wetland) called "hydrogeomorphic" classification (Brinson 1993). There are four hydrogeomorphic classes present in Colorado: riverine, slope, depression, and mineral soil flats (Table 1). Within a geographic region, HGM wetland classes are further subdivided into subclasses. A subclass includes all those wetlands that have essentially the same characteristics and perform the same functions.

One of the fundamental goals of HGM is to create a system whereby every wetland is evaluated according to the same standard. In the past, wetland functional assessments typically were on a site-by-site basis, with little ability to compare functions or assessments between sites. HGM allows for consistency, first through the use of a widely applicable classification, then through the use of *reference wetlands*. Reference wetlands are chosen to encompass the known variation of a subclass of wetlands. A subset of reference wetlands is a *reference standard*, wetlands that correspond to the highest level of functioning of the ecosystem across a suite of functions (Brinson and Rheinhardt 1996).

HGM assumes that the highest, sustainable functional capacity is achieved in wetland ecosystems and landscapes that have not been subject to long-term anthropogenic disturbance. Under these conditions, the structural components and physical, chemical, and biological processes in the wetland and surrounding landscape are assumed to be at a dynamic equilibrium, which allows maximum ecological function (Smith et al. 1995). If a wetland is to be designated a reference standard for a given subclass of wetlands, it must meet these criteria. The need to locate reference wetlands is compatible with CNHP's efforts to identify those wetlands with the highest biological significance, in that the least disturbed wetlands will often be those with the highest biological significance.

Table 1. Hydrogeomorphic wetland classes in Colorado (Colorado Geological Survey et al. 1998).

Class	Geomorphic setting	Water Source	Water Movement	Subclass	Examples
Riverine	In riparian areas along rivers and streams	Overbank flow from channel	One-directional and horizontal downstream	R1-steep gradient, low order streams	The <i>Salix brachycarpa</i> / mesic forbs community at Cumberland Basin
				R2-moderate gradient, low to middle order	The <i>Salix planifolia</i> / <i>Carex utriculata</i> community at Upper Elbert Creek
				R3-middle elevation, moderate gradient along small/mid-order stream	The <i>Populus angustifolia</i> / plant communities found at Middle Florida
				R4-low elevation canyons or plateaus	The <i>Populus angustifolia</i> / <i>Salix ligulifolia</i> - <i>Shepherdia argentea</i> community found at Animas at La Posta
				R5-low elev. floodplains	San Juan River
Slope	At the base of slopes, e.g., along the base of the foothills; also, places where porous bedrock overlying non-porous bedrock intercepts the ground surface.	Groundwater	One-directional, horizontal to the surface from ground-water	S1-alpine and subalpine fens on non-calcareous substrates.	Iron fens in San Juan County near Silverton ?
				S2-subalpine and montane fens on calcareous substrates	Wetland complex at Haviland Lake site
				S3-wet meadows at middle elev.	Large hillside seeps
				S4-low elevation meadows	Unaweep Seep in Mesa County.

<b>Class</b>	<b>Geomorphic setting</b>	<b>Water Source</b>	<b>Water Movement</b>	<b>Subclass</b>	<b>Examples</b>
Depres- sional	In depressions cause by glacial action (in the mountains) and oxbow ponds within floodplains. Lake, reservoir, and pond margins are also included.	Shallow ground water	Generally two-directional, vertical: flowing into and out of the wetland in the bottom and sides of the depression	D1-mid to high elevation basins with peat soils or lake fringe without peat	Bulrush wetlands at Mitchell Lakes
				D2-low elevation basins that are permanently or semi-permanently flooded	Depressional oxbow wetlands in Animas River floodplain
				D3-low elevation basin with seasonal flooding	Depressional wetlands in Colorado River floodplain
				D4-low elevation basins that are temporarily flooded	Abandoned beaver ponds
				D5-low elevation basins that are intermittently flooded	Playa lakes
Mineral Soil Flat	Topographically flat wetland	Precipitation and groundwater	Two directional	F1-low elevation with seasonal high water table	Antero Reservoir in South Park

## **THE NATURAL HERITAGE NETWORK AND BIOLOGICAL DIVERSITY**

Just as ancient artifacts and historic buildings represent our cultural heritage, a diversity of plant and animal species and their habitats represent our “natural heritage.” Colorado’s natural heritage encompasses a wide variety of ecosystems from tallgrass prairie and shortgrass high plains to alpine cirques and rugged peaks, from canyon lands and sagebrush shrublands to dense subalpine spruce-fir forests and wide-open tundra.

These widely diversified habitats are determined by water availability, temperature extremes, altitude, geologic history, and land use history. The species that inhabit each of these ecosystems have adapted to the specific set of conditions found there. Because human influence today touches every part of the Colorado environment, we are responsible for understanding our impacts and carefully planning our actions to ensure our natural heritage persists for future generations.

Some generalist species, like house finches, have flourished over the last century, having adapted to habitats altered by humans. However, many other species are specialized to survive in vulnerable Colorado habitats; among them are Bell’s twinpod (a wildflower), the Arkansas darter (a fish), and the Pawnee montane skipper (a butterfly). These species have special requirements for survival that may be threatened by incompatible land management practices and competition from non-native species. Many of these species have become imperiled not only in Colorado, but also throughout their range of distribution. Some species exist in less than five populations in the entire world. The decline of these specialized species often indicates disruptions that could permanently alter entire ecosystems. Thus, recognition and protection of rare and imperiled species is crucial to preserving Colorado’s diverse natural heritage.

Colorado is inhabited by some 800 vertebrate species and subspecies, and tens of thousands of invertebrate species. In addition, the state has approximately 4,300 species of plants and more than 450 recognized plant associations that represent upland and wetland ecosystems. It is this rich natural heritage that has provided the basis for Colorado’s diverse economy. Some components of this heritage have always been rare, while others have become imperiled with human-induced changes in the landscape. This decline in biological diversity is a global trend resulting from human population growth, land development, and subsequent habitat loss. Globally, the loss in species diversity has become so rapid and severe that Wilson (1988) has compared the phenomenon to the great natural catastrophes at the end of the Paleozoic and Mesozoic eras.

The need to address this loss in biological diversity has been recognized for decades in the scientific community. However, many conservation efforts made in this country were not based upon preserving biological diversity; instead, they primarily focused on preserving game animals, striking scenery, and locally favorite open spaces. To address the absence of a methodical, scientifically based approach to preserving biological diversity Dr. Robert Jenkins of The Nature Conservancy pioneered the Natural Heritage Methodology in the early 1970s.

Recognizing that rare and imperiled species are more likely to become extinct than common ones, the Natural Heritage Methodology ranks species according to their rarity or degree of imperilment. The ranking system is scientifically based upon the number of known locations of the species as well as their 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 realized that plant associations are equally important as individual species, this methodology has been applied to ranking and preserving rare plant associations, as well as the best examples of common associations.

The Natural Heritage Methodology is used by Natural Heritage Programs throughout North, Central, and South America, forming an international database network. The 85 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. Information collected by the Natural Heritage Programs can provide a means to protect species before the need for legal endangerment status arises. It can also enable 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 single-celled organisms such as bacteria and protists through the multicellular kingdoms of plants and animals. 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 associations in which species live, the ecosystems in which associations exist, and the interactions between these levels. All levels are necessary for the continued survival of species and plant associations, and many are important for the well being of humans.

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

**Genetic Diversity** — the genetic variation within a population and among populations of a plant or animal species. The genetic makeup of a species varies 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. Once lost, this unique genetic information cannot be reclaimed.

**Species Diversity** — the total number and abundance of plant and animal species and subspecies in an area.

**Community Diversity** — the variety of plant communities or associations within an area that represent the range of species relationships and inter-dependence. These associations may be diagnostic or even restricted to an area. Although the terms plant association and plant community have been described by numerous ecologists, no general consensus of their meaning has developed. The terms are similar, somewhat overlapping, and are often used more or less interchangeably. The U.S. National Vegetation Classification (USNVC) (Anderson et al. 1998), the accepted national standard for vegetation, defines a community as an "assemblage of species that co-occur in defined areas at certain times and that have the potential to interact with one another", and a plant association as a type of plant community with "definite floristic composition, uniform habitat conditions, and uniform physiognomy" (Flahault and Schroter 1910). Identifying and protecting representative examples of plant communities ensures conservation of multiple numbers of species, biotic interactions, and ecological process. Using communities as a "coarse-filter" enables conservation efforts to work toward protecting a more complete spectrum of biological diversity.

**Landscape Diversity** — the type, condition, pattern, and connectedness of natural communities. A landscape consisting of a mosaic of natural 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 should include all levels of diversity: genetic, species, community or association, and landscape. Each level is dependent on the other levels and inextricably linked. In addition, and all too often omitted, humans are also closely linked to all levels of this hierarchy. We at the Colorado Natural Heritage Program believe that a healthy natural environment and a healthy human environment go hand in hand, and that recognition of the most imperiled species is an important step in comprehensive conservation planning.

### ***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 associations 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.

The Biological and Conservation Data System (BCD) developed by The Nature Conservancy is used by all Natural Heritage Programs to house data about imperiled species. 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. The Colorado Natural Heritage Program also uses the Biodiversity Tracking and Conservation System (BioTiCS) for digitizing and mapping occurrences of rare plants, animals, and plant associations. These rare species and plant associations 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-use planning tool.

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

What species and ecological associations 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 associations 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, Colorado State Parks, Colorado Department of Transportation, 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***

Key to the functioning of Natural Heritage Programs is the concept of setting priorities for gathering information and conducting inventories. The number of possible facts and observations that can be gathered about the natural world is essentially limitless. The financial and human resources available to gather such information are not. Because biological inventories tend to be under-funded, there is a premium on devising systems that are both effective in providing information that meets users' needs and efficient in gathering that information. The cornerstone of Natural Heritage inventories is the use of a ranking system to achieve these twin objectives of effectiveness and efficiency.

Ranking species and ecological associations according to their imperilment status provides guidance for where Natural Heritage Programs should focus their information-gathering activities. For species deemed secure, only general information needs to be maintained by Natural Heritage Programs. Fortunately, the more common and secure species constitute the majority of most groups of organisms. On the other hand, for those species that are by their nature rare, more detailed information is needed. Because of these species' rarity, gathering comprehensive and detailed population data can be less daunting than gathering similarly comprehensive information on more abundant species.

To determine the status of species within Colorado, CNHP gathers information on plants, animals, and plant associations. Each of these elements of natural diversity is assigned a rank that indicates its relative degree of imperilment on a five-point scale (for example, 1 = extremely rare/imperiled, 5 = abundant/secure). The primary criterion for ranking elements is the number of occurrences (in other words, the number of known distinct localities or populations). This factor is weighted more heavily than other factors because an element found in one place is more imperiled than something found in twenty-one places. Also of importance are the size of the

geographic range, the number of individuals, the trends in both population and distribution, identifiable threats, and the number of protected occurrences.

Element imperilment ranks are assigned both in terms of the element's degree of imperilment within Colorado (its State-rank or S-rank) and the element's imperilment over its entire range (its Global-rank or G-rank). Taken together, these two ranks indicate the degree of imperilment of an element. For example, the lynx, which is thought to be secure in northern North America but is known from less than five current locations in Colorado, is ranked G5 S1 (globally-secure, but critically imperiled in this state). The Rocky Mountain Columbine, which is known only in Colorado from about 30 locations, is ranked a G3 S3 (vulnerable both in the state and globally, since it only occurs in Colorado and then in small numbers). Further, a tiger beetle that is only known from one location in the world at the Great Sand Dunes National Monument is ranked G1 S1 (critically imperiled both in the state and globally, because it exists in a single location). CNHP actively collects, maps, and electronically processes specific occurrence information for animal and plant species considered extremely imperiled to vulnerable in the state (S1 - S3). Several factors, such as rarity, evolutionary distinctiveness, and endemism (specificity of habitat requirements), contribute to the conservation priority of each species. Certain species are "watchlisted," meaning that specific occurrence data are collected and periodically analyzed to determine whether more active tracking is warranted. A complete description of each of the Natural Heritage ranks is provided in Table 3.

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 3, ranks followed by a "B," for example S1B, indicate that the rank applies only to the status of breeding occurrences. Similarly, ranks followed by an "N," for example S4N, refer to non-breeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state.

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 with an "S" or a "G" respectively, followed by a number or letter. These ranks should not be interpreted as legal designations.

Table 2. Definition of natural heritage imperilment ranks.

<b>G/S1</b>	Critically imperiled globally/state because of rarity (5 or fewer occurrences in the world/state; or 1,000 or fewer individuals), or because some factor of its biology makes it especially vulnerable to extinction.
<b>G/S2</b>	Imperiled globally/state because of rarity (6 to 20 occurrences, or 1,000 to 3,000 individuals), or because other factors demonstrably make it very vulnerable to extinction throughout its range.
<b>G/S3</b>	Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences, or 3,000 to 10,000 individuals).
<b>G/S4</b>	Apparently secure globally/state, though it may be quite rare in parts of its range, especially at the periphery. Usually more than 100 occurrences and 10,000 individuals.
<b>G/S5</b>	Demonstrably secure globally/state, though it may be quite rare in parts of its range, especially at the periphery.
<b>G/SX</b>	Presumed extinct globally, or extirpated within the state.
<b>G#?</b>	Indicates uncertainty about an assigned global rank.
<b>G/SU</b>	Unable to assign rank due to lack of available information.
<b>GQ</b>	Indicates uncertainty about taxonomic status.
<b>G/SH</b>	Historically known, but usually not verified for an extended period of time.
<b>G#T#</b>	Trinomial rank (T) is used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.
<b>S#B</b>	Refers to the breeding season imperilment of elements that are not residents.
<b>S#N</b>	Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used.
<b>SZ</b>	Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliably identified, mapped, and protected.
<b>SA</b>	Accidental in the state.
<b>SR</b>	Reported to occur in the state but unverified.
<b>S?</b>	Unranked. Some evidence that species may be imperiled, but awaiting formal rarity ranking.

Note: Where two numbers appear in a state or global rank (for example, S2S3), the actual rank of the element is uncertain, but falls within the stated range.

**Legal Designations for Rare Species**

Natural Heritage imperilment ranks should not be interpreted as legal designations. Although most species protected under state or federal endangered species laws are extremely rare, not all rare species receive legal protection. Legal status is designated by 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 4 defines the special status assigned by these agencies and provides a key to abbreviations used by CNHP.

Candidate species for listing as endangered or threatened under the Endangered Species Act are indicated with a “C.” While obsolete legal status codes (Category 2 and 3) are no longer used, CNHP continues to maintain them in its Biological and Conservation Data system for reference.

Table 3. Federal and State Agency special designations for rare species.

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

### Element Occurrences and their Ranking

Actual locations of elements, whether they are single organisms, populations, or plant associations, are referred to as element occurrences. The element occurrence is considered the most fundamental unit of conservation interest and is at the heart of the Natural Heritage Methodology. To prioritize element occurrences for a given species, an element occurrence rank (EO-Rank) is assigned according to the ecological quality of the occurrences whenever sufficient information is available. This ranking system is designed to indicate which occurrences are the healthiest and ecologically the most viable, thus focusing conservation efforts where they will be most successful. The EO-Rank is based on three factors:

**Size** – a measure of the area or abundance of the element’s occurrence, relative to other known, and/or presumed viable, examples. Takes into account factors such as area of occupancy, population abundance, population density, population fluctuation, and minimum dynamic area (which is the area needed to ensure survival or re-establishment of an element after natural disturbance).

**Condition/Quality** – an integrated measure of the composition, structure, and biotic interactions that characterize the occurrence. This includes factors such as reproduction, age structure, biological composition (such as the presence of non-native versus native species), structure (for example, canopy, understory, and ground cover in a forest community), and biotic interactions (such as levels of competition, predation, and disease).

**Landscape Context** – an integrated measure of two factors: the dominant environmental regimes and processes that establish and maintain the element, and connectivity. Dominant environmental regimes and processes include herbivory, hydrologic and water chemistry regimes (surface and groundwater), geomorphic processes, climatic regimes (temperature and precipitation), fire regimes, and many kinds of natural disturbances. Connectivity includes such factors as a species having access to habitats and resources needed for life cycle completion, fragmentation of ecological associations and systems, and the ability of the species to respond to environmental change through dispersal, migration, or re-colonization.

Each of these factors is rated on a scale of A through D, with A representing an excellent grade and D representing a poor grade. These grades are then averaged to determine an appropriate EO-Rank for the occurrence. If not enough information is available to rank an element occurrence, an EO-Rank of E is assigned. EO-Ranks and their definitions are summarized in Table 5.

Table 4. Element occurrence ranks and their definitions.

<b>A</b>	Excellent viability.
<b>B</b>	Good viability
<b>C</b>	Fair viability.
<b>D</b>	Poor viability.
<b>H</b>	Historic: known from historical record, but not verified for an extended period of time.
<b>X</b>	Extirpated (extinct within the state).
<b>E</b>	Extant: the occurrence does exist but not enough information is available to rank.
<b>F</b>	Failed to find: the occurrence could not be relocated.

### 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, 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 non-native 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 associations. 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 necessary ecological processes cannot be contained within a site of reasonable size. The boundaries described in this report indicate the immediate, and therefore most important, area to be considered for protection. Continued landscape level conservation efforts are necessary as well, which will involve regional efforts in addition to 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 6 for a summary of these B-ranks.

Table 5. Natural Heritage Program biological diversity ranks and their definitions.

<b>B1</b>	<p>Outstanding Significance:</p> <p>Only known occurrence of an element</p> <p>A-ranked occurrence of a G1 element (or at least C-ranked if best available occurrence)</p> <p>Concentration of A- or B-ranked occurrences of G1 or G2 elements (four or more)</p>
<b>B2</b>	<p>Very High Significance:</p> <p>B- or C-ranked occurrence of a G1 element</p> <p>A- or B-ranked occurrence of a G2 element</p> <p>One of the most outstanding (for example, among the five best) occurrences rangewide (at least A- or B-ranked) of a G3 element.</p> <p>Concentration of A- or B-ranked G3 elements (four or more)</p> <p>Concentration of C-ranked G2 elements (four or more)</p>
<b>B3</b>	<p>High Significance:</p> <p>C-ranked occurrence of a G2 element</p> <p>A- or B-ranked occurrence of a G3 element</p> <p>D-ranked occurrence of a G1 element (if best available occurrence)</p> <p>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>
<b>B4</b>	<p>Moderate Significance:</p> <p>Other A- or B-ranked occurrences of a G4 or G5 community</p> <p>C-ranked occurrence of a G3 element</p> <p>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)</p> <p>Concentration of A- or B-ranked occurrences of G4 or G5 N1-N2, S1-S2 elements (four or more)</p> <p>D-ranked occurrence of a G2 element</p> <p>At least C-ranked occurrence of a disjunct G4 or G5 element</p> <p>Concentration of excellent or good occurrences (A- or B-ranked) of G4 S1 or G5 S1 elements (four or more)</p>
<b>B5</b>	<p>General or State-wide Biological Diversity Significance: good or marginal occurrence of common community types and globally secure S1 or S2 species.</p>

### Protection Urgency Ranks

Protection urgency ranks (P-ranks) refer to the timeframe in which it is recommended that conservation protection occur. In most cases, this rank refers to the need for a major change of protective status (for example agency special area designations or ownership). The urgency for protection rating reflects the need to take legal, political, or other administrative measures to protect the area. Table 7 summarizes the P-ranks and their definitions.

Table 6. Natural Heritage Program protection urgency ranks and their definitions.

<b>P1</b>	Protection actions needed immediately. It is estimated that current stresses may reduce the viability of the elements in the PCA within 1 year.
<b>P2</b>	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.
<b>P3</b>	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.
<b>P4</b>	No protection actions are needed in the foreseeable future.
<b>P5</b>	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 site. 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 site. 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 non-natives, mowing, etc.) or people and site management (building barriers, rerouting trails, patrolling for collectors, hunters, or trespassers, etc.). Management action does not include legal, political, or administrative measures taken to protect a potential conservation area. Table 8 summarizes M-ranks and their definitions.



Table 7. Natural Heritage Program management urgency ranks and their definitions.

<b>M1</b>	Management actions may be required within one year or the element occurrences could be lost or irretrievably degraded.
<b>M2</b>	New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA.
<b>M3</b>	New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA.
<b>M4</b>	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.
<b>M5</b>	No management needs are known or anticipated in the PCA.

## PROJECT BACKGROUND

### *Location and Physical Characteristics of Study Area*

La Plata County comprises approximately 3,258 square miles, or 2,085,951 acres, of southwest Colorado (Figure 1). 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 The Nature Conservancy (Figure 1). Elevations range from about 5,900 to 14,000 feet. La Plata County is bordered by Montezuma, Dolores, Ouray, 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.

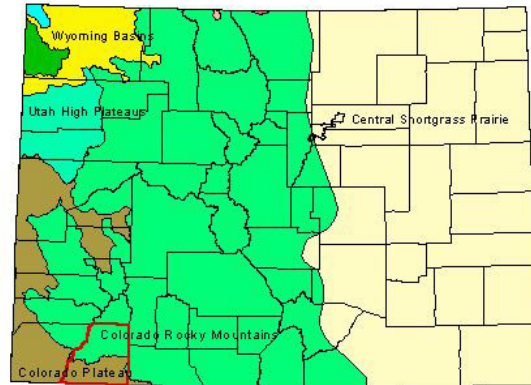


Figure 1. Ecoregions of Colorado. La Plata County is located in the Southern Colorado Rocky Mountains and Colorado Plateau Ecoregions, and is outlined in red.

The major population centers in La Plata County are Durango and Bondad on the Animas River, Bayfield and Ignacio on Los Pinos River and Hesperus and Breen on the La Plata River. According to the United States Census Bureau, La Plata County had a population totaling 43,941 individuals in the year 2000. The concentration is greatest in the city of Durango where the total population in 2000 was recorded as 14,243 and next Bayfield recording 1,592 with the town of Ignacio at 723 (U.S. Department of Commerce, Economics and Statistics Administration, US Census Bureau, 2002). It is important to note that a large portion of the populace lives in the rural areas of La Plata County.

The following discussion on climate is from the following websites, unless otherwise referenced: [www.worldclimate.com](http://www.worldclimate.com); [www.godurango.com](http://www.godurango.com). The climate of the Southern Rocky Mountain Province is a temperate semiarid steppe regime, averaging 300 days of sunshine annually. There are four distinct seasons where temperatures are generally moderate. The mean freeze-free period

is 99 days and humidity is minimal. Durango's average maximum temperature in July is 87F, and in January is 40F where the average minimum temperature in January is 11F, according to data smoothed to monthly averages from 1971 – 2000 (WRCC 2004). The climate is influenced by prevailing westerly winds that carry storms from the Pacific and by the north/south orientation of the local mountain ranges. The driest month is June and the wettest is August, when the summer monsoons ensue. The southern and lower elevations of La Plata County receive 14.8 inches of rainfall annually as compared to the northern and higher elevations which receive between 25.0 and 31.2 inches of annual rainfall. The Western Regional Climate Center reports an annual average total precipitation in Durango at 19.94 inches and in Ignacio at 14.72 inches from averaged monthly data from 1971 to 2000 (WRCC 2004). Winter precipitation varies with altitude as does snow and rain fall. "Snowmelt usually supplies much more water than can be used for agriculture in the area" as quoted from the USDA Soil Survey of La Plata County Area, Colorado, 1988. 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.

La Plata County's varied geology ranges from Precambrium metamorphic and granitic rocks, through Triassic, Jurassic and Cretaceous sedimentary shales, limestones and sandstones, Tertiary uplifts and glaciated valleys to the Quarternary 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 geology, 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.

In central La Plata County, the middle elevations, geology is comprised of sedimentary layers of the Mesozoic and Paleozoic eras characterized in this area by sedimentary sandstones and shales and alluvium. The picturesque high red mesas visible from Durango, for example, are identified mostly as the Cutler or Dolores Formations created from the sluggish water deposits of the ancestral Rocky Mountains of the late Paleozoic/early Mesozoic era. The deposits oxidized in the absence of water, producing the red color. The tan or white layers therein are identified as various members of the Hermosa formation (Blair et al. 1996, Chronic, 1980). Hot springs discharge through fractures in the Cutler Formation just north of Durango (Blair et al., 1996). Some other examples of sedimentary layers visible in this part of the county are the Dakota sandstone, which caps Animas City Mountain, the Point Lookout Sandstone, which tops Perins Peak and Raider Ridge.

The southern part of the county lies on the edge of the Colorado Plateau, and shows the typical mesa and canyon topography. The city of Durango sits almost at the point of the joining land forms (Southern Rocky Mountains; Colorado Plateau) in a flat valley bottom created first by glaciation then flattened out by ancient lake deposition (Blair et al. 1996). The hogback monocline and cuervas visible from Hesperus to Bayfield are part of a tertiary uplift that dips southward toward the center of the San Juan Basin in New Mexico. The southeast portion of the county is on the northern part of the San Juan Basin, containing mesas, cuervas, hogbacks and valleys comprised mostly of sandstones and alluvial depositions; the north part of the basin is rimmed by shale and coal beds, the source for expansive gas well development in the region (Chronic, 1980). Examples of geologic formations in this area are the Morrison Formation (brightly colored soft shales usually below a sandstone slab), Animas Formation (full of alluvium, rocky soil visible south of Ignacio on the lower slopes of Rattlesnake Hill), San Jose Formation (sandstones, sandy shales along the lower reaches of the Florida River – on the Florida Mesa). The Mesa Verde Formation and Mancos and Lewis shales rim the basin and divide the two major

landforms in La Plata County (Tweto, 1979).

The western and middle portions of the county also contain mesa landforms typical of the Colorado Plateau. These are outside of the San Juan Basin and are comprised mostly of the Mesa Verde Formation with associated Cliffhouse sandstone (on the west), Meneffee Formation (sandstone, shale, coal) and Mancos and Lewis shale, and coal. (Chronic, 1980; Tweto, 1979). Mancos shale can best be seen along HWY 160 west on Hesperus Hill where the gray shale hillsides support extensive stands of Gambel oak.

Finally, the La Plata mountain range, in the extreme western part of La Plata County is a lacolith range, still associated with the San Juan volcanism. Gravels deposited from this range have an uncertain background (Blair et al. 1996). Mancos shale is visible at the toe slopes of this range. The steep mountains are comprised from lacolith and sill intrusions within Pennsylvanian and Permian sedimentary layers (Chronic 1980).

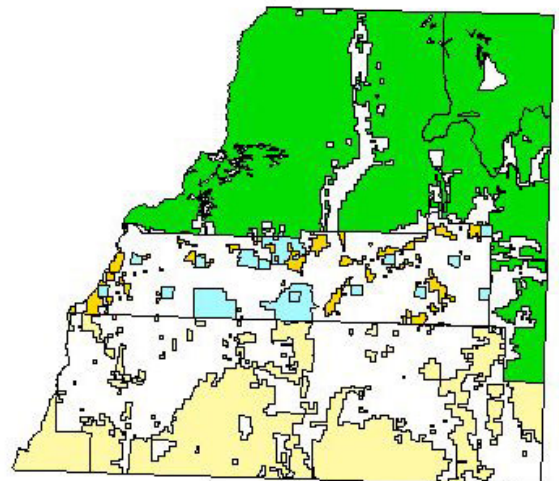
These geologic structural units influence the distribution of wetland plant associations through their direct affect on soil development, groundwater movement, and fluvial processes. For example, numerous seeps and springs exist in the San Juan volcanic area, and are likely discharging from permeable bedrock derived from lava flows, tuffs, and ash flows. Steep terrain in mountainous regions results in narrow linear riparian areas while broad floodplain wetlands, associated with the alluvial groundwater system in the gravels of the La Plata River, Animas River, Los Pinos River and Florida River floodplains are the result of the La Plata Range and the San Juan uplift and subsequent erosion.

Soils of the area may be alluvial, wind deposited, or weathered in place. Some soils at the lowest elevations may have excess salt or sodium. A special situation in the semi-desert is the presence of cryptobiotic crusts on the soils. This living soil, containing mosses, lichens, algae and bacteria is important for stabilizing the sandy soils and adding to the long-term stability of desert grasslands (USDI 2001). Mountain soils are normally rocky and shallow, except in areas where groundwater discharge or slope wetlands occur. At high elevation sites, these areas often form organic soils (e.g., peat or muck) due to organic matter production, persistent soil saturation and thus anaerobic conditions, and cool year round temperatures. Along drainages, both in the mountains and at lower elevations, wetland plant associations occur on alluvial soils. Soil development around many of the seeps and springs in La Plata County varies according to their geomorphic setting (e.g., steep hillsides, atop geologic bedrock, or gentle slopes). Soils along the lower river valleys (Animas River; Florida River; Pine River) are highly variable ranging from very fine material to areas of sand gravel and cobble. Some oxbows and backchannels may have organic soil horizons but may not be classified as an organic soil. Soils also vary according to the parent material from which they've weathered. For more specific information, see "Soil Survey of La Plata County Area, Colorado" (USDA 1988).

### ***Ownership***

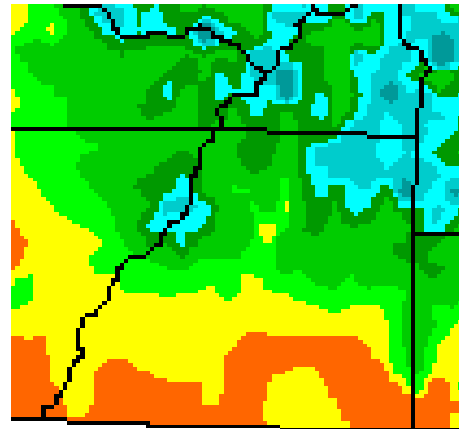
La Plata County consists primarily of San Juan National Forest, private lands and Southern Ute Indian tribal lands (Figure 3). USFS lands dominate the northern section of the county, while Southern Ute tribal lands comprise the southern section, and private lands are found primarily in the central part.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

Figure 2-.  
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.

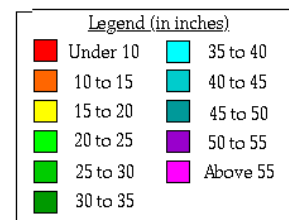


### **Hydrology**

Major rivers in La Plata County are the Animas River and its tributaries, including the Hermosa Creek, Junction Creek and Florida Rivers. The La Plata River dissects the La Plata Mountain Range in the west central portion of the County and Los Pinos River drains the east side of the County. These river systems are all a part of the San Juan River watershed where waters eventually meet the San Juan River in northern New Mexico.



Melting snow accumulated from higher elevations as well as annual rainfall are measured in cubic feet per second on the Animas River in Durango. Water levels are considered Low: 800-1500cfs, Medium: 1500-2500cfs, High:2500-5000cfs and the highest cfs levels on the Animas River are measured in the spring (information available on website: [www.swhitewater.com/gupper.html](http://www.swhitewater.com/gupper.html)).



Period: 1961-1990

Historically, flows of the Los Pinos and Florida Rivers were high and turbid in the spring with a low and clear flow later in summer and throughout the winter. Water impoundments have altered this pattern. The Florida River is dammed at Lemon Reservoir and provides irrigation and Durango with its municipal supply. Los Pinos River is dammed at Vallecito Reservoir and supplies the area with irrigation. 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 smaller impoundments such as the Mormon Reservoir.

Figure 3. Summary of precipitation in La Plata County – ([www.wrcc.com](http://www.wrcc.com))

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. Prior to this diversion, the Animas River was considered an unregulated river – a rarity in western Colorado (Blair et al., 1996). The water for this project is being pumped from the river, not dammed. 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). Direct effects on the Animas River and its riparian ecology below this pumping station are not known at this time. Flows will be altered by the diversion, and subsequent effects may be detrimental to the perpetuity of the cottonwood ecosystem. (please see Hydrological Modifications, page 48)

The historic flow of the Animas, Florida and Los Pinos Rivers has been significantly altered due to water development projects for irrigation and municipal use. Floodplains are not inundated as frequently during spring runoff due to altered flows and channelization structures. In summary, floodplain dynamics along these rivers in La Plata County, which are necessary for continued development of wetland habitat, have been greatly altered. As a result, new wetlands are not being created within the floodplains and aquatic habitat has been reduced.

Alluvial aquifers are present along the main streams in La Plata County, providing residential wells and irrigation. This resource has historically been used for agricultural and domestic purposes. The Animas and Florida Rivers expand and combine alluvial systems where as the Los Pinos, and La Plata alluvial aquifers are isolated along the main stems in the lower valleys. The majority of the alluvial wells present in the entire San Juan River Basin are concentrated in La Plata County along Los Pinos, Animas, and La Plata River valleys. Well depths vary greatly as does the thickness of alluvium throughout the alluvial aquifer systems. Withdrawal is small compared with bedrock aquifers and surface water use. (Topper *et al.*, 2003)

Groundwater in La Plata County is associated with the four principal regional aquifers of the Colorado Plateau and smaller local aquifers (this discussion on groundwater is almost entirely based on USGS 1995: Groundwater Atlas of the United States – HA 730-C, unless otherwise referenced). Discharge from these aquifers is mainly associated with small seep and spring wetlands, such as the bulrush wetland at Mitchell Lakes, but occasionally support larger slope wetlands, such as the subalpine riparian wetland (*Betula glandulosa* / mesic forb – mesic graminoid) at Haviland Lake. Groundwater discharge provides critical flow to many small streams in La Plata County, and thus is vital to the health of many riparian areas.

The four regional aquifers are composed of permeable, moderately to well consolidated sedimentary rocks which range in age from Permian to Tertiary and are separated by impermeable confining units. The numerous water-yielding units have been grouped into four principal regional aquifers: (1) Uinta-Animas aquifer; (2) Mesa Verde aquifer; (3) Dakota-Glen Canyon aquifer and (4) Coconino aquifer. All four aquifers underlie La Plata County but discharge in different geographical locations within the county, mostly associated with the hydrological rock unit:

- (1) Uinta-Animas aquifer – this aquifer is found in the southeastern part of the county and is associated with the San Jose Formation (permeable, coarse arkosic sandstone, mudstone), the Animas Formation and Nacimiento Formation (permeable conglomerate, medium to very coarse sandstone, impermeable shale, mudstone). This aquifer recharges at higher elevations, mostly at the rim of the San Juan Basin in La Plata County. This rim is defined by the hogback monocline visible near Durango, dipping south into the San Juan Basin. Discharge is to stream flow in the alluvium of the river valleys in the San Juan Basin. These areas include Los Pinos River from about Bear Creek south to its confluence with the San Juan River; the Florida River south from the Florida Mesa to its confluence with the Animas River and the Animas River south of Durango. This aquifer provides important water resource via wells in the southeastern part of the county (Topper *et al.* 2003).
- (2) Mesa Verde aquifer – this aquifer is found in the southwestern part of La Plata County. The aquifer is found within rocks of the Mesa Verde Group (which locally consists of sandstone, shale, siltstone and coal of the Cliffhouse sandstone and Menefee formations, intertongued with the Mancos shale) which are older than those associated with the Animas. Thus, the Mesa Verde aquifer is typically found at a lower elevation than the Uinta-Animas. Discharge not only occurs via seeps and

springs but also directly into streams, such as Cherry Creek and the lower reaches of the La Plata River. Seeps and springs associated with this aquifer occur in the southwestern part of the county such as the spring located at the town of Marvel. Discharge is also via well withdraw. Well water from this aquifer is an important resource for communities west of Durango (Topper, *et al.* 2003). The Mancos Shale Formation serves as the confining unit between the Mesa Verde and the underlying Dakota-Glen Canyon aquifer.

- (3) Dakota-Glen Canyon aquifer – this aquifer contains four permeable zones that are referred to as the Dakota aquifer (associated with the Dakota Sandstone), Morrison aquifer (associated with sandstone portions of the Morrison Formation), Entrada aquifer (associated with Entrada sandstone), and Glen Canyon aquifer (associated with Glen Canyon sandstone or equivalent). The latter two aquifers associated with the system are absent in La Plata County (Topper, *et al.* 2003). This aquifer system underlies both the Uinta-Animas and Mesa Verde aquifers and gives little discharge in the region. This aquifer underlies the middle portion of La Plata County, north of Durango, running mostly east and west. The aquifers are associated with the Dakota Sandstone and the Morrison Formation, visible in the sedimentary layers from the Animas Valley north and south of Durango. Locally, recharge occurs in the higher elevations of the Dakota and Morrison Formations near Durango. From these recharge areas, groundwater then flows toward discharge areas along the Animas River and its tributaries. The Chinle Formation is the lower confining unit of most of the Dakota-Glen Canyon aquifer, but the Triassic Dolores Formation composes the confining unit in the “eastern Four Corners Platform”.
- (4) Coconino-DeChelly aquifer – this aquifer is contained in rocks of Early Permian age and underlies most of the southern part of the Colorado Plateau. It occurs in the northwestern portion of La Plata County. Rocks associated with this aquifer are of the Cutler Formation (sandstones and shales) in La Plata County. The Cutler Formation yields small amounts of water only in fractures (Topper, *et al.* 2003). Information available conflicts for the northwest portion of La Plata County. According to the Colorado Geological Survey, this portion of the county falls within the southeastern portion of the Paradox Basin aquifers – the Lower Paleozoic carbonate aquifer associated with Leadville Limestone, Ouray, Elbert and Ignacio Formations (Topper et al. 2003). Information agrees that the underlying aquifer may be contributing to base flows in the Animas River drainage (but also flows toward the Dolores River drainage). Recharge for this aquifer takes place at higher elevations, where the groundwater generally flows from the San Juan uplift to the major surface-water drainages. Aquifers in the area may contribute to the discharge at Mitchell Lakes, Electra Lake area and Haviland Lake wetlands from the Hermosa Cliffs. Well withdrawal takes place near Electra Lake for domestic purposes, where wells are at least 300 feet deep for water access (Topper, *et al.* 2003).
- (5) No Principle Aquifer – there is no principle aquifer in the northeastern portion of La Plata County.



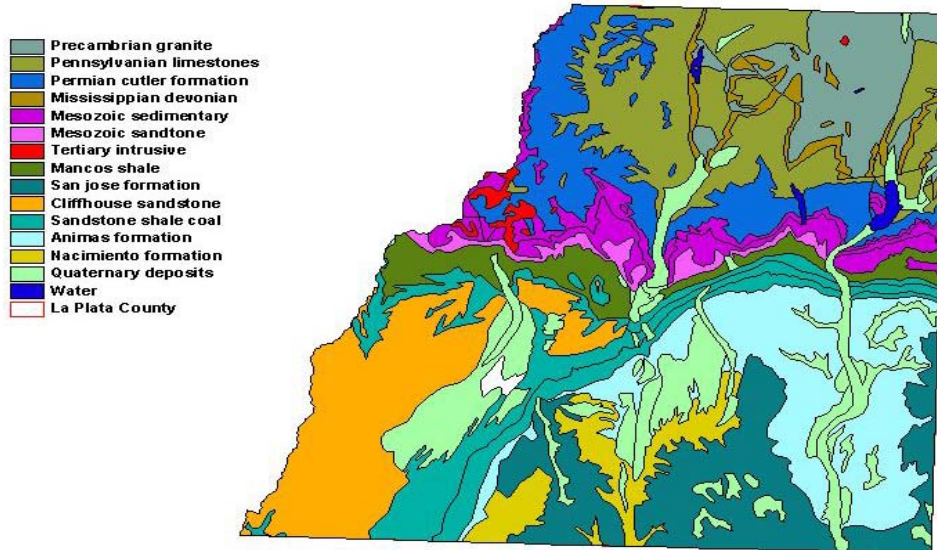
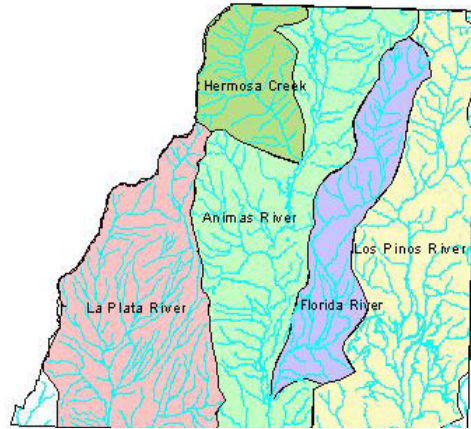


Figure 5. Geological Summary of La Plata County

### ***Upland Vegetation***

Upland vegetation in La Plata County can be classified into six broad types, each containing several plant communities. These types more or less correspond to elevation: from lowest to highest, 1) sagebrush; 2) pinyon-juniper woodlands; 3) mountain shrublands; 4) montane; 5) subalpine 6) alpine tundra. Within each of these zones, the addition of water (streams, rivers, or springs) creates additional vegetation types. Although distribution of vegetation in La Plata County is mostly determined by elevation, topography, soils, and local climatic factors all contribute to the distribution patterns.

**Sagebrush** in La Plata County is often found on the mesas and cuevas of the Colorado Plateau ecoregion in the southern part of the county. It is also found in deep sandy valley benches where the adjacent higher slopes are covered with pinyon-juniper woodlands or scrub oak.

**Pinyon-Juniper Woodlands** are well known in La Plata County's Colorado Plateau region. Rocky Mountain juniper (*Juniperus scopulorum*) is more common in and around Durango and Utah juniper (*Juniperus osteosperma*) is more common in the southern part of the county, on tribal and private lands. Rocky Mountain juniper often outnumbers the pinyon (*Pinus edulis*) in woodlands around Durango and then mixes into the lower reaches of ponderosa pine stands with mountain shrubs intermixed.

**Mountain Shrub:** This is a discontinuous band of vegetation and occurs as patches of serviceberry (*Amelanchier* spp.) and Gambel oak (*Quercus gambelii*) intermixed with Douglas-fir, ponderosa pine and pinyon-juniper woodlands. Also within the mountain shrubs in La Plata County are Fendler bush or false mock orange, (*Fendlera rupicola*), Squaw apple (*Peraphyllum ramosissimum*), mountain mahogany (*Cercocarpus montanus*), banana yucca (*Yucca baccata*), snowberry (*Symphoricarpos rotundifolius*).

**Montane:** Woodlands consisting of ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*) or Gambel oak (*Quercus gambelii*) occupy this zone. At the northern part of this zone, aspen (*Populus tremuloides*) forests are intermixed and continue to intermix with conifer forests in higher elevations (up to at least 10,000ft.). Aspen is the only upland deciduous forest tree in the region, and is the most widespread tree in North America, due to its great genetic variability.

**Subalpine:** A continuous band of conifer forests, dominated by subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*), is indicative of this zone. Bristlecone pine (*Pinus aristata*), lodgepole pine, Douglas-fir, and aspen are also found throughout the zone. Thurber fescue (*Festuca thurberi*) is common in parklands in the uppermost elevations in the zone. More mesic meadows may be occupied by open stands of osha (*Ligusticum porteri*), false hellebore (*Veratrum tenuipetalum*), bistort (*Bistorta bistortoides*), showy alpine ragwort (*Ligularia amplexens*), thickleaf ragwort (*Senecio crassulus*), and king's crown (*Rhodiola integrifolia*).

**Alpine:** Low herbaceous species such as alpine avens (*Geum rossii*), and tufted hairgrass (*Deschampsia cespitosa*) are common in this zone. Erosional processes such as freeze-thaw and rock glaciers are found over the landscape in this zone.

**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 lower elevations are silver buffalo berry (*Shepherdia argentea*) and skunkbush (*Rhus trilobata*). It is common for the understory to contain hay grasses but native graminoids as well, 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, though many riverine wetlands in the county are supplemented by groundwater, such as the narrowleaf cottonwood / river birch (*Populus angustifolia* / *Betula occidentalis*) association along 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 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 bulrush 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 further 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 (*Palaroides arundinaceae*) 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 unpublished.) 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).

## OBSERVATIONS ON MAJOR THREATS TO WETLAND BIODIVERSITY

The following table lists only those threats that were observed at or near the Potential Conservation Areas and were thought to potentially impact the elements of concern.

Table 8. Threats observed at the potential conservation areas.

Potential Conservation Area	B -rank	Hydrologic Modification	Residential Development	Oil & Gas Development	Incompatible Grazing	Logging	Recreation	Roads/Railroad	Non-native Species
Animas River Canyon	B2						X	X	X
Elbert Creek	B3	X			X		X	X	X
Junciton Creek	B2						X	X	X
Lightner Creek	B2	X			X		X	X	X
Lower Hermosa Creek	B2				X		X		X
Madden Creek	B2		X				X	X	X
Vallecito Creek - Johnson Creek	B3				X		X	X	X
Animas River at La Posta	B3	X	X	X	X		X		X
Animas River at Rockwood	B3							X	X
Falls Creek	B3	X	X				X		X
Florida River at Burnt Timber Creek	B3				X		X	X	X
Haviland Lake	B3	X	X				X	X	X
Los Pinos at Bayfield North	B3	X	X		X				X
Los Pinos at Rattlesnake Hill	B3	X		X	X				X
Lower Florida River	B3	X	X	X	X			X	X
Middle Florida River	B3	X	X	X	X			X	X
Middle Hermosa Creek	B3				X	?	X		X
Morgan Canyon	B3			X					
Sauls Creek	B3			X	X	X	X	X	X
Spring Creek North	B3			X			X	X	X
Upper Elbert Creek	B3						X	X	X
Lake Marie	B4				X		X		X
Los Pinos at Bayfield South	B4	X		X	X				X
Mitchell Lakes	B4				X	?	X	X	X
Vallecito Reservoir Tributary*	B4								X
Cumberland Basin	B5						X		
Endlich Mesa Basin	B5				X				
Indian Creek at Tuckerville	B5					?	X	X	
Lower Coon Creek*	B5							X	X
Middle La Plata River	B5	X	X	X	X			X	X
Needle Creek at Emerald Lake	B5						X		
Sunlight Basin	B5								
West Virginia Gulch	B5								

\* Sites damaged by wildfire in 2002.

Some general threats to biodiversity were not observed specifically at sites but rather have an effect on biodiversity on a larger landscape-level scale. These threats are discussed in the following text.

### ***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 less biological significance. Since development tends to occur adjacent to watercourses, wetland and riparian habitats are highly susceptible to development stresses.

### ***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).

### ***Livestock Grazing***

Today, many riparian areas and seeps and springs in La Plata County are 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 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 and subsequent weed invasion) 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, recreation and new developments. 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 usually necessary. When seeding, it is important to consider seedbed characteristics including rock cover, and the potential of the soil to support the planted species. A first step is to assess the current vegetation, in relation to the potential of the site. 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. Non-native species that are prevalent in La Plata County wetlands include:

Timothy	<i>Phleum pratense</i>
Reedcanary grass	<i>Phalaris arundinacea</i>
Redtop	<i>Agrostis gigantea</i>
Kentucky bluegrass	<i>Poa pratensis</i>
Smooth brome	<i>Bromus inermis</i>
Canada thistle	<i>Cirsium arvense</i>
Oxeye daisy	<i>Chrysanthemum leucanthemum</i>
Bull thistle	<i>Cirsium vulgare</i>
Musk thistle	<i>Cardus nutans</i>
Common dandelion	<i>Taraxacum officinale</i>
White sweet clover	<i>Melilotus alba</i>
Yellow sweet clover	<i>Melilotus officinalis</i>
Horseweed	<i>Conyza canadensis</i>
White-Dutch clover	<i>Trifolium repens</i>
Red clover	<i>Trifolium pratense</i>
Burdock	<i>Arctium minus</i>

### ***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 and subsequent effects of drought are many and varied and were taken into consideration when observing wetland sites in 2003. However, it is unknown how severe or limiting the stress from drought is on wetland 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 Potential Conservation Area sites profiled in this report contain beetle damaged trees, or are surrounded by forest with a large cover 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.

## **METHODS**

Focusing on private lands, site selection was based on the objective of visiting every wetland type at various geomorphic positions and elevations within La Plata County. The highest quality occurrences of each wetland type were targeted during the field season. Wetland types were defined using plant associations. CNHP classifies wetland and riparian plant associations, not wetland types. Plant associations reflect the broad nature of wetlands in the study area (e.g., willow carr, sedge meadow, cottonwood riparian forest, etc.), while also mirroring the local nature of wetlands in the watershed. Most other classifications applied to wetlands in Colorado, and across the nation, discriminate wetlands based primarily on the physiognomy (physical

structure) of the vegetation. Broad structural classes, however, do not recognize the relative rarity of the plant species or associations contained in La Plata County.

### ***Collect Available Information***

CNHP databases were updated with information regarding the known locations of species and significant plant associations 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, Rocky Mountain Herbarium, Fort Lewis College, and local private collections. The Colorado Division of Wildlife provided data on the fishes of La Plata County. Both general and specific literature sources were incorporated into CNHP databases as either locational information or as biological data pertaining to a species in general. Such information covers basic species and community biology including range, habitat, phenology (timing), food sources, and substrates. This information was entered into CNHP's Biodiversity Tracking and Conservation System (BIOTICS).

### ***Identify rare or imperiled species and significant plant associations with potential to occur in La Plata County***

The list of plant associations thought to occur in La Plata County was derived from the Colorado Statewide Wetland Classification and Characterization (CSWCC) project (Carsey *et al.* 2003) which is based on the U.S. National Vegetation Classification (USNVC) (Anderson *et al.* 1998), the accepted national standard for vegetation. The CSWCC utilized and integrated previously collected data from the Classification of Riparian Wetland Plant Associations of Colorado (Kittel *et al.* 1999), CNHP wetland surveys, and Colorado State University. The CSWCC incorporated all these data on riparian and other wetlands collected during the past 12 years as well as data from other researchers to avoid duplication of effort.

The information collected in the previous step was used to refine the potential element list and to refine our search areas. In general, species and plant associations that have been recorded from La Plata County, or from adjacent counties, are included in this list. Species or plant associations which prefer habitats that are not included in this study area were removed from the list. The list includes those elements currently monitored by CNHP that were thought to potentially occur in La Plata County and were therefore targeted in CNHP field inventories.

The amount of effort given to the inventory for each of these elements was prioritized according to the element's rank. Globally rare (G1 - G3) elements were given highest priority; state rare (S1-S3) elements were secondary.

### ***Identify Targeted Inventory Areas***

Survey sites or Targeted Inventory Areas (TIAs) were chosen based on their likelihood of harboring rare or imperiled species or significant plant associations. Known locations were targeted, and additional potential areas were chosen using a variety of information sources, such as aerial photography. Precisely known element locations were always included so that they could be verified and updated. Many locations were not precisely known due to ambiguities in the original data, e.g., "headwaters of Cataract Creek." In such cases, survey sites for that element were chosen in likely areas in the general vicinity. Areas with potentially high natural values were chosen using aerial photographs, geology maps, vegetation surveys, personal recommendations from knowledgeable local residents, and numerous roadside surveys by our field scientists.

General habitat types can be discerned from the aerial photographs, and those chosen for survey sites were those that appeared to be in the most natural condition. In general, this means those



sites that are the largest, least fragmented, and mostly free of visible disturbances such as roads, trails, fences, quarries, etc.

The above information was used to delineate over 65 survey areas that were believed to have high probability of harboring natural heritage resources.

Roadside surveys were useful in further resolving the natural condition of these areas. The condition of wetlands is especially difficult to discern from aerial photographs, and a quick survey from the road can reveal such features as weed infestation or overgrazing.

Because of the overwhelming number of potential sites and limited resources, surveys for all elements were prioritized by the degree of imperilment. For example, all species with Natural Heritage ranks of G1-G3 were the primary target of our inventory efforts. Although species with lower Natural Heritage ranks were not the main focus of inventory efforts, many of these species occupy similar habitats as the targeted species, and were searched for and documented as they were encountered.

### ***Contact Landowners***

Attaining permission to conduct surveys on private property was essential to this project. Once survey sites were chosen, land ownership of these areas was determined using records at the La Plata County assessor's office. Landowners were then either contacted by phone or mail or in person. If landowners could not be contacted, or if permission to access the property was denied, this was recorded and the site was not visited. **Under no circumstances were properties surveyed without landowner permission.**

### ***Conduct Field Surveys***

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

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

**Amphibians:** visual or with aquatic nets

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

**Wetland plant associations:** visual, collect qualitative or quantitative composition, soil, hydrological, and function data

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

When a rare species or significant natural community was discovered its precise location and known extent was recorded on 1:24,000 scale topographic maps. Other data recorded at each occurrence included numbers observed, breeding status, habitat description, disturbance features, observable threats, and potential protection and management needs. The overall significance of each occurrence, relative to others of the same element, was estimated by rating the quality (size, vigor, etc.) of the population or community, the condition or naturalness of the habitat, the long-

term viability of the population or community, and the defensibility (ease or difficulty of protecting) of the occurrence. These factors are combined into an element occurrence rank, which is useful in refining conservation priorities. See the previous section on Natural Heritage Network for more about element occurrence ranking.

Field surveys also included a wetland functional evaluation. Some of the PCAs profiled in this report were not visited by the author of this report but rather by previous CNHP ecologists. For these PCAs, no functional evaluation is given. For those PCAs visited by the primary investigator, a qualitative wetland functional evaluation is detailed in the PCA profile. Site visits and assessments were conducted on the following two levels:

(1) **Roadside or adjacent land assessments.** Many of the sites could be viewed at a distance from a public road or from adjacent public land. While on the ground the field scientist can see, even from a distance, many features not apparent on maps and aerial photos. The road assessments determined the extent of human and livestock impacts on the survey area, which included ditching, adventive plant species, indicator plant species of intensive livestock use, stream bank destabilization, major hydrologic alterations, excessive cover of non-native plant species, or new construction. Sites with one or more of these characteristics were generally excluded as potential conservation areas and no extensive data were gathered at these areas.

(2) **On-site assessments.** On-site assessment was the preferred method, as it is the only assessment technique that can yield high-confidence statements concerning the known or potential presence of rare and imperiled elements or excellent examples of common associations. On-site assessments are also the most resource intensive because of the effort required to contact landowners. In several cases where on-site assessments were desired, they could not be conducted because either field personnel were denied access to the property by the landowner, or CNHP was unable to contact the landowner during the time frame of this study.

The following information was collected for the PCAs in this report:

### ***General Field Information***

- list of all plant associations in the wetland complex, including the amount of wetland area covered by that community. In almost all cases, plant associations were immediately placed within CNHP's Statewide Wetland Classification. However, on rare occasions a plant association was encountered which could not be easily classified based on the stands that had been previously sampled
- vegetation data for each major plant association in the wetland were collected using visual ocular estimates of species cover in a representative portion of the plant association
- sketch of the site layout, with distribution of community types indicated (this was generally done on the 7.5-min. USGS topographic map, but occasionally for clarity a separate map was drawn on the site survey form)
- UTM coordinates collected from Garmin GPS 12 Personal Navigator
- elevation (from 7.5-min. USGS topographic maps)
- current and historic land use (e.g., grazing, logging, recreational use) when apparent
- notes on geology and geomorphology
- reference photos of the site
- indicators of disturbance such as logging, grazing, flooding, etc.

### **Natural Heritage Information**

- list of elements present or expected at the site
- element occurrence (EO) ranks or information that will lead to EO Rank
- proposed conservation area boundaries

### General Wetland Information

- proposed HGM Class and Subclass
- Cowardin System and Subsystem
- water source
- hydroperiod
- general soils description (these are based on either a detailed description of a soil profile in the field (e.g., horizons, texture, color, cobble size, percent mottling) or from information from the county soil surveys).

### Qualitative Functional Assessment

- hydrological functions (e.g., groundwater recharge/discharge, flood storage, shoreline anchoring)
- biogeochemical functions (e.g., elemental cycling, sediment trapping, and toxicant retention/removal)
- biological functions (e.g., foodchain support, production export, fish and wildlife habitat, habitat diversity)

### Restoration Potential

- cause of disturbances, if any (e.g., alteration of hydrology, peat removal, fill material, presence of non-native species, etc.)
- feasibility of rectifying the disturbance (re-establishing natural hydrological regime, remove fill material, plant native species, etc.)
- discussion of possible methods for restoration.

### *Delineate Potential Conservation Area Boundaries*

Finally, since the objective for this inventory is to prioritize specific areas for conservation efforts, potential conservation area boundaries were delineated. Such a boundary is an estimation of the minimum area needed to assure persistence of the element. Primarily, in order to insure the preservation of an element, the ecological processes that support that occurrence must be preserved. The preliminary potential conservation area boundary is meant to include features on the surrounding landscape that provide these functions. Typically, a minimal buffer of at least 1,000 feet was incorporated into the boundaries. Data collected in the field are essential to delineating such a boundary, but other sources of information such as aerial photography are also used. These boundaries are considered preliminary and additional information about the site or the element may call for alterations of the boundaries.

## **RESULTS**

CNHP ecologists identified 65 wetland/riparian Targeted Inventory Areas (TIAs) that merited on-site investigation (Figure 6 and Figure 7). Of the 65 TIAs, 48% are encompassed within Potential Conservation Areas. An effort was made to select sites that potentially had natural hydrology, native species composition, and vegetation structure intact. However, on-site inspection revealed that many of the wetland TIAs (31%) were heavily impacted by roads, buildings, non-native species, agriculture, and/or grazing or were considered to be common types and were dropped from the inventory. Due to time limitations, 15% of the TIAs were not visited; most of these were located on U.S. Forest Service lands, and finally only a small percentage of TIAs (6%) were not visited due to permission to survey being denied. Figure 6 depicts TIAs identified in the county which are found within PCAs; were visited but not within PCAs; those not visited; and those denied permission.

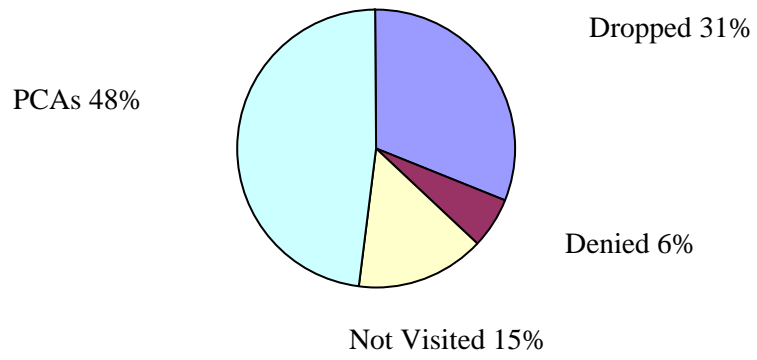


Figure 6. Summary of Targeted Inventory Areas

Figure 7. L

## SIGNIFICANT ELEMENTS ASSOCIATED WITH WETLANDS AND RIPARIAN AREAS

The following table presents CNHP elements of biological significance known to occur in or associated with wetlands in the Potential Conservation Areas in this report. This is not a comprehensive list of the elements known to occur in or associated with wetlands in La Plata County, but rather only includes those elements deemed significant enough to be archived in CNHP's BIOTICS.

Table 9. Known elements of concern found within PCAs, by taxonomic group. Elements with the highest global significance (G1-G3) are in bold type. Detailed descriptions of the wetland elements listed below can be found in the Natural History section of this document.

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status
<b>Animals</b>				
<i>Dendroica graciae</i>	Grace's Warbler	G5	S3B	
<b><i>Gila robusta</i></b>	<b>Roundtail chub</b>	<b>G3</b>	<b>S2</b>	<b>BLM, SC</b>
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T3	S3	FS/BLM SC
<b>Plants</b>				
<i>Aralia racemosa</i>	American Spikenard	G4G5	S1	
<b><i>Besseyia ritteriana</i></b>	<b>Kittentails</b>	<b>G3</b>	<b>S3</b>	
<i>Carex viridula</i>	Green sedge	G5	S1	
<i>Commelina dianthifolia</i>	Birdbill dayflower	G5	S1	
<i>Cypripedium calceolus</i> subs. <i>parviflorum</i>	Yellow ladies slipper	G5	S2	
<b><i>Draba spectabilis</i> var. <i>oxyloba</i></b>	<b>Showy whitlow-grass</b>	<b>G3?T3Q</b>	<b>S3S4</b>	
<i>Eriophorum altaicum</i> var. <i>neogeum</i>	Altai cottongrass	G4?T3T 4	S3	FS
<i>Polypodium hesperium</i>	Western polypody	G5	S1S2	
<i>Woodsia neomexicana</i>	New Mexico cliff fern	G4	S2	
<b>Plant Communities</b>				
<b><i>Abies concolor</i> – (<i>Picea pungens</i>)-<i>Populus angustifolia</i>/<i>Acer glabrum</i></b>	<b>White fir-blue spruce-narrowleaf cottonwood / Rocky Mountain maple</b>	<b>G2</b>	<b>S2</b>	
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Alnus incana</i> ssp. <i>tenuifolia</i>	Subalpine fir-Engelmann spruce/ thinleaf alder forest	G5	S5	
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Calamagrostis canadensis</i>	Subalpine fir – Engelmann spruce / bluejoint reedgrass	G5	S3	
<i>Abies lasiocarpa</i> – <i>Picea engelmannii</i> / <i>Salix drummondiana</i>	Subalpine fir – Engelmann spruce / Drummond willow	G5	S4	
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> - <i>Populus angustifolia</i> / <i>Lonicera involucrata</i>	Subalpine fir-Engelmann spruce-narrowleaf cottonwood/ twinberry honeysuckle	G4	S3	
<b><i>Acer negundo</i>-<i>Populus angustifolia</i>/<i>Cornus sericea</i></b>	<b>Boxelder-narrowleaf cottonwood/red-osier dogwood</b>	<b>G2</b>	<b>S2</b>	
<i>Alnus incana</i> / <i>Cornus sericea</i>	<b>Thinleaf alder/red-osier</b>	<b>G3Q</b>	<b>S3</b>	

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status
	<b>dogwood</b>			
<i>Alnus incana</i> / mesic forbs	<b>Thinleaf alder / mesic forbs shrubland</b>	<b>G3</b>	<b>S3</b>	
<i>Alnus incana</i> / <i>Salix drummondiana</i>	<b>Thinleaf alder / shortfruit willow</b>	<b>G3</b>	<b>S3</b>	
<i>Betula glandulosa</i> /mesic forb-mesic graminoid	<b>Bog birch/mesic forb-mesic graminoid shrubland</b>	<b>G3G4</b>	<b>S3</b>	
<i>Cardamine cordifolia</i> - <i>Mertensia ciliata</i> - <i>Senecio triangularis</i>	Alpine wetlands	G4	S4	
<i>Carex utriculata</i>	Beaked sedge herbaceous vegetation	G5	S5	
<i>Festuca thurberi</i>	Thurber's fescue grassland	G4	S	
<i>Picea engelmannii</i> / <i>Trautvettaria carolinensis</i>	<b>Engelmann spruce/Carolina tasselrue montane forest</b>	<b>G3</b>	<b>S2?</b>	
<i>Picea pungens</i> / <i>Alnus incana</i>	<b>Blue spruce / thinleaf alder</b>	<b>G3</b>	<b>S3</b>	
<i>Populus angustifolia</i> - <i>Picea pungens</i> / <i>Alnus incana</i>	Narrowleaf cottonwood-blue spruce/thinleaf alder	G4	S4	
<i>Populus angustifolia</i> / <i>Alnus incana</i> ssp. <i>tenuifolia</i>	<b>Narrowleaf cottonwood/thinleaf alder woodland</b>	<b>G3</b>	<b>S3</b>	
<i>Populus angustifolia</i> / <i>Betula occidentalis</i>	<b>Narrowleaf cottonwood/river birch</b>	<b>G3</b>	<b>S3</b>	
<i>Populus angustifolia</i> / <i>Cornus sericea</i>	Narrowleaf cottonwood/red-osier dogwood	G4	S3	
<i>Populus angustifolia</i> / <i>Crataegus rivularis</i>	<b>Narrowleaf cottonwood/river hawthorn woodland</b>	<b>G2</b>	<b>S2</b>	
<i>Populus angustifolia</i> - <i>Juniperus scopulorum</i>	<b>Narrowleaf cottonwood-Rocky Mountain juniper</b>	<b>G2G3</b>	<b>S3</b>	
<i>Populus angustifolia</i> / <i>Rhus trilobata</i>	<b>Narrowleaf cottonwood/skunkbush</b>	<b>G3</b>	<b>S3</b>	
<i>Populus angustifolia</i> / <i>Salix eriocephala</i> var. <i>ligulifolia</i> – <i>Shepherdia argentea</i>	<b>Narrowleaf cottonwood / strapleaf willow – silver buffaloberry</b>	<b>G2</b>	<b>S2</b>	
<i>Pseudotsuga menziesii</i> / <i>Paxistima myrsoides</i>	<b>Douglas fir/Mountain lover montane forest</b>	<b>G2G3</b>	<b>S2S3</b>	
<i>Populus angustifolia</i> / <i>Pseudotsuga menziesii</i>	narrowleaf cottonwood / Douglas fir	G4	S3	
<i>Populus tremuloides</i> / <i>Cornus sericea</i>	<b>Quaking aspen/red-osier dogwood</b>	<b>G3</b>	<b>S3</b>	
<i>Salix drummondiana</i> /mesic forb	Drummond (blue) willow/mesic forb shrubland	G4	S4	
<i>Salix ligulifolia</i>	<b>Strapleaf willow shrubland</b>	<b>G2G3</b>	<b>S2S3</b>	
<i>Salix lucida</i> var. <i>lasiandra</i>	<b>Shining willow shrubland</b>	<b>G3Q</b>	<b>S2S3</b>	
<i>Salix monticola</i> /mesic forb	<b>Rocky Mountain (serviceberry) willow/mesic forb shrubland</b>	<b>G3</b>	<b>S3</b>	
<i>Salix monticola</i> /mesic graminoid	<b>Rocky Mountain (serviceberry) willow/mesic graminoid shrubland</b>	<b>G3</b>	<b>S3</b>	

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status
<i>Salix planifolia/Caltha leptosepala</i>	Planeleaf willow/marsh marigold	G4	S4	
<i>Salix planifolia/Carex utriculata</i>	<b>Planeleaf willow/beaked sedge</b>	<b>G3G4</b>	<b>S2</b>	
<i>Schoenoplectus acutus var. acutus-Schoenoplectus tabernaemontani</i>	Hardstem bulrush-softstem bulrush herbaceous vegetation	G4	S2S3	

### SITES OF BIODIVERSITY SIGNIFICANCE

The 34 most important wetland sites in La Plata County are profiled in this section as Potential Conservation Areas (PCAs) with biodiversity ranks (Table 10). These PCAs include the wetlands with the highest biodiversity significance, as well as the best examples of common wetland types present in the study area. Five are identified as being nearly irreplaceable biodiversity significance (B2), 19 of high biodiversity significance (B3), five of moderate biodiversity significance (B4), and five of general biodiversity significance (B5). The highest ranking PCAs are the highest priorities for conservation action.

The two NCA summaries appear at the beginning of the PCA profiles, and the PCAs are then organized in ascending order according to their B-rank (e.g. B2 to B5). Concluding the PCAs are the Missionary Ridge Burned Area sites. Following the PCAs are two sites of local significance.

Each Potential Conservation Area (PCA) is described in a standard PCA profile report that reflects data fields in CNHP's BIOTICS. The contents of the profile report are outlined and explained below:

**PCA Profile Explanation Biodiversity Rank: B#**

The overall significance of the PCA in terms of rarity of the Natural Heritage resources and the quality (condition, abundance, etc.) of the occurrences. Please see Natural Heritage Ranking System section for more details.

**Protection Urgency Rank: P#**

A summary of major land ownership issues that may affect the long-term viability of the PCA and the element(s).

**Management Urgency Rank: M#**

A summary of major management issues that may affect the long-term viability of the PCA and the element(s).

**Location:** General location.

**Legal Description:** USGS 7.5-minute Quadrangle name(s) and Township Range Section(s).

**Size:** Expressed in acres.

**Elevation:** Expressed in feet.

**Redders, 2003, Community Type:** Jeffery S. Redders, Ecologist for the San Juan National Forest completed A Classification of Riparian Area and Wetland Vegetation Of the San Juan National Forest in September 2003. Using this classification, canopy cover from field data collected in 2003 or canopy cover from data recorded in CNHPs database were used to determine the community type. In some instances, percent cover was not high enough to satisfy the percent cover criteria in this classification. In these instances, the most dominant species were taken into consideration or the classification was considered not applicable.

**General Description:** A brief narrative of the topography, hydrology, vegetation, and current use of the potential conservation area.

**Biodiversity Rank Comments:** A synopsis of the rare species and significant plant communities that occur within the proposed conservation area. A table within the area profile lists each element occurrence found in the PCA, global and state ranks of these elements, the occurrence ranks and federal and state agency special designations. See Table 3 for explanations of ranks and Table 4 for legal designations.

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

**Protection Rank Comments:** Discussion of major land ownership issues that may affect the long-term viability of the PCA and the element(s).

**Management Rank Comments:** Discussion of major management issues that may affect the long-term viability of the PCA and the element(s).

**Soils Description:** Soil profile descriptions were generally conducted at each PCA. When these profile descriptions were found to match the mapped soil type found in the county soil surveys, then reference is only given to that particular soil series and no profile description is provided. However, if a profile description did not match the mapped soil type, then profile descriptions are presented. Classification of these soils was conducted, when possible, using *Keys to Soil Taxonomy* (Soil Survey Staff 1990).

**Wetland Functional Assessment:** A summary of the functions and the proposed HGM classification, Cowardin system, and the plant community derived from CNHP's Statewide Wetland Classification for the wetlands occurring within each Potential Conservation Area. (Note: Some of the PCAs profiled in this report were not visited by the principal investigator but rather by previous CNHP ecologists. For these PCAs, no functional evaluation is given. For those PCAs visited by an author, a wetland functional evaluation is detailed in the PCA profile.)

**Restoration Potential:** A brief summary describing the feasibility of restoring ecosystem processes at each PCA.

These PCAs alone do not represent a complete wetland conservation program; they represent only the rare and imperiled elements.



Table 10. Potential Conservation Areas contained within La Plata County, arranged by biodiversity rank (B-rank).

<b>Potential Conservation Areas</b>
<b>B2</b>
Animas River Canyon
Junction Creek
Lightner Creek
Lower Hermosa Creek
Madden Creek
<b>B3</b>
Animas River at La Posta
Animas River at Rockwood
Cumberland Basin
Elbert Creek
Falls Creek
Florida River at Burnt Timber Creek
Haviland Lake
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
Spring Creek North
Upper Elbert Creek
Upper Hermosa Creek
Vallecito Creek - Johnson Creek
<b>B4</b>
Endlich Mesa Basin
Los Pinos at Bayfield South
Lower Coon Creek
Mitchell Lakes
Vallecito Reservoir Tributary
<b>B5</b>
Lake Marie
Middle La Plata River
Needle Creek at Emerald Lake
Sunlight Basin
West Virginia Gulch

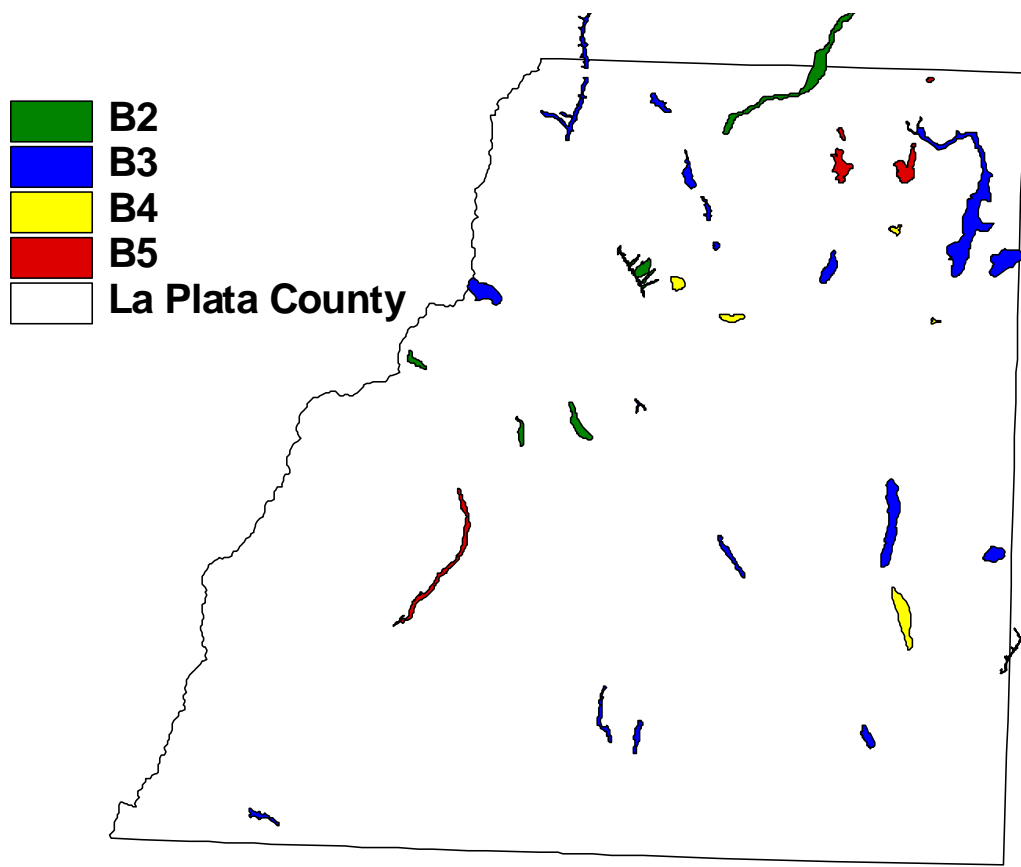


Figure 8. Location of wetland PCAs in La Plata County.

## *Animas River NCA*

**Location:** The Animas River Network of Conservation Areas is located along the Animas River corridor for the entire length of La Plata County and part of San Juan County to the north.

U.S.G.S. 7.5-min. quadrangles: Snowdon Peak; Mountain View Crest; Electra Lake; Hermosa; Durango East; Durango West; Loma Linda; Basin Mountain; Long Mountain.

**Elevation:** 6100 – 7200 ft.

**Size:** Approximately 14,861 acres

**General Description:** The Animas River Network of Conservation Areas is located in both San Juan County and La Plata County. In the higher elevations, the Animas River cuts through a steep, narrow canyon. In this area, the NCA encompasses a mosaic of high quality riparian communities of mixed conifer and deciduous forests. The natural periodic flooding regime is intact. At lower elevations the Animas River NCA surrounds a wide alluvial valley within mesa/canyon topography. Wide meanders, point bar deposits, and terraces from channel migration support a variety of riparian deciduous woodlands and shrublands. Some back flow eddies, small sloughs and water from springs support patches of emergent wetlands.

Mining activities at its headwaters, along with natural mineral erosion have polluted the Upper Animas watershed. The waters in the Upper Animas are uninhabitable by fish. Tributary dilution and conservation efforts both contribute to the marked improvement in water quality by the time the Animas reaches La Plata County (USDI 2000; USGS 2000; Blair et al., 1996). In Durango, the river is considered gold-medal fishing waters by the US Fish and Wildlife Service. Riparian vegetation along the Animas is rich in diversity and structure, providing the region with important habitat. Anthropogenic influences impact riparian and wetland areas along the river. The Animas valley, from Bakers Bridge to its southern most reaches, is largely agricultural with current trends toward residential development. Golf courses are becoming more common along the river near Hermosa. Ownership is generally USFS in the northern portion and private or tribal in the southern portion. Small parcels (most less than 500 acres) line the Animas River from Bakers Bridge to the state line.

The Animas River provides water for agriculture and 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 in the fall of 2003. The new reservoir will cover Ridges Basin, west of the Animas River. The water is being pumped from the river, not dammed. 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 (in this case a major diversion) 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 are subject to invasion by exotic species such as tamarisk and Russian olive. In a functioning cottonwood system, a mosaic of age classes and a variety of associations take place along the river continuum.

Table 11. PCAs and Sites of Local Significance within the Animas River NCA

PCA Name	
Animas River Canyon	B2
Animas River at Rockwood	B3
Animas River at La Posta	B3
Lower Animas River	B5**
Site of Local Significance*	
Animas River at Durango	No Rank

\* Sites of Local Significance are not officially attached to an NCA in the CNHP database.

\*\*Site is profiled in La Plata County Biological Assessment, Lyon et al., 2004 and not in this document.

Table 12. Combined Element Occurrences associated with the PCAs within Animas River NCA.

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

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



**Figure 9. Animas River Network of Conservation Areas**



6 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.

 **NCA Boundary**

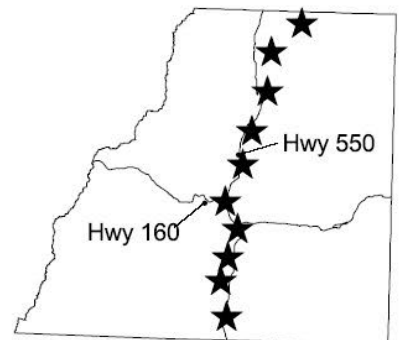
Durango, 37106-A1  
 1x2 Degree Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**





## *Hermosa Creek NCA*

**Location:** The Hermosa Creek Network of Conservation Areas is located in La Plata and San Juan counties, Colorado. It comprises the entire Hermosa Creek watershed, including thirteen potential conservation areas.

U.S.G.S. 7.5-min. quadrangles: Hermosa Peak, Engineer Mountain, Orphan Butte, Elk Creek, Electra Lake, La Plata, Monument Hill, and Hermosa

**Elevation:** 6642 to 12,519 ft.

**Size:** Approximately 108,102 acres

**General Description:** The NCA comprises the entire watershed of Hermosa Creek. The headwaters of Hermosa Creek begin in the high San Juan Mountains at Bolam Pass and run south. Hermosa Creek is a major tributary of the Animas River, and joins that river in La Plata County at Hermosa, approximately eight miles north of Durango. Vegetation in the NCA ranges from prostrate shrub tundra and alpine meadows at the headwaters, through spruce-fir and aspen forests, to ponderosa pine forests at the lower elevations. Geologic substrates include Precambrian rocks, Jurassic sandstones of the Morrison, Wanaka and Entrada formations, Triassic Dolores formation, and Pennsylvanian sandstones, shales and limestone of the Rico and Hermosa formations. The PCAs within the NCA share a dependence on hydrology and the health of the adjacent uplands to support the riparian plant communities and animals such as cutthroat trout.

The area surrounding the Hermosa Creek Trail receives heavy recreation including ATV/motorcycle use, horse packing, mountain biking, fishing and hiking. There is also a ski area on the east side of the NCA, where the Forest Service leases land to the Durango Mountain Resort. More research is needed to evaluate the impacts of this lease (i.e., snowmaking).

Table 13. PCAs included in the Hermosa Creek NCA:

PCA Name	Biodiversity Significance
Upper Hermosa Creek	B3
Highline Trail*	B3
Middle Hermosa Creek	B3
Mitchell Lakes	B3
Sheephead Basin*	B3
Orphan Butte*	B4
Big Bend Creek*	B5
Clear Creek La Plata*	B5
Deer Creek*	B5
East Fork Hermosa Creek*	B5
Lower Hermosa Creek	B5

\*Sites profiled in La Plata County Biological Assessment, Lyon et al., 2004. \*Sites are not profiled in this document.

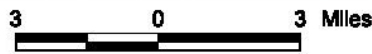
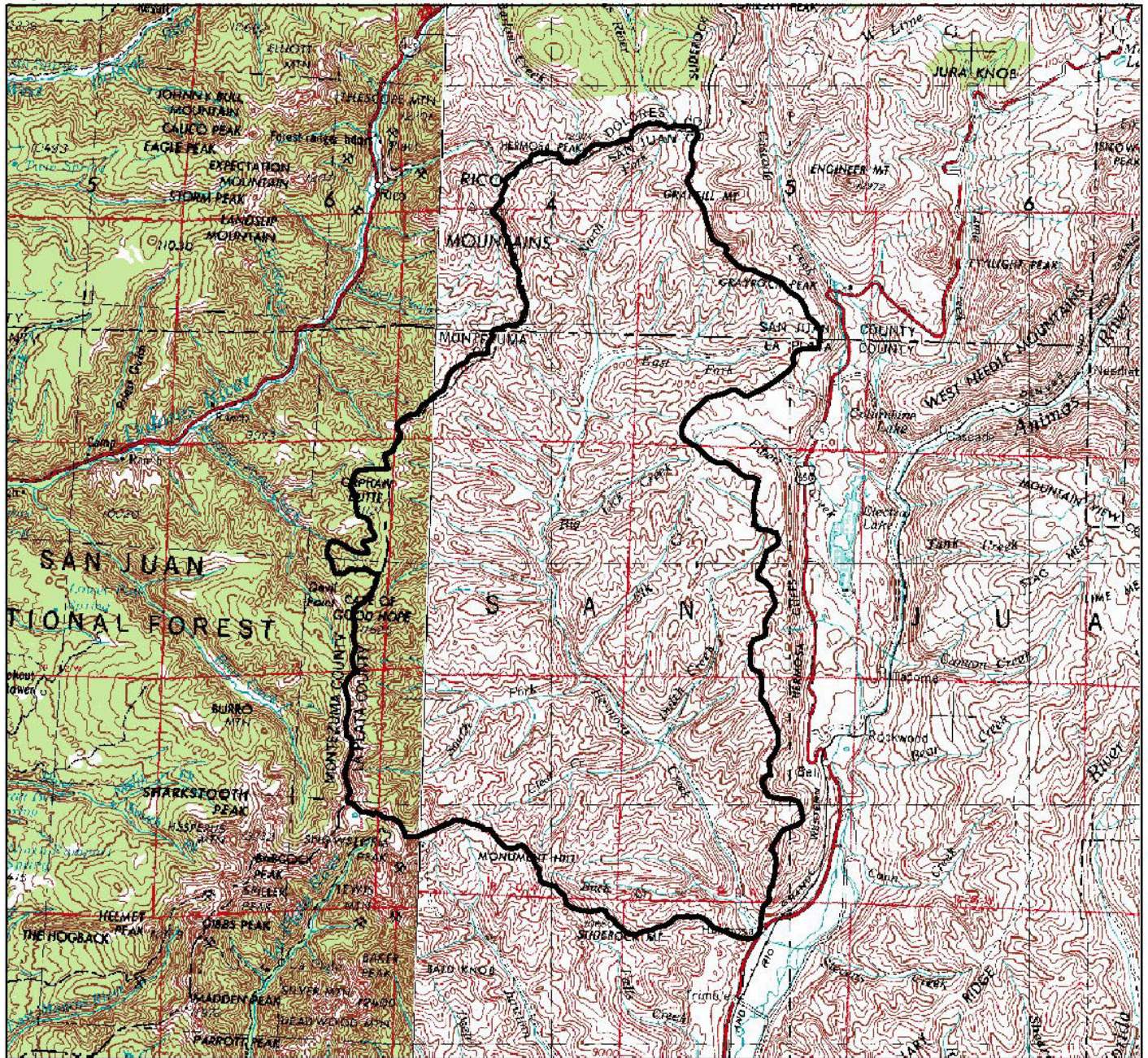
Table 14. Combined Element Occurrences Hermosa Creek NCA

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	BLM/FS	US
<b>Natural Communities</b>						
<i>Abies concolor-Picea pungens-Populus angustifolia/Acer glabrum</i>	Montane Riparian Forests	G2	S2	B		
<i>Abies lasiocarpa/Erigeron eximius</i>	Subalpine Forests	G5	S4	A		
<i>Abies lasiocarpa-Picea engelmannii/Calamagrostis canadensis</i>	Montane Riparian Forests	G5	S3	B		
<i>Cardamine cordifolia-Mertensia ciliata-Senecio triangularis</i>	Alpine Wetlands	G4	S4	C		
<i>Festuca thurberi</i> subalpine grassland herbaceous vegetation	Subalpine Grasslands	G3	S3	A		
<i>Picea pungens/Alnus incana</i>	Montane Riparian Forests	G3	S3	B		
<i>Picea pungens/Alnus incana</i>	Montane Riparian Forests	G3	S3	B		
<i>Populus angustifolia-Picea pungens/Alnus incana</i>	Montane Riparian Forests	G4	S4	AB		
<i>Salix brachycarpa</i> /mesic forb	Alpine Willow Scrub	G4	S4	B		
<i>Salix monticola</i> /mesic forb	Montane Riparian Willow Carr	G4	S3	D		
<i>Schoenoplectus tabernaemontani-Schoenoplectus acutus</i>	Great Plains Marsh	G4	S2S3	B		
<b>Plants</b>						
<i>Aralia racemosa</i>	American Spikenard	G4G5	S1			
<i>Besseyia ritteriana</i>	Ritter's Coral-drops	G3	S3	B		
<i>Besseyia ritteriana</i>	Ritter's Coral-drops	G3	S3	A		
<i>Botrychium pinnatum</i>	Northern Moonwort	G4?	S1	E		
<i>Cypripedium calceolus ssp. parviflorum</i>	American Yellow Lady's-slipper	G5	S2	E	USFS: Y	

<b>Birds</b>						
<i>Dendroica graciae</i>	Grace's Warbler	G5	S3B	E		
<i>Tympanuchus phasianellus columbianus</i>	Columbian Sharp-tailed Grouse	G4T3	S2	H	USFS: Y, BLM: Y	
<b>Mammals</b>						
<i>Mustela nigripes</i>	Black-footed Ferret	G1	S1	X		LE, X, N
<b>Fish</b>						
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River Cutthroat Trout	G4T3	S3	H	BLM: Y	
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River Cutthroat Trout	G4T3	S3	E	BLM: Y	
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River Cutthroat Trout	G4T3	S3	E	BLM: Y	



**Figure 10. Hermosa Creek Network of Conservation Areas**



**Colorado Natural Heritage Program**

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 Fort Collins, CO 80523-8002

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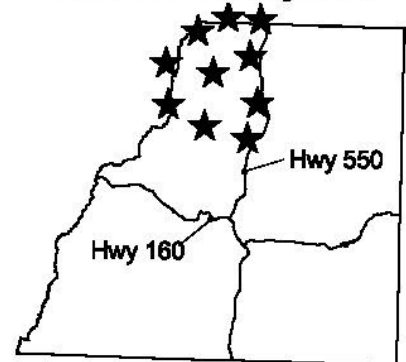
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 **NCA Boundary**

Durango, 37106-A1  
 Cortez, 37108-A1  
 1x2 Degree 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 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 oak (*Quercus gambelii*). Riparian species such as box elder (*Acer negundo*) and river birch (*Betula fontinalis*) 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
<b>Plant Community</b>					
<b><i>Abies concolor – Picea pungens – Populus angustifolia/Acer glabrum</i></b>	<b>White fir – blue spruce – narrowleaf cottonwood/ Rocky Mountain maple</b>	<b>G2</b>	<b>S2</b>		<b>A</b>
<i>Picea pungens/Alnus incana</i> woodland	Blue spruce/thinleaf alder- Montane riparian forests	G3	S3		A
<i>Populus angustifolia-Pseudotsuga menziesii</i> forest	Narrowleaf cottonwood-Douglas fir -Montane riparian forest	G3	S2		A
<i>Abies lasiocarpa-Picea engelmannii-Populus angustifolia/Lonicera involucrata</i> forest	Subalpine fir-Blue spruce-Narrowleaf cottonwood/twinberry-Montane riparian forest	G4	S3		B
<i>Populus angustifolia/Salix exigua</i> forest	Narrowleaf cottonwood/coyote willow riparian forests	G4	S4		B
<i>Populus angustifolia-Picea pungens/Alnus incana</i> forest	Narrowleaf cottonwood-Blue spruce/thinleaf alder-Montane riparian forests	G4	S4		A
<i>Alnus incana/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.

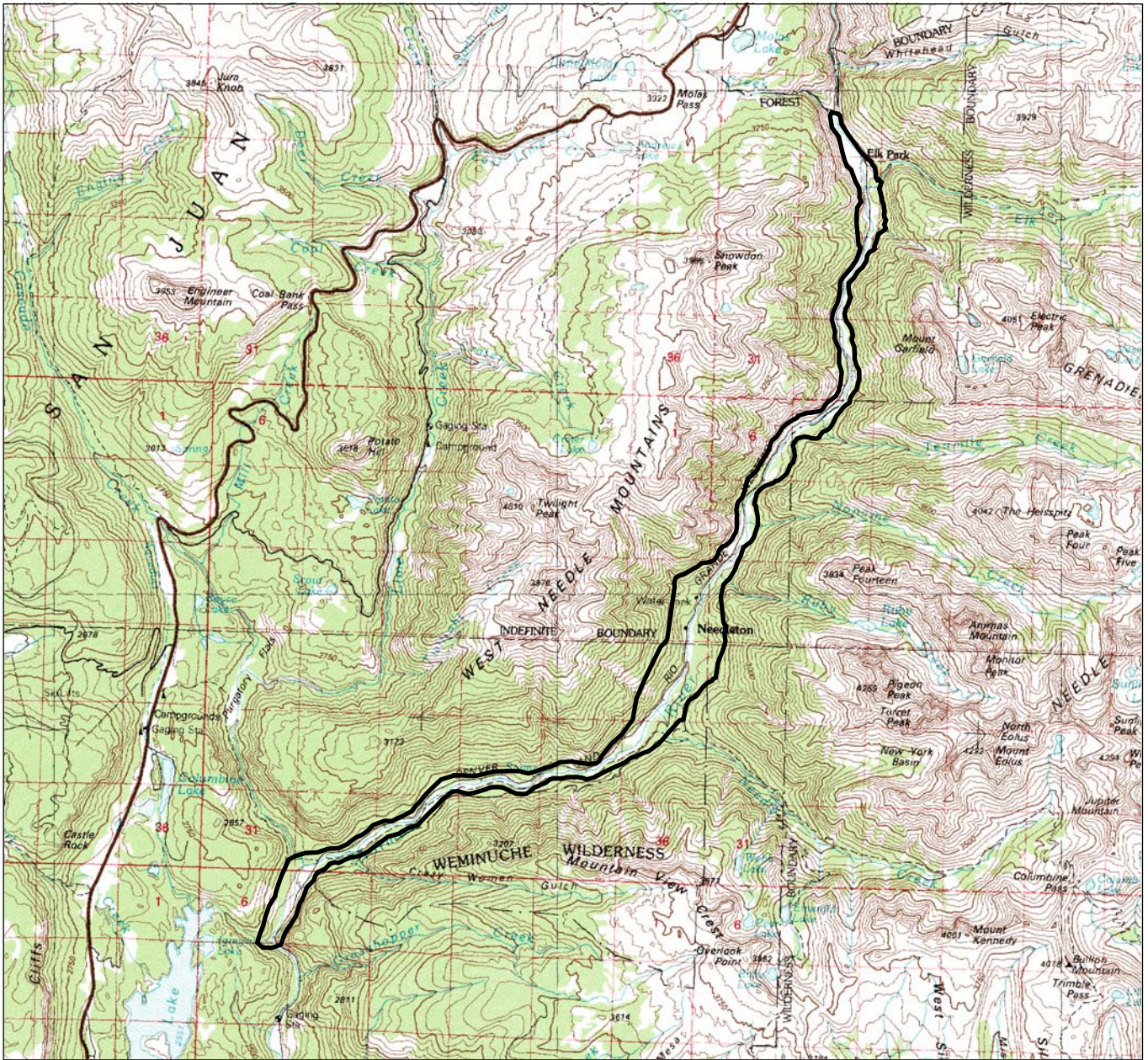
**Management Comments:** Most of the canyon is not accessible. There is probably some effect on vegetation from the train's smoke. Continued monitoring will help to protect the area from invasive non-native plants that may be introduced by the railroad or recreational users.

**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.


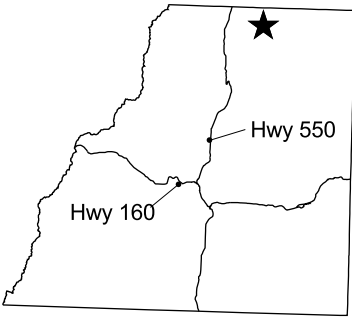
**Wetland Functional Assessment for the Animas River Canyon PCA:** Wetland ecologists did not visit this site in 2003, thus a functional assessment was not performed. The site was visited in 2002.



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



1 0 1 Miles

<p><b>Colorado Natural Heritage Program</b>                  Colorado State University                  College of Natural Resources                  8002 Campus Delivery                  Fort Collins, CO 80523-8002</p> <p><b>Disclaimer</b>                  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> <b>PCA Boundary</b></p> <p>Silverton, 37107-E1                  30x60 Minute Series</p> <p>Digital Raster Graphics produced by the U.S. Geological Survey                  map created 2 April 2004                  UTM, Zone13, NAD27</p>	<p><b>Location in Study Area</b></p> 
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## *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
<b>Plant Community</b>					
<i>Acer negundo</i> – <i>Populus angustifolia</i> / <i>Cornus sericea</i>	<b>Box elder – narrowleaf cottonwood / red-osier dogwood</b>	<b>G2</b>	<b>S2</b>		<b>A</b>
<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

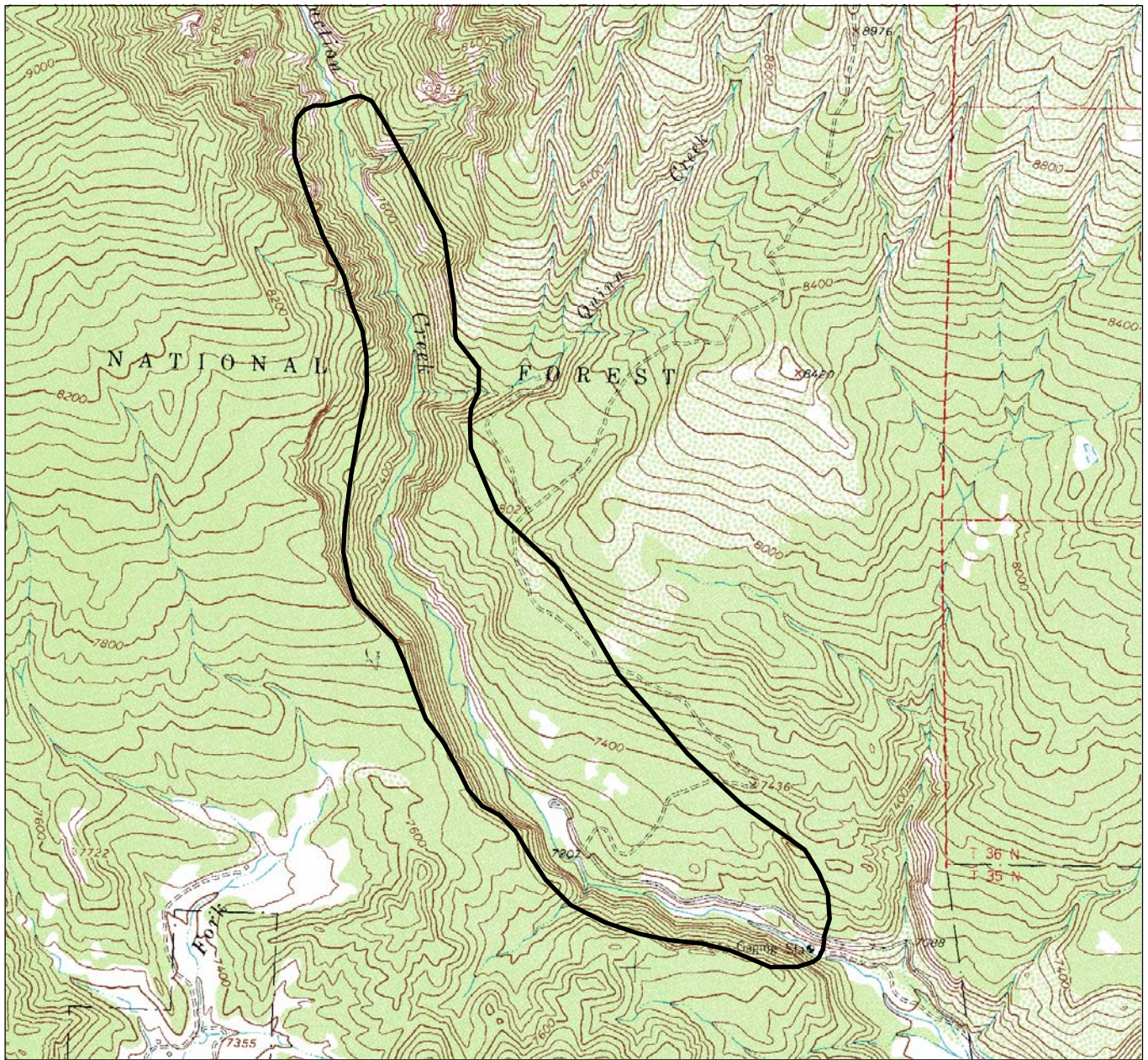
**CNHP's Wetland Classification:**

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

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This riparian wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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.


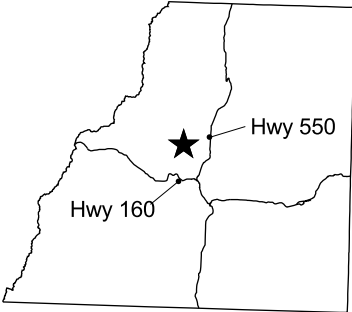


**Figure 12. Junction Creek Potential Conservation Area, B2: Very High Biodiversity Significance**



0.25 0 0.25 Miles



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## *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:** 7700ft.

**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
<b>Plant Community</b>					
<i>Acer negundo</i> – <i>Populus angustifolia</i> / <i>Cornus sericea</i>	<b>Box elder – narrowleaf cottonwood / red-osier dogwood</b>	<b>G2</b>	<b>S2</b>		<b>B</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/disturbances that cause erosion may contribute to excessive sediment deposition, elevated nutrient levels and invite weed invasion in the wetland area. 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 erosion and weed invasion in the PCA.

**Soils Description:** Soils within the riparian area are rocky and alluvium derived. Carsey and others (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 (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

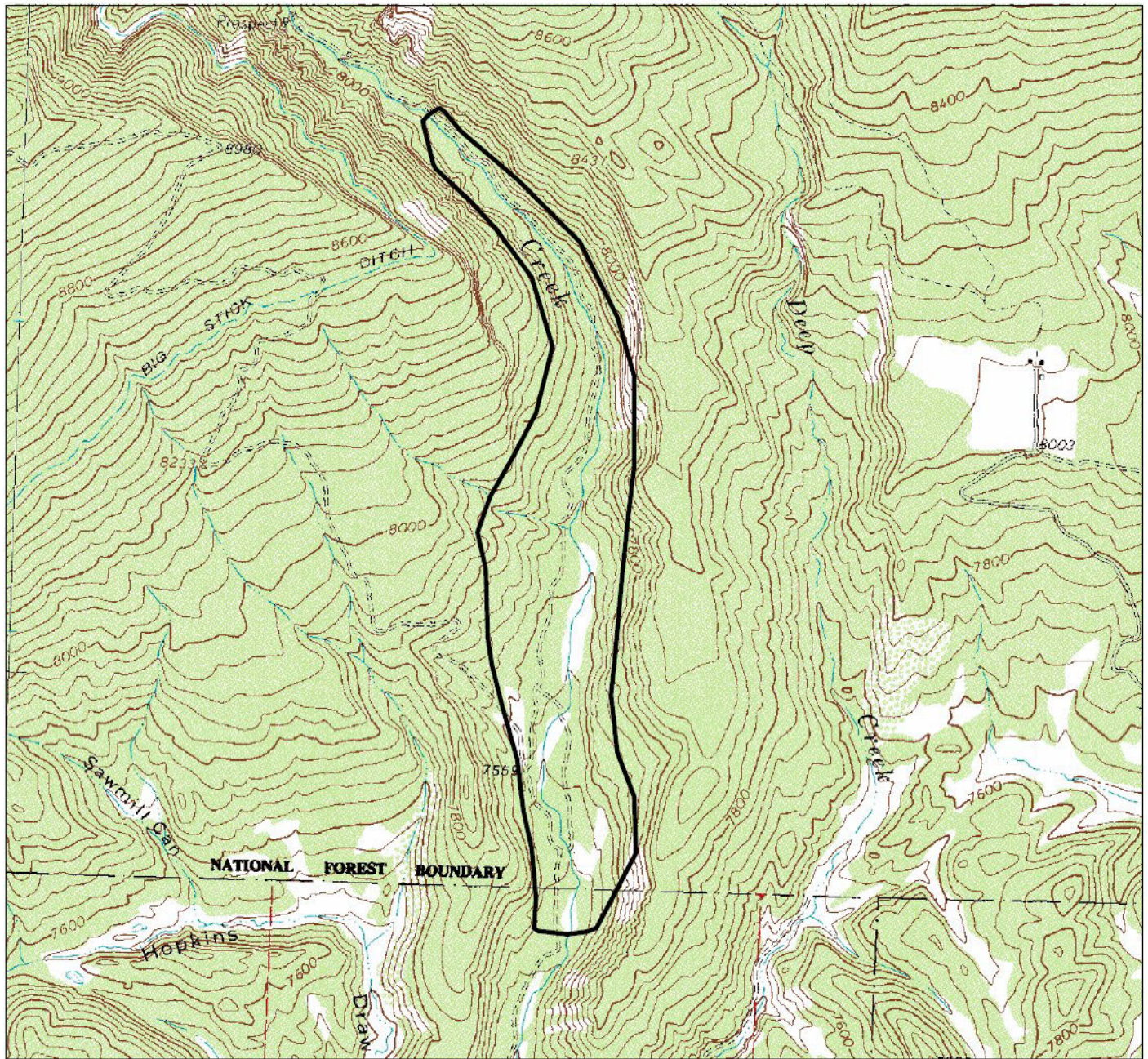
**CNHP's Wetland Classification:** *Acer negundo* – *Populus angustifolia* / *Cornus sericea*

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

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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**



**Colorado Natural Heritage Program**

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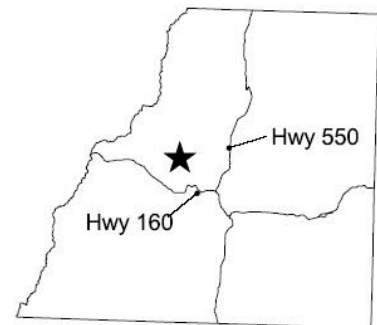
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 **PCA Boundary**

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**





## *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 Gambel 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 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
<b>Plant Community</b>					
<b><i>Abies concolor-Picea pungens-Populus angustifolia/Acer glabrum</i></b>	<b>Montane riparian forest</b>	<b>G2</b>	<b>S2</b>		<b>B</b>
<i>Dendroica graciae</i>	Graces warbler	G5	S3B		E
<i>Cypripedium calceolus</i> ssp. <i>parviflorum</i>	American yellow ladys slipper	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 (*Breea arvensis*), 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

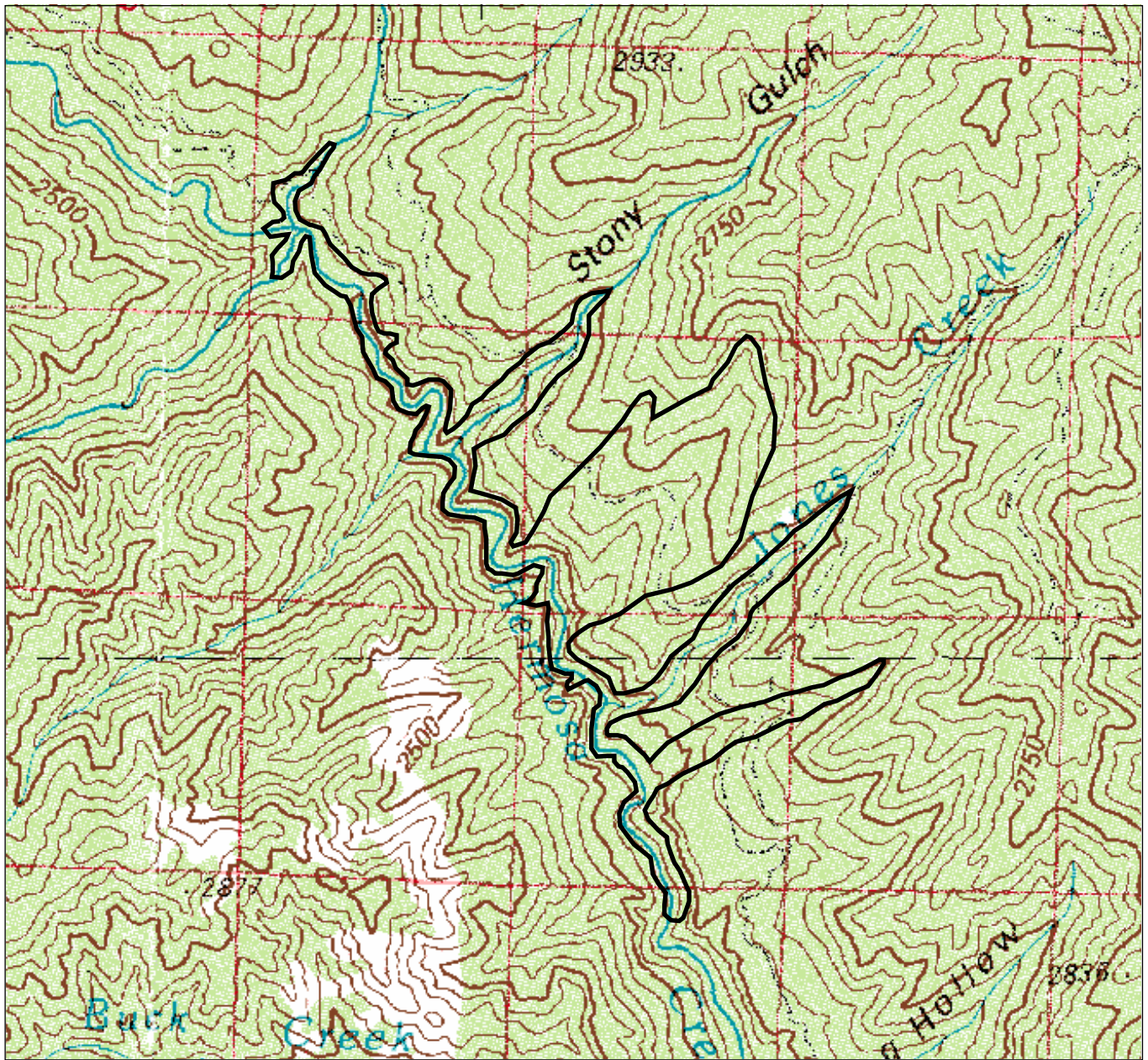
**CNHP's Wetland Classification:** *Abies concolor-Picea pungens-Populus angustifolia/Acer glabrum*

Table 21. Wetland functional assessment for the slope wetland at the Lower Hermosa Creek PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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**

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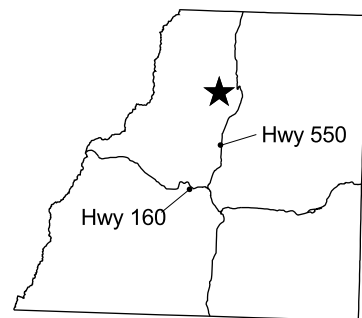
 **PCA Boundary**

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
<b>Plant Community</b>					
<i>Abies concolor</i> – <i>Picea pungens</i> – <i>Populus angustifolia</i> / <i>Acer glabrum</i>	<b>White fir – blue spruce - narrowleaf cottonwood / Rocky Mountain maple</b>	<b>G2</b>	<b>S2</b>		<b>B</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 old roads where heavy disturbance that causes erosion may contribute to excessive sediment deposition elevated nutrient levels and invites 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

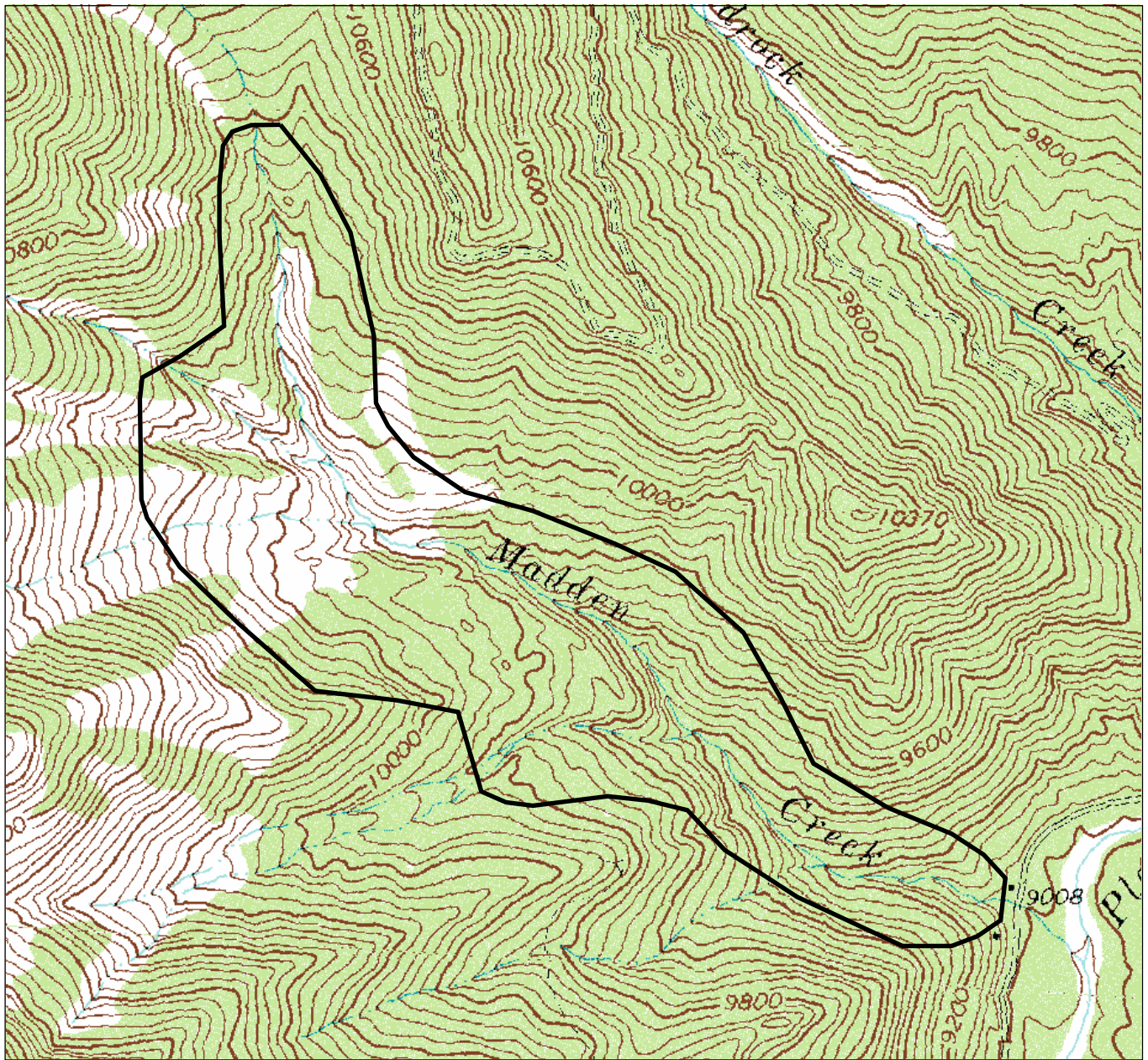
**CNHP's Wetland Classification:** *Abies concolor* – (*Picea pungens*) – *Populus angustifolia* / *Acer glabrum*

Table 23. Wetland functional assessment for the riverine wetland at the Madden Creek PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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**

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 College of Natural Resources  
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 Fort Collins, CO 80523-8002

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 **PCA Boundary**

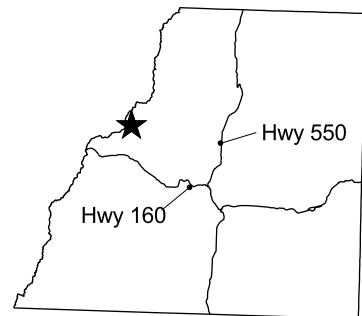
La Plata, 37108-D1  
 7.5 Minute Series

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 are 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
<b>Plant Community</b>					
<i>Populus angustifolia/ Salix eriocephala var. ligulifolia – Shepherdia argentea</i>	<b>Narrowleaf cottonwood/ strapleaf willow – silver buffaloberry</b>	<b>G2</b>	<b>S2</b>		<b>C</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, 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. 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

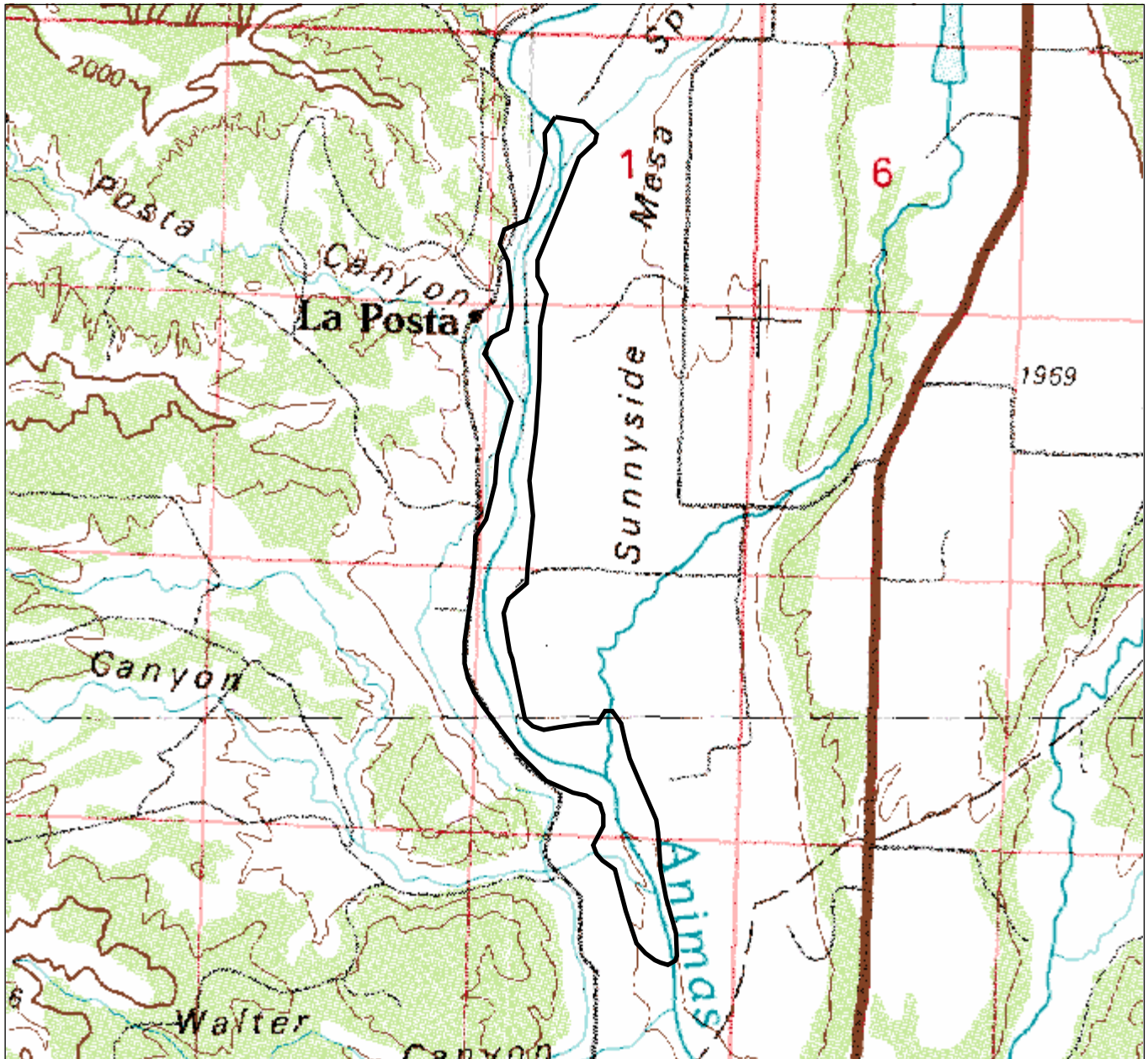
**Cowardin System:** Palustrine

**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.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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**

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 **PCA Boundary**

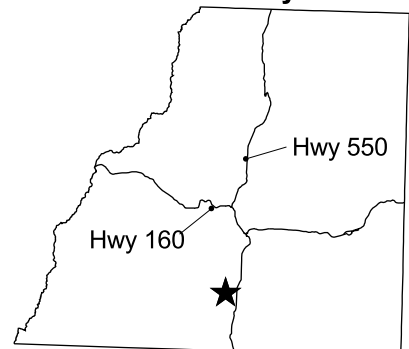
Durango, 37107-A1  
 30x60 Minute Series

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 to 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
<b>Plant Community</b>					
<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.

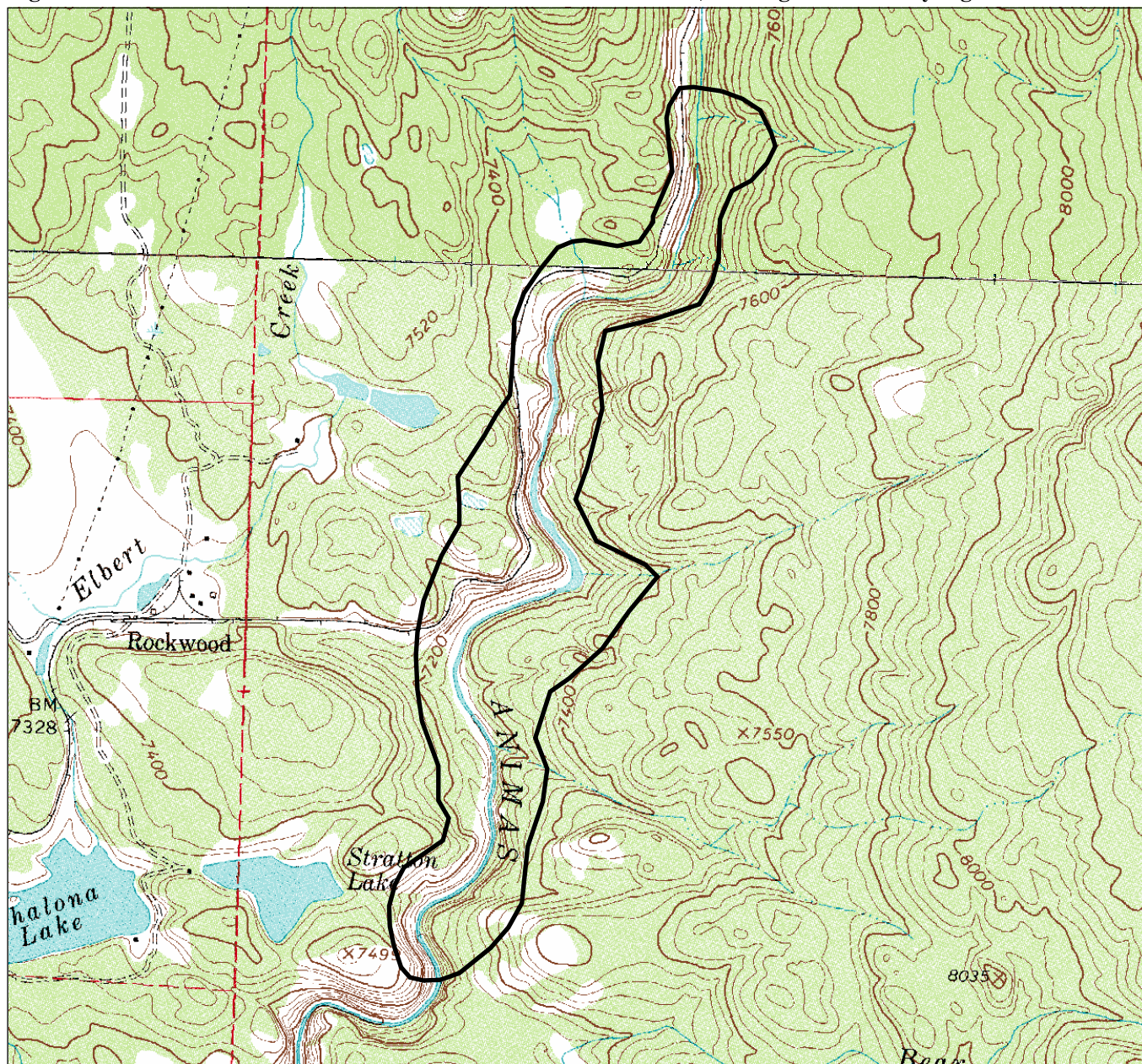
**Soils Description:** Very little soil development is taking place in the narrow, rocky canyon with boulders, cobble and gravel and very shallow mineral soils. Soils for the narrowleaf cottonwood / thinleaf alder community type are typically coarse textured, ranging from deep sands to shallow sandy 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.


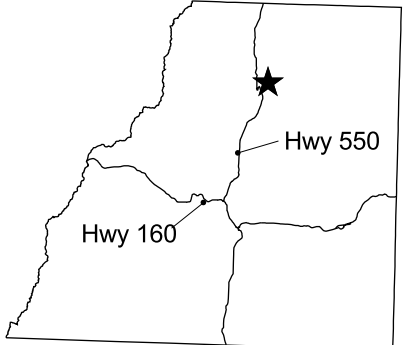
**Wetland Functional Assessment for the Animas River at Rockwood PCA:** CNHP wetland ecologists did not visit this site in the 2003 field season. Thus, a functional assessment could not be conducted.



**Figure 17. Animas River at Rockwood Potential Conservation Area, B3: High Biodiversity Significance**



0.2 0 0.2 Miles

<p><b>Colorado Natural Heritage Program</b>                  Colorado State University                  College of Natural Resources                  8002 Campus Delivery                  Fort Collins, CO 80523-8002</p> <p><b>Disclaimer</b>                  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> <b>PCA Boundary</b></p> <p>Hermosa, 37107-D7                  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><b>Location in Study Area</b></p> 
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## Cumberland Basin PCA

**Biodiversity Rank: B3.** High biodiversity significance. The PCA contains an excellent example of a globally imperiled (G3) rare plant and a good (B ranked) example of a globally secure (G4) plant community.

**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: M4.** Although the area is not currently threatened, management may be needed in the future to maintain the current quality of the element occurrence. Weed invasion and recreation are the main threats to the PCA.

**Location:** The Cumberland Basin PCA is located in the basin surrounding Taylor Lake in the La Plata Mountain Range.

U.S.G.S. 7.5-min. quadrangles: La Plata

Legal Description: T37N R11W Section 24

**Elevation:** 11,500 ft.

**Size:** Approximately 980 acres

**Redders, 2003, Community Type:** Willow Shrublands: *Salix brachycarpa* / Mesic Forbs

**General Description:** The Cumberland Basin PCA encompasses the headwaters of 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, willow carrs, 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 amplexens*), thickleaf ragwort (*Senecio crassulus*), king's crown (*Rhodiola integrifolia*) and other typical subalpine meadow species.

In the bottom of the basin, the main inlet to the lake has beaver dams, creating smaller ponds while there is a large lodge in the largest body of water (Taylor Lake). An old mining-era dam is hardly visible, covered with willows and a social trail, and apparently enhances the lake size. Extensive willow carrs occur in swales, along streamlets, around the lake, and on gentle hillsides. Willows are dominated by shortfruit willow (*Salix brachycarpa*) and planeleaf willow (*Salix planifolia*). Lush riparian and mesic meadow forbs thrive in the area with grasses on the dryer sites and sedges in the wettest.

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*), alpine 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 and Comments:** 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). The PCA supports an excellent occurrence of *Geum rossii* - *Polygonum bistortoides* alpine meadows plant community.

The area also supports a large occurrence of the apparently globally secure (G4) shortfruit willow / mesic forbs plant association in good condition. This plant community forms large willow carrs in mosaic with other low-stature willow shrublands, where type of willow community depends on moisture regime. (Carsey *et al.* 2002) The Cumberland Basin contains ample rocky, somewhat drier habitat for the shortfruit willow to survive, while planeleaf willow dominates in extremely small patches in the wettest areas. Willow carrs are in a mosaic with alpine meadows.

Table 27. 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
<b>Plant Community</b>					
<i>Salix brachycarpa</i> / mesic forbs	Shortfruit willow / mesic forbs	G4	S4		B
<i>Geum rossii</i> - <i>Polygonum bistortoides</i>	Alpine meadows	G4G5	S4S5		A
<b>Plants</b>					
<b><i>Besseyia ritteriana</i></b>	<b>Kittentails</b>	<b>G3</b>	<b>S3</b>		<b>A</b>
<i>Draba spectabilis</i> var. <i>oxyloba</i>	Showy whitlow-grass	G3?T3Q	S3		A
<i>Stellaria irrigua</i>	Altai chick weed	G4?	S2		B

\*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 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 it's 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 entire PCA is owned and managed by the San Juan National Forest.

**Management Comments:** Despite heavy recreational use on trails and at Taylor Lake, the PCA is in excellent condition and plants appear to be thriving. Social trails and a recent horse camp erode some areas. Weed invasion is currently minimal, though it is suggested to monitor the impacted areas for invasion. Public education such as information about Leave No Trace and camping with horses could help sustain the current excellent condition of the PCA.

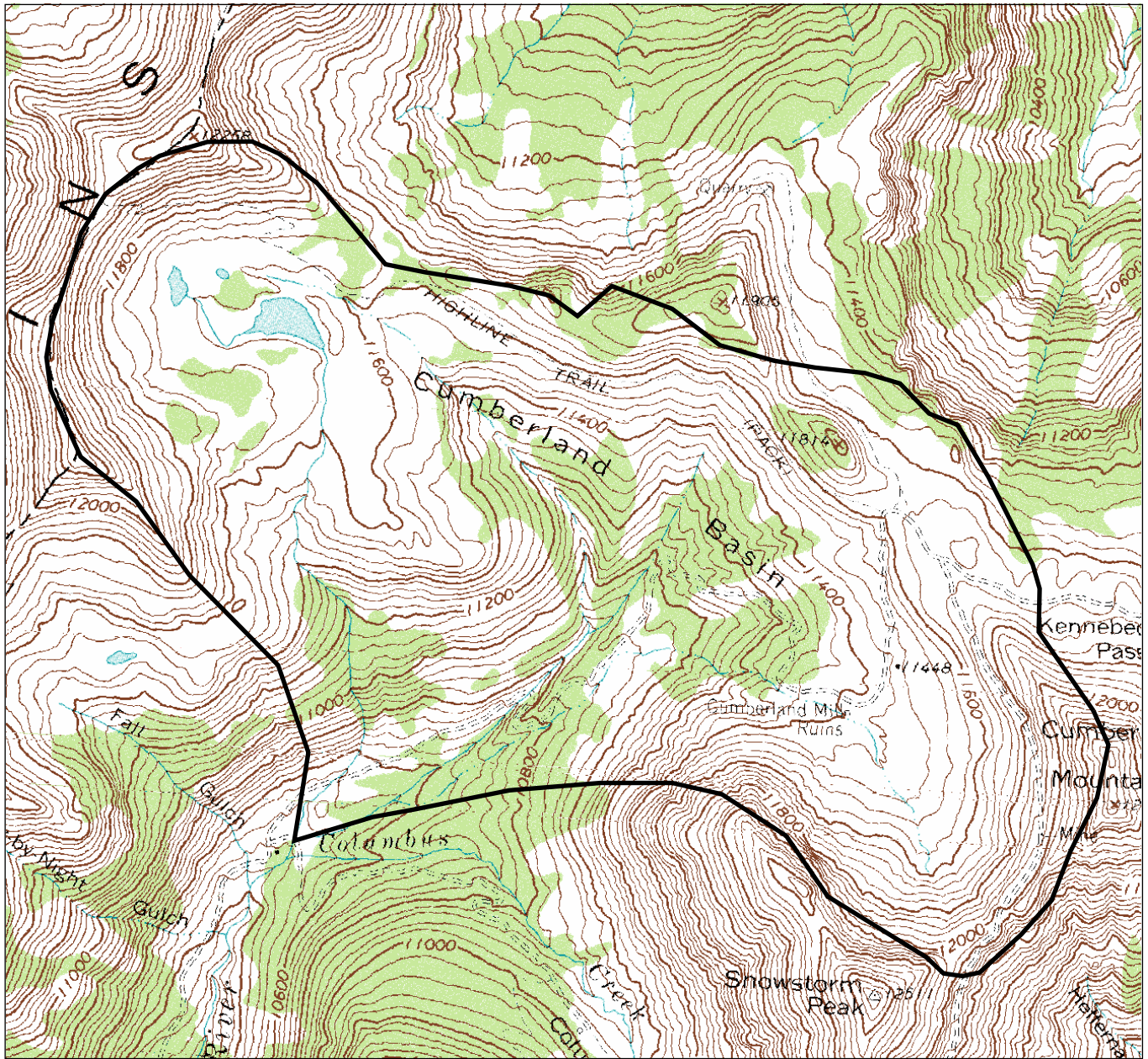
**Soils Description:** Soil textures for the *Salix brachycarpa*/ mesic forbs plant community range from silty clay loams to fine sandy loams with some mottling (Carsey et al. 2002).

**Restoration Potential:** The area is functioning as expected.


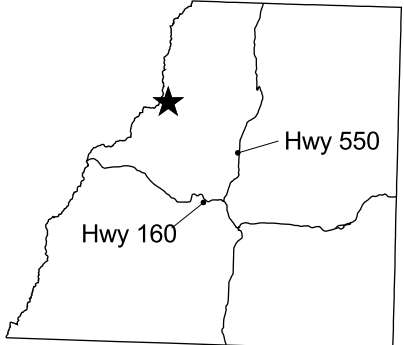
**Wetland Functional Assessment for the Cumberland Basin PCA:** A wetland functional assessment was not performed at this site. The area is subalpine and receives sheetflow drainage and first order stream inflow. The small inputs would influence some low functionality, although it is thought that the area is functioning as expected within its HGM wetland class.



**Figure 18. Cumberland Basin Potential Conservation Area, B3: High Biodiversity Significance**



0.2 0 0.2 Miles

<p><b>Colorado Natural Heritage Program</b>                  Colorado State University                  College of Natural Resources                  8002 Campus Delivery                  Fort Collins, CO 80523-8002</p> <p><b>Disclaimer</b>                  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> <b>PCA Boundary</b></p> <p>La Plata, 37108-D1                  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><b>Location in Study Area</b></p> 
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## *Elbert Creek PCA*

**Biodiversity Rank: B3.** Very 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
<b>Plant Community</b>					
<b><i>Abies concolor</i> – <i>Picea pungens</i> – <i>Populus angustifolia</i>/<i>Acer glabrum</i></b>	<b>White fir – blue spruce – narrowleaf cottonwood/ Rocky Mountain maple</b>	<b>G2</b>	<b>S2</b>		<b>C</b>
<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
<b>Plants</b>					
<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.

**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 and others (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

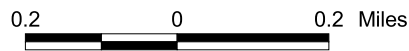
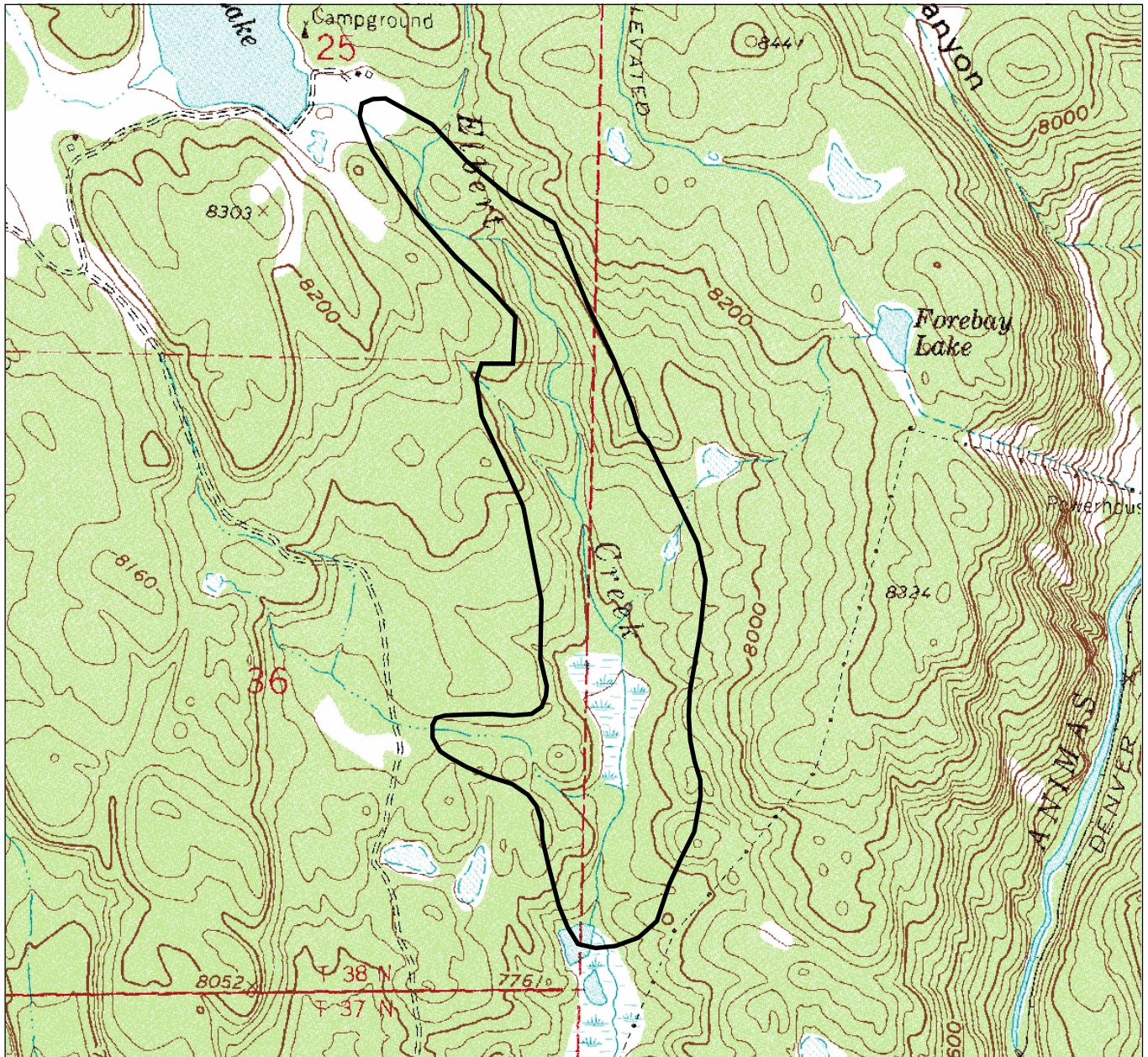
**CNHP's Wetland Classification:** *Abies concolor* – *Picea pungens* – *Populus angustifolia*/*Acer glabrum*; *Alnus incana* / *Cornus sericea*


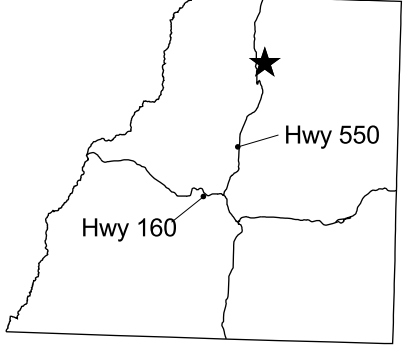
Table 29. Wetland functional assessment for the riverine wetland at the Elbert Creek PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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**



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## *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*), strapleaf 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/ strapleaf 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/ 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 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
<b>Plant Community</b>					
<i>Populus angustifolia/ Salix eriocephala var. ligulifolia – Shepherdia argentea</i>	<b>Narrowleaf cottonwood / strapleaf willow – silver buffaloberry</b>	<b>G2</b>	<b>S2</b>		<b>C</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 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 subsequent weed invasion. 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 (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*


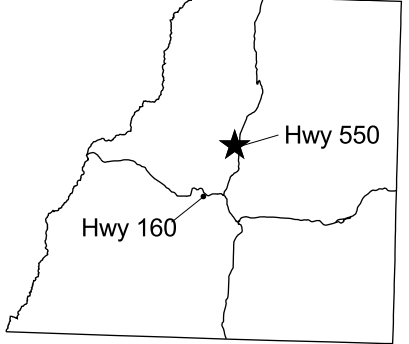
Table 31. Wetland functional assessment for the riverine wetland at the Falls Creek PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	Below Potential	This riparian area has altered hydrology, agricultural and heavy recreation impacts.
<b>Hydrological Functions</b>		
Flood Attenuation and Storage	Low	Most of steam 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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

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## *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 mannagrass (*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 *et al.* 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
<b>Plant Community</b>					
<b><i>Alnus incana</i> / mesic forbs</b>	<b>Thinleaf alder/ mesic forbs</b>	<b>G3</b>	<b>S3</b>		<b>B</b>
<i>Salix caudata ssp. 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.

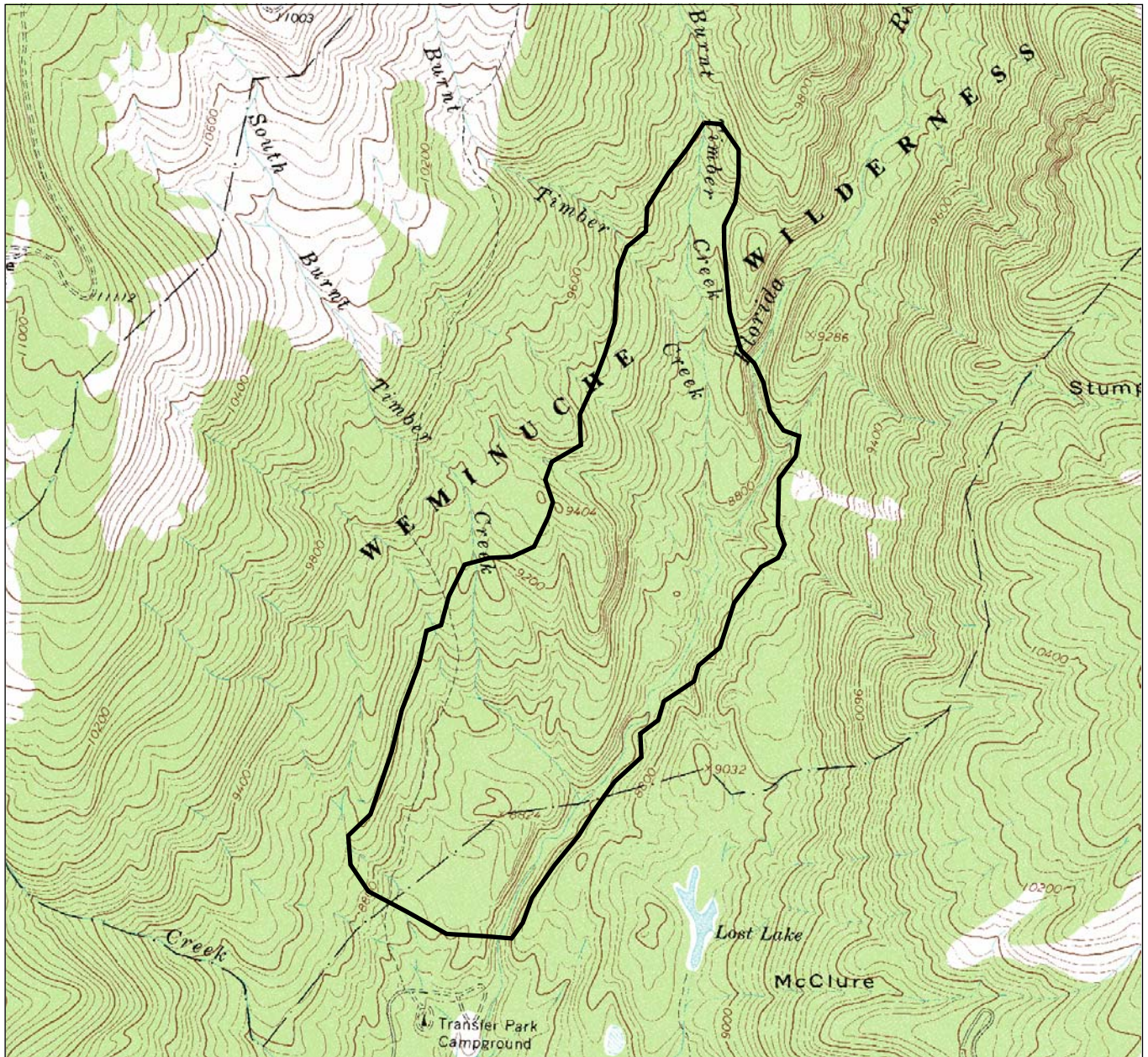


**Wetland Functional Assessment for the Florida River at Burnt Timber Creeks PCA:**  
**Proposed HGM Class:** Riverine **Subclass R2**  
**Cowardin System:** Palustrine  
**CNHP's Wetland Classification:** *Salix monticola* / Mesic graminoids; *Salix lasiandra* shrubland


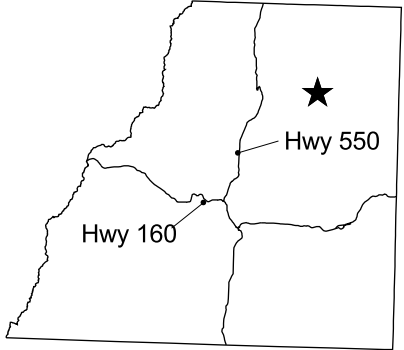
Table 33 . Wetland functional assessment for riverine wetlands at the Florida River at Burnt Timber Creek PCA. Note this assessment is for the willow dominated wetlands on the east side of the Florida River Canyon and not the canyon itself.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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.
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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><b>Colorado Natural Heritage Program</b>                  Colorado State University                  College of Natural Resources                  8002 Campus Delivery                  Fort Collins, CO 80523-8002</p> <p><b>Disclaimer</b>                  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> <b>PCA Boundary</b></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><b>Location in Study Area</b></p> 
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## *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 serripes*), shrubby cinquefoil (*Daisyphora 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					
<b><i>Betula glandulosa</i>/mesic forb-mesic graminoid</b>	<b>Subalpine riparian wetland</b>	<b>G3G4</b>	<b>S3</b>		<b>B</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.

**Wetland Functional Assessment for the Haviland Lake PCA:**

**Proposed HGM Class:** Slope

**Subclass:** S1/S2

**Cowardin System:** Palustrine

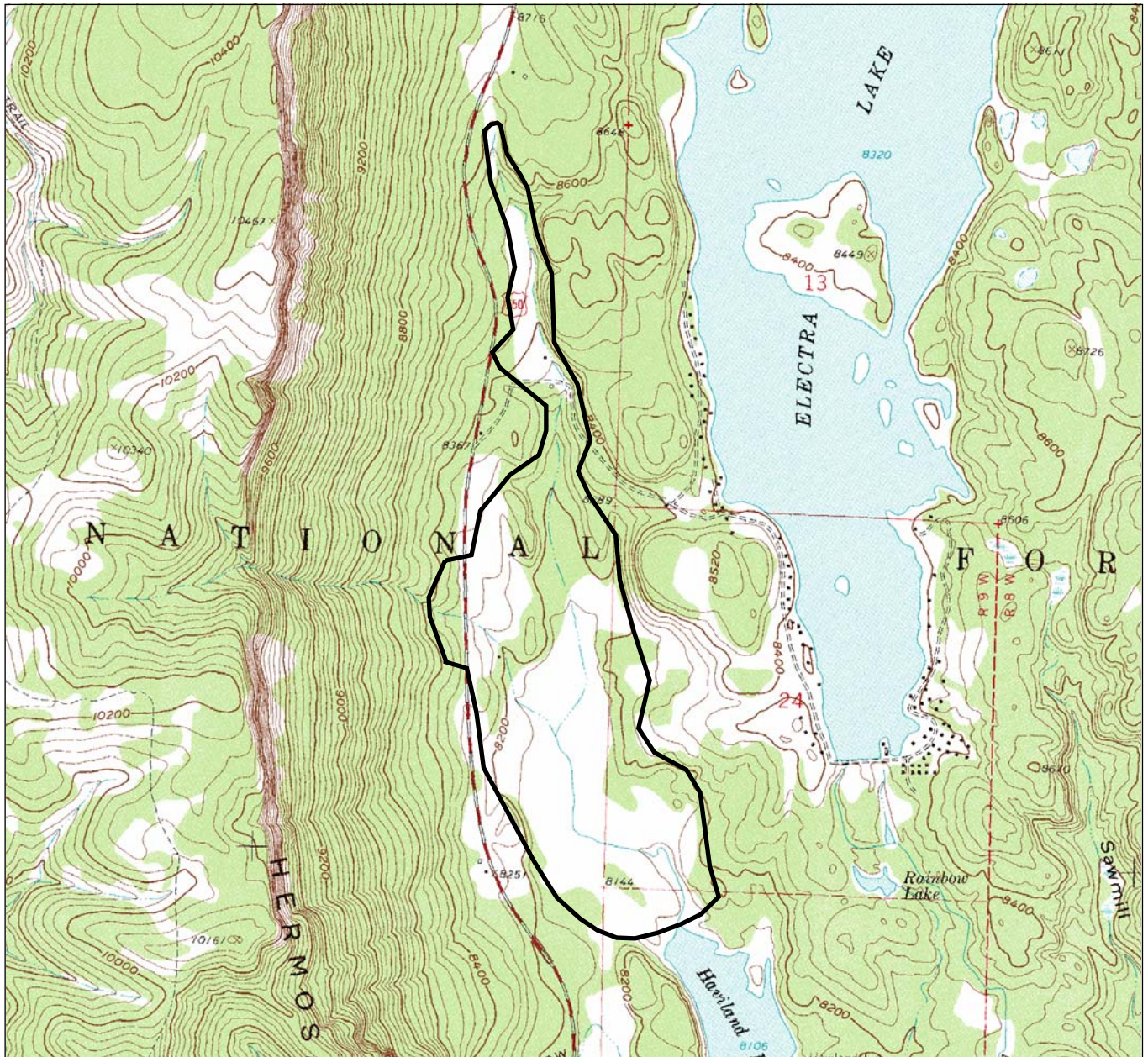
**CNHP's Wetland Classification:** *Betula glandulosa*/mesic forb-mesic graminoid

Table 35. Wetland functional assessment for the slope wetland at the Haviland Lake PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
Flood Attenuation and Storage	Low	The wetland is not located in the immediate floodplain of the Animas River. However it is likely in the historical floodplain and would have flood storage potential with the presence of low-lying areas and ponds.
Sediment/Shoreline Stabilization	Low	The wetland does contain ponds with native vegetation with fibrous roots.
Groundwater Discharge/Recharge	Yes	Springs and seeps feed the wetland. Groundwater recharge is low due to presence of peaty soils and bedrock near surface
Dynamic Surface Water Storage	Low	There is storage of surface runoff from precipitation and snowmelt.
<b>Biogeochemical Functions</b>		
Elemental Cycling	Normal	No disruptions noted. The wetland is functioning similar to other montane slope wetlands.
Removal of Imported Nutrients, Toxicants, and Sediments.	High	Wetland is moderately to highly vegetated, with peaty soils and emergent and submerged vegetation.
<b>Biological Functions</b>		
Habitat Diversity	Moderate	The area supports two Cowardin classes.
General Wildlife Habitat	Moderate	Wildlife sign noted. Diverse tree and shrub layer provide dynamic habitat for a variety of birds and herbivores.
General Fish/Aquatic Habitat	Low	No fish observed, but likely habitat for salamanders and other aquatic amphibians.
Production Export/Food Chain Support	Moderate	No inlet and outlet, > 5 acres vegetated with diverse composition of vegetation and structure.
Uniqueness	Moderate	The alkaline, slope wetland is uncommon in the Animas River valley.



**Figure 22. Haviland Lake Potential Conservation Area, B3: High Biodiversity Significance**



0.2 0 0.2 Miles

**Colorado Natural Heritage Program**

Colorado State University  
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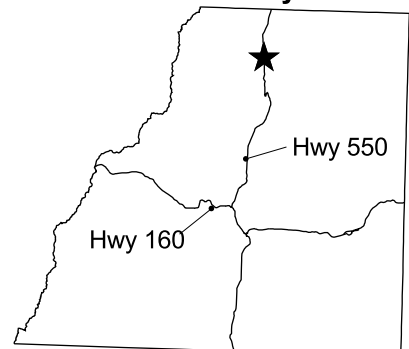
 **PCA Boundary**

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**





## *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 (*Besseya 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
<b>Plants</b>					
<b><i>Besseyia Ritteriana</i></b>	<b>Kittentails</b>	<b>G3</b>	<b>S3</b>		<b>A</b>
<i>Draba spectabilis</i> var. <i>oxyloba</i>	Showy Draba	G3?T3Q	S3S4		A
<b>Plant Community</b>					
<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 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

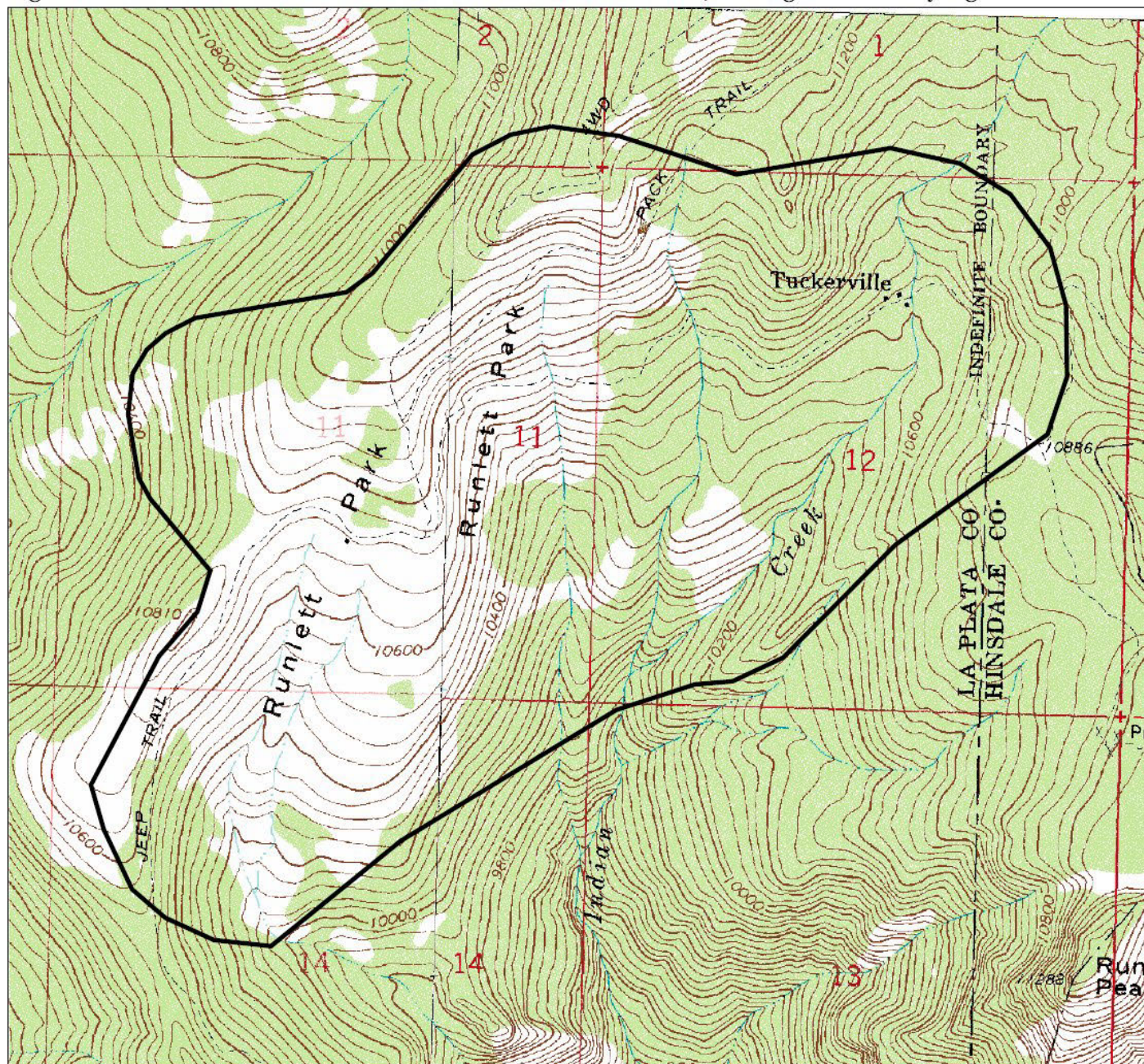
**CNHP's Wetland Classification:** *Salix planifolia* / *Caltha leptosepala*

Table 37. Wetland functional assessment for the riverine wetland at the Indian Creek at Tuckerville PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
Flood Attenuation and Storage	Moderate	Small 1 <sup>st</sup> 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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

**Colorado Natural Heritage Program**

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 College of Natural Resources  
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 Fort Collins, CO 80523-8002

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 **PCA Boundary**

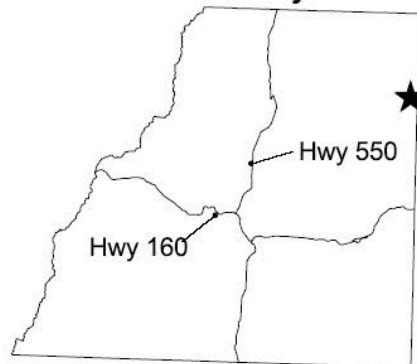
Granite Peak, 37107-D4  
 Vallecito Reservoir, 37107-D5  
 7.5 Minute Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**





## *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
<b>Plant Community</b>					
<b><i>Populus angustifolia</i> / <i>Crateagus rivularis</i></b>	<b>Narrowleaf cottonwood/ river hawthorn</b>	<b>G2</b>	<b>S2</b>		<b>C</b>
<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

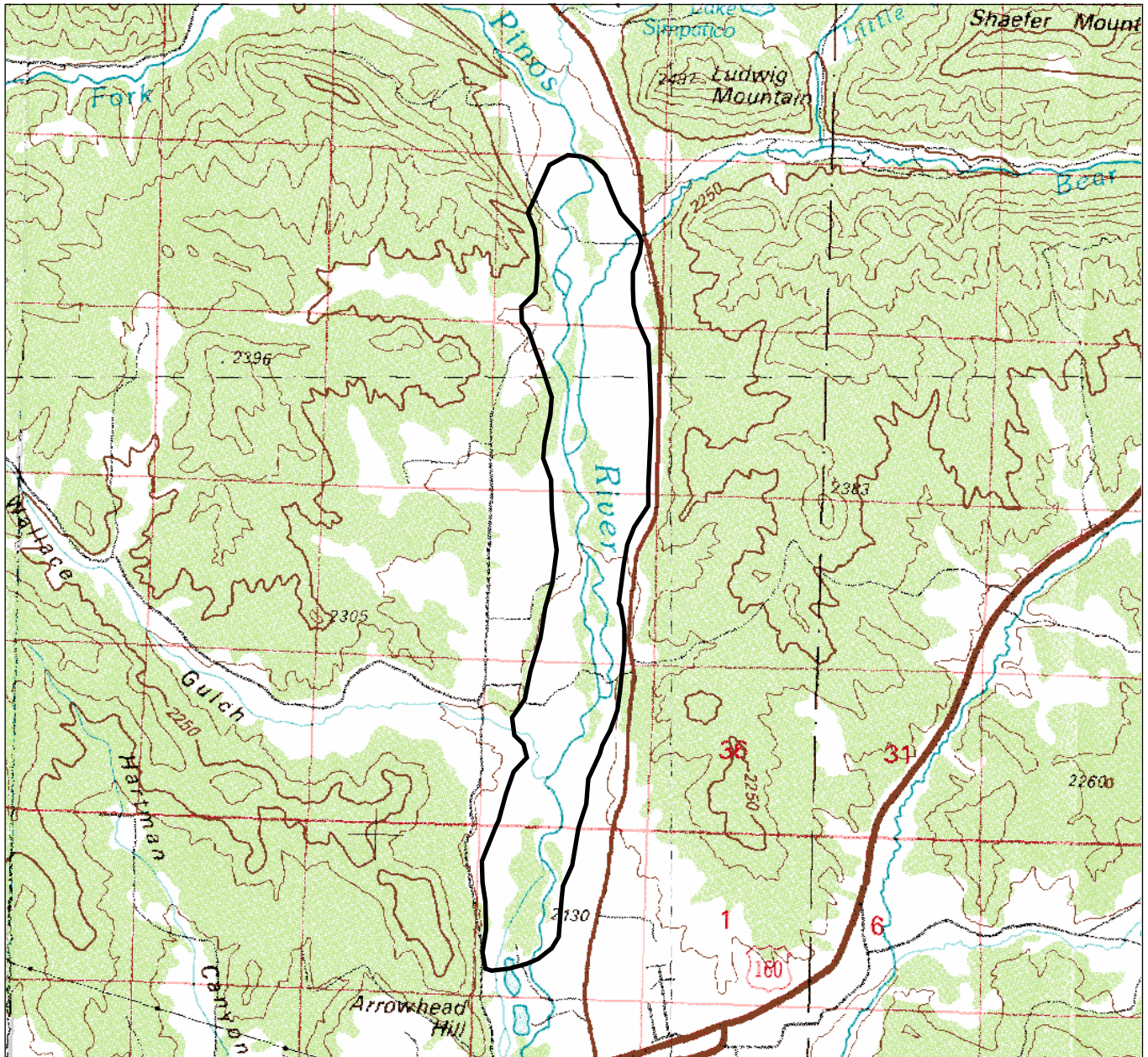
**Cowardin System:** Palustrine

**CNHP's Wetland Classification:** *Populus angustifolia* / *Crateagus rivularis*, *Populus angustifolia* / *Betula occidentalis* and *Populus angustifolia* / *Alnus incana*.


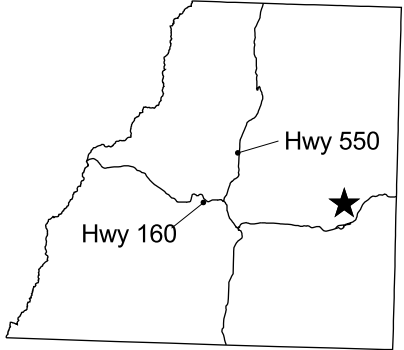
Table 39. Wetland functional assessment for the riverine wetland at the Los Pinos at Bayfield North PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	Below Potential	This wetland appears to be functioning below its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

<p><b>Colorado Natural Heritage Program</b></p> <p>Colorado State University College of Natural Resources 8002 Campus Delivery Fort Collins, CO 80523-8002</p> <p><b>Disclaimer</b></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> <b>PCA Boundary</b></p> <p>Durango, 37107-A1 30x60 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><b>Location in Study Area</b></p> 
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## *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*), strapleaf 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/ 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). 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
<b>Plant Community</b>					
<i>Populus angustifolia</i> / <i>Salix eriocephala</i> var. <i>ligulifolia</i> – <i>Shepherdia argentea</i>	<b>Narrowleaf cottonwood / strappleaf willow – silver buffaloberry</b>	<b>G2</b>	<b>S2</b>		<b>C</b>
<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.

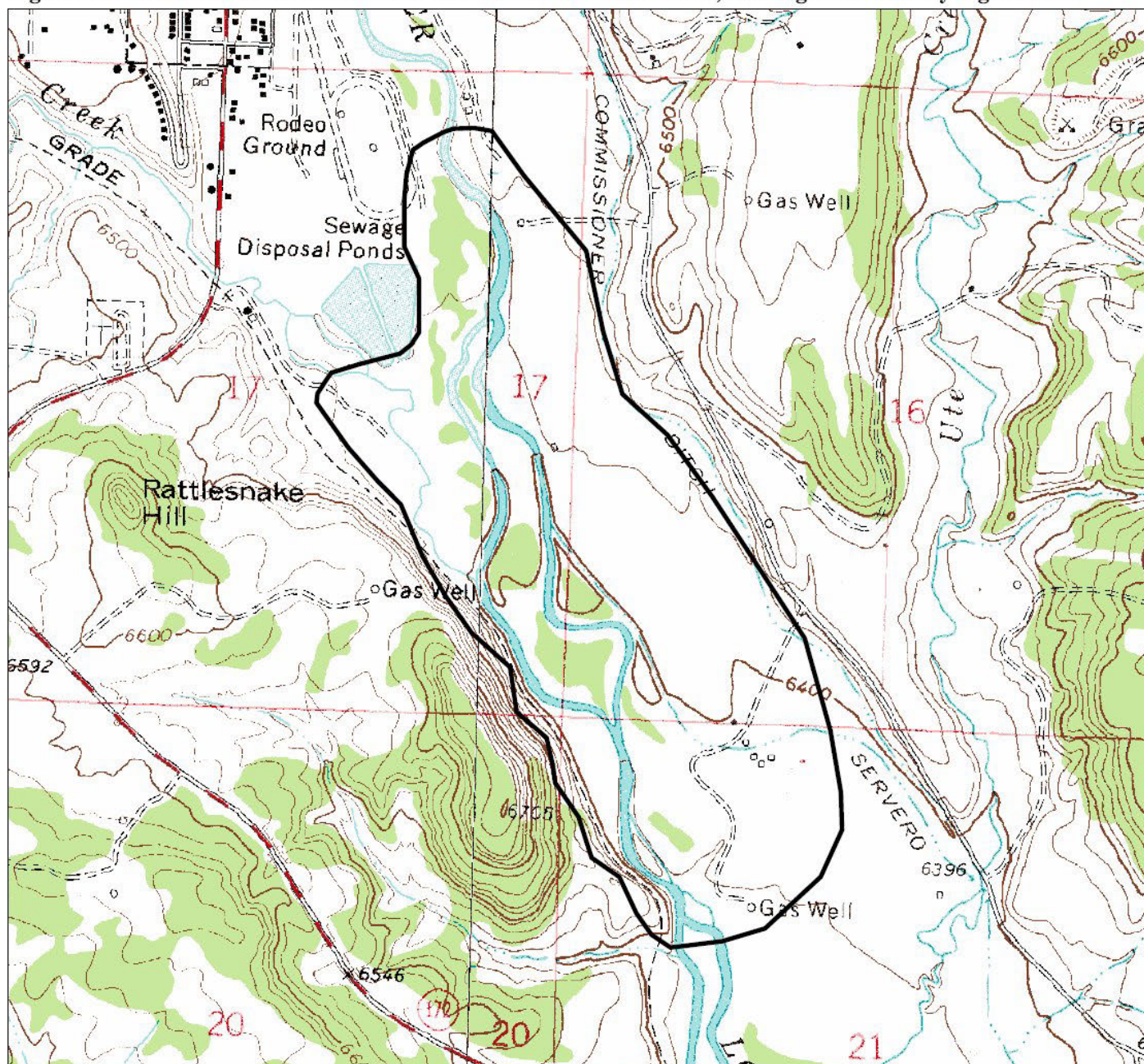
**Soils Description:** Soils sampled have silty clay loam texture and multiple sandy depositions in the horizons. Mottling occurs in the upper region. Soil Survey of the La Plata County Area, Colorado (USDA 1988) delineates two main soils in mosaic in the PCA. They are Pescar fine sandy loam classified 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.





Figure 25. Los Pinos at Rattlesnake Hill Potential Conservation Area, B3: High Biodiversity Significance



0.2 0 0.2 Miles

**Colorado Natural Heritage Program**

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 **PCA Boundary**

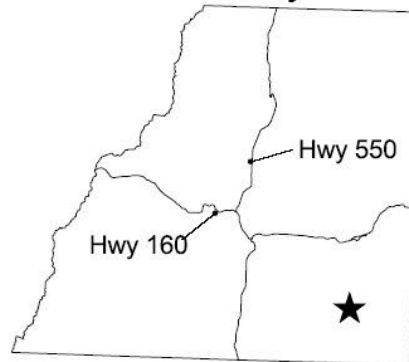
Tiffany, 37107-A5  
 Ignacio, 37107-A6  
 7.5 Minute Series

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
<b>Plant Community</b>					
<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
<b>Fish</b>					
<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

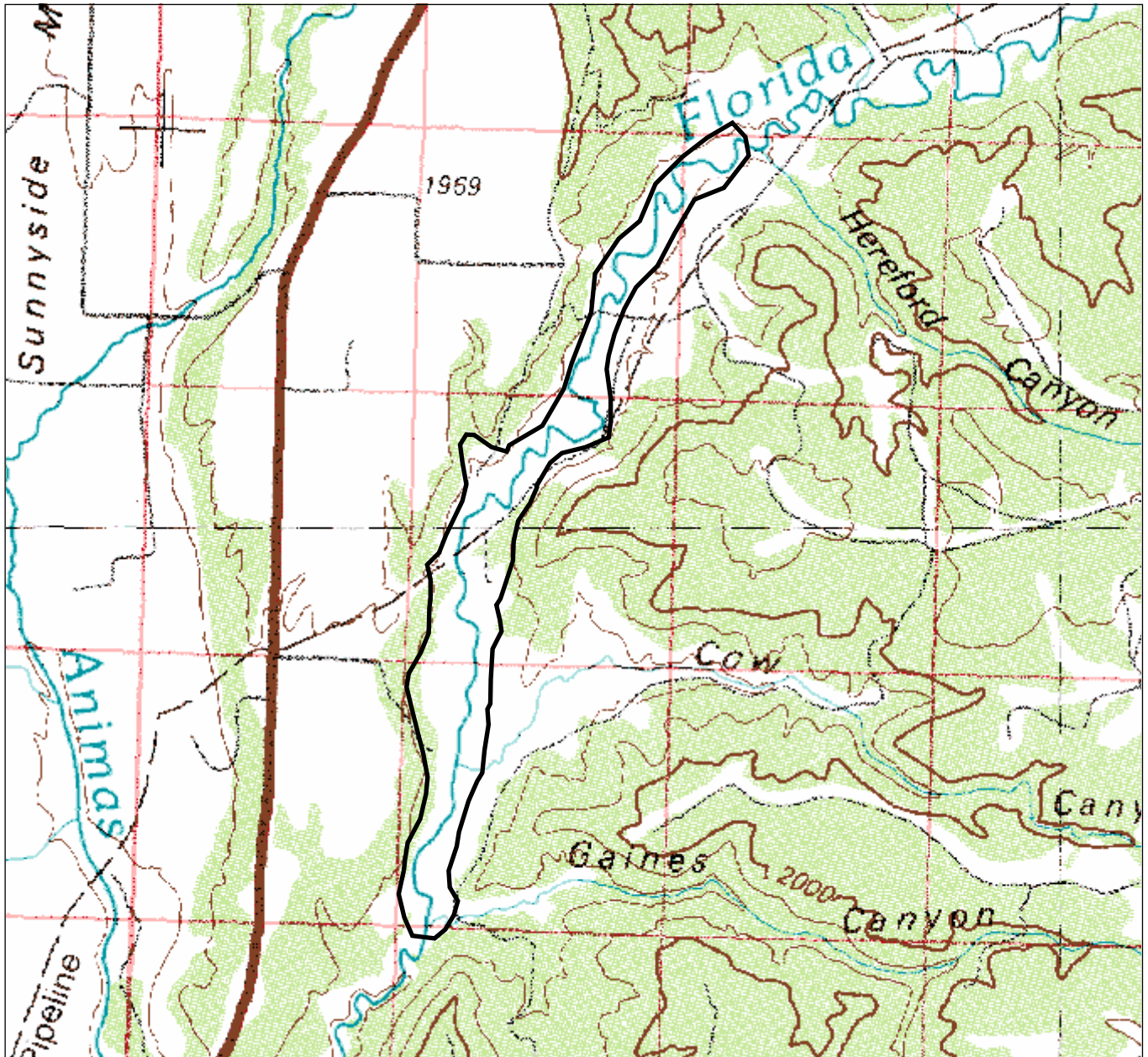
**CNHP's Wetland Classification:** *Populus angustifolia* / *Salix eriocephala* var. *ligulifolia* - *Shepherdia argentea*

Table 43. Wetland functional assessment for the riverine wetland at the Lower Florida PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	Below Potential	This wetland appears to be functioning below its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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**

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 **PCA Boundary**

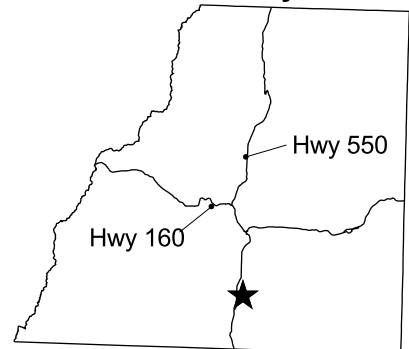
Durango, 37107-A1  
 30x60 Minute Series

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
<b>Plant Community</b>					
<b><i>Populus angustifolia/ Salix eriocephala var. ligulifolia – Shepherdia argentea</i></b>	<b>Narrowleaf cottonwood / strapleaf willow – silver buffaloberry</b>	<b>G2</b>	<b>S2</b>		<b>C</b>
<i>Populus angustifolia / 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

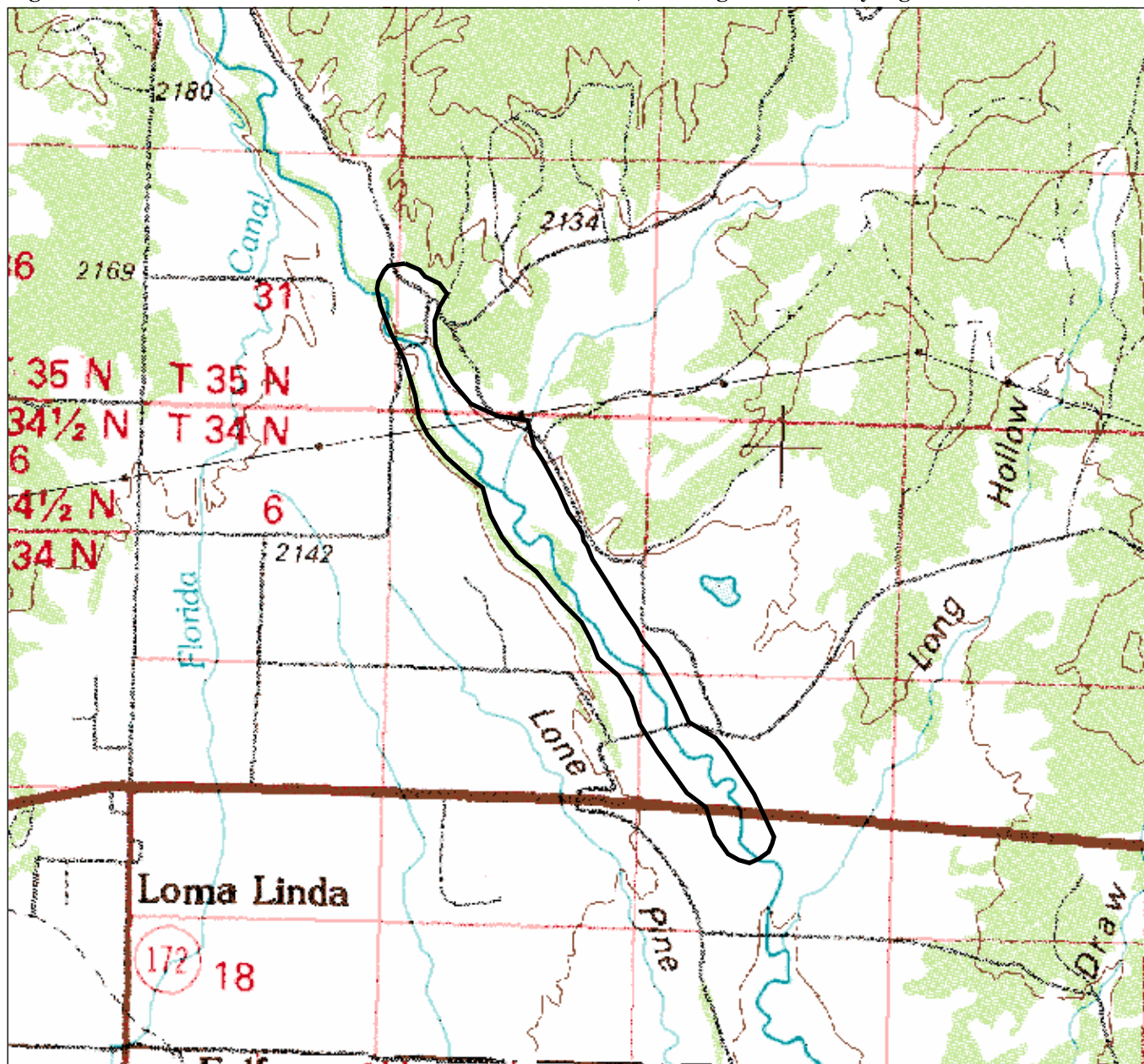
**Cowardin System:** Palustrine

**CNHP's Wetland Classification:** *Populus angustifolia*/ *Salix eriocephala* var. *ligulifolia* - *Shepherdia argentea*; *Populus angustifolia* / *Crataegus rivularis*


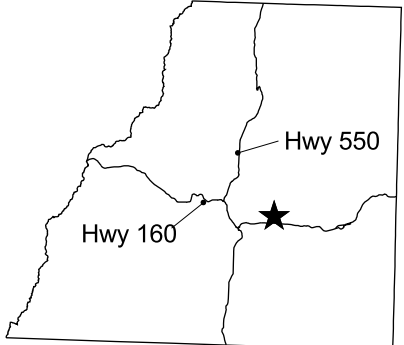
Table 45. Wetland functional assessment for the riverine wetland at the Middle Florida PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	Below Potential	The wetland appears to be functioning below its potential, however, river morphology restoration has enhanced functionality.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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><b>Colorado Natural Heritage Program</b>                  Colorado State University                  College of Natural Resources                  8002 Campus Delivery                  Fort Collins, CO 80523-8002</p> <p><b>Disclaimer</b>                  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> <b>PCA Boundary</b></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><b>Location in Study Area</b></p> 
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## *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 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
<b>Plant Community</b>					
<i>Picea pungens/Alnus incana</i>	<b>Montane riparian forest</b>	<b>G3</b>	<b>S3</b>		<b>B</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).

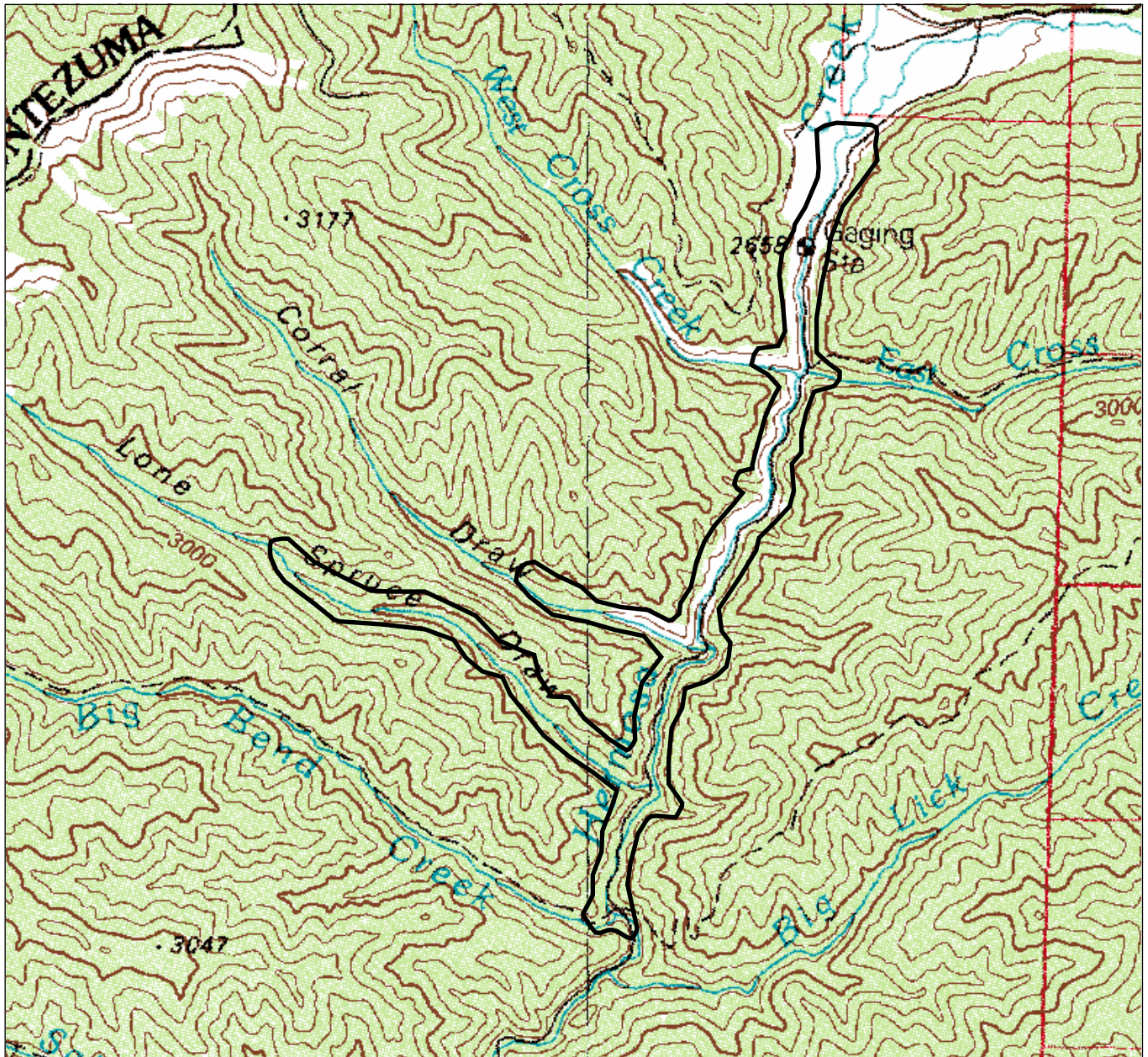
**Soils Description:** Soils of the blue spruce / thinleaf alder community type are typically shallow, loamy sand to silty clay loams with heavy organic matter content over gravel, cobbles, and boulders (Carsey *et al.* 2003).

**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

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 College of Natural Resources  
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 **PCA Boundary**

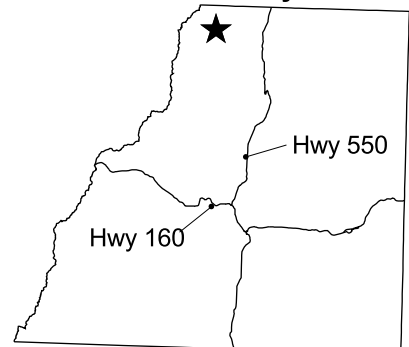
Silverton, 37107-E1  
 30x60 Minute Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**



## *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 51/2 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
<b>Plant Community</b>					
<i>Populus angustifolia</i> / <i>Rhus trilobata</i>	narrowleaf cottonwood / skunkbush sumac	<b>G3</b>	<b>S3</b>		<b>B?</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*).

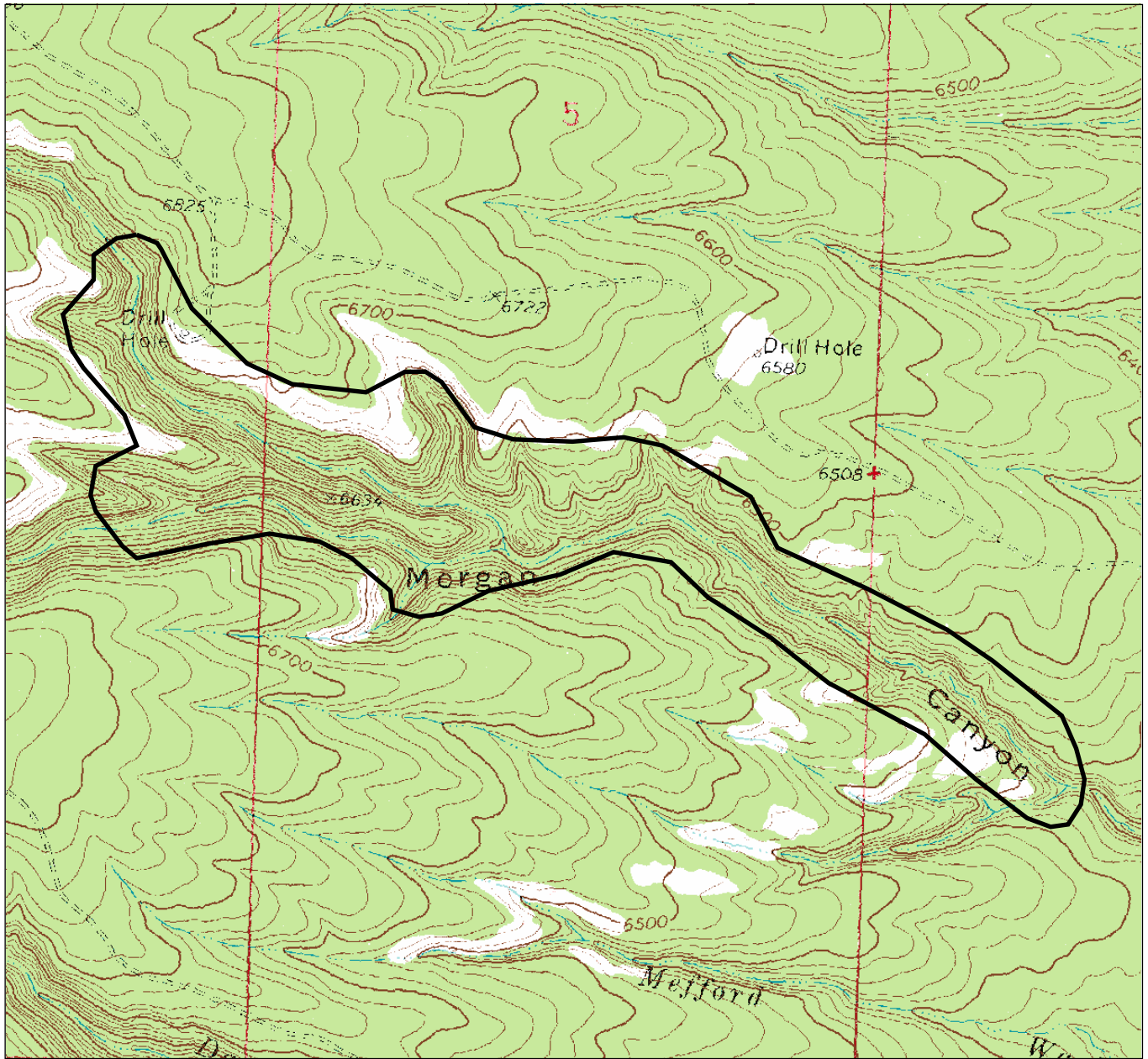
**Soils Description:** The soil textures of this community type are typically fine sandy loams, clay loams, silty clay loams, and silty clay. Soil Survey of La Plata County Area, Colorado (USDA 1988) delineate Morgan Canyon as rock outcrop.

**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

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 **PCA Boundary**

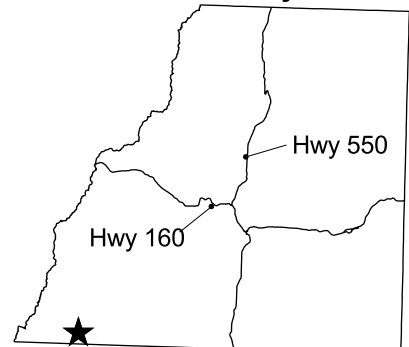
Red Mesa, 37108-A2  
 7.5 Minute Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**





## *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 strapleaf 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; 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) strapleaf 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
<b>Plant Community</b>					
<i>Salix eriocephala</i> var. <i>ligulifolia</i>	<b>Strapleaf willow</b>	<b>G2G3</b>	<b>S2S3</b>		<b>B</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.

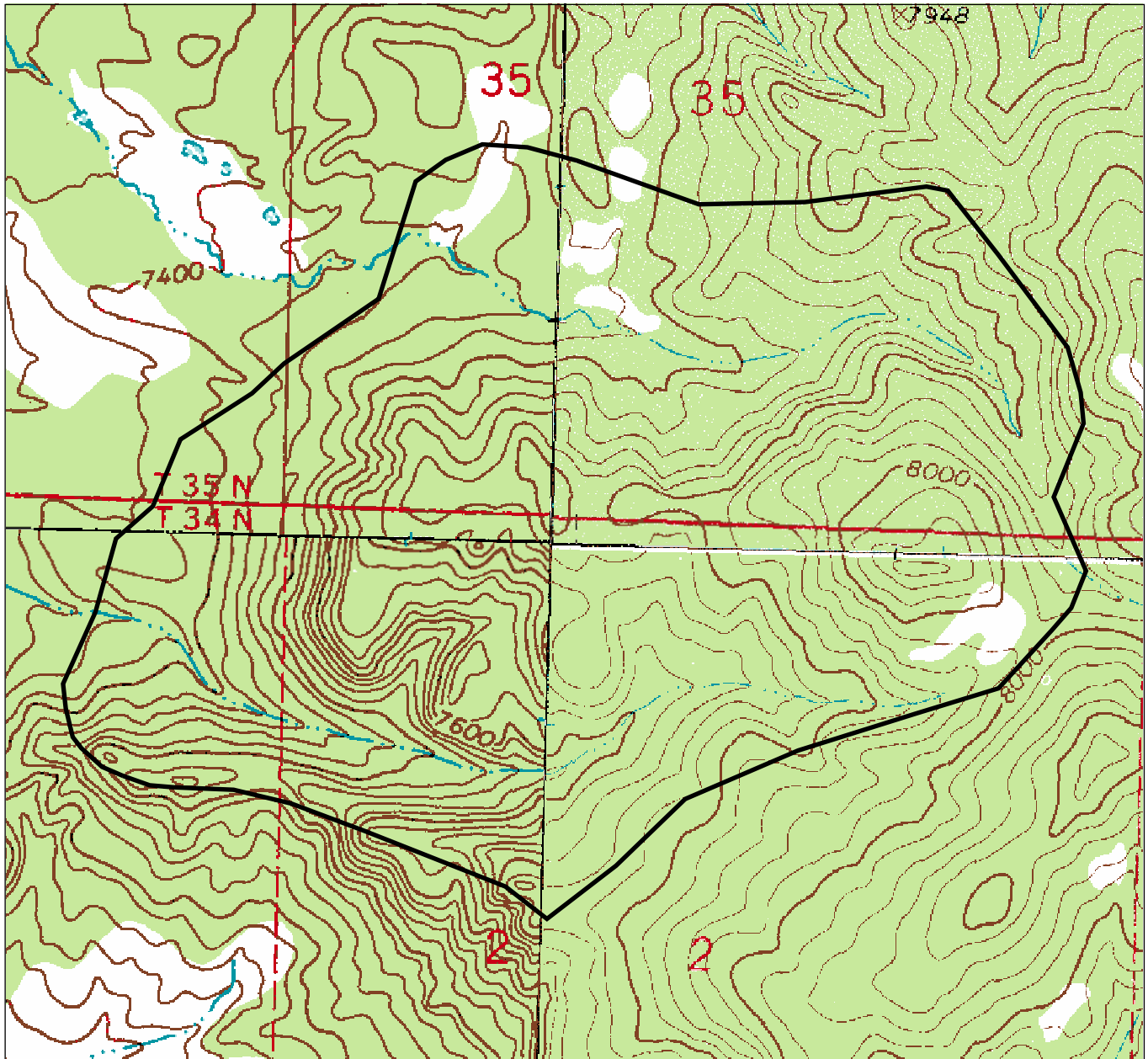
**Management Comments:** It is suggested to eradicate and monitor exotic species to maintain the current quality of the elements in the PCA. The surrounding area receives heavy recreational use. Monitoring the area for weed invasion is suggested especially with increased gas development with subsequent 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

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 **PCA Boundary**

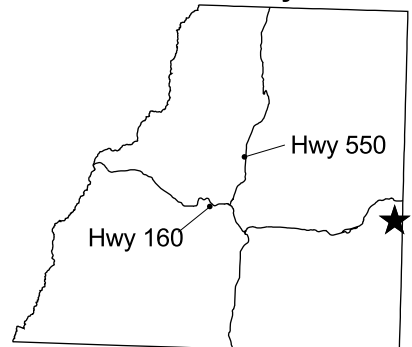
Pargin Mountain, 37107-B4  
 Bayfield, 37107-B5  
 Baldy Mountain, 37107-C4  
 Ludwig Mountain, 37107-C5  
 7.5 Minute Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**



## *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
<b>Plant Community</b>					
<i>Populus angustifolia/Juniperus scopulorum</i>	<b>Narrowleaf cottonwood/Rocky</b>	<b>G2/G3</b>	<b>S3</b>		<b>B</b>

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
	Mountain woodland				

\*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 (*Breca arvensis*), 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

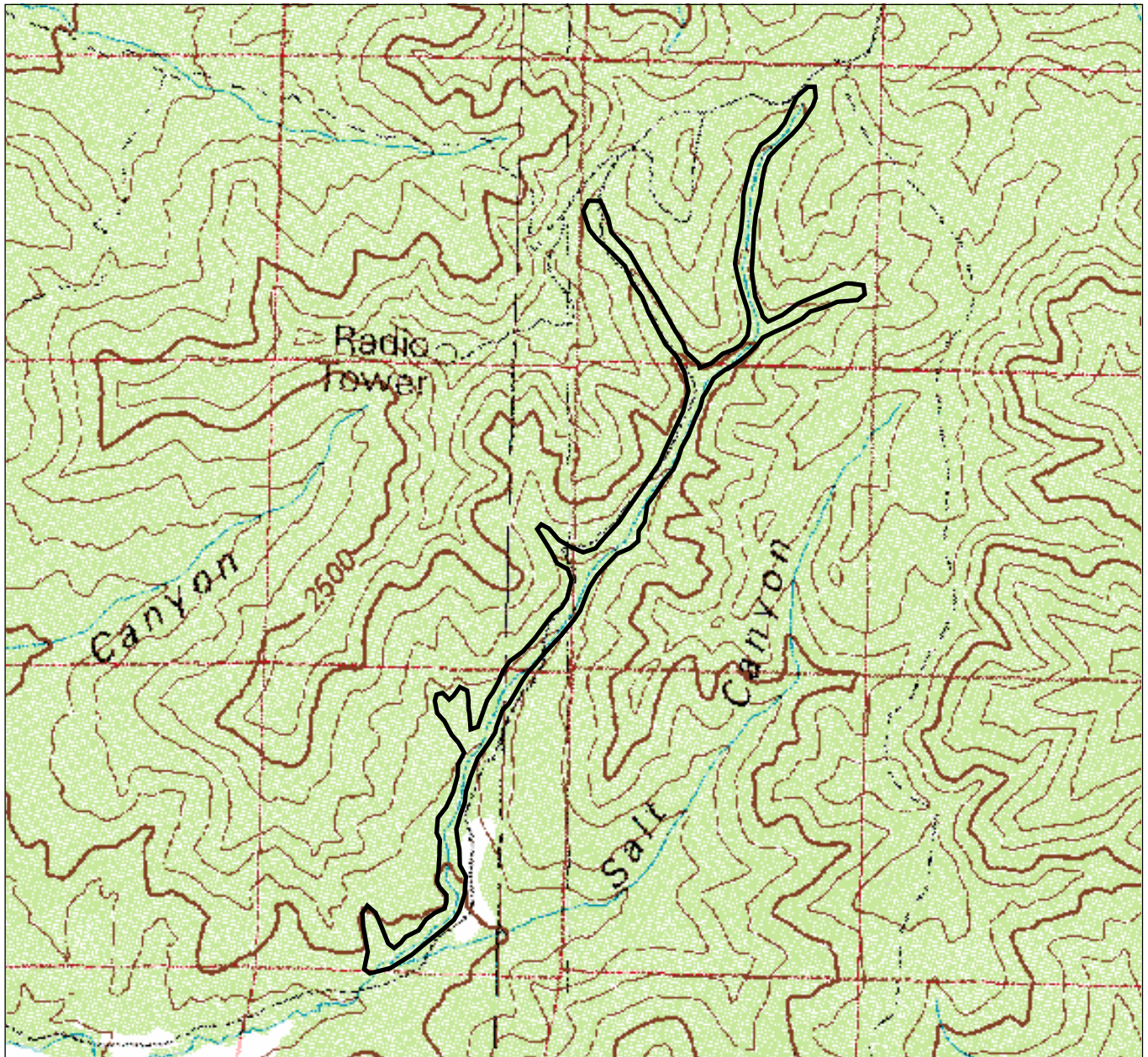
**CNHP's Wetland Classification:** *Populus angustifolia/Juniperus scopulorum*

Table 50. Wetland functional assessment for the slope wetland at the Spring Creek North PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

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 **PCA Boundary**

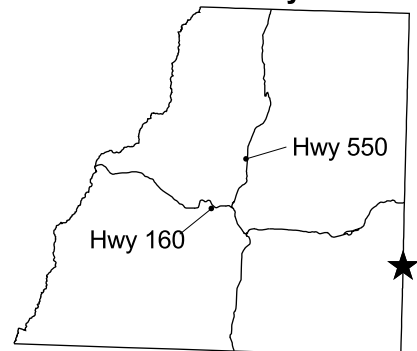
Durango, 37107-A1  
 30x60 Minute Series

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
<b>Plant Community</b>					
<i>Salix planifolia</i> / <i>Carex utriculata</i>	<b>Planeleaf willow / beaked sedge</b>	<b>G3G4</b>	<b>S2</b>		<b>B</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

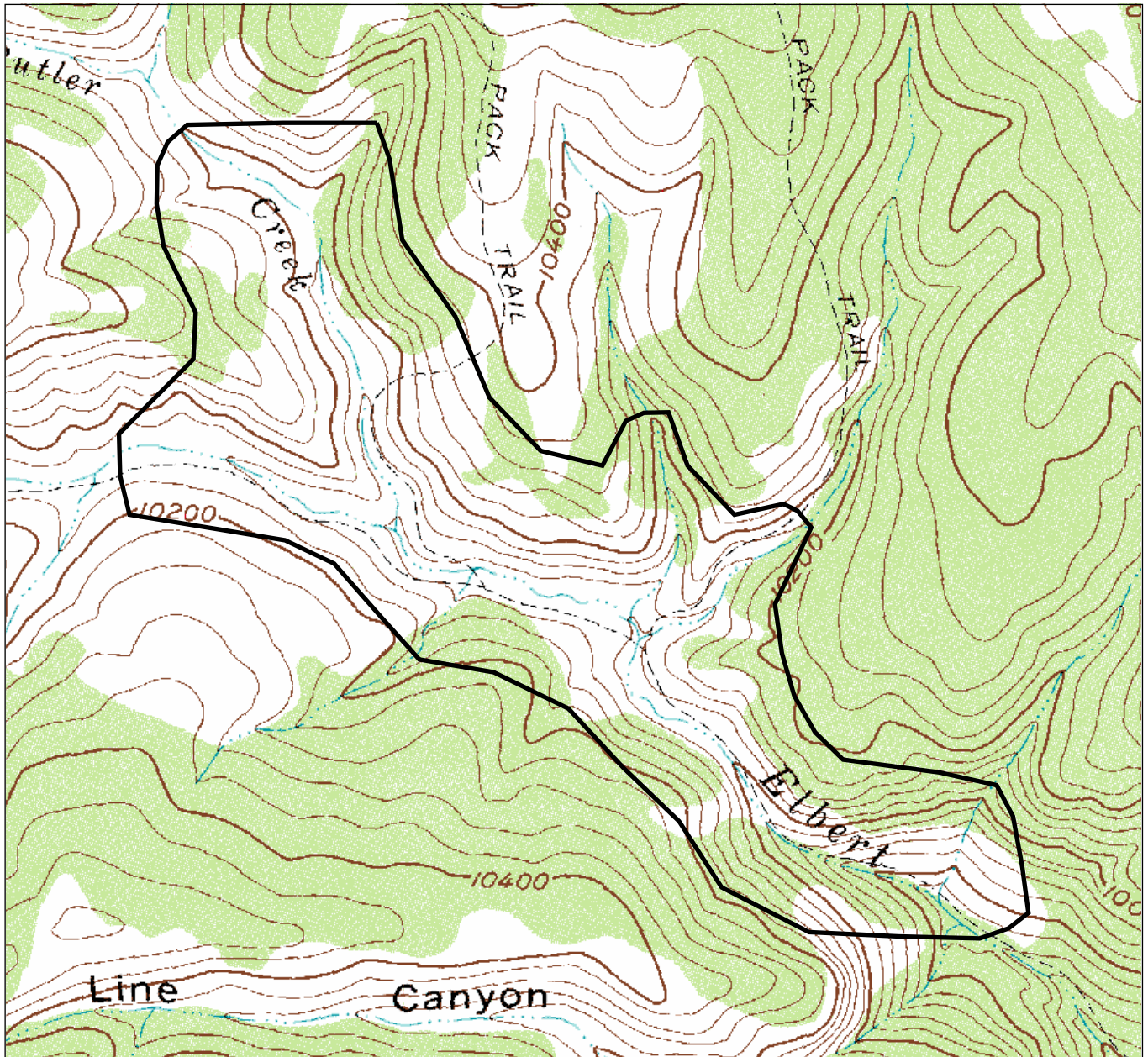
**CNHP's Wetland Classification:** *Salix planifolia* / *Carex utriculata*

Table 52. Wetland functional assessment for the riverine wetland at the Upper Elbert Creek PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

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 **PCA Boundary**

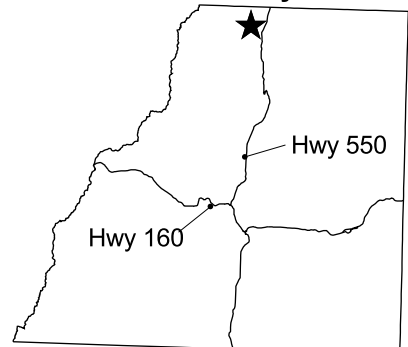
Electra Lake, 37107-E7  
 7.5 Minute Series

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
<b>Plant Community</b>					
<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

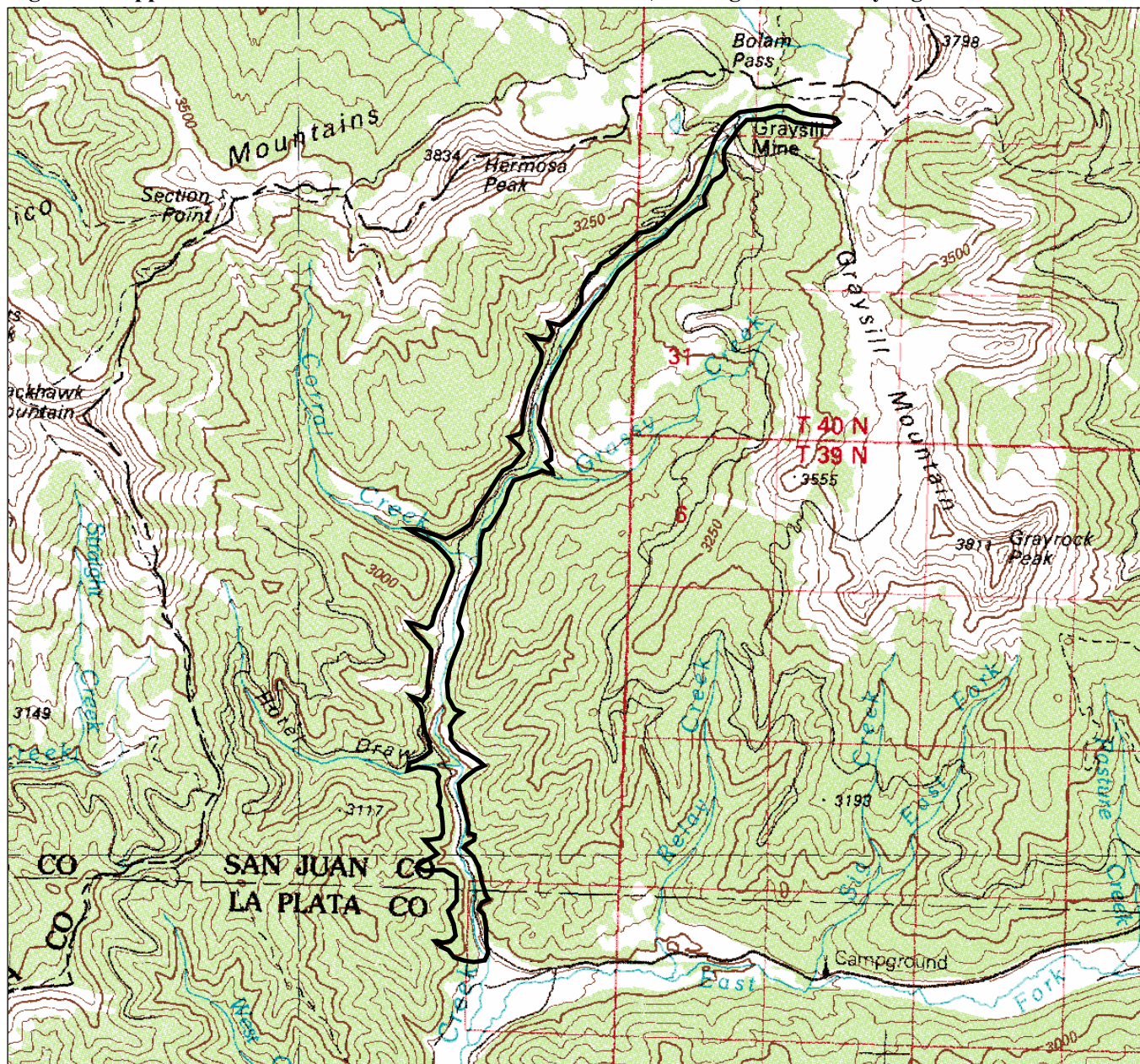
**Cowardin System:** Palustrine

**CNHP's Wetland Classification:** *Picea pungens/Alnus incana*


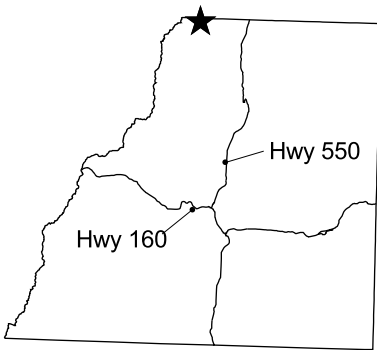
Table 54. Wetland functional assessment for the riverine wetland at the Upper Hermosa Creek PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland is functioning at potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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><b>Colorado Natural Heritage Program</b>                  Colorado State University                  College of Natural Resources                  8002 Campus Delivery                  Fort Collins, CO 80523-8002</p> <p><b>Disclaimer</b>                  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> <b>PCA Boundary</b></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><b>Location in Study Area</b></p> 
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## Vallecito Creek - Johnson Creek PCA

**Biodiversity Rank: 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
<b>Plant Communities</b>					
<i>Pseudotsuga menziesii/Paxistima myrisoides***</i>	Douglas fir/Mountain lover montane forest	G2G3	S2S3		A
<b><i>Picea pungens / Alnus incana</i></b>	<b>Montane riparian forest</b>	<b>G3</b>	<b>S3</b>		<b>A</b>
<i>Picea engelmannii/Trautvetteria caroliniensis</i>	Engelmann spruce/Carolina tasselrue montane forest	G3	S2?		B
<i>Salix drummondiana/ mesic forbs</i>	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

Scientific Name	Common Name	Global Rank	State Rank	Federal and State Status	EO* Rank
<b>Plants</b>					
<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</i> var. <i>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

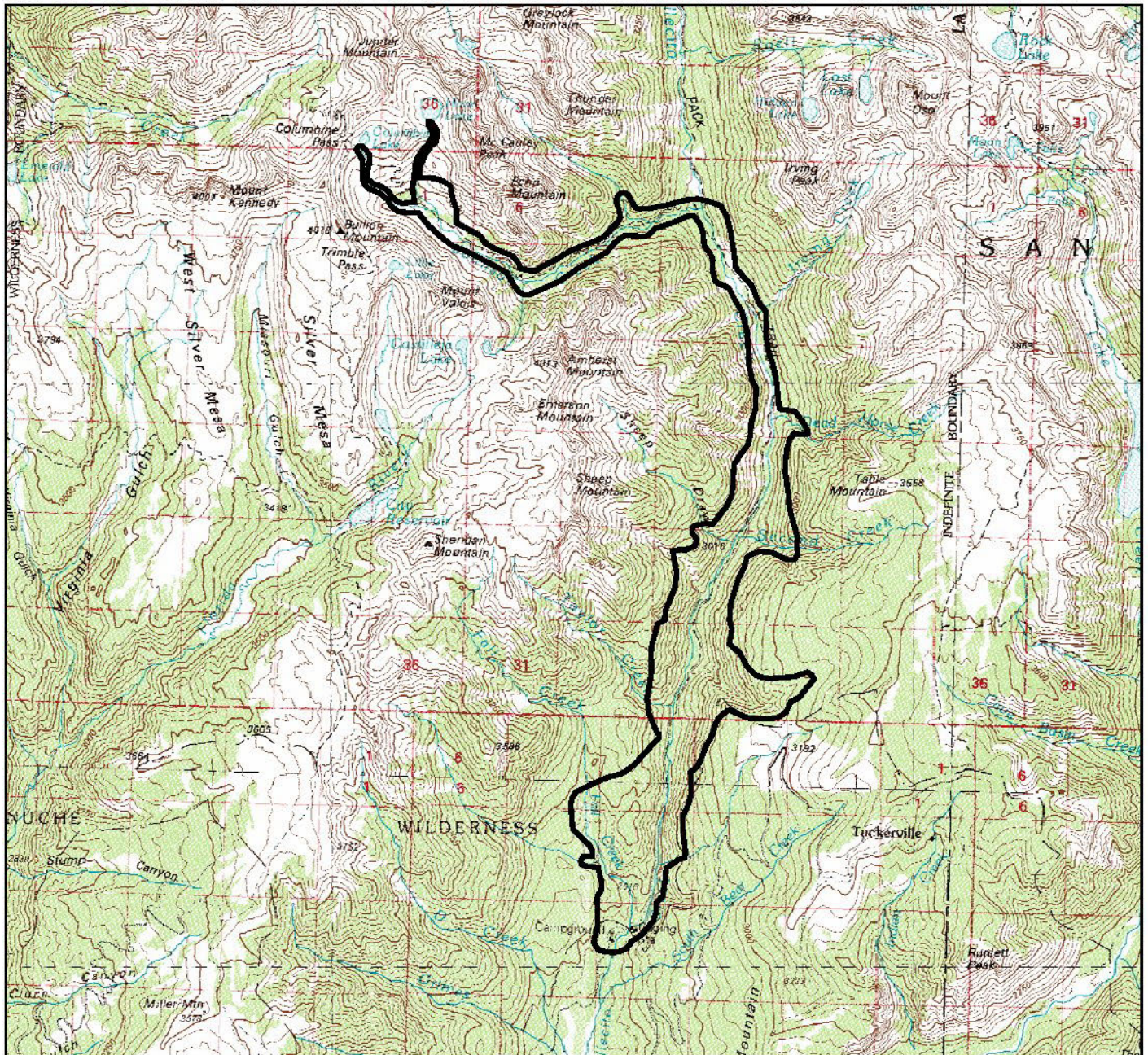
**CNHP's Wetland Classification:** *Abies lasiocarpa* – *Picea engelmannii* / *Alnus incana*; *Abies lasiocarpa* – *Picea engelmannii* / *Salix drummondiana*; *Picea pungens* / *Alnus incana*

Table 56. Wetland functional assessment for the riverine wetland at the Vallecito Creek and Johnson Creek PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
Flood Attenuation and Storage	High	This is a large watershed with 1 <sup>st</sup> 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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

**Colorado Natural Heritage Program**

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

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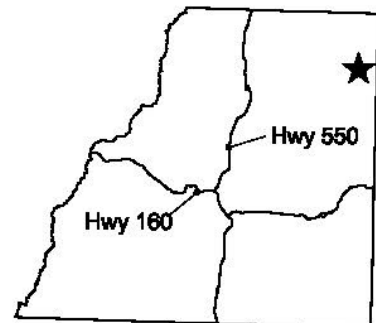
 **PCA Boundary**

Durango, 37107-A1  
 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**





## *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 wetland 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 57. 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	State Status	EO* Rank
<b>Plants</b>					
<b><i>Eriophorum chamissonis</i></b>	<b>Russet cottongrass</b>	<b>G5</b>	<b>S1</b>	<b>FS</b>	<b>A</b>

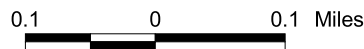
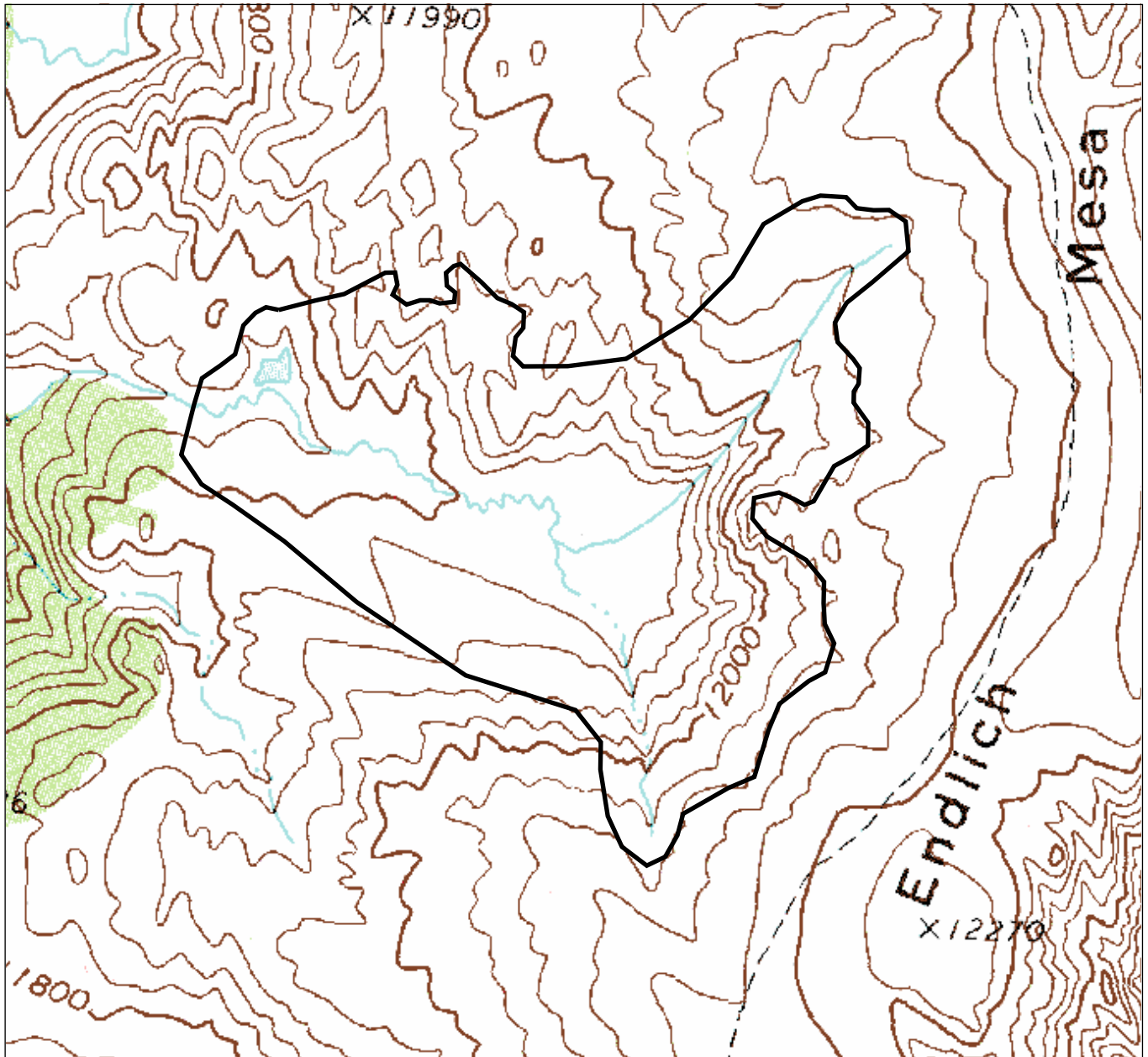
\*EO=Element Occurrence. Multiple listings represent separate locations.


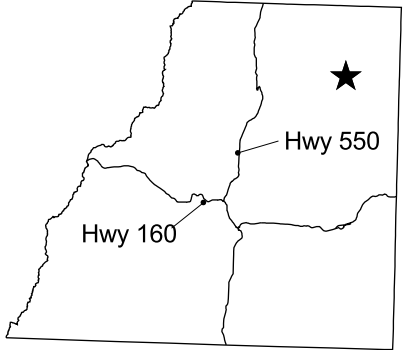
**Boundary Justification:** This site includes the occurrence and a buffer of similar habitat. Limiting direct impacts such as trampling or erosion within this area would help to maintain the quality of the plant occurrence. The hydrology of the site is important to the element and should be considered 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.

**Figure 35. Endlich Mesa Basin Potential Conservation Area, B4: Moderate Biodiversity Significance**



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## *Los Pinos at Bayfield South*

**Biodiversity Rank: B4.** General 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
<b>Plant Community</b>					
<i>Populus angustifolia</i> / <i>Betula occidentalis</i>	<b>Narrowleaf cottonwood / river birch</b>	<b>G3</b>	<b>S2</b>		<b>C</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 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

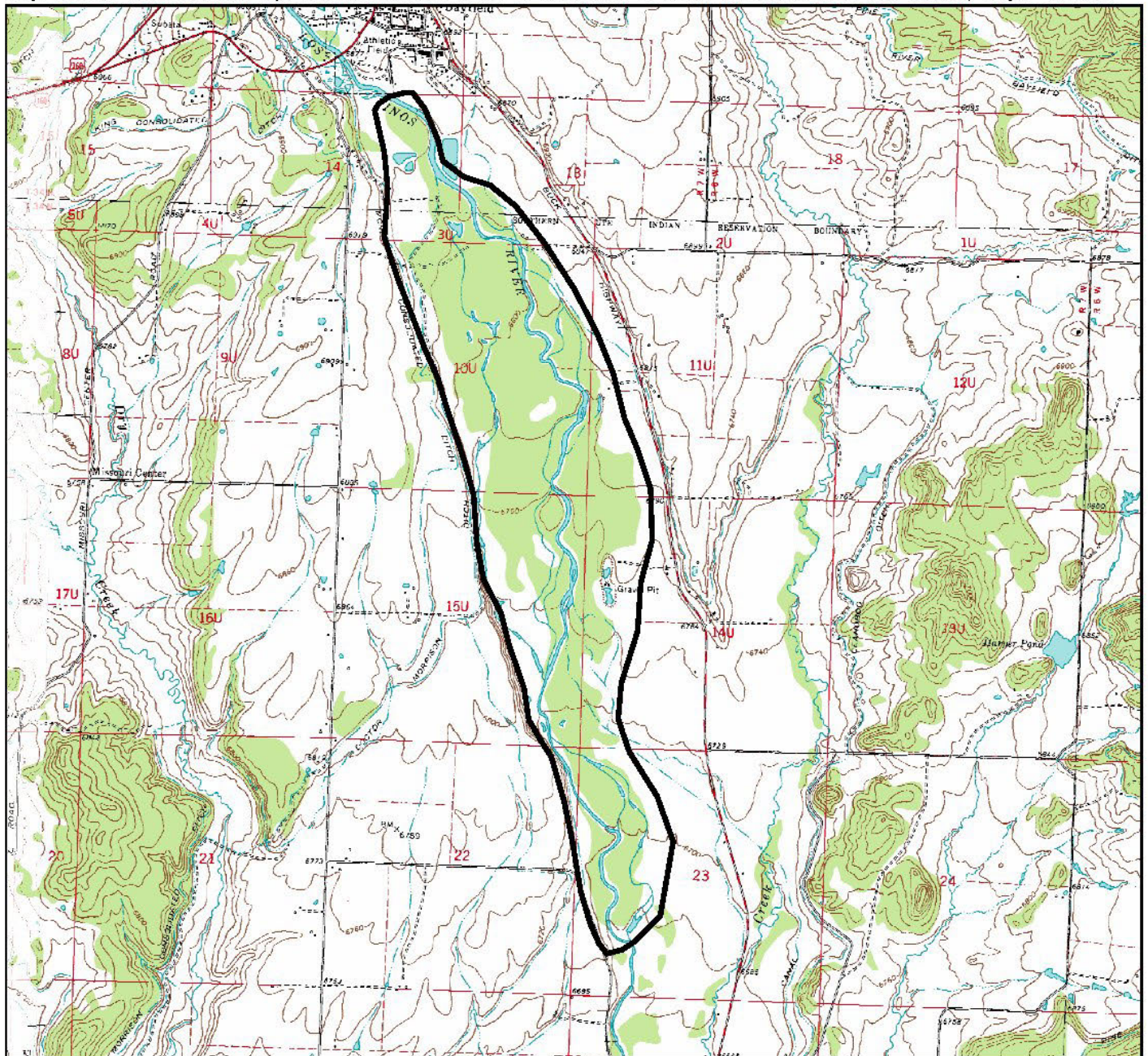
**Cowardin System:** Palustrine

**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.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	Below Potential	This wetland appears to be functioning below its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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.

**Figure 36. Los Pinos at Bayfield South Potential Conservation Area, B4: Moderate Biodiversity Significance**



0.4 0 0.4 Miles

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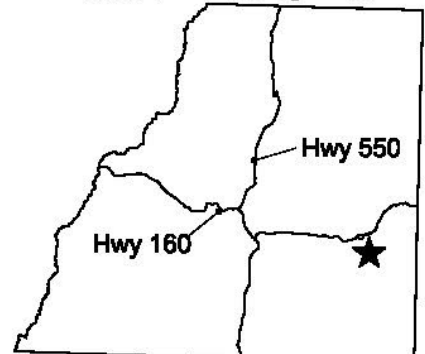
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 **PCA Boundary**

Bayfield, 37107-B5  
 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**



## *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 depressional 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
<b>Plant Community</b>					
<i>Schoenoplectus acutus</i> <b>var. <i>acutus</i></b> – <i>Schoenoplectus</i> <i>tabernaemontani</i>	<b>Hardstem bulrush – softstem bulrush</b>	<b>G4</b>	<b>S2S3</b>		<b>B</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

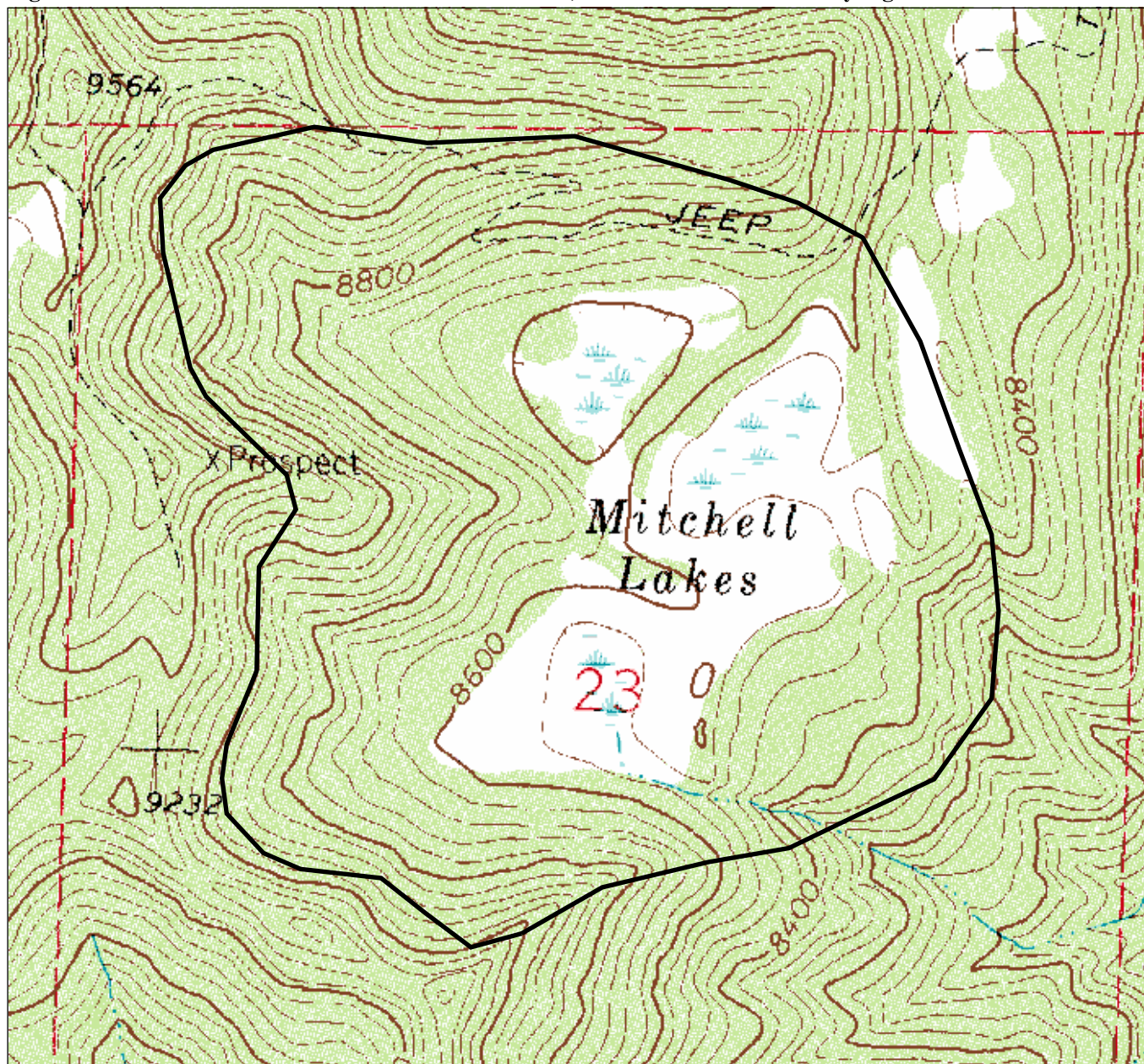
**CNHP's Wetland Classification:** *Schoenoplectus acutus* var. *acutus*– *S. tabernaemontani*

Table 61. Wetland functional assessment for the riverine wetland at the Mitchell Lakes PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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.
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

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 College of Natural Resources  
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 **PCA Boundary**

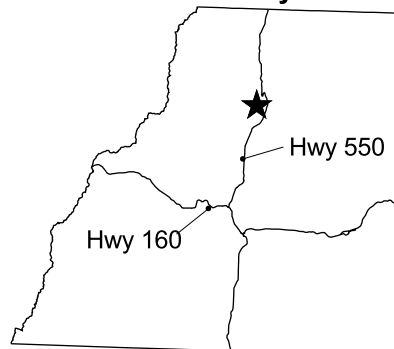
Hermosa, 37107-D7  
 7.5 Minute Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**



## *Lake Marie PCA*

**Biodiversity Rank: B5:** Moderate 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
<b>Plant Community</b>					
<i>Eriophorum altaicum</i> var. <i>neogeum</i>	<b>Altai cottongrass</b>	<b>G4?T3T4</b>	<b>S3</b>	<b>FS</b>	<b>A</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 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.

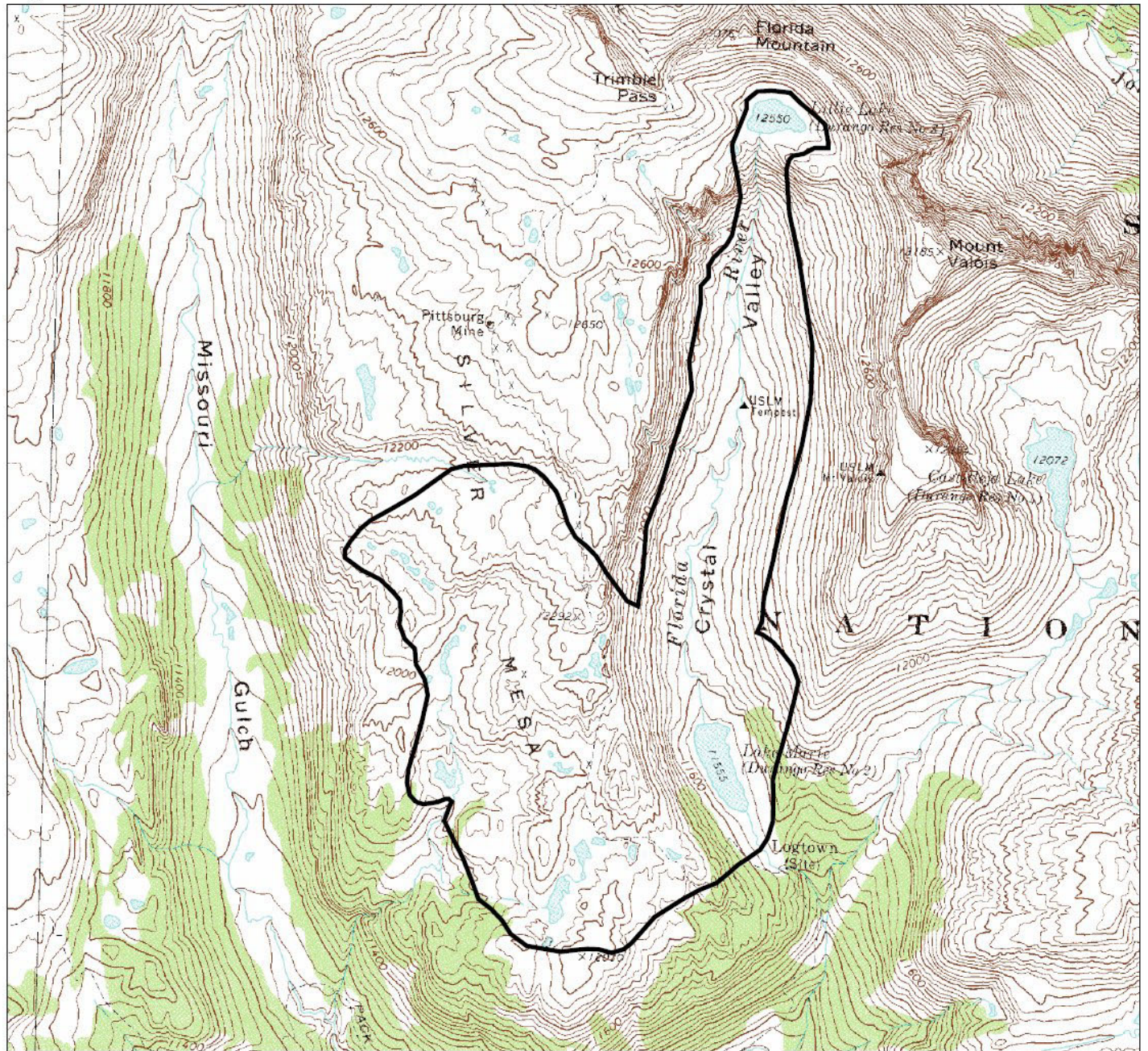
**Wetland Functional Assessment for the Lake Marie PCA:**  
**Proposed HGM Class:** River                      **Subclass:** R2R3  
**Cowardin System:** Palustrine  
**CNHP's Wetland Classification:** *Salix planifolia/Carex aquatilis*

Table 63. Wetland functional assessment for the riverine wetland at the Lake Marie PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	At Potential	This wetland appears to be functioning at its potential.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

**Colorado Natural Heritage Program**

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

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 **PCA Boundary**

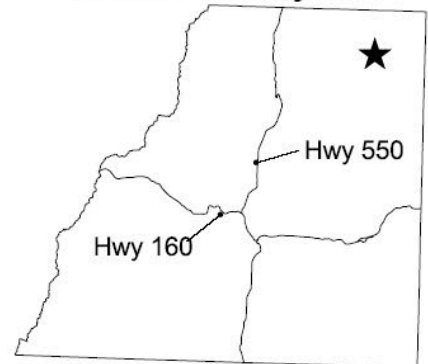
Columbine Pass, 37107-E5  
7.5 Minute Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**





## *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 exasperated 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*), Dalmatian 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
<b>Plant Community</b>					
<i>Populus angustifolia/ Betula occidentalis</i>	<b>Montane riparian forest</b>	<b>G3</b>	<b>S2</b>		<b>D</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 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 arvensis*), 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

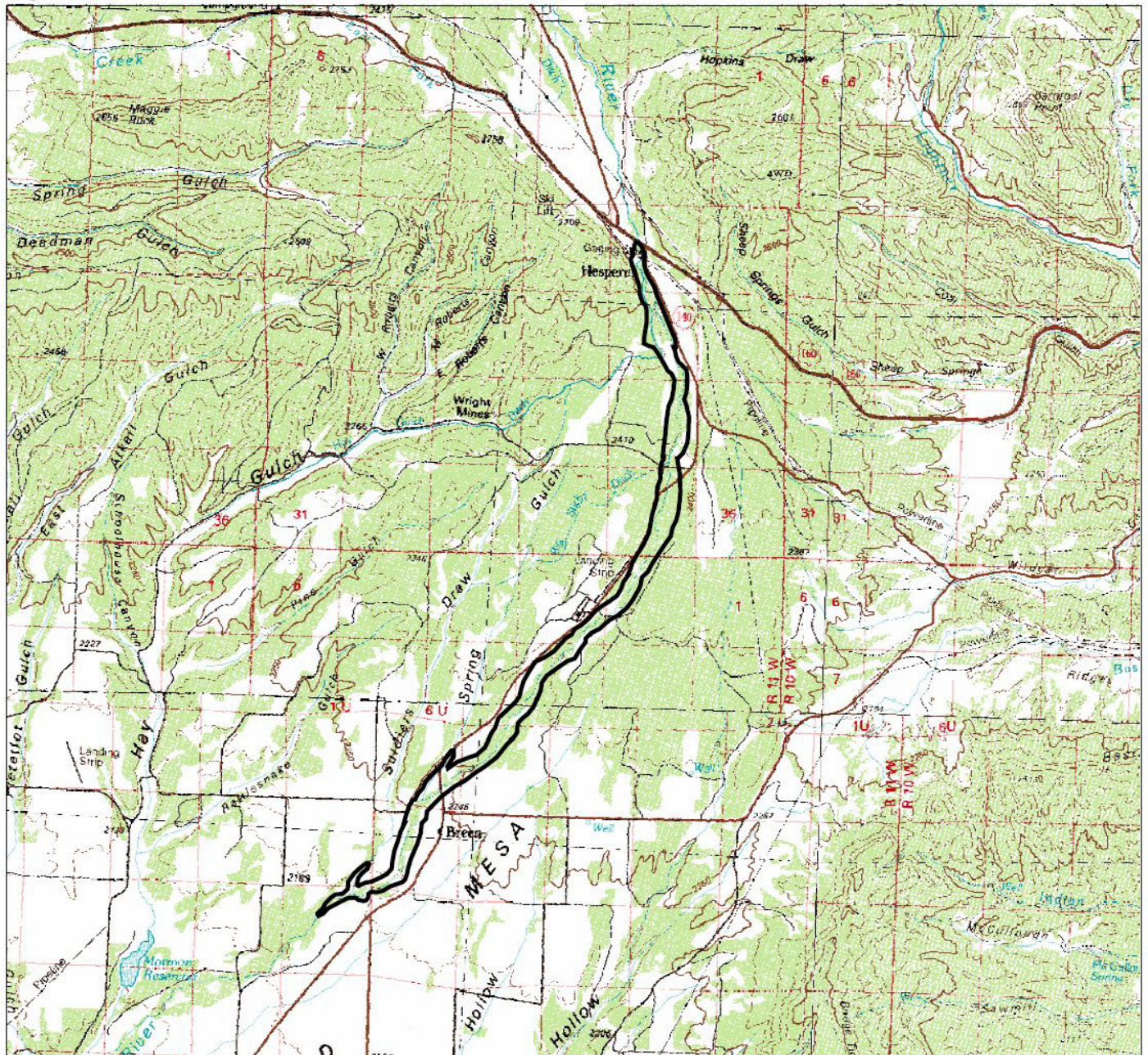
**CNHP's Wetland Classification:** *Populus angustifolia/Betula occidentalis*

Table 65. Wetland functional assessment for the slope wetland at the Middle La Plata River PCA.

<b>Function</b>	<b>Rating</b>	<b>Comments</b>
Overall Functional Integrity	Below Potential	This wetland is functioning below the range of variability for corresponding HGM subclass.
<b>Hydrological Functions</b>		
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	
<b>Biogeochemical Functions</b>		
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.
<b>Biological Functions</b>		
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

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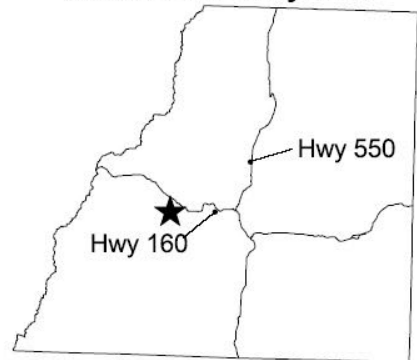
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 **PCA Boundary**

Cortez, 37108-A1  
 30x60 Degree Series

Digital Raster Graphics produced by the U.S. Geological Survey  
 map created 3 April 2004  
 UTM, Zone13, NAD27

**Location in Study Area**





## *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. *neogeum* is documented in British Columbia, Montana, Wyoming, Utah, and Colorado. CNHP has 32 known locations for *Eriophorum altaicum* var. *neogeum* (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
<b>Plant Community</b>					
<b><i>Eriophorum altaicum</i></b>	<b>Altai cottongrass</b>	<b>G4T3T4</b>	<b>S3</b>	<b>FS</b>	<b>A</b>

\*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.

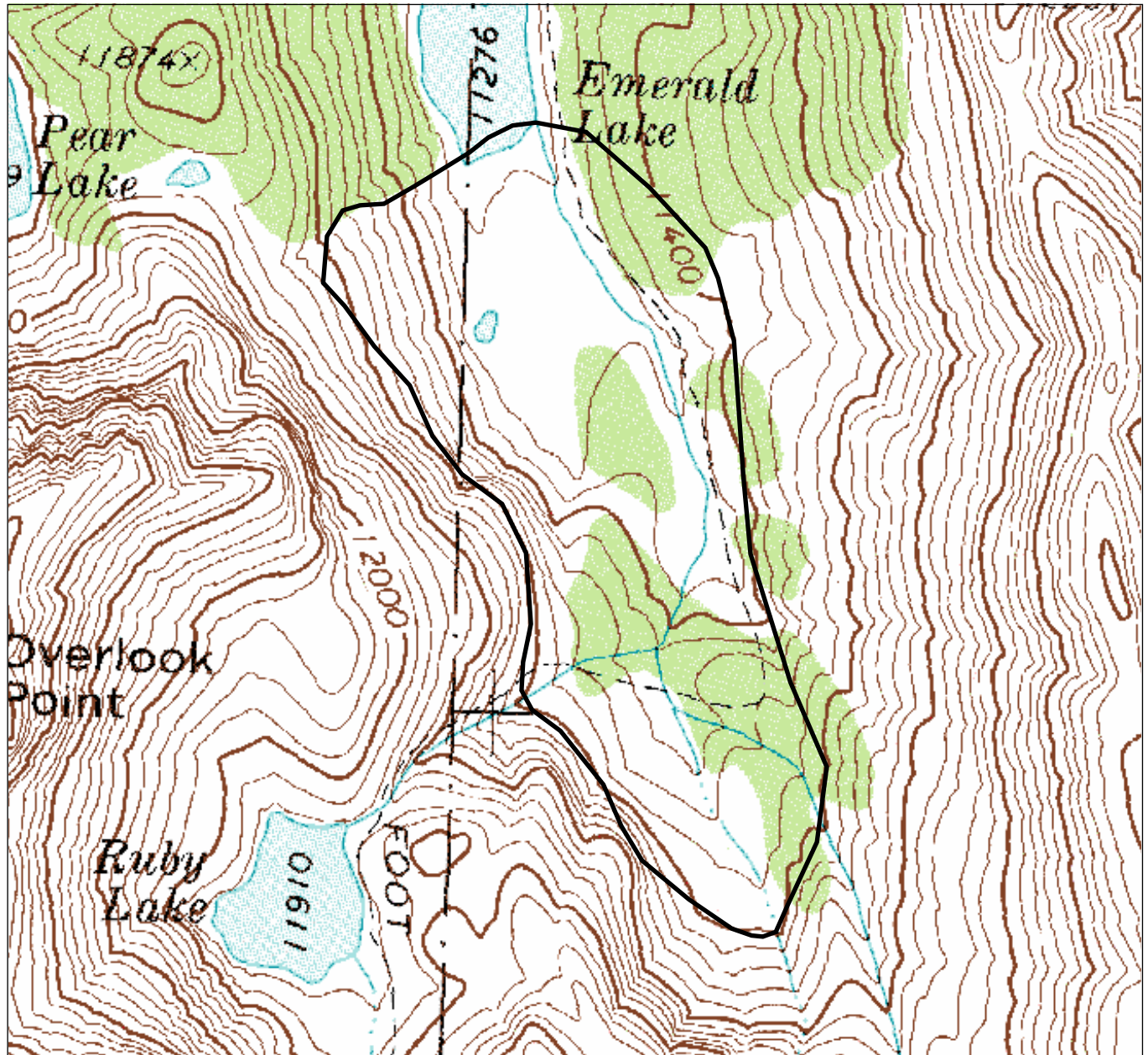
**Protection Comments:** The PCA is within the Weminuche Wilderness and private property. Public education regarding wetland ecology may encourage volunteer efforts toward conservation. Placement of conservation easements on private property is one action that promotes the lasting conservation of an area and may benefit the landowner.

**Management Comments:** There are no serious management needs known for this site. Recreation is the predominant land use.


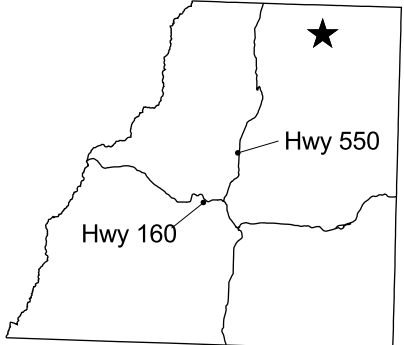
**Restoration Potential:** The area is functioning as expected.

**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

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## *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
<b>Plant Community</b>					
<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.

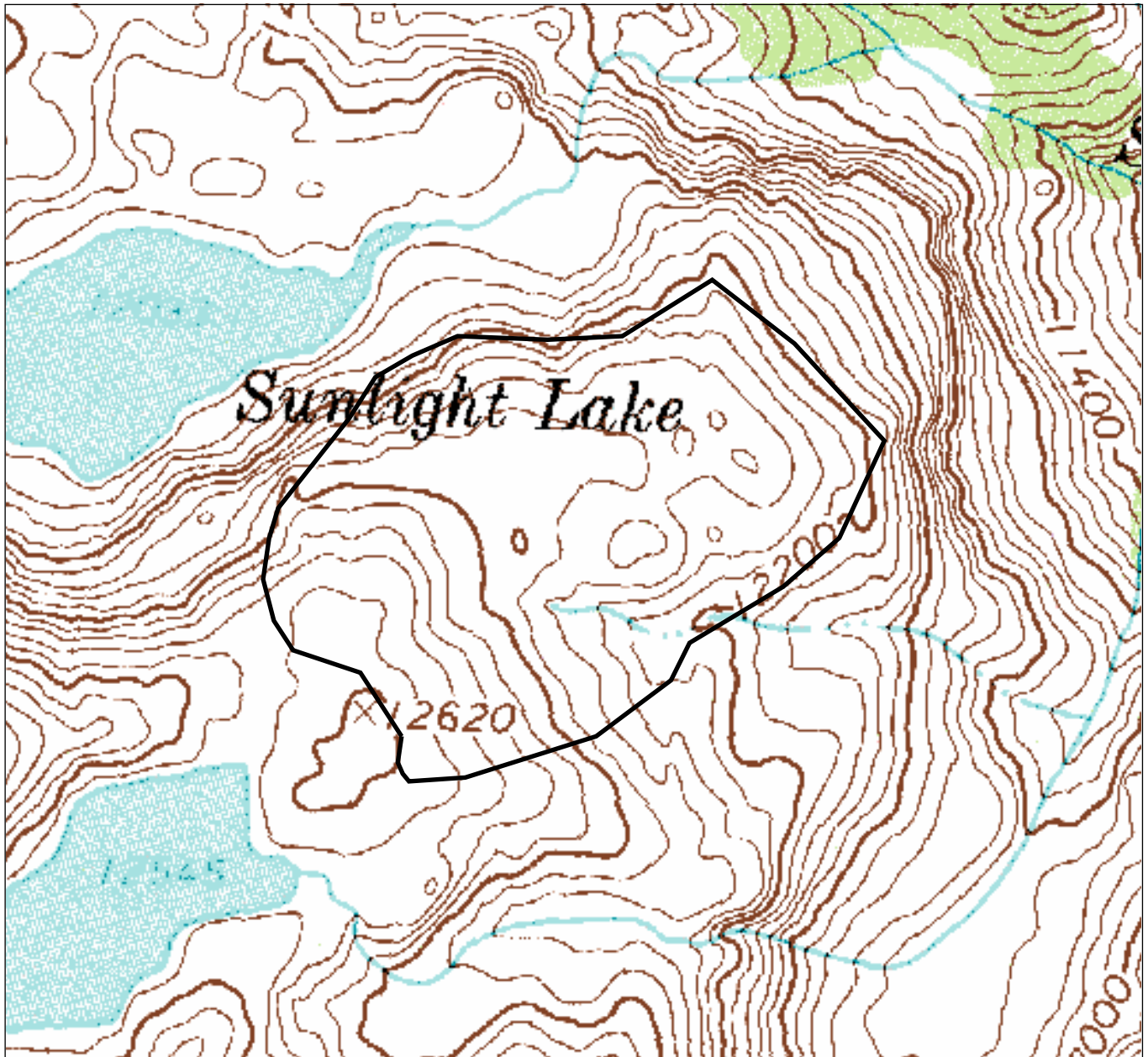
**Soils Description:** Soils are described as hydric.

**Restoration Potential:** There are apparently no restoration needs.


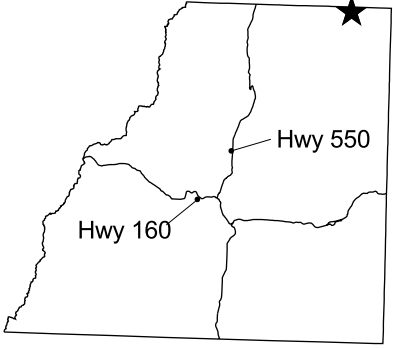
**Wetland Functional Assessment for the Sunlight Basin PCA:** CNHP wetland ecologists did not visit this drainage in the 2003 field season. Thus, a functional assessment could not be conducted.



**Figure 41. Sunlight Basin Potential Conservation Area, B5: General Biodiversity Interest**



0.1 0 0.1 Miles

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## *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	State Status	EO* Rank
<b>Plants</b>					
<i>Eriophorum altaicum</i> var. <i>neogaena</i>	<b>Altai cottongrass</b>		<b>S3</b>	<b>FS</b>	<b>A</b>
<b>Animals</b>					
<i>Oncorhynchus clarki pleuriticus</i>	<b>Colorado River cutthroat trout</b>	<b>G4T3</b>	<b>S3</b>	<b>FS/BLM</b>	<b>E</b>

\*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

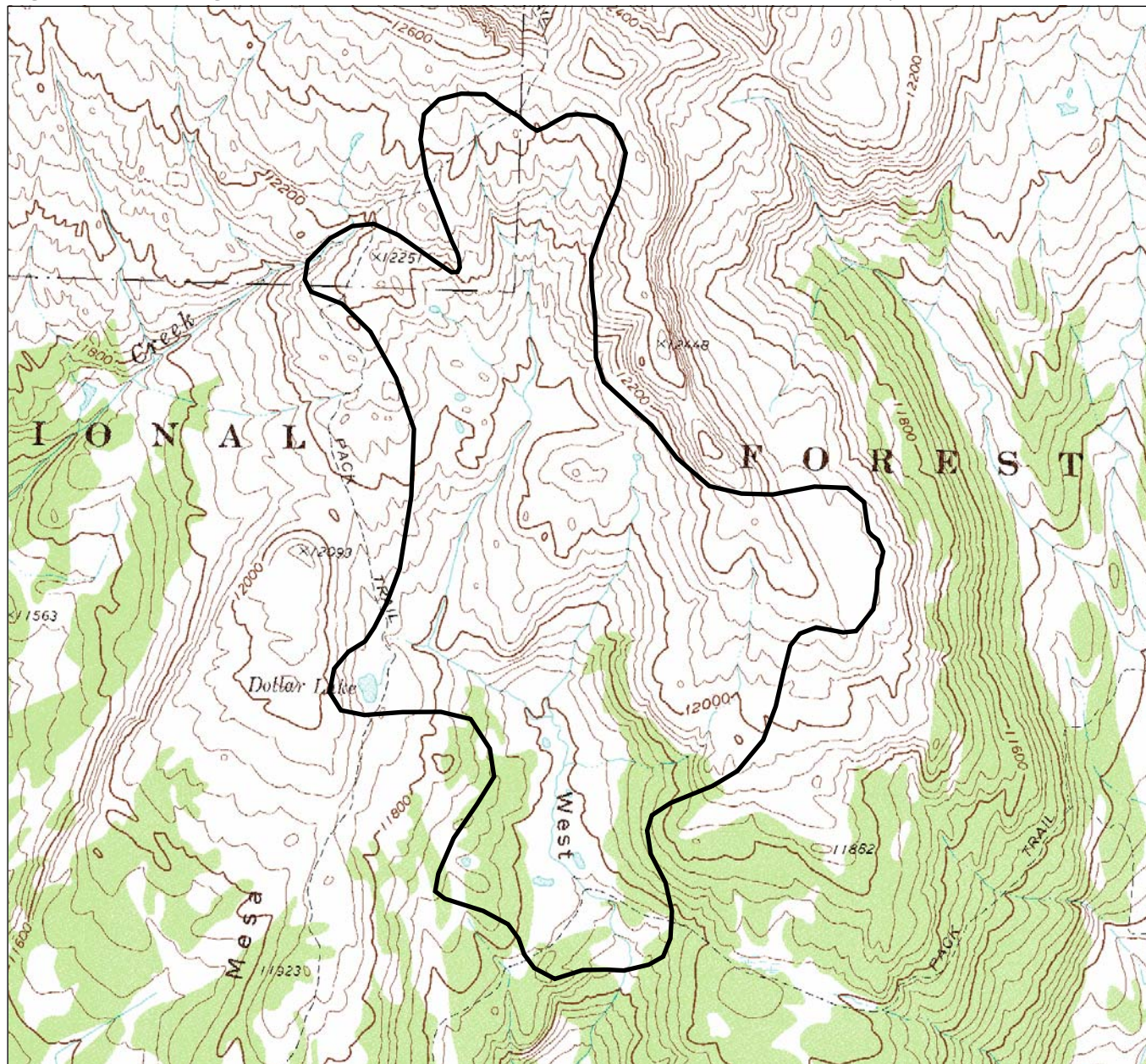
also encompasses the headwaters and its tributaries that are essential for the trout, extending to the downstream barrier. A 1000-foot upland buffer is provided to limit direct physical disturbance and local hydrological alteration.

**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

**Colorado Natural Heritage Program**

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 College of Natural Resources  
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 **PCA Boundary**

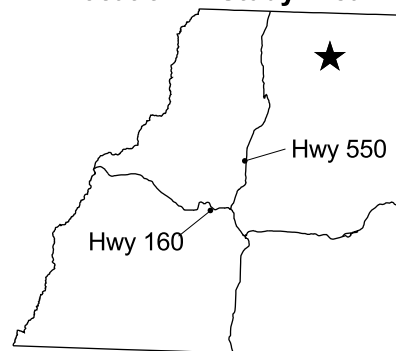
Mountain View Crest, 37107-E6  
 7.5 Minute Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**



## 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.

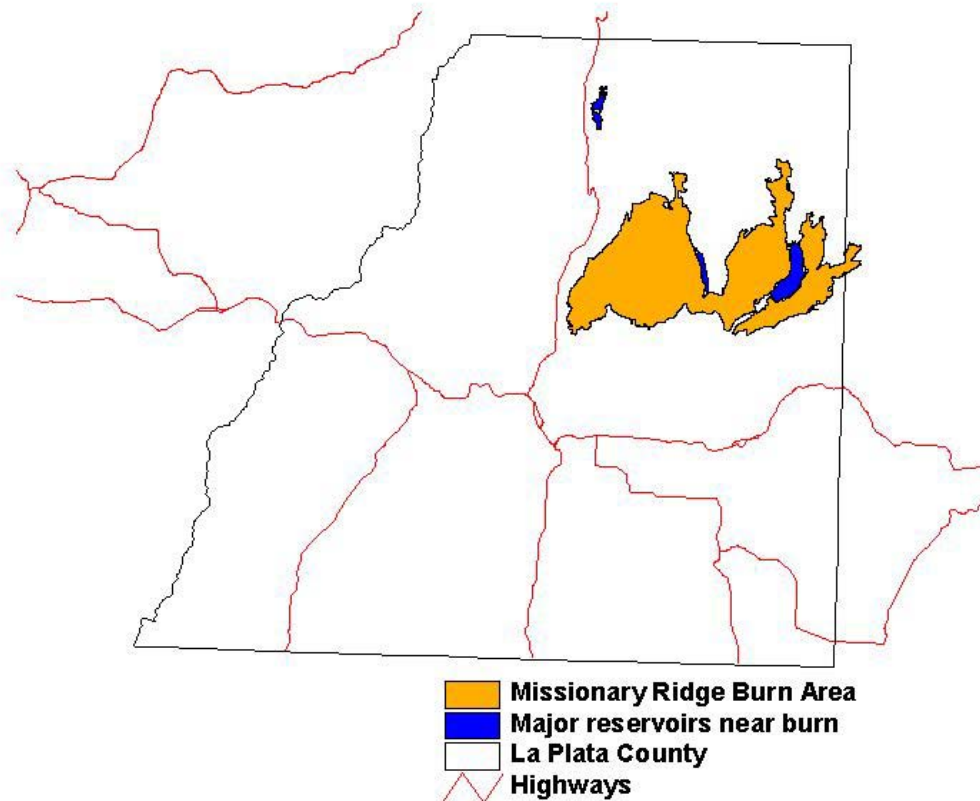


Figure 43. Perimeter of Missionary Ridge Wildfire Area; perimeter provided by USFS, San Juan National Forest.



## *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
<b>Plant Community</b>					
<i>Picea pungens</i> / <i>Cornus sericea</i>	<b>Blue spruce / red-osier dogwood</b>	<b>G4</b>	<b>S2</b>		<b>A</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. Normal 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).

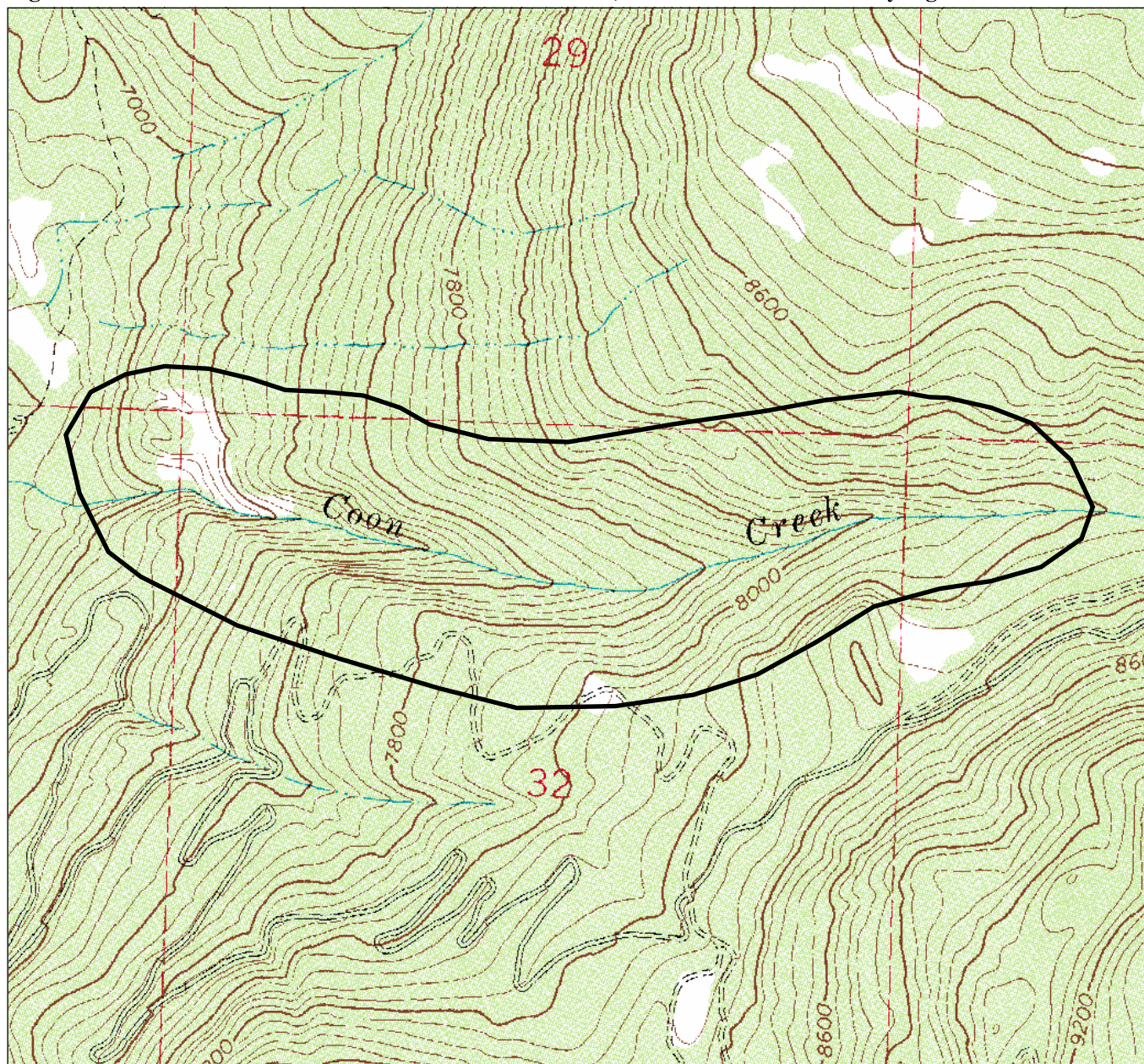
**Soils Description:** Soils for this community type are typically clay loams to sandy loams often with mottling (Carsey *et al.* 2002) indicating soils are saturated and then dry out.

**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.


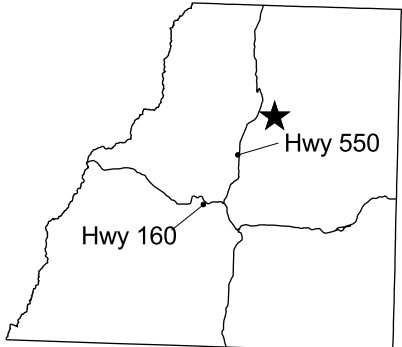
**Wetland Functional Assessment for the title PCA:** A wetland functional assessment was not performed at this site. This PCA is within the Missionary Ridge Fire area and is not expected to be performing at its potential.



**Figure 44. Lower Coon Creek Potential Conservation Area, B4: Moderate Biodiversity Significance**



0.1 0 0.1 Miles

<p><b>Colorado Natural Heritage Program</b>                  Colorado State University                  College of Natural Resources                  8002 Campus Delivery                  Fort Collins, CO 80523-8002</p> <p><b>Disclaimer</b>                  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> <b>PCA Boundary</b></p> <p>Hermosa, 37107-D7                  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><b>Location in Study Area</b></p> 
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## 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
<b>Plant Community</b>					
<i>Populus tremuloides</i> / <i>Cornus sericea</i>	<b>Quaking aspen / red-osier dogwood</b>	<b>G4</b>	<b>S2S3</b>		<b>B</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. Normal 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.

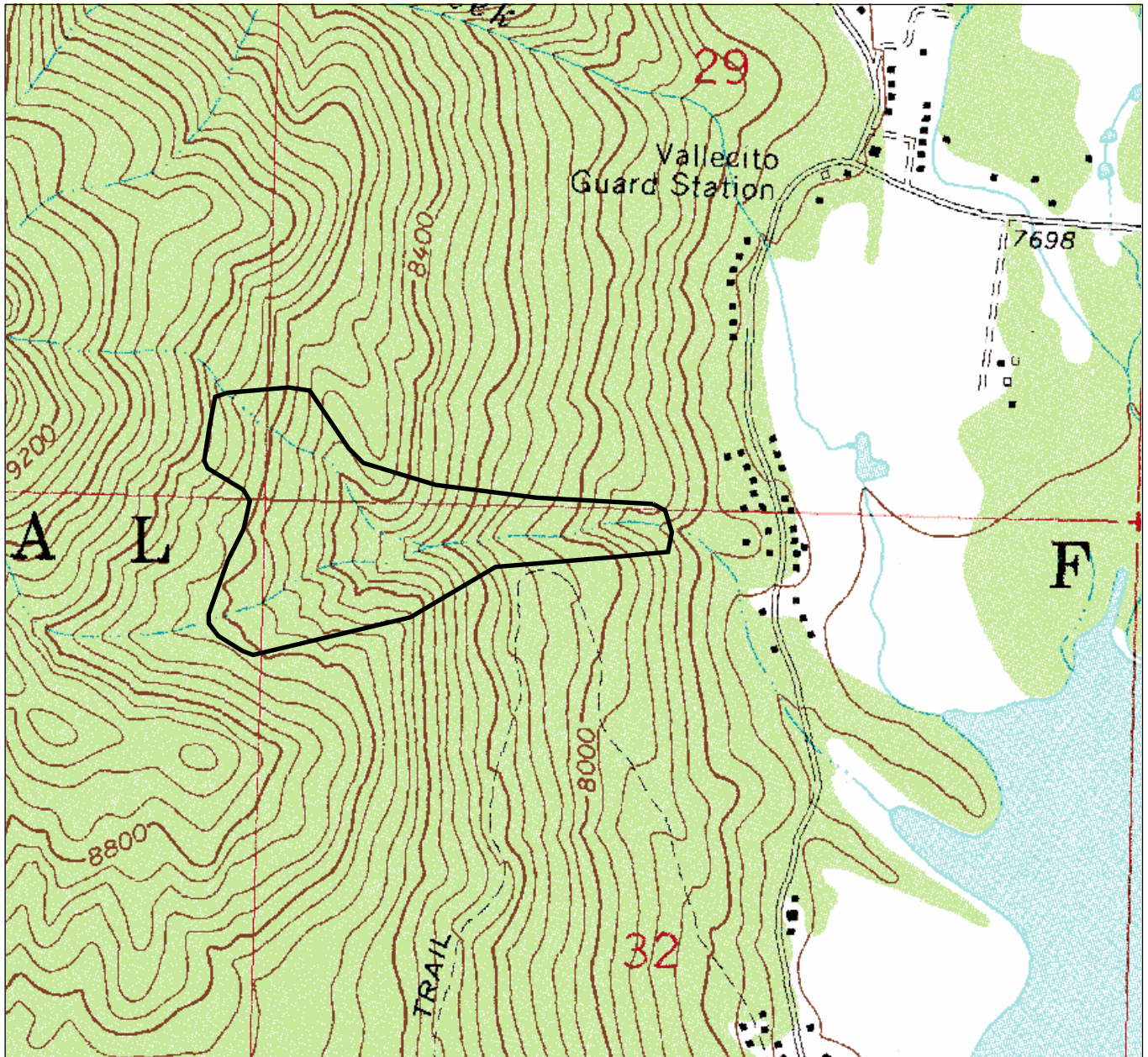
**Wetland Functional Assessment for the Vallecito Reservoir Tributary PCA:** A functional assessment was not performed at this site. The riparian area in this PCA is partially damaged due to the Missionary Ridge Fire, 2002, and is not expected to be functioning at its potential.

Figure 45. Sign depicting common threat – CR 250.





**Figure 46. Vallecito Reservoir Tributary 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

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 **PCA Boundary**

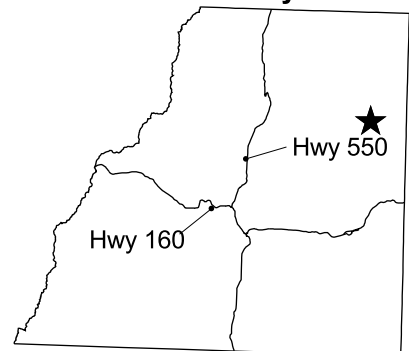
Vallecito Reservoir, 37107-D5  
 7.5 Minute Series

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

map created 3 April 2004

UTM, Zone13, NAD27

**Location in Study Area**



## ***Existing Element Occurrences Within the Burned Area: Past and Present Condition***

### **South Fork Coon Creek**

U.S.G.S. 7.5-min. quadrangle: Lemon Reservoir.

Legal Description: T37N R8W Section: 33, 34

Element Occurrence: Thinleaf alder / mixed willow species (*Alnus incana* / mixed *Salix* spp.)

G/S Rank: G3 S3

First Observation: 1995

Element Occurrence Rank: B = good condition

Current Condition: Community is severely damaged. There is vigorous aspen regeneration in the area, especially on the uplands. Very few individuals of thinleaf alder (*Alnus incana*) were noted in the riparian area. Substrate is unstable.

### **Haflin Canyon**

U.S.G.S. 7.5 min. quadrangle: Durango East.

Legal Description: T36N R9W Section: 26

Element Occurrence: Douglas fir / red-osier dogwood (*Pseudotsuga menziesii* / *Cornus sericea*)

G/S Rank: G4 S2

First Observation: 1995

Element Occurrence Rank: A = excellent condition

Current Condition: The plant community is completely lost. There are no signs of regenerating coniferous species in 2003. There is limited woody regeneration occurring in the riparian area consisting of aspen (*Populus tremuloides*), red-osier dogwood (*Cornus sericea*), Rocky Mountain maple (*Acer glabrum*) and choke cherry (*Prunus virginiana*). There is a high percentage of bare ground with deep fine soil and ash. Annual grasses, (*Triticum aestivum*, *Lolium perenne*) apparently planted, are occurring where establishment is favorable such as in depressions, along the trail, in swales and the riparian area. The drainages are choked in some areas with downed logs and debris, even after below average snow cover and spring rains in 2003. The uplands regeneration is currently sparse, but encouraging, consisting of a mixture of both native and non-native species.

Figure 47. Regeneration in the Haflin Creek drainage, 2003.



## *Animas River at Durango Site of Local Significance*

**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.

**Size:** Approximately 409 acres

**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 (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 may invite exotic weed invasion.

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*).

**Protection Comments:** The central area of the SLS is managed by the City of Durango. Private property parcels (most are 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. Public education regarding riparian ecology may encourage volunteer efforts toward conservation. Placement of conservation easements is one action that promotes lasting conservation and may benefit the landowner.

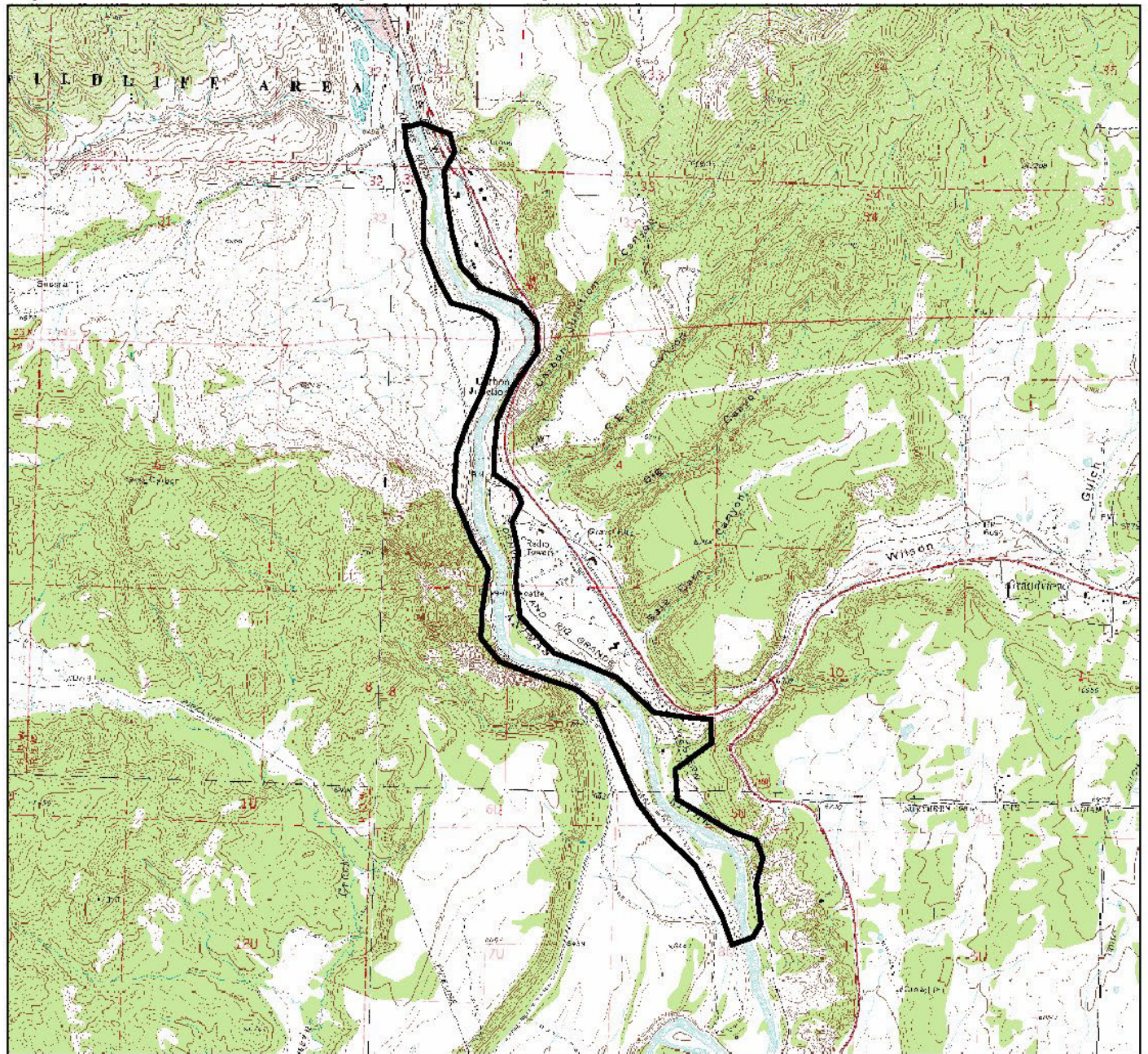
**Management Comments:** The area is managed by a variety of property owners. Exotic shrub invasion (Russian olive) is common throughout. Cooperative efforts toward restoration are ideal to complete the conservation of the entire river reach.

**Soils Description:** Soils sampled have sand depositions, and a significant silty clay horizon with mottling in the upper region. Soil Survey of La Plata County Area, Colorado (USDA 1988) delineates most of the SLS as Sycle fine sandy loam, classified as mesic Aridic Haplustolls.

**Restoration Potential:** 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.



**Figure 48. Animas River at Durango Site of Local Significance**



0.4 0 0.4 Miles

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 Fort Collins, CO 80523-8002

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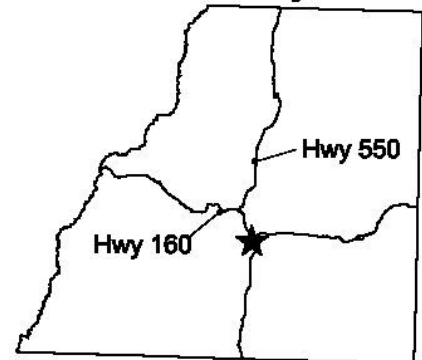
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 **SLS Boundary**

Loma Linda, 37107-B7  
 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**





## *Durango Nature Center Site of Local Significance*

**Location:** The Durango Nature Center Site of Local Significance 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.

**Size:** Approximately 56 acres

**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. Vegetation is characterized by occasional mature cottonwoods with little regeneration. The shrub layer is dense to sparse dominated by sandbar willow (*Salix exigua*), with associated skunkbush sumac (*Rhus trilobata*). Upland shrubs are sometimes near the river bank and may include big sage (*Artemisia* spp.) and rabbitbrush (*Chrysothamnus nauseosus*) or Woods' rose (*Rosa woodsii*). The understory is comprised largely of 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 provides education to the public on the Florida River's 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 surrounding land use is predominantly agricultural, land use trends are toward more home development and subdivisions, and expected continuing gas well development and infill.

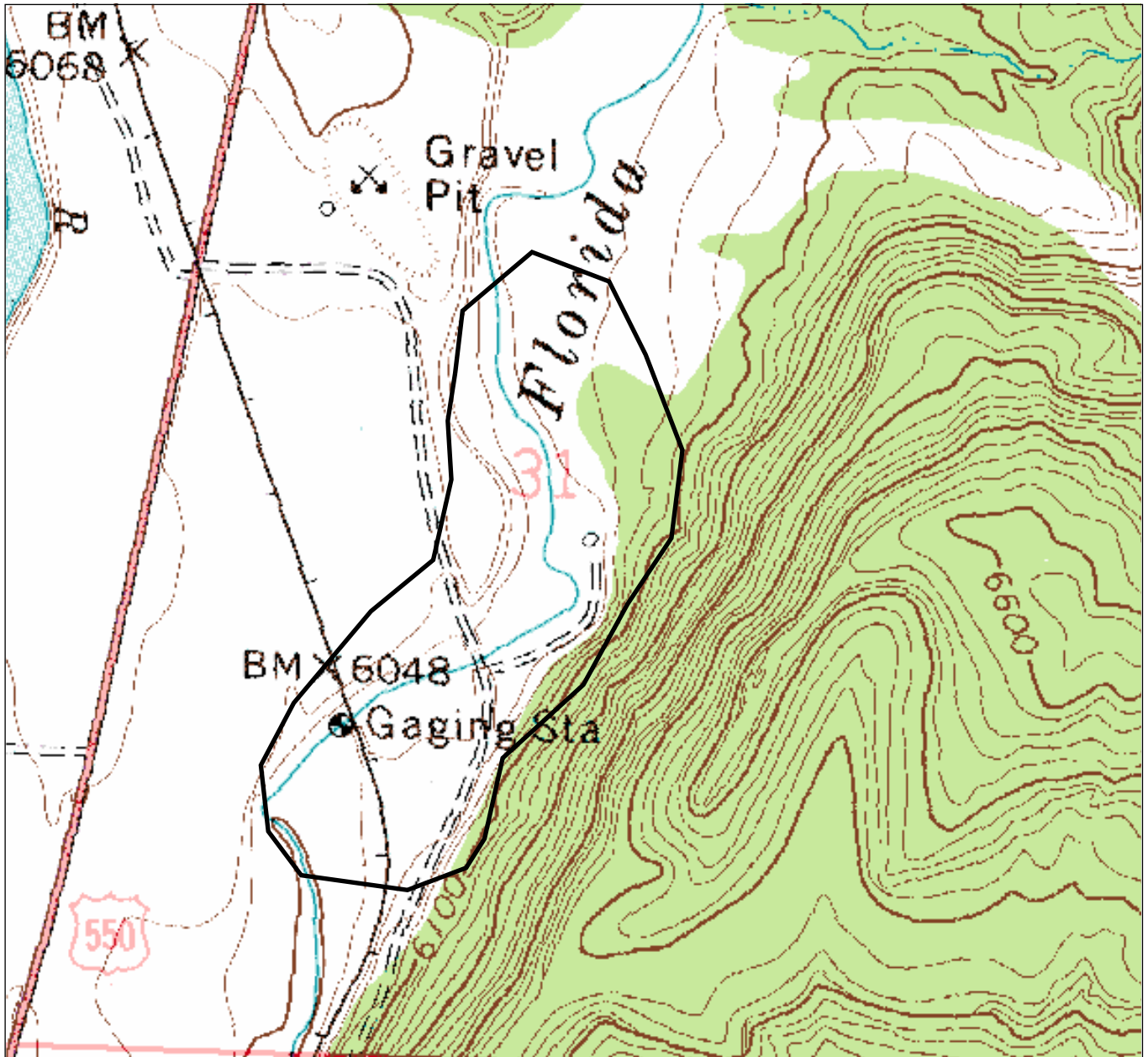
**Protection Comments:** The site is entirely within private property. Continued land use practices such as home developments and gas well infill are expected. The nature center is within a conservation easement, emphasizing natural heritage education.

**Management Comments:** Exotic shrub invasion is occurring within the site. Property owners manage for exotic invasion in some surrounding areas.


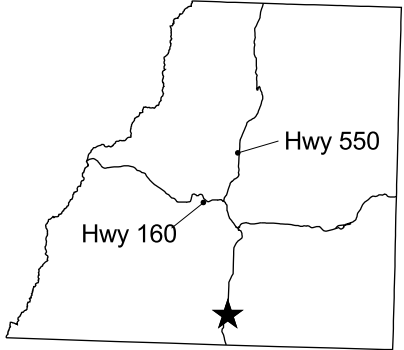
**Soils Description:** Sampled soil texture is silty clay with coarse alluvial horizons intermixed, such as layers of cobble and sandy layers from at least two major flooding events. Soil Survey of La Plata County Area, Colorado delineates the area as Tefton Loam, classified as fine loamy, mixed (calcareous), mesic Aquic Ustifluent, and described as somewhat poorly drained sandy loams over alluvial valley floors (USDA 1988).

**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.

Figure 49. Durango Nature Center Site of Local Significance



0.1 0 0.1 Miles

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## Rare and Imperiled Wetland Plant Communities of La Plata County (adapted from Carsey et al. 2003)

### White fir - (Blue spruce) - Narrowleaf cottonwood / Rocky Mountain maple Forest

*Abies concolor* - (*Picea pungens*) - *Populus angustifolia* / *Acer glabrum*



**Global rank/State rank:**

G2 / S2

**HGM subclass:** R3/4

**Colorado elevation range:**

7,200-9,100 ft (2,200-2,770 m)

### General Description

The *Abies concolor*-(*Picea pungens*)-*Populus angustifolia*/*Acer glabrum* (white fir-blue spruce-narrowleaf cottonwood/Rocky Mountain maple) plant association is a diverse, mixed conifer-deciduous forest occurring on active floodplains and stream banks of montane valley floors. The presence of *Abies concolor* distinguishes this community from the more common *Populus angustifolia*-*Picea pungens*/*Alnus incana* (narrowleaf cottonwood-blue spruce/thinleaf alder) plant association, and is indicative of the southern-most mountains in Colorado. *Picea pungens* (blue spruce) is often an upper canopy component but is not present in all stands. This is reflected in the association name by placing *Picea pungens* in parentheses.

This community is located in narrow to moderately wide valleys, 50-300 ft (17-100 m) on immediate stream banks, floodplains and upper terraces, 1-6.5 ft, 1.5 ft avg. (0.3-2.0 m, 0.35 avg. m), above the channel high-water level. Streams are steep to moderately steep, straight to moderately sinuous (2-6%, average 4% gradient). The soils are well drained and poorly developed mineral soils with shallow sandy loams over coarse alluvial materials.

### Vegetation Description

The upper canopy is diverse, dominated by *Populus angustifolia* (narrowleaf cottonwood) and *Abies concolor* (white fir) and usually including several other tree species such as *Picea pungens* (blue spruce), *Abies lasiocarpa* (subalpine fir), and *Pseudotsuga menziesii* (Douglas-fir). Shrubs are thickest near the stream channel with

*Acer glabrum* (Rocky Mountain maple) being the most commonly encountered and abundant species.

Other shrubs often present include *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Betula occidentalis* (river birch), *Cornus sericea* (red-osier dogwood), *Amelanchier utahensis* (Utah serviceberry), *Jamesia americana* (wax flower), *Lonicera involucrata* (twinberry honeysuckle), *Mahonia repens* (Oregon grape), *Salix bebbiana* (Bebb willow), *S. drummondiana* (Drummond willow), *S. monticola* (mountain willow), *Symphoricarpos* spp. (snowberry), *Ribes* spp. (current), and *Rosa woodsii* (Woods rose).

The herbaceous undergrowth is variable, depending on site conditions, but is generally sparse, with less than 20% total cover. No one species is present in all stands.

Common forb species include *Heracleum maximum* (common cowparsnip), *Geranium richardsonii* (Richardson geranium), *Vicia americana* (American vetch), *Viola* spp. (violet), *Osmorhiza berteroi* (sweet cicely), *Maianthemum stellatum* (starry false Solomon seal), *Mertensia ciliata* (tall fringed bluebells). Graminoid species include *Elymus glaucus* (blue wildrye), *Bromus inermis* (smooth brome), and *Poa pratensis* (Kentucky bluegrass).

### Ecological Processes

This plant association is a mid- to late-seral community. High elevations and cool, shaded canyon bottoms create an environment for *Abies concolor* (white fir) and *Picea pungens* (blue spruce). The active channel flooding and sediment deposition along the reach allows *Populus angustifolia* (narrowleaf cottonwood) to persist. On higher terraces that no longer experience flooding, *Abies* and *Picea* may become the climax tree species.

Potential conservation areas that support this community are Junction Creek, Lower Hermosa Creek, Madden Creek and Elbert Creek.

Avg. Cover %	(Range)	Species Name	# Plots (N=15)
45	(20-100%)	<i>Populus angustifolia</i>	14
33	(5-60%)	<i>Picea pungens</i>	6
29	(5-66%)	<i>Abies concolor</i>	13*
20	(1-62%)	<i>Acer glabrum</i>	12
15	(1-50%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	10
13	(1-36%)	<i>Pseudotsuga menziesii</i>	10
12	(1-27%)	<i>Salix drummondiana</i>	5
8	(1-30%)	<i>Heracleum maximum</i>	5
7	(1-30%)	<i>Amelanchier alnifolia</i>	7
7	(1-30%)	<i>Elymus glaucus</i>	5
6	(1-20%)	<i>Lonicera involucrata</i>	8
5	(1-10%)	<i>Symphoricarpos oreophilus</i>	5

**Other species with < 5% average cover present in at least 10% of plots:**  
*Rudbeckia laciniata* var. *ampla* (1-10%), *Taraxacum officinale* (1-7%), *Rosa woodsii* (1-10%), *Geranium richardsonii* (1-7%), *Poa pratensis* (1-11%), *Maianthemum stellatum* (1-4%), *Thalictrum fendleri* (1-3%), *Chamerion angustifolium* ssp. *circumvagum* (1-4%), *Actaea rubra* ssp. *arguta* (1-3%), *Equisetum arvense* (1-3%), *Galium triflorum* (1-3%), *Mertensia ciliata* (1-3%), *Oxypolis fendleri* (1%), *Achillea millefolium* var. *occidentalis* (1%).

\**Abies concolor* occurred in all stands, but was not captured in every sample plot.



## Subalpine fir - Engelmann spruce / Thinleaf alder Forest

*Abies lasiocarpa* - *Picea engelmannii* / *Alnus incana* ssp. *tenuifolia*

Global rank/State rank

G5 / S5

HGM subclass: R2, R3/4

Colorado elevation range:

7,200-10,300 ft (2,200-3,100 m)



### General Description

Occurs on heavily forested stream reaches where *Abies lasiocarpa*-*Picea engelmannii* (subalpine fir-Engelmann spruce) forests also occur on adjacent hillslopes. Tall *Alnus incana* ssp. *tenuifolia* (thinleaf alder) and *Salix drummondiana* (Drummond willow) grow in a thick band along the edge of the stream. At lower elevations, *Alnus incana* is more abundant than *Salix drummondiana*. At mid-elevations, the two shrubs can be codominant. At higher elevations, *Salix drummondiana* becomes dominant and *Alnus incana* drops out, forming the *Abies lasiocarpa*-*Picea engelmannii*/*Salix drummondiana* plant association.

This is a common community on first- and second-order streams above 8,000 ft in elevation. It is generally found on stream benches and banks in narrow, 150-800 ft (40-250 m) wide, V-shaped valleys. Most commonly occurs within 15-20 ft (5-6 m) of the channel edge and is rarely more than 2 ft (0.5 m) above the stream bank.

Stream channels are narrow and steep, moderately wide with a moderate gradient or wide and very sinuous.

Soils are shallow, dark-colored, thin layers of loamy sands, silty loams, and sandy clay loams over cobbly alluvium. There is generally a high organic matter content in the top 20 inches (50 cm) and mottles at 40 inches (100 cm), becoming skeletal at 60 inches (150 cm).

### Vegetation Description

*Picea engelmannii* (Engelmann spruce) and/or *Abies lasiocarpa* (subalpine fir)

dominates the upper canopy, with *Picea engelmannii* present more often than *Abies lasiocarpa*. Other tree species such as *Picea pungens* (blue spruce), *Pinus contorta* (lodgepole pine), and *Populus tremuloides* (quaking aspen) are occasionally present. *Alnus incana* ssp. *tenuifolia* (thinleaf alder) is always present in the shrub canopy layer, and other shrubs are often present as well. The herbaceous undergrowth is usually rich in forb species, with an overall herbaceous cover of 20-70%.

**Ecological processes**

This association appears to be a late-seral, or at least a long-lived, riparian community that may represent a successional change from deciduous-dominated overstory to a conifer-dominated overstory at lower elevations, a shift which may be attributed to a lack of flooding or other frequent disturbance. The successional process of the spruce-fir forest is slow (200 + years); factors such as fire frequency, wind-throw and insect attack can affect the composition and age structure of *Abies lasiocarpa* and *Picea engelmannii* stands.

Potential conservation areas supporting this community type are Vallecito Creek and Johnson Creek.

Avg. Cover %	(Range)	Species Name	# Plots (N=56)
34	(1-80%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	56
31	(1-82%)	<i>Picea engelmannii</i>	51
22	(1-53%)	<i>Cornus sericea</i> ssp. <i>sericea</i>	8
21	(1-77%)	<i>Abies lasiocarpa</i>	43
17	(3-30%)	<i>Salix geeyeriana</i>	8
14	(2-48%)	<i>Pinus contorta</i>	9
12	(1-32%)	<i>Acer glabrum</i>	9
12	(1-43%)	<i>Corydalis caseana</i> ssp. <i>brandegeei</i>	7
9	(0.1-95%)	<i>Calamagrostis canadensis</i>	32
9	(1-43%)	<i>Equisetum arvense</i>	29
7	(1-20%)	<i>Salix drummondiana</i>	25
7	(1-10%)	<i>Picea pungens</i>	9
6	(1-30%)	<i>Lonicera involucrata</i>	40
5	(0.1-15%)	<i>Carex aquatilis</i>	9
5	(1-21%)	<i>Populus tremuloides</i>	15
5	(1-20%)	<i>Salix monticola</i>	6

**Other species with < 5% average cover present in at least 10% of plots:**  
*Heracleum maximum* (0.1-25%), *Oxypolis fendleri* (1-34%), *Mertensia ciliata* (0.1-11%), *Mertensia franciscana* (1-7%), *Amelanchier alnifolia* (1-10%), *Maianthemum racemosum* ssp. *amplexicaule* (1-18%), *Rubus parviflorus* (1-10%), *Streptopus amplexifolius* var. *chalazatus* (1-8%), *Pyrola asarifolia* ssp. *asarifolia* (1-10%), *Cardamine cordifolia* (1-11%), *Glyceria striata* (1-14%), *Ribes inerme* (1-10%), *Saxifraga odontoloma* (1-10%), *Symphytotrichum foliaceum* (1-10%), *Hydrophyllum fendleri* (1-10%), *Vaccinium scoparium* (1-8%), *Ribes lacustre* (1-7%), *Viola canadensis* var. *scopulorum* (0.1-20%), *Galium trifidum* ssp. *subbiflorum* (1-10%), *Equisetum pratense* (1-6%), *Osmorhiza depauperata* (1-10%), *Aconitum columbianum* (1-10%), *Actaea rubra* ssp. *arguta* (1-8%), *Senecio triangularis* (1-9%), *Arnica cordifolia* (1-7%), *Thalictrum fendleri* (1-10%), *Mitella pentandra* (1-10%), *Geranium richardsonii* (1-8%), *Rosa woodsii* (1-7%), *Chamerion angustifolium* ssp. *circumvagum* (1-6%), *Maianthemum stellatum* (1-8%), *Osmorhiza berteroi* (1-3%), *Dodecatheon pulchellum* (1-5%), *Galium triflorum* (1-8%), *Chaenactis douglasii* (1-4%), *Elymus glaucus* (1-5%), *Carex disperma* (0.1-5%), *Orthilia secunda* (1-3%), *Conioselinum scopulorum* (0.1-5%), *Rubus idaeus* ssp. *strigosus* (1-3%), *Luzula parviflora* (0.1-4%), *Taraxacum officinale* (1-3%), *Achillea millefolium* var. *occidentalis* (1-5%), *Poa pratensis* (1-4%), *Pyrola minor* (1-3%), *Geum macrophyllum* var. *perincisum* (0.1-3%), *Fragaria virginiana* ssp. *glauca* (1-3%), *Pseudocymopterus montanus* (1-2%), *Galium boreale* (1-3%), *Carex microptera* (1-2%), *Bromus ciliatus* var. *ciliatus* (1%).

## Subalpine fir - Engelmann spruce / Bluejoint reedgrass Forest

### *Abies lasiocarpa* - *Picea engelmannii* / *Calamagrostis canadensis*

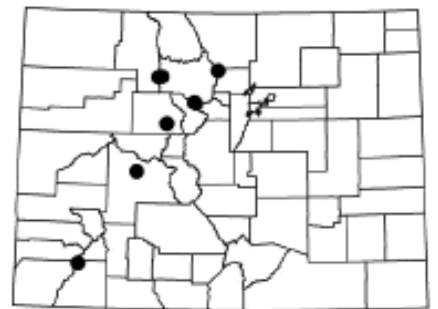
Global rank/State rank:

G5 / S3

HGM subclass: R2

Colorado elevation range:

8,600-9,800 ft (2,600-3,000 m)



### General Description

This association forms a heavily shaded forest with few shrubs and a thick carpet of grass. It is a minor plant association that occurs sporadically throughout the middle and northern Rocky Mountains and occasionally in the southern San Juan Mountains in southwest Colorado. The ground is wet and spongy and covered with moss and grasses.

Typical habitats for this association are narrow to wide valleys with moderate (5%) stream gradients. It occurs on moist toeslopes bordering streams and wet meadows about 1.5 ft (0.5 m) above the bankfull level of the channel. Water tables are usually high with standing water present in the growing season. Soils are typically poorly drained with fine sandy clay over a gravel or cobble layer.

### Vegetation Description

*Picea engelmannii* (Engelmann spruce) is usually the dominant overstory species. *Abies lasiocarpa* (subalpine fir) can occur with up to 50% cover. Shrub cover is generally low, shrubs may or may not be present. Shrub species occasionally present include *Alnus incana* ssp. *tenuifolia* (thinleaf alder) *Lonicera involucrata* (twinberry honeysuckle) *Salix drummondiana* (Drummond willow), and *Vaccinium myrtillus* (whortleberry).

*Calamagrostis canadensis* (bluejoint reedgrass) dominates the herbaceous understory and is always present with 20-95% cover. *Equisetum arvense* (field horsetail) is also usually present, with 3-20% cover. Other mesic graminoids present less often include



*Glyceria striata* (fowl mannagrass), *Carex utriculata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex microptera* (small-wing sedge). Forb cover can be high or low depending on site conditions. Common forb species include *Senecio triangularis* (arrowleaf ragwort), *Heracleum maximum* (common cowparsnip) and *Ligusticum* (licorice-root) spp.

### Ecological processes

Many first- and second-order streams run through subalpine spruce-fir forests providing habitats for obligate riparian shrubs, forbs, and grasses, forming a number of riparian *Abies lasiocarpa*-*Picea engelmannii* (subalpine fir-Engelmann spruce) plant associations. Although *Abies lasiocarpa* and *Picea engelmannii* are not obligate riparian species, the two species strongly influence subalpine riparian ecosystems. Sites supporting this forest type are fairly wet. As hydrologic conditions change, the understory will change to reflect wetter or drier conditions. This community is found at Middle Hermosa Creek PCA.

Avg. Cover		Species Name	# Plots (N=8)
%	(Range)		
39	(20-95%)	<i>Calamagrostis canadensis</i>	8
36	(14-60%)	<i>Picea engelmannii</i>	7
21	(10-50%)	<i>Abies lasiocarpa</i>	6
15	(10-20%)	<i>Carex utriculata</i>	2
13	(5-20%)	<i>Pinus contorta</i>	2
12	(3-20%)	<i>Equisetum arvense</i>	7
11	(1-20%)	<i>Glyceria striata</i>	2
9	(3-20%)	<i>Senecio triangularis</i>	4
7	(1-20%)	<i>Heracleum maximum</i>	4
7	(3-10%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	2
7	(3-10%)	<i>Ligusticum porteri</i>	2
6	(1-11%)	<i>Ligusticum tenuifolium</i>	2
5	(1-10%)	<i>Saxifraga odontoloma</i>	3

**Other species with < 5% average cover present in at least 10% of plots:**  
*Streptopus amplexifolius* var. *chalazatus* (1-10%), *Lonicera involucrata* (1-10%), *Geranium richardsonii* (1-10%), *Ribes lacustre* (3-5%), *Mertensia ciliata* (1-10%), *Cardamine cordifolia* (1-5%), *Carex aquatilis* (1-5%), *Geum macrophyllum* var. *perincisum* (1-10%), *Oxypolis fendleri* (1-5%), *Rosa woodsii* (1-5%), *Aconitum columbianum* (1-3%), *Arnica cordifolia* (1-3%), *Carex disperma* (0.1-5%), *Fragaria virginiana* ssp. *glauca* (1-3%), *Carex microptera* (1-3%), *Chamerion angustifolium* ssp. *circumvagum* (1-2%), *Galium triflorum* (1%), *Orthilia secunda* (1%), *Vicia americana* (1%), *Bromus ciliatus* var. *ciliatus* (1%), *Mitella pentandra* (1%), *Carex canescens* (1%), *Poa pratensis* (1%), *Veronica americana* (1%), *Pyrola minor* (1%), *Senecio serra* var. *serra* (1%), *Moneses uniflora* (0.1-1%), *Luzula parviflora* (0.1-1%), *Conioselinum scopulorum* (0.1-1%).

## Subalpine fir - Engelmann spruce / Drummond willow Forest

### *Abies lasiocarpa* - *Picea engelmannii* / *Salix drummondiana*

**Global rank/State rank:**

G5 / S4

**HGM subclass:** R2, R3/4

**Colorado elevation range:**  
8,400-10,900 ft (2,600-3,300 m)



#### **General Description**

This association is a heavily forested type found along second and third-order streams above 8,400 ft (2,600 m) where *Abies lasiocarpa*-*Picea engelmannii* (subalpine fir-Engelmann spruce) forests also occur on adjacent hillslopes. Tall *Alnus incana* ssp. *tenuifolia* (thinleaf alder) and *Salix drummondiana* (Drummond willow) grow in a thick band along the edge of the stream. At lower elevations, *Alnus incana* is more abundant than *Salix drummondiana*. At mid-elevations, the two shrubs can be co-dominant. At higher elevations, *Salix drummondiana* becomes dominant and *Alnus incana* drops out, forming the *Abies lasiocarpa*-*Picea engelmannii*/*Salix drummondiana* plant association. *Picea pungens* (blue spruce) is occasionally present at the stream edge and represents a variation of this type.

This common and well-documented plant association occurs in the San Juan Mountains and the Colorado, Gunnison, Arkansas, and South Platte River Basins. It is commonly found on steep (2-25% gradient), narrow (<35 ft, 10 m), first-order streams in moderate to deep V-shaped valleys. The thick shrub canopy is restricted to a narrow band along the rocky stream bank. It can also occur in wider valleys along moderate gradient reaches with channel bottoms that range from bedrock to gravel and one site in the Gunnison River Basin occurs along a braided stream channel. Soils are typically shallow (<3 ft, 1 m) sandy loams to sandy clay loams packed between large angular boulders and cobbles with a thin layer of partially decomposed organic matter under the litter layer.

#### **Vegetation Description**

This association does not generally form a mosaic and is often the only riparian association along a stream reach. It typically has a dense canopy of 20-90% cover of *Abies lasiocarpa* (subalpine fir) and/or *Picea engelmannii* (Engelmann spruce). *Picea pungens* (blue spruce) is occasionally present in lower elevation, wet stands, and *Pinus contorta* (lodgepole pine) may be present in drier, early-seral stands. *Salix drummondiana* (Drummond willow) is always present as part of a narrow but dense strip of shrubs. Other shrubs that occur with less frequency include *Salix monticola*



(mountain willow), *Salix brachycarpa* (barrenground willow), *Salix planifolia* (planeleaf willow), *Lonicera involucrata* (twinberry honeysuckle), *Alnus incana* ssp. *tenuifolia* (thinleaf alder) and *Cornus sericea* (red-osier dogwood). The dense herbaceous undergrowth is formed by a variety of species.

### Ecological Processes

The dense overstory, thick shrub canopy, and thick forb undergrowth of this association indicate that it is late-seral. High forb cover suggests that with time, further upper canopy closure, and a continued high water table, this association may shift to an *Abies lasiocarpa*-*Picea engelmannii*/*Mertensia ciliata* (subalpine fir/bluebells) plant association. With a more open forest canopy, shrubs such as *Alnus incana* ssp. *tenuifolia* (thinleaf alder) or *Salix drummondiana* (Drummond willow) may have higher abundance. Stands with high cover of both *Salix drummondiana* and *Alnus incana* in the understory may be transitional as *Salix drummondiana* replaces *Alnus incana* at higher elevations.

This community is found at Vallecito Creek and Johnson Creek Potential Conservation Area.

Avg. Cover %	(Range)	Species Name	# Plots (N=55)
36	(1-90%)	<i>Salix drummondiana</i>	53*
32	(3-100%)	<i>Picea engelmannii</i>	52
15	(1-40%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	15
13	(3-21%)	<i>Pinus contorta</i>	11
12	(1-40%)	<i>Populus tremuloides</i>	11
10	(1-40%)	<i>Salix monticola</i>	29
10	(1-36%)	<i>Abies lasiocarpa</i>	37
9	(1-34%)	<i>Vaccinium myrtillus</i> var. <i>oreophilum</i>	7
7	(1-20%)	<i>Heracleum maximum</i>	34
7	(1-30%)	<i>Ribes inerne</i>	8
7	(1-12%)	<i>Picea pungens</i>	8
6	(1-44%)	<i>Streptopus amplexifolius</i> var. <i>chalazatus</i>	14
6	(1-30%)	<i>Calamagrostis canadensis</i>	31
6	(1-31%)	<i>Lonicera involucrata</i>	38
6	(1-19%)	<i>Equisetum arvense</i>	22
6	(1-30%)	<i>Mertensia ciliata</i>	41
6	(1-12%)	<i>Salix bebbiana</i>	7
5	(1-13%)	<i>Carex aquatilis</i>	11
5	(1-27%)	<i>Salix brachycarpa</i>	8
5	(1-30%)	<i>Senecio triangularis</i>	29

#### Other species with < 5% average cover present in at least 10% of plots:

*Oxypolis fendleri* (1-16%), *Orthilia secunda* (1-12%), *Cardamine cordifolia* (1-15%), *Mertensia franciscana* (1-12%), *Symphoricarpos oreophilus* (1-10%), *Arnica cordifolia* (1-13%), *Equisetum pratense* (1-14%), *Rosa woodsii* (1-10%), *Geranium richardsonii* (1-12%), *Ligusticum porteri* (1-10%), *Saxifraga odontoloma* (1-17%), *Chamerion latifolium* (1-6%), *Viola canadensis* var. *scopulorum* (1-17%), *Carex disperma* (1-13%), *Chamerion angustifolium* ssp. *circumvagum* (1-9%), *Conioselinum scopulorum* (1-12%), *Maianthemum stellatum* (1-20%), *Actaea rubra* ssp. *arguta* (1-8%), *Galium triflorum* (1-8%), *Taraxacum officinale* (1-10%), *Juncus compressus* (1-3%), *Aconitum columbianum* (1-10%), *Osmorhiza depauperata* (1-10%), *Fragaria virginiana* ssp. *glauca* (1-5%), *Poa pratensis* (1-7%), *Thalictrum fendleri* (1-10%), *Rubus idaeus* ssp. *strigosus* (1-5%), *Pseudocymopterus montanus* (1-8%), *Pyrola minor* (1-3%), *Deschampsia caespitosa* (1-3%), *Mitella pentandra* (1-3%), *Geum macrophyllum* var. *perincisum* (1-3%), *Galium boreale* (1-3%), *Achillea millefolium* var. *occidentalis* (1-10%), *Luzula parviflora* (1-3%), *Polygonum viviparum* (1-3%), *Mimulus guttatus* (1-2%), *Polygonum bistortoides* (1-2%).

\* *Salix drummondiana* occurred in all stands, but was not captured in every sample plot.

**Subalpine fir - Engelmann spruce - Narrowleaf cottonwood /  
(Twinberry honeysuckle) Forest**

*Abies lasiocarpa* - *Picea engelmannii* - *Populus angustifolia* /  
(*Lonicera involucrata*)

**Global rank/State rank:**

G4 / S3

**HGM subclass:** R2, R3/4

**Colorado elevation range:**

8,300-9,500 ft (2,500-2,800 m)



**General Description**

The *Abies lasiocarpa*-*Picea engelmannii*-*Populus angustifolia*/(*Lonicera involucrata*) (subalpine fir-Engelmann spruce-narrowleaf cottonwood/(twinberry honeysuckle)) plant association is an unusual combination occurring at the upper elevational limits of *Populus angustifolia* (narrowleaf cottonwood) and is generally restricted to the southern parts of the Colorado Rockies. One plot from Routt County is tentatively placed in this association as well.

The community occurs on active floodplains of larger rivers in the upper montane valleys, on terraces or elevated stream benches between 1.5-7 ft (0.5-1.2 m) above the active channel elevation. The rivers are wide and slightly sinuous. Soils are fairly shallow (6-15 in, 10-40 cm) sandy loam and sand over deep, coarse alluvial materials.

**Vegetation Description**

The overstory is a mix of *Picea engelmannii* (Engelmann spruce) and *Populus angustifolia* (narrowleaf cottonwood). Other tree species that may be present include *Abies lasiocarpa* (subalpine fir), *Abies concolor* (white fir) seedling and saplings, and *Pseudotsuga menziesii* (Douglas-fir). Overall, shrubs are not abundant and provide less than 50% cover. *Lonicera involucrata* (twinberry honeysuckle) is the most constant shrub species, but may not be abundant. Other species include *Acer glabrum*

(Rocky Mountain maple), *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Salix geyeriana* (Geyer willow), and *Symphoricarpos oreophilus* (mountain snowberry). Herbaceous cover is sparse and no species is consistently present. The most typical species include *Bromus canadensis* (Canadian brome), *Festuca rubra* (red fescue), *Fragaria virginiana* (strawberry), *Heracleum maximum* (common cowparsnip), *Maianthemum stellatum* (starry false Solomon seal), and *Geranium richardsonii* (Richardson geranium).

### Ecological Processes

The *Abies lasiocarpa*-*Picea engelmannii*-*Populus angustifolia*/(*Lonicera involucrata*) (subalpine fir-Engelmann spruce-narrowleaf cottonwood/(twinberry honeysuckle)) plant association is a mid- to late-seral community. *Populus angustifolia* (narrowleaf cottonwood) will continue to co-occur with conifer species where fluvial activity (e.g., flooding, channel migration, sediment deposition, and scouring) persists. Higher elevations and cool, shaded canyon bottoms create an environment for *Abies lasiocarpa* (subalpine fir) and *Picea engelmannii* (Engelmann spruce). The active channel flooding and sediment deposition allows *Populus angustifolia* (narrowleaf cottonwood) to persist or regenerate. On higher terraces that no longer experience flooding, *Abies* and *Picea* may become the climax tree species.

This association is found in the Hermosa Creek NCA.

Avg. Cover %	(Range)	Species Name	# Plots (N=7)
49	(20-93%)	<i>Populus angustifolia</i>	6*
21	(4-55%)	<i>Abies lasiocarpa</i>	5
20	(10-30%)	<i>Picea engelmannii</i>	7
19	(2-44%)	<i>Pseudotsuga menziesii</i>	3
10	(3-20%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	4
8	(1-20%)	<i>Lonicera involucrata</i>	6*
7	(3-10%)	<i>Ribes lacustre</i>	2
6	(1-10%)	<i>Salix monticola</i>	2
6	(1-10%)	<i>Heterotheca villosa</i>	2
5	(1-10%)	<i>Geranium richardsonii</i>	5
4	(3-5%)	<i>Senecio atratus</i>	2

**Other species with < 5% average cover present in at least 10% of plots:**  
*Thalictrum fendleri* (1-10%), *Picea pungens* (2-5%), *Heracleum maximum* (1-5%), *Taraxacum officinale* (1-7%), *Populus tremuloides* (1-4%), *Acer glabrum* (1-3%), *Osmorhiza depauperata* (1-5%), *Cornus sericea* ssp. *sericea* (1-3%), *Solidago simplex* ssp. *simplex* var. *simplex* (1-3%), *Erigeron glabellus* (1-3%), *Pedicularis procera* (1-3%), *Maianthemum stellatum* (1-5%), *Fragaria virginiana* ssp. *glauca* (1-3%), *Symphoricarpos oreophilus* (1-3%), *Ligusticum porteri* (1-3%), *Actaea rubra* ssp. *arguta* (1-3%), *Achillea millefolium* var. *occidentalis* (1-3%), *Bromus inermis* (1-2%), *Bromus ciliatus* var. *ciliatus* (1-2%), *Mertensia ciliata* (1-1%), *Paxistima myrsinites* (1-1%), *Chamerion angustifolium* ssp. *circumvagum* (1-1%), *Galium triflorum* (1-1%), *Senecio triangularis* (1-1%), *Amelanchier alnifolia* (1-1%), *Ribes montigenum* (1-1%), *Vicia americana* (1-1%), (-%),

\* *Populus angustifolia* occurred in all stands, but was not captured in every sample plot.

## Boxelder - Narrowleaf cottonwood / Red-osier dogwood Forest

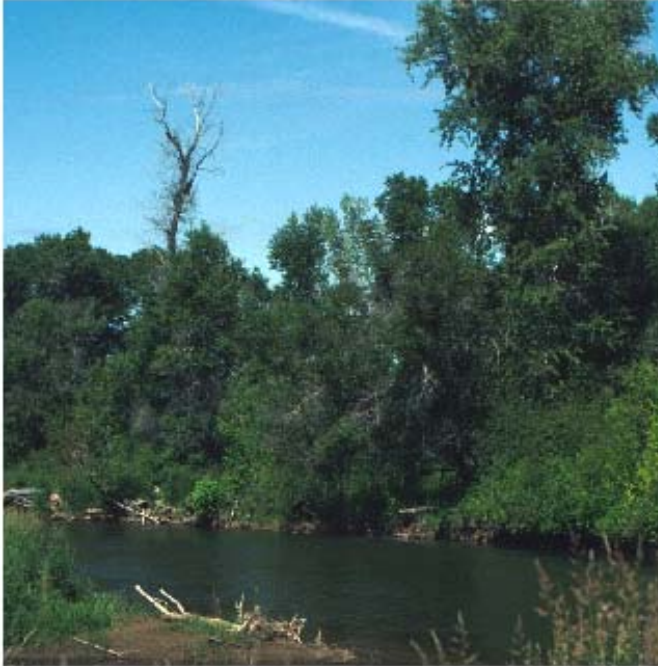
*Acer negundo* - *Populus angustifolia* / *Cornus sericea*

**Global rank/State rank:**

G2 / S2

**HGM subclass:** R3/4

**Colorado elevation range:**  
5,700-7,700 ft (1,730-2,350 m)



### General Description

The *Acer negundo*-*Populus angustifolia*/*Cornus sericea* (box elder-narrowleaf/red-osier dogwood) plant association is a tall (12-25 ft, 4-8 m), multi-layered, deciduous riparian forest. It grows on broad alluvial floodplains with strongly meandering stream channels, where it can form extensive riparian forests. It can also occur as small stands on narrow streams at high elevations.

This plant association occurs along moderately sinuous stream reaches within narrow valleys or broad alluvial floodplains. It occurs at 2-10 ft (0.5-2 m) above the bankfull channel level. Stream channels are slightly meandering to strongly meandering. Soil textures range from loamy sand to silty clay loam with minimal skeletal fraction. Mottling may occur at about 20-25 inches (50-60 cm).

### Vegetation Description

This community is characterized by a tall gallery forest of *Populus angustifolia* (narrowleaf cottonwood) and a subcanopy of *Acer negundo* (boxelder). In most of the stands sampled, *Acer negundo* (boxelder) formed a subcanopy underneath the taller canopy of narrowleaf cottonwoods. However, patches of *Acer negundo* (boxelder) do occur on the floodplain without the cottonwood overstory as part of the overall mosaic of different aged stands. These are thought to be older stands where the cottonwood has died. *Juniperus scopulorum* (Rocky Mountain juniper), *Pseudotsuga menziesii* (Douglas-fir), and *Picea pungens* (blue spruce) are occasionally present in small amounts.

Mesic shrubs form a dense and diverse mid-canopy layer. *Cornus sericea* (red-osier dogwood) is the most abundant and dominant shrub. Other shrub species which may be present include *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Rosa woodsii* (Woods rose), *Acer glabrum* (Rocky Mountain maple), *Rhus trilobata* (skunkbush sumac), *Salix ligulifolia* (strapleaf willow), *Salix monticola* (mountain willow), *Salix boothii* (Booth willow), and *Salix lucida* ssp. *caudata* (shining willow). Forb and graminoid cover vary from low to abundant. Species include *Maianthemum racemosum* (feathery false Solomon seal), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower),

and *Solidago gigantea* (giant goldenrod). In disturbed stands *Cirsium arvense* (Canada thistle), *Agrostis gigantea* (redtop), and *Taraxacum officinale* (dandelion) can occur.

### Ecological Processes

The *Acer negundo*-*Populus angustifolia*/*Cornus sericea* (boxelder-narrowleaf cottonwood/red-osier dogwood) plant association appears to be late-seral. This is evident from the mature *Populus angustifolia* trees and dense stands of *Cornus sericea* within the closed forest canopy. Young, early-seral stands of regenerating cottonwoods may be found on the inside bends of the channel and on point bars and lower terraces. Channel migration and meander movement may cut into the mature forest on the outside of meander bends, leaving the stands immediately adjacent to, yet potentially several meters above, the channel. Over time, the riparian communities can convert to upland plant associations.

This community is found at Junction Creek PCA.

Avg. Cover		Species Name	# Plots (N=21)
%	(Range)		
41	(3-90%)	<i>Populus angustifolia</i>	19*
33	(1-90%)	<i>Cornus sericea</i> ssp. <i>sericea</i>	21
27	(1-80%)	<i>Acer negundo</i> var. <i>interius</i>	20*
19	(5-80%)	<i>Solidago gigantea</i>	6
19	(1-50%)	<i>Prunus virginiana</i> var. <i>melanocarpa</i>	5
18	(1-80%)	<i>Bromus inermis</i>	7
11	(1-30%)	<i>Clematis ligusticifolia</i>	5
10	(1-40%)	<i>Poa pratensis</i>	15
10	(1-30%)	<i>Crataegus rivularis</i>	9
10	(1-30%)	<i>Agrostis gigantea</i>	4
8	(1-27%)	<i>Pseudotsuga menziesii</i>	5
8	(1-15%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	4
7	(1-20%)	<i>Ribes inerme</i>	6
7	(5-10%)	<i>Osmorhiza depauperata</i>	4
7	(1-20%)	<i>Maianthemum racemosum</i> ssp. <i>amplexicaule</i>	5
7	(1-20%)	<i>Rosa woodsii</i>	17
7	(1-23%)	<i>Geranium richardsonii</i>	6
6	(1-30%)	<i>Dactylis glomerata</i>	9
6	(1-20%)	<i>Phalaris arundinacea</i>	7
6	(1-20%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	11
6	(1-20%)	<i>Elymus glaucus</i>	6
5	(1-30%)	<i>Maianthemum stellatum</i>	11
5	(1-20%)	<i>Taraxacum officinale</i>	14
5	(1-11%)	<i>Quercus gambelii</i>	5

**Other species with < 5% average cover present in at least 10% of plots:**  
*Rhus trilobata* var. *trilobata* (1-10%), *Amelanchier alnifolia* (1-10%), *Juniperus scopulorum* (1-10%), *Rubus idaeus* ssp. *strigosus* (1-7%), *Elymus repens* (1-10%), *Amelanchier utahensis* (1-5%), *Phleum pratense* (1-10%), *Mahonia repens* (1-5%), *Galium triflorum* (1-5%), *Symphoricarpos oreophilus* (1-5%), *Geum macrophyllum* var. *perincisum* (1-5%), *Lonicera involucrata* (1-5%), *Urtica dioica* ssp. *gracilis* (1-5%), *Vicia americana* (1-3%), *Melilotus officinalis* (1-3%), *Achillea millefolium* var. *occidentalis* (1-2%), *Galium boreale* (1%), *Mentha arvensis* (1%)

\**Populus angustifolia* and *Acer negundo* were present in all stands, but were not captured in every sample plot.



## Thinleaf alder - Red-osier dogwood Shrubland

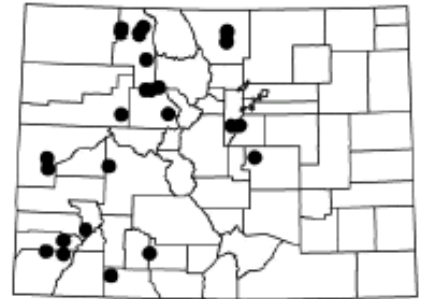
*Alnus incana* ssp. *tenuifolia* - *Cornus sericea*

**Global rank/State rank:**

G3Q/ S3

**HGM subclass:** R3/4

**Colorado elevation range:**  
5600-9,000 ft (1,700-2,750 m)



### General Description

The *Alnus incana* ssp. *tenuifolia*-*Cornus sericea* (thinleaf alder-red-osier dogwood) plant association is a narrow thicket of medium to tall shrubs lining the stream bank. Due to heavy shading, there is usually a limited herbaceous understory.

This plant association occurs on narrow, rocky banks and benches of small channels as well as narrow, constricted reaches of larger rivers. It can also occur along overflow channels and narrow tributaries. Stream channels are steep and narrow, wider and moderately sinuous, or wider and highly sinuous. Soils range from loamy sand to sandy clay loam. Mottling is evident at approximately 12 inches (30 cm) and gravel or cobble layers appear at 20-40 inches (50-100 cm) beneath the surface.

### Vegetation Description

This plant association is characterized by a dense thicket of shrubs dominated by *Alnus incana* ssp. *tenuifolia* (thinleaf alder) and *Cornus sericea* (red-osier dogwood). *Salix exigua* (sandbar willow) is often present. A wide variety of other shrub species may be present, including *Salix bebbiana* (Bebb willow), *Salix ligulifolia* (strapleaf willow), *Salix lucida* (ssp. *caudata* or ssp. *lasiandra*) (shining willow), *Salix monticola* (mountain willow), *Lonicera involucrata* (twinberry honeysuckle), *Rosa woodsii* (Woods rose), *Betula occidentalis* (river birch), and *Rubus idaeus* (American red raspberry). Tree species are scattered and only occasionally present.

Forb cover is highly variable depending on the amount of light that penetrates the canopy. Forb species include *Rudbeckia laciniata* (cutleaf coneflower), *Heracleum maximum* (common cowparsnip), *Maianthemum stellatum* (starry false Solomon seal),

*Osmorhiza depauperata* (bluntseed sweetroot) and *Ligusticum porteri* (Porter licoriceroot). Graminoid cover is usually low, but can include *Poa pratensis* (Kentucky bluegrass). *Equisetum arvense* (field horsetail) is sometimes present.

### Ecological Processes

*Alnus incana* ssp. *tenuifolia* (thinleaf alder) is a long-lived, early-seral species. It is one of the first species to establish on fluvial or glacial deposits as well as the spoils of placer mining. After establishment, young stands of *Alnus* are continually flooded. As stands mature, the stems can slow flood waters and trap sediment. Fine-textured sediments accumulate on top of the coarser alluvial material and the land surface eventually rises above annual flood levels. Flooding is then less frequent and soils begin to develop. *Alnus incana* ssp. *tenuifolia* is shade-intolerant, and many mature stands in Colorado are restricted to stream bank edges, possibly because these are the only sites where light can penetrate the neighboring overstory canopy.

In Colorado, the *Alnus incana* ssp. *tenuifolia*-*Cornus sericea* (thinleaf alder-red-osier dogwood) plant association is tolerant of flooding and requires a high water table each spring. It appears to be a stable, long-lived association where succession to other types can be very slow.

This community is found at Lightner Creek PCA.

Avg. Cover %	(Range)	Species Name	# Plots (N=25)
47	(1-100%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	25
35	(5-83%)	<i>Cornus sericea</i> ssp. <i>sericea</i>	25
31	(8-70%)	<i>Salix bebbiana</i>	3
11	(3-20%)	<i>Betula occidentalis</i>	6
10	(1-20%)	<i>Salix drummondiana</i>	4
10	(1-33%)	<i>Juniperus scopulorum</i>	4
10	(3-30%)	<i>Salix ligulifolia</i>	7
9	(1-30%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	14
8	(1-20%)	<i>Lonicera involucrata</i>	10
8	(0.1-30%)	<i>Heracleum maximum</i>	15
7	(1-20%)	<i>Salix monticola</i>	7
7	(1-45%)	<i>Poa pratensis</i>	11
6	(1-25%)	<i>Calamagrostis canadensis</i>	8
6	(1-20%)	<i>Rubus idaeus</i> ssp. <i>strigosus</i>	8
5	(1-20%)	<i>Rosa woodsii</i>	18

**Other species with < 5% average cover present in at least 10% of plots:**

*Carex pellita* (1-10%), *Ribes inerme* (1-10%), *Populus angustifolia* (1-13%), *Salix exigua* (1-10%), *Agrostis gigantea* (0.1-10%), *Equisetum pratense* (2-7%), *Osmorhiza depauperata* (1-10%), *Poa palustris* (1-5%), *Urtica dioica* ssp. *gracilis* (1-5%), *Equisetum arvense* (0.1-10%), *Solidago gigantea* (1-9%), *Symphoricarpos oreophilus* (1-5%), *Maianthemum stellatum* (1-10%), *Aconitum columbianum* (1-5%), *Actaea rubra* ssp. *arguta* (1-5%), *Streptopus amplexifolius* var. *chalazatus* (1-3%), *Glyceria striata* (1-5%), *Rhus trilobata* var. *trilobata* (1-3%), *Geranium richardsonii* (1-3%), *Amelanchier alnifolia* (1-3%), *Ligusticum porteri* (1-3%), *Prunus virginiana* var. *melanocarpa* (1-3%), *Amelanchier utahensis* (1-3%), *Geum macrophyllum* var. *perincisum* (0.1-5%), *Elymus glaucus* (1-3%), *Mentha arvensis* (1-2%), *Mertensia ciliata* (1-2%), *Taraxacum officinale* (1-2%), *Achillea millefolium* var. *occidentalis* (1%), *Fragaria virginiana* ssp. *glauca* (1%), *Cardamine cordifolia* (1%), *Chamerion angustifolium* ssp. *circumvagum* (1%), *Phleum pratense* (1%).

## Thinleaf alder / Mesic forb Shrubland

*Alnus incana* ssp. *tenuifolia* / Mesic forb

**Global rank/State rank:**

G3 / S3

**HGM subclass:** R2, R3/4

**Colorado elevation range:**  
5,800-9,600 ft (1,750-2,930 m)



### General Description

This association is characterized by stands of medium-tall, deciduous shrubs and a thick, herbaceous undergrowth of forbs and wetland grasses. A low canopy of shorter shrubs may also be present with *Ribes* (currant) and *Salix* (willow) species and *Cornus sericea* (red-osier dogwood). Undisturbed stands have abundant forbs and native grasses. Stands disturbed by season-long livestock grazing have reduced forb cover and an increase in non-native grasses including *Poa pratensis* (Kentucky bluegrass) and *Agrostis stolonifera* (creeping bentgrass). Large stands (>0.5 acre, 0.2 ha) with the native herbaceous undergrowth intact are uncommon.

This plant association occurs along narrow, 130-230 ft (40-70 m) wide, alluvial benches and terraces of canyons and valleys. It also occurs as narrow bands in wider valleys and occasionally forms a wide band on the floodplain. Stream channels are highly variable. They can be steep (3-12%) gradient and narrow or wider, rocky, and moderately sinuous. Occasionally, stream channels are low gradient and highly sinuous, narrow and highly sinuous, or braided. Soils are well drained silt loams, loams, sandy clay loams, sandy loams, or just sand. Some profiles have a high percentage of organic matter and are either skeletal or stratified with skeletal layers. Some profiles have significant silt fractions in the upper layers.

### Vegetation Description

*Alnus incana* ssp. *tenuifolia* (thinleaf alder) creates a dense, tall shrub canopy. Other shrubs occasionally present include *Lonicera involucrata* (twinberry honeysuckle), *Ribes inerme* (whitestem gooseberry), *R. montigenum* (gooseberry currant) *Rosa woodsii* (Woods rose), *Salix bebbiana* (Bebb willow), *S. drummondiana* (Drummond willow), *S. geyeriana* (Geyer willow), *S. lucida* ssp. *caudata* (shining willow) and *S. monticola* (mountain willow). A few trees, including *Picea engelmannii* (Engelmann



spruce), *Populus tremuloides* (quaking aspen), and *Populus angustifolia* (narrowleaf cottonwood) may be present along the edges of the stand. The ground is generally very wet and covered with tall, 3-7 ft (1-2 m), forbs and graminoids. Forb cover is high in undisturbed stands, with total cover often exceeding 60%. Dominant forb species include *Heracleum maximum* (common cowparsnip), *Angelica ampla* (giant angelica), *Aconitum columbianum* (Columbian monkshood), *Mertensia ciliata* (tall fringed bluebells), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower), *Viola canadensis* var. *scopulorum* (Canada white violet) and *Streptopus amplexifolius* (claspleaf twistedstalk). Graminoid species include *Glyceria striata* (fowl mannagrass), *Calamagrostis canadensis* (bluejoint reedgrass), *Carex microptera* (smallwing sedge), and *C. utriculata* (beaked sedge). A dense ground cover also includes *Equisetum arvense* (field horsetail), *Equisetum hyemale* (scouringrush horsetail) and *Equisetum pratense* (meadow horsetail).

### Ecological Processes

*Alnus incana* ssp. *tenuifolia* (thinleaf alder) is a long-lived, early-seral species. It is one of the first species to establish on fluvial or glacial deposits as well as the spoils of placer mining. After establishment, young stands of *Alnus incana* are continually flooded. As stands mature, the stems can slow flood waters and trap sediment. Fine-textured sediments accumulate on top of the coarser alluvial material and the land surface eventually rises above annual flood levels. Flooding is then less frequent and soils begin to develop.

This plant community is found at Florida River at Burnt Timber Creek PCA.

Avg. Cover			# Plots (N=56)
%	(Range)	Species Name	
56	(10-98%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	56
14	(0.1-70%)	<i>Heracleum maximum</i>	42
12	(1-70%)	<i>Aconitum columbianum</i>	27
9	(0.1-18%)	<i>Picea engelmannii</i>	14
8	(1-62.5%)	<i>Senecio triangularis</i>	27
7	(1-40%)	<i>Mertensia ciliata</i>	40
7	(1-20%)	<i>Salix drummondiana</i>	15
7	(1-20%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	13
7	(1-20%)	<i>Populus tremuloides</i>	14
7	(1-18%)	<i>Salix geyeriana</i>	8
7	(1-70%)	<i>Rosa woodsii</i>	14
6	(1-30%)	<i>Ribes inerme</i>	12
6	(1-32%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasiandra</i>	11
6	(1-30%)	<i>Lonicera involucrata</i>	25
6	(1-16%)	<i>Salix monticola</i>	13
6	(1-30%)	<i>Equisetum arvense</i>	39
5	(1-25%)	<i>Cardamine cordifolia</i>	21
5	(1-13%)	<i>Urtica dioica</i> ssp. <i>gracilis</i>	13
5	(1-20%)	<i>Calamagrostis canadensis</i>	31
5	(1-11%)	<i>Salix bebbiana</i>	7

#### Other species with < 5% average cover present in at least 10% of plots:

*Maianthemum stellatum* (0.1-27%), *Glyceria striata* (0.1-15%), *Geranium richardsonii* (1-15%), *Elymus glaucus* (1-10%), *Mentha arvensis* (1-14%), *Oxypolis fendleri* (1-37.5%), *Rubus idaeus* ssp. *strigosus* (1-15%), *Carex utriculata* (1-6%), *Poa pratensis* (1-12%), *Streptopus amplexifolius* var. *chazatus* (0.1-10%), *Saxifraga odontoloma* (1-5%), *Taraxacum officinale* (1-13%), *Conioselinum scopulorum* (1-10%), *Abies lasiocarpa* (1-6%), *Arnica cordifolia* (1-11%), *Mitella pentandra* (1-6%), *Galium boreale* (1-10%), *Carex aquatilis* (1-5%), *Galium triflorum* (1-5%), *Osmorhiza depauperata* (1-5%), *Thalictrum fendleri* (1-5%), *Achillea millefolium* var. *occidentalis* (1-8%), *Actaea rubra* ssp. *arguta* (1-5%), *Phleum pratense* (0.1-10%), *Bromus inermis* (1-5%), *Fragaria virginiana* ssp. *glauca* (1-3%), *Geum macrophyllum* var. *perincisum* (0.1-3%), *Carex microptera* (1-3%), *Chamerion angustifolium* ssp. *circumvagum* (1%).

**Thinleaf alder - Mixed willow (Mountain willow, Shining willow, Strapleaf willow) Shrubland**

*Alnus incana* ssp. *tenuifolia* - *Salix* (*monticola*, *lucida*, *ligulifolia*)

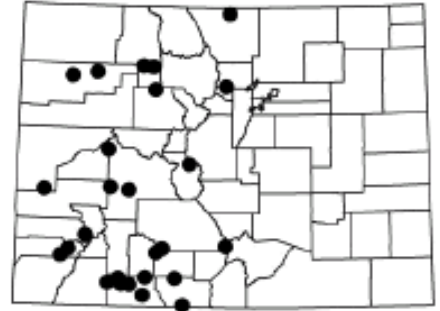
**Global rank/State rank:**

G3 / S3

**HGM subclass:** R3/4

**Colorado elevation range:**

5,600-9,600 ft (1,700-2,930 m)



**General Description**

The *Alnus incana* ssp. *tenuifolia*/*Salix* (*monticola*, *lucida*, *ligulifolia*) (thinleaf alder/mixed willow species) plant association is a more general type than other *Alnus incana* ssp. *tenuifolia* types. It has a high diversity of associated shrub species, unlike the nearly pure stands of alder found in other *Alnus incana* ssp. *tenuifolia* dominated plant associations. The abundance of other shrubs may represent a transition in the physical setting, for example, from a broad floodplain dominated by *Salix* to a narrow valley bottom and channel lined with only *Alnus incana* ssp. *tenuifolia* (thinleaf alder). This association occurs along narrow, moderately steep streams (30-65 ft (10-20 m) wide with a gradient of 3-10%) and in moderately wide to wide river valleys on cobble point bars, islands, flat alluvial benches, and large alluvial floodplains. Stream channels are steep and narrow, moderately steep and wide, or wide and sinuous. Soils are poorly developed with loamy sands, sand, sandy loams, and silt loams over coarse alluvium.

**Vegetation Description**

This plant association is characterized by the dominance of *Alnus incana* ssp. *tenuifolia* (thinleaf alder). There is considerable variation of associated shrub species in the stands. Several willow species are often present, but no single willow species consistently occurred in all stands. Other shrubs frequently present include *Salix lucida* (ssp. *caudata* or ssp. *lasiandra*) (shining willow), *S. monticola* (mountain willow), *S. drummondiana* (Drummond willow), *S. bebbiana* (Bebb willow), *S. exigua* (sandbar willow), *S. geyeriana* (Geyer willow), *S. ligulifolia* (strapleaf willow), *Acer glabrum* (Rocky Mountain maple), and *Amelanchier utahensis* (Utah serviceberry). Tree cover is sparse, but can include *Picea pungens* (blue spruce), *Populus tremuloides* (quaking aspen), *P. angustifolia* (narrowleaf cottonwood) and *Picea engelmannii* (Engelmann spruce). The herbaceous undergrowth is varied with 10-90% total cover. Native herbaceous species include *Equisetum arvense* (field horsetail), *Heracleum maximum* (common cowparsnip), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower), *Mertensia ciliata* (tall fringed bluebells), *Calamagrostis canadensis* (bluejoint reedgrass) *Cardamine*



*cordifolia* (heartleaf bittercress) and *Carex utriculata* (beaked sedge). Introduced species include *Trifolium repens* (white clover), *Taraxacum officinale* (dandelion) and *Poa pratensis* (Kentucky bluegrass)

### Ecological Processes

In Colorado, the *Alnus incana* ssp. *tenuifolia* -mixed *Salix* species plant association may represent response to recent changes in the environment. Several stands occur on abandoned beaver dams, for example. This shift in the physical environment may explain the diverse mix of shrub species in the canopy. If the water table lowers, this plant association may succeed to a more stable, drier community dominated by *Salix geeyeriana* (Geyer willow) or *Populus tremuloides* (quaking aspen). Other stands appear to be disturbed by livestock grazing and may represent a grazing-induced stage of the *Alnus incana* ssp. *tenuifolia*/mesic forb plant association.

Avg. Cover		Species Name	# Plots (N=28)
%	(Range)		
44	(5-100%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	28
20	(3-50%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasiandra</i>	17
19	(1-40%)	<i>Salix ligulifolia</i>	11
17	(1-57%)	<i>Salix monticola</i>	16
15	(3-39%)	<i>Salix bebbiana</i>	8
13	(1-70%)	<i>Poa pratensis</i>	20
12	(3-30%)	<i>Salix geeyeriana</i>	6
12	(1-39%)	<i>Salix exigua</i>	13
10	(1-38%)	<i>Calamagrostis canadensis</i>	10
9	(1-27%)	<i>Ribes inerme</i>	11
9	(1-40%)	<i>Salix drummondiana</i>	10
8	(1-27%)	<i>Trifolium repens</i>	8
8	(1-30%)	<i>Equisetum arvense</i>	17
7	(3-13%)	<i>Populus angustifolia</i>	9
7	(1-21%)	<i>Heracleum maximum</i>	18
7	(1-15%)	<i>Aconitum columbianum</i>	5
7	(1-25%)	<i>Mertensia ciliata</i>	12
7	(1-22%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	11
6	(1-30%)	<i>Rosa woodsii</i>	15
6	(1-20%)	<i>Phleum pratense</i>	10
6	(1-20%)	<i>Picea pungens</i>	6
6	(1-22%)	<i>Mertensia franciscana</i>	5
6	(1-18%)	<i>Poa palustris</i>	5
6	(1-15%)	<i>Agrostis gigantea</i>	5
5	(1-20%)	<i>Dactylis glomerata</i>	5
5	(1-20%)	<i>Taraxacum officinale</i>	21

**Other species with < 5% average cover present in at least 10% of plots:**  
*Glyceria striata* (1-15%), *Rubus idaeus* ssp. *strigosus* (1-11%), *Geranium richardsonii* (1-17%), *Cardamine cordifolia* (1-19%), *Lonicera involucrata* (1-15%), *Oxyopolis fendleri* (1-15%), *Mentha arvensis* (1-10%), *Carex utriculata* (1-10%), *Achillea millefolium* var. *occidentalis* (1-10%), *Geum macrophyllum* var. *perincisum* (0.1-10%), *Juncus balticus* var. *montanus* (1-8%), *Urtica dioica* ssp. *gracilis* (1-4%), *Carex microptera* (1-5%), *Maianthemum stellatum* (0.1-5%), *Vicia americana* (1-3%), *Osmorhiza depauperata* (1-3%), *Galium boreale* (1-2%).

## Bog birch / Mesic forb - Mesic graminoid Shrubland

*Betula nana* (=glandulosa) / Mesic forb - Mesic graminoid

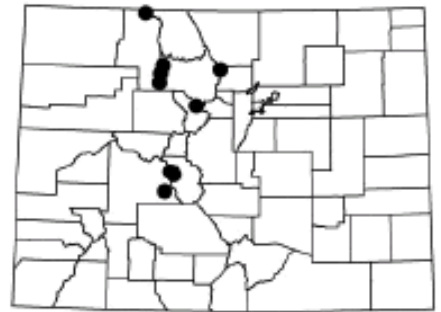


**Global rank/State rank:**

G3G4 / S3

**HGM subclass:** S1/2, R1, R2

**Colorado elevation range:**  
8,200-11,000 ft (2,500-3,350 m)



### General Description

The *Betula nana* (=glandulosa)/mesic forb-mesic graminoid (bog birch/mesic forb-mesic graminoid) plant association is a low stature (2-3 ft, 0.3-1 m) open shrubland of subalpine and lower alpine elevations. It occurs intermixed with *Salix* (willow) shrublands and *Carex* (sedge) meadows, forming complex wetland mosaics. It typically grows in very wet peat fens. This association is documented throughout high mountain ranges of Colorado, although typically occurring only in small stands. Most stands of this association occur within a mosaic of subalpine meadows or willow communities. It grows in areas where soils are saturated from snowmelt runoff for a significant part of the growing season, often in fens, where the vegetation receives water from seeps and springs. Stream channels may be wide and slightly sinuous. Soils are deep peats and moderately deep (9-12 in, 23-30 cm) silty clay loams over gravels with a water table 10-48 inches (25-120 cm) deep.

### Vegetation Description

*Betula nana* (=glandulosa) (bog birch) is the dominant shrub in the canopy. Several other shrubs may be present; however, none are as abundant as *Betula*. Shrub species occasionally present include *Dasiphora floribunda* (shrubby cinquefoil), *Salix wolfii* (Wolf willow), *S. planifolia* (planeleaf willow), *S. brachycarpa* (barrenground willow), *S. monticola* (mountain willow), and *Lonicera involucrata* (twinberry honeysuckle).

The herbaceous undergrowth grows on small hummocks and is usually dominated by a dense mixture of mesic forbs and graminoids. Mesic graminoid species include *Calamagrostis canadensis* (bluejoint reedgrass), *Carex aquatilis* (water sedge), *C. utriculata* (beaked sedge), *C. norvegica* (Norway sedge), *Deschampsia caespitosa* (tufted hairgrass), and *Phleum alpinum* (alpine timothy). Forb species include *Achillea millefolium* var. *occidentalis* (western yarrow), *Fragaria virginiana* (strawberry), *Galium boreale* (northern bedstraw), *Epilobium angustifolium* (fireweed), *Caltha leptosepala* (marsh marigold), *Ligusticum tenuifolium* (Idaho licoriceroot), *Angelica pinnata* (small-leaf angelica), *Mertensia ciliata* (tall fringed bluebells), *Thalictrum alpinum* (alpine meadowrue), and *Conioselinum scopulorum* (Rocky Mountain hemlockparsley). Due to their small size, *Betula nana* (= *glandulosa*) (bog birch) communities often inter-grade with surrounding communities.

### Ecological Processes

This plant association appears to be a long-lived mid- to late-seral community. As peatland hummocks develop or become more pronounced, they may become more heavily dominated by *Salix* (willow) species. Due to cold temperatures and a short growing season, this process may take several decades to occur.

This plant association occurs in the Haviland Lake Potential Conservation Area.

Avg. Cover %	(Range)	Species Name	# Plots (N=10)
44	(20-80%)	<i>Betula nana</i>	10
21	(3-80%)	<i>Carex aquatilis</i>	5
17	(3-50%)	<i>Picea engelmannii</i>	4
16	(10-25%)	<i>Salix planifolia</i>	5
13	(3-30%)	<i>Poa pratensis</i>	3
12	(3-20%)	<i>Salix monticola</i>	4
12	(3-30%)	<i>Salix brachycarpa</i>	5
11	(3-20%)	<i>Pinus contorta</i>	3
9	(1-30%)	<i>Calamagrostis canadensis</i>	4
9	(1-21%)	<i>Salix wolfii</i>	7
9	(1-20%)	<i>Dasiphora floribunda</i>	8
9	(3-11%)	<i>Ligusticum tenuifolium</i>	4
8	(1-10%)	<i>Chamerion angustifolium</i> ssp. <i>circumvagum</i>	4
6	(1-11%)	<i>Lonicera involucrata</i>	4
6	(1-25%)	<i>Fragaria virginiana</i> ssp. <i>glauca</i>	7
6	(1-10%)	<i>Caltha leptosepala</i>	4
6	(1-20%)	<i>Trisetum wolfii</i>	4
6	(1-10%)	<i>Carex utriculata</i>	2
5	(1-10%)	<i>Deschampsia caespitosa</i>	5

**Other species with < 5% average cover present in at least 10% of plots:**  
*Bromus ciliatus* var. *ciliatus* (1-8%), *Galium boreale* (1-13%), *Poa reflexa* (1-10%), *Taraxacum officinale* (1-12%), *Conioselinum scopulorum* (1-10%), *Salix boothii* (3-3%), *Mertensia ciliata* (1-10%), *Geum macrophyllum* var. *perincisum* (1-4%), *Polygonum bistortoides* (1-7%), *Geum triflorum* var. *triflorum* (1-4%), *Thalictrum alpinum* (2-3%), *Arnica cordifolia* (1-3%), *Geranium richardsonii* (1-3%), *Juncus drummondii* (1-3%), *Trollius laxus* ssp. *albiflorus* (1-3%), *Symphotrichum foliaceum* (1-3%), *Maianthemum stellatum* (1-3%), *Castilleja sulphurea* (1-3%), *Valeriana edulis* (1-2%), *Phleum alpinum* (1-3%), *Achillea millefolium* var. *occidentalis* (1-3%), *Luzula parviflora* (1-2%), *Polygonum viviparum* (1%), *Aconitum columbianum* (1%), *Veronica wormskjoldii* (1%), *Stellaria umbellata* (1%), *Pedicularis groenlandica* (1%), *Luzula comosa* (1%), *Trisetum spicatum* (1%), *Carex norvegica* (1%), *Equisetum arvense* (1%), *Rhodiola rhodantha* (0.1%).

**Heartleaf bittercress - Tall fringed bluebells - Arrowleaf ragwort  
Herbaceous Vegetation**

*Cardamine cordifolia* - *Mertensia ciliata* - *Senecio triangularis*

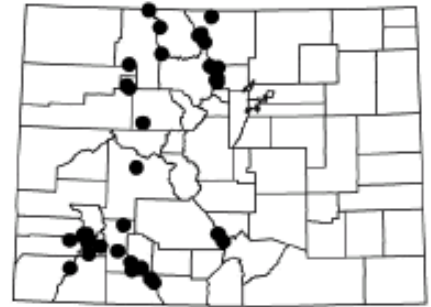
**Global rank/State rank:**

G4 / S4

**HGM subclass:** S1/2, R1, R2

**Colorado elevation range:**

8,450-12,300 ft (2,570-3,800 m)



**General Description**

The generally small stands of the *Cardamine cordifolia*-*Mertensia ciliata*-*Senecio triangularis* (heartleaf bittercress-tall fringed bluebells-arrowleaf groundsel) plant association are found in and near running water of small streams, seeps, and springs. Associated taxa may vary greatly with this plant association, but the dominance of *Cardamine cordifolia*, *Mertensia ciliata* or *Senecio triangularis* is clear. All of these species, or only one of the three, may be present. If trees form a canopy above the forbs, the stand may belong to the *Abies lasiocarpa*-*Picea engelmannii*/*Mertensia ciliata* (subalpine fir-Engelmann spruce/tall fringed bluebells) association.

This association typically occurs on moderately steep to very steep first order streams, but can occur on less steep stream reaches as well. In many cases this habitat probably experiences a long period of snow cover. Soils can be moderately deep (15 in, 40 cm) sandy clay loam and sand, but in general are quite thin and skeletal.

**Vegetation Description**

This association is easy to recognize. It is a narrow band of forbs and mosses with one or more of the following three forb species being abundantly present: *Cardamine cordifolia* (heartleaf bittercress), *Mertensia ciliata* (tall fringed bluebells) and *Senecio triangularis* (arrowleaf ragwort). All of these species may be present or only one of them. In addition, this type is always rich in other forbs. Stands generally have at least fifteen species, and often have as many as 45 forb species present. This diversity is made up of a wide variety of forb species; some can be quite abundant. Other forb species include *Saxifraga odontoloma* (brook saxifrage), *Mitella pentandra* (fivestamen miterwort), *Oxypolis fendleri* (Fendler cowbane), *Delphinium barbeyi* (tall larkspur), *Epilobium* spp. (willowherb), *Caltha leptosepala* (marsh marigold), *Geranium richardsonii* (Richardson geranium), *Arnica cordifolia* (heartleaf arnica), *Conioselinum scopulorum* (Rocky Mountain hemlockparsley), *Rhodiola integrifolia* ssp. *integrifolia* (ledge stonecrop), *Primula parryi* (Parry primrose), *Corydalis caseana* ssp. *brandegei* (Brandege fumewort), *Senecio taraxacoides* (dandelion ragwort), *Heracleum maximum* (common cowparsnip), and *Ligusticum porteri* (Porter licoriceroot), among others.



## Ecological Processes

This association is found in a habitat which is early-seral and experiences frequent fluvial depositions, keeping any invading conifers from advancing beyond the sapling stage. Although it is an early-seral community, the *Cardamine cordifolia-Mertensia ciliata-Senecio triangularis* plant association is reasonably stable because it is maintained by frequent disturbance. However, with excessive grazing by sheep, it may be converted to communities dominated by various increaser species. This association is in the Hermosa Creek NCA.

Avg. Cover %	(Range)	Species Name	# Plots (N=57)
33	(1-87%)	<i>Cardamine cordifolia</i>	51
27	(1-80%)	<i>Mertensia ciliata</i>	36
24	(0.1-90%)	<i>Senecio triangularis</i>	37
11	(1-30%)	<i>Heracleum maximum</i>	10
8	(0.1-30%)	<i>Oxypolis fendleri</i>	19
8	(0.1-30%)	<i>Rhodiola integrifolia</i>	5
8	(0.1-37%)	<i>Saxifraga odontoloma</i>	31
7	(2-20%)	<i>Equisetum arvense</i>	11
7	(1-25%)	<i>Carex aquatilis</i>	7
7	(0.1-20%)	<i>Calamagrostis canadensis</i>	10
6	(0.1-30%)	<i>Caltha leptosepala</i>	24
6	(0.1-15%)	<i>Carex scopulorum</i>	6
6	(1-18%)	<i>Geranium richardsonii</i>	8
5	(0.1-28%)	<i>Picea engelmannii</i>	10
5	(1-24%)	<i>Arnica mollis</i>	8

**Other species with < 5% average cover present in at least 10% of plots:**  
*Aconitum columbianum* (1-15%), *Juncus mertensianus* (0.1-15%), *Deschampsia caespitosa* (0.1-20%), *Carex utriculata* (1-7%), *Conioselinum scopulorum* (1-5%), *Rhodiola rhodantha* (1-3.1%), *Primula parryi* (0.1-13%), *Mitella pentandra* (0.1-6%), *Taraxacum officinale* (1-9%), *Mimulus guttatus* (1-3%), *Poa leptocoma* (0.1-5%), *Erigeron peregrinus* ssp. *callianthemus* (0.1-7%), *Castilleja rhexiifolia* (0.1-3%), *Pheum alpinum* (0.1-3%), *Trollius laxus* ssp. *albiflorus* (0.1-3%), *Achillea millefolium* var. *occidentalis* (1-3%), *Sibbaldia procumbens* (0.1-3%), *Luzula parviflora* (1-3%), *Juncus drummondii* (0.1-3%), *Polygonum bistortoides* (0.1-3%), *Epilobium anagallidifolium* (0.1-4%), *Stellaria umbellata* (0.1-1%), *Veronica wormskjoldii* (0.1-1%), *Poa reflexa* (0.1-1%).



## Beaked sedge Herbaceous Vegetation

### *Carex utriculata*

**Global rank/State rank:**

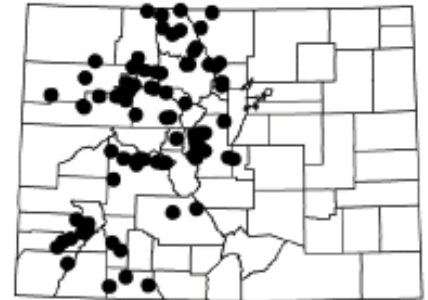
G5 / S5

**HGM subclass:** D1, D2/3, R2,

S1/2?, S3/4

**Colorado elevation range:**

5,600-11,000 ft (1,700-3,350 m)



### General Description

The *Carex utriculata* (beaked sedge) plant association is a common wet meadow community that occurs around the edges of montane lakes and beaver ponds, along the margins of slow-moving reaches of streams and rivers, and in marshy swales and overflow channels on broad floodplains. The water table is usually near the surface for most of the growing season. This association is well documented throughout the western states. A clear dominance of *Carex utriculata* over other *Carex* species including *C. aquatilis* (water sedge), sets this association apart from closely related types.

*Carex utriculata* (beaked sedge) grows in standing water or saturated soils. It also occurs along the margins of lakes and beaver ponds. Stream channels are wide and slightly sinuous, to wide and more sinuous. Soils are saturated organics or fine silty clays to clays over cobbles and alluvium. Mottling often occurs within a few centimeters of the surface.

### Vegetation Description

This plant association is characterized by stands dominated by *Carex utriculata* (beaked sedge). Stands often appear to be nearly pure *Carex utriculata* (beaked sedge), but a variety of other graminoid species may be present as well. *Carex aquatilis* can be abundant, but if equal in cover to *C. utriculata*, see the *Carex aquatilis-Carex utriculata* association on page 336. Other *Carex* (sedge) species present include *Carex lenticularis* (shore sedge) and *C. microptera* (small-wing sedge), but usually with low cover relative to the amount of *C. utriculata* (beaked sedge) present. Other graminoid species that may be present include *Glyceria striata* (fowl mannagrass), *Calamagrostis canadensis* (bluejoint reedgrass), and *Juncus balticus* var. *montanus* (mountain rush). Forb cover is very inconspicuous and can include *Mentha arvensis* (wild mint), *Mimulus guttatus* (seep monkeyflower), and *Geum macrophyllum* (largeleaf avens). Willow carrs (i.e., shrubland thickets) are often adjacent and a few scattered willows will occur within the *Carex utriculata* (beaked sedge) stand. Individual willows tend to be very short if present, either from limiting growth conditions (extremely cold and/or extremely wet), or because of heavy browsing by wildlife or livestock. The elevation of the site determines which willow species are in and adjacent to *Carex utriculata* (beaked sedge) stands. Willow species

that are present may include *Salix monticola* (mountain willow), *S. drummondiana* (Drummond willow), *S. geyeriana* (Geyer willow), *S. planifolia* (planeleaf willow), and *S. exigua* (sandbar willow).

### Ecological Processes

The *Carex utriculata* (beaked sedge) plant association occurs on the wettest sites of the riparian or wetland area, such as low-lying swales, and shallow margins of lakes and ponds, often in standing water. It is an early-seral community and is known to invade margins of newly formed beaver ponds, as well as the freshly exposed silt beds of drained beaver ponds. With time, the *Carex utriculata* plant association will grade into *Carex aquatilis* (water sedge) and *Calamagrostis canadensis* (bluejoint reedgrass) associations.

Successional shifts in species composition can be initiated by a change in the physical environment of the riparian area. Flooding events can result in sediments deposited on the floodplain, raising the surface higher above the water table. As aggradation, or build up, of the floodplain proceeds, the site can become drier and the dominant graminoid cover changes.

Abandoned beaver ponds also go through a similar succession. With time, ponds become silted-in and *Carex utriculata* establishes on the new, saturated substrate. As the site becomes firm and raised above the old pond level, *Carex aquatilis* and willows may become established. With further aggradation and time *Calamagrostis canadensis* may become established in the undergrowth. Depending on site characteristics, various willow species may become established in the overstory as well, creating the *Salix monticola*/*Carex utriculata* (mountain willow/beaked sedge) plant association or the *Salix geyeriana*/*Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) plant association, for example.

Distance from the stream channel can also differentiate the graminoid dominance spatially within the riparian mosaic. *Carex utriculata* commonly occurs at the stream channel or pond edge where the water table is close to or at the ground surface. As the floodplain surface becomes higher with increased distance from the channel edge, the ground becomes slightly less saturated and shifts to mesic meadows of *Carex aquatilis*, or on higher surfaces, to slightly drier meadows of *Calamagrostis canadensis*.

Elbert Creek Potential Conservation Area contains this wetland type.

Avg. Cover		Species Name	# Plots (N=143)
%	(Range)		
72	(7-100%)	<i>Carex utriculata</i>	143
9	(0.1-50%)	<i>Carex aquatilis</i>	40
7	(1-20%)	<i>Carex microptera</i>	15
7	(0.1-30%)	<i>Calamagrostis canadensis</i>	20
7	(1-20%)	<i>Juncus balticus</i> var. <i>montanus</i>	16
6	(1-10%)	<i>Salix monticola</i>	15
5	(0.1-15%)	<i>Mentha arvensis</i>	15

**Other species with < 5% average cover present in at least 10% of plots:**  
*Equisetum arvense* (0.1-20%), *Glyceria striata* (0.1-10%), *Deschampsia caespitosa* (1-10%),  
*Geum macrophyllum* var. *perincisum* (0.1-15%), *Poa pratensis* (1-10%).

## Blue spruce / Thinleaf alder Woodland

*Picea pungens* / *Alnus incana* ssp. *tenuifolia*

Global rank/State rank:

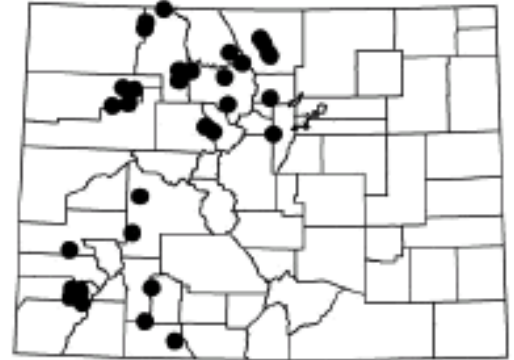
G3 / S3

HGM subclass:

R2, R3/4

Colorado elevation range:

6,100-10,650 ft (1,900-3,200 m)



### General Description

The *Picea pungens*/*Alnus incana* ssp. *tenuifolia* (blue spruce/thinleaf alder) plant association occurs in montane riparian areas in Colorado. It occurs in deep, shaded canyons and narrow valleys along relatively straight stream reaches. It generally forms small patches, but can be continuous for several river miles.

This plant association occurs along narrow to moderately wide floodplains and stream benches in canyons subject to cold air drainage and limited sunlight. Stream channels are steep and narrow, moderately broad and slightly sinuous, or broad and highly sinuous. Soils are generally shallow and range from loamy sand to silty clay loams with heavy organic matter content over gravel, cobbles, and boulders.

### Vegetation Description

*Picea pungens* (blue spruce) dominates the overstory with 1-70% cover. There are typically many seedling and saplings as well as mature trees. *Abies lasiocarpa* (subalpine fir) is usually present with up to 50% cover. Other tree species that occurred in half or fewer of the stands sampled include *Picea engelmannii* (Engelmann spruce), *Populus tremuloides* (quaking aspen), *Pinus contorta* (lodgepole pine) and *Pinus ponderosa* (ponderosa pine).

The thick shrub understory is confined to a narrow band lining the stream channel.

*Alnus incana* ssp. *tenuifolia* (thinleaf alder) was present in all stands sampled, and ranged in cover from 1 to 80%. Other shrub species present were highly variable, with constancy of less than 40%, but often appearing with abundant cover when present.

These shrubs include *Salix drummondiana* (Drummond willow), *Cornus sericea* (red-osier dogwood), *Ribes lacustre* (current), *Acer glabrum* (Rocky Mountain maple), *Vaccinium* spp. (whortleberry), *Salix boothii* (Booth willow), and *Salix wolfii* (Wolf willow).

The forb canopy layer is thick, up to 50% total cover and species-rich, often with more

than 40 species represented in one stand. Species include *Actaea rubra* (red baneberry), *Conioselinum scopulorum* (Rocky Mountain hemlockparsley), *Oxypolis fendleri* (cowbane), *Geranium richardsonii* (Richardson geranium), *Heracleum maximum* (common cowparsnip), *Maianthemum stellatum* (starry false Solomon seal), *Mertensia ciliata* (tall fringed bluebells), *Rudbeckia laciniata* var. *ampla* (cutleaf cornflower), and *Equisetum arvense* (field horsetail).

### Ecological Processes

In deep, narrow canyons with swift-moving streams and narrow floodplains and benches, *Picea pungens* (blue spruce) appears to be a climax riparian species, and will remain until removed or damaged by a catastrophic flood. In Colorado, the closely related *Picea pungens/Equisetum arvense* (blue spruce/field horsetail) plant association is considered an indicator of frequent flooding. With less frequent flooding, this association may gradually change to a *Picea pungens/Alnus incana* ssp. *tenuifolia* (blue spruce/thinleaf alder) plant association.

Potential conservation areas supporting *Picea pungens/Alnus incana* are Vallecito and Johnson Creek PCA, Middle Hermosa Creek PCA.

Avg. Cover		Species Name	# Plots (N=35)
%	(Range)		
32	(1-70%)	<i>Picea pungens</i>	35
28	(1-80%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	34*
12	(1-85%)	<i>Calamagrostis canadensis</i>	13
12	(1-55%)	<i>Salix exigua</i>	5
12	(1-50%)	<i>Abies lasiocarpa</i>	15
9	(1-28%)	<i>Acer glabrum</i>	6
9	(1-32%)	<i>Salix bebbiana</i>	7
9	(1-28%)	<i>Salix monticola</i>	7
9	(1-18%)	<i>Populus tremuloides</i>	8
8	(1-45%)	<i>Equisetum arvense</i>	27
8	(1-40%)	<i>Salix drummondiana</i>	16
8	(1-20%)	<i>Ribes lacustre</i>	7
7	(1-32%)	<i>Ribes inerme</i>	10
7	(1-18%)	<i>Pinus contorta</i>	6
5	(1-25%)	<i>Poa pratensis</i>	20
5	(1-30%)	<i>Lonicera involucrata</i>	26
5	(0.1-20%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	14
5	(1-10%)	<i>Cornus sericea</i>	8
5	(0.1-20%)	<i>Trifolium repens</i>	8

#### Other species with < 5% average cover present in at least 10% of plots:

*Saxifraga odontoloma* (1-10%), *Symphoricarpos oreophilus* (1-20%), *Heracleum maximum* (1-15%), *Rubus idaeus* ssp. *strigosus* (0.1-20%), *Mertensia ciliata* (1-10%), *Thalictrum fendleri* (1-10%), *Streptopus amplexifolius* var. *chalazatus* (1-10%), *Senecio triangularis* (1-10%), *Erigeron speciosus* var. *speciosus* (1-9%), *Maianthemum stellatum* (0.1-13%), *Geranium richardsonii* (0.1-10%), *Bromus ciliatus* var. *ciliatus* (1-11%), *Actaea rubra* ssp. *arguta* (1-10%), *Salix ligulifolia* (1-5%), *Rosa woodsii* (1-10%), *Aconitum columbianum* (1-10%), *Taraxacum officinale* (0.1-15%), *Poa palustris* (1-5%), *Amelanchier alnifolia* (1-10%), *Phleum pratense* (1-10%), *Cardamine cordifolia* (1-10%), *Urtica dioica* ssp. *gracilis* (1-10%), *Elymus glaucus* (1-10%), *Galium triflorum* (1-10%), *Luzula parviflora* (0.1-8%), *Conioselinum scopulorum* (0.1-5%), *Dasiphora floribunda* (1-7%), *Chamerion angustifolium* ssp. *circumvagum* (1-10%), *Osmorhiza depauperata* (0.1-10%), *Fragaria virginiana* ssp. *glauca* (1-5%), *Glyceria striata* (0.1-5%), *Achillea millefolium* var. *occidentalis* (1-5%), *Galium boreale* (1-5%), *Orthilia secunda* (1-3%), *Viola canadensis* var. *scopulorum* (0.1-3%), *Carex microptera* (1-3%), *Vicia americana* (1-5%), *Oxypolis fendleri* (1-3%), *Osmorhiza berteroi* (1-3%), *Geum macrophyllum* var. *perincisum* (0.1-5%), *Prunella vulgaris* (1%), *Ranunculus macounii* (1%).

\**Alnus incana* ssp. *tenuifolia* occurred in all stands, but was not captured in every sample plot.



## Narrowleaf cottonwood - Blue spruce / Thinleaf alder Woodland

*Populus angustifolia* - *Picea pungens* / *Alnus incana* ssp. *tenuifolia*

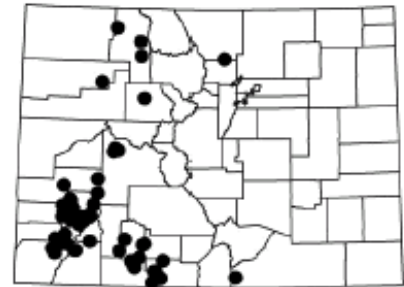
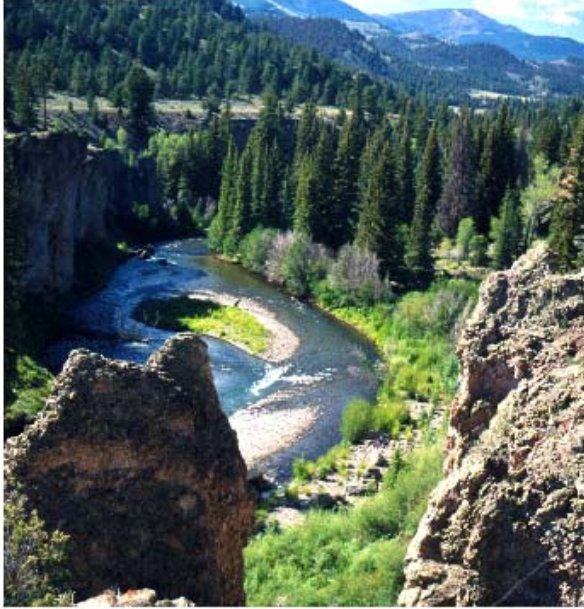
**Global rank/State rank:**

G4 / S4

**HGM subclass:** R2?, R3/4

**Colorado elevation range:**

6,800-9,600 ft (2,070-2,925 m)



### General Description

This is a common mixed deciduous-evergreen community of montane valleys, where *Populus angustifolia* (narrowleaf cottonwood) and *Picea pungens* (blue spruce) are co-dominant along a stream reach. Frequently, other conifer trees are present, but not as abundant as *Picea pungens* (blue spruce). The shrub understory is typically dense and diverse. *Alnus incana* ssp. *tenuifolia* (thinleaf alder) is almost always present. Only a handful of good condition stands are known, and the community is highly threatened by improper livestock grazing, heavy recreational use, and stream flow alterations.

This association occurs in valleys with narrow to moderately wide floodplains, 30-600 ft (10-200 m), and in deep canyons. This association is commonly found on slightly meandering to meandering floodplains of broad reaches. Occasionally, stands occur along steep reaches. Soils range from shallow sandy loams to silty clay loams and clays over cobbles and boulders. Profiles are generally highly stratified, with layers of fine soils over layers of coarser sediments.

### Vegetation Description

The upper canopy is dominated by *Populus angustifolia* (narrowleaf cottonwood) and either *Picea pungens* (blue spruce) or *Picea engelmannii* (Engelmann spruce). Other less frequently encountered tree species may also be present and include *Pseudotsuga menziesii* (Douglas-fir), *Abies concolor* (white fir), *Populus tremuloides* (quaking aspen), and *Abies lasiocarpa* (subalpine fir). *Alnus incana* ssp. *tenuifolia* (thinleaf alder) is almost always present in the shrub canopy layer, although cover amounts vary and other shrub species may be more abundant. *Lonicera involucrata* (twinberry honeysuckle) is the most frequently encountered species after *Alnus*. Many other shrub species can occur within this association, including *Amelanchier alnifolia* (Saskatoon serviceberry), *Acer glabrum* (Rocky Mountain maple), *Salix drummondiana* (Drummond willow), *S. exigua* (sandbar willow), *S. lucida* ssp. *caudata* (shining willow), *S. geyeriana* (Geyer willow), *S. boothii* (Booth willow),



*Prunus virginiana* (chokecherry), and *Symphoricarpos oreophilus* (mountain snowberry).

The undergrowth is diverse and can be sparse or dense, depending on local conditions. Total herbaceous cover rarely exceeds 40%. *Maianthemum stellatum* (starry false Solomon seal) and *Geranium richardsonii* (Richardson geranium) are frequently found. Graminoid cover is less diverse than forb cover.

### Ecological Processes

This mixed deciduous-evergreen plant association is a mid-seral community. With continued fluvial activity, such as flooding, channel migration, sediment deposition, and scouring, narrowleaf cottonwood and blue spruce will continue to co-occur along the reach. Gradual and slightly sinuous stream channels that have overbank flow and sediment deposition favor establishment of *Populus angustifolia*. *Picea pungens* is favored along reaches in deep valleys with steep canyon walls that provide conditions for strong cold-air drainage. If the floodplain is no longer active, i.e., is no longer flooded because the stream channel has become lower (surface becomes a terrace) or upstream dams control floods, then cottonwoods will eventually die and the conifers may persist.

This plant community is widespread throughout the county, though is not included in any of the PCA profiles.

Avg. Cover %	(Range)	Species Name	# Plots (N=51)
34	(2-90%)	<i>Populus angustifolia</i>	51*
28	(1-60%)	<i>Betula occidentalis</i>	8
27	(0.1-90%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	41
25	(1-80%)	<i>Picea pungens</i>	51
17	(1-50%)	<i>Picea engelmannii</i>	9
17	(1-96%)	<i>Cornus sericea</i> ssp. <i>sericea</i>	31
11	(1-50%)	<i>Salix ligulifolia</i>	15
11	(1-25%)	<i>Pseudotsuga menziesii</i>	17
9	(1-50%)	<i>Acer glabrum</i>	12
7	(1-40%)	<i>Lonicera involucrata</i>	33
7	(1-28%)	<i>Populus tremuloides</i>	8
7	(1-23%)	<i>Abies concolor</i>	9
7	(1-15%)	<i>Salix drummondiana</i>	11
6	(2-20%)	<i>Salix exigua</i>	8
6	(1-30%)	<i>Calamagrostis canadensis</i>	8
5	(1-30%)	<i>Salix monticola</i>	15
5	(1-20%)	<i>Prunus virginiana</i> var. <i>melanocarpa</i>	8
5	(1-15%)	<i>Amelanchier alnifolia</i>	17

### Other species with < 5% average cover present in at least 10% of plots:

*Rudbeckia laciniata* var. *ampla* (1-16%), *Symphoricarpos rotundifolius* (1-30%), *Salix bebbiana* (0.1-15%), *Equisetum arvense* (1-10%), *Maianthemum stellatum* (0.1-30%), *Elymus glaucus* (1-20%), *Equisetum hyemale* var. *affine* (1-20%), *Geranium richardsonii* (1-10%), *Heracleum maximum* (1-11%), *Osmorhiza depauperata* (1-30%), *Poa pratensis* (1-16%), *Actaea rubra* ssp. *arguta* (1-10%), *Taraxacum officinale* (0.1-16%), *Mertensia franciscana* (1-9%), *Ligusticum porteri* (1-10%), *Fragaria virginiana* ssp. *glauca* (1-9%), *Rosa woodsii* (0.1-9%), *Thalictrum fendleri* (1-10%), *Pseudocymopterus montanus* (1-10%), *Ribes inerme* (1-5%), *Viola canadensis* var. *scopulorum* (1-10%), *Amelanchier utahensis* (0.1-3%), *Paxistima myrsinites* (1-4%), *Galium triflorum* (1-10%), *Chamerion angustifolium* ssp. *circumvagum* (1-3%), *Equisetum pratense* (1-4%), *Rubus idaeus* ssp. *strigosus* (1-5%), *Geum macrophyllum* var. *perincisum* (0.1-4%), *Cardamine cordifolia* (1-4%), *Achillea millefolium* var. *occidentalis* (1-5%), *Vicia americana* (1-5%), *Galium boreale* (0.1-5%), *Oxypolis fendleri* (1-4%), *Mertensia ciliata* (0.1-5%).

\**Populus angustifolia* occurred in all stands, but was not captured in every sample plot.

## Narrowleaf cottonwood / Thinleaf alder Woodland

*Populus angustifolia* / *Alnus incana* ssp. *tenuifolia*



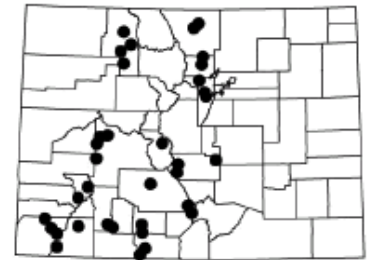
Global rank/State rank:

G3 / S3

HGM subclass: R3/4

Colorado elevation range:

6,000-9,600 ft (1,830-2,930 m)



### General Description

The *Populus angustifolia*/*Alnus incana* ssp. *tenuifolia* (narrowleaf cottonwood/thinleaf alder) plant association is characterized by a dense stand of *Alnus incana* lining the stream bank and an open to nearly closed canopy of *Populus angustifolia*. Other shrubs may occur but *Alnus incana* ssp. *tenuifolia* (thinleaf alder) usually has at least 10-20% cover and is the most abundant of all other shrubs within the stand. It occurs along narrow, fast-moving stream reaches in montane areas.

This plant association occurs on active floodplains in narrow to broad valleys. It forms a narrow, dense band along stream banks and benches. Some of the stands have signs of recent flooding. Stream gradient and channel width are highly variable. Some sites occur along steep, narrow reaches with little sinuosity. Other sites occur along low gradient, moderately sinuous, broad channel reaches, low gradient, highly sinuous reaches, or very narrow and highly sinuous stream sections. Soils are mostly coarse textured ranging from deep sands to shallow sandy loams. Some profiles show stratification with loams to clay loams alternating with sands. Most profiles become skeletal at an average depth of 12 inches (30 cm).

### Vegetation Description

The dominance of *Populus angustifolia* (narrowleaf cottonwood) and *Alnus incana* ssp. *tenuifolia* (thinleaf alder) are the key diagnostic characteristics of this association. Several other tree and shrub species may be present, but they rarely equal the abundance of the diagnostic species. The overstory is an open to dense canopy of *Populus angustifolia*, which is always present, if sometimes only as sapling-sized individuals. Other tree species that may be present include *Pseudotsuga menziesii* (Douglas-fir), *Juniperus scopulorum* (Rocky Mountain juniper), *Populus tremuloides* (quaking aspen), *Pinus ponderosa* (ponderosa pine), *Populus x acuminata* (lanceleaf cottonwood), *Abies concolor* (white fir), or *Picea pungens* (blue spruce). The shrub understory is dominated by a dense band of *Alnus incana* ssp. *tenuifolia* (thinleaf alder) lining the stream bank. A variety of other shrubs may be present, intermingling with the alder but usually providing less than the total alder cover. Other shrub species include *Salix bebbiana* (Bebb willow), *Salix monticola* (mountain willow), *Salix drummondiana* (Drummond willow), *Salix ligulifolia* (strapleaf willow), *Salix lucida* ssp. *caudata* (shining willow), *Salix exigua* (sandbar willow), *Cornus sericea* (red-osier dogwood), *Rosa woodsii* (Woods rose), *Acer glabrum* (Rocky Mountain maple), and *Betula occidentalis* (river birch).

The herbaceous undergrowth is generally sparse. Herbaceous species include *Poa pratensis* (Kentucky bluegrass), *Taraxacum officinale* (dandelion), *Equisetum arvense* (field horsetail), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower), *Heracleum maximum* (common cowparsnip), *Maianthemum stellatum* (starry false Solomon seal), *Trifolium repens* (white clover), *Calamagrostis canadensis* (bluejoint reedgrass), *Oxypolis fendleri* (Fendler cowbane), and *Cardamine cordifolia* (heartleaf bittercress).

### Ecological Processes

The *Populus angustifolia*/*Alnus incana* ssp. *tenuifolia* (narrowleaf cottonwood/thinleaf alder) plant association is considered a mid-seral community (not the youngest and not the oldest stands of cottonwoods within a reach). With time and without flooding disturbance, stands may become dominated by invading conifers from adjacent upland communities such as *Pseudotsuga menziesii* (Douglas-fir), *Juniperus* spp. (juniper), or *Picea engelmannii* (Engelmann spruce).

Potential conservation areas containing this association are Los Pinos at Rattlesnake Hill, Los Pinos at Bayfield North, Animas River at Rockwood PCAs.

Avg. Cover %	(Range)	Species Name	# Plots (N=37)
37	(3-84%)	<i>Populus angustifolia</i>	37
35	(1-80%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	37
18	(1-40%)	<i>Agrostis gigantea</i>	5
13	(1-30%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasiandra</i>	14
13	(3-28%)	<i>Betula occidentalis</i>	5
12	(1-48%)	<i>Trifolium repens</i>	7
11	(3-35%)	<i>Salix drummondiana</i>	10
10	(1-30%)	<i>Poa pratensis</i>	26
10	(1-30%)	<i>Cornus sericea</i> ssp. <i>sericea</i>	12
10	(1-34%)	<i>Populus tremuloides</i>	5
8	(1-32%)	<i>Salix exigua</i>	8
7	(1-15%)	<i>Agrostis stolonifera</i>	6
7	(1-14%)	<i>Salix monticola</i>	9
6	(1-22%)	<i>Cardamine cordifolia</i>	5
6	(0.1-40%)	<i>Dactylis glomerata</i>	9
6	(1-20%)	<i>Rubus idaeus</i> ssp. <i>strigosus</i>	6
6	(1-17%)	<i>Calamagrostis canadensis</i>	8
6	(1-14%)	<i>Pseudotsuga menziesii</i>	7
5	(1-14%)	<i>Salix bebbiana</i>	8
5	(1-11%)	<i>Ribes inerme</i>	5
5	(1-20%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	12

#### Other species with < 5% average cover present in at least 10% of plots:

*Acer glabrum* (1-10%), *Rosa woodsii* (1-30%), *Heracleum maximum* (0.1-15%), *Pyrola asarifolia* ssp. *asarifolia* (1-10%), *Poa palustris* (1-10%), *Taraxacum officinale* (1-20%), *Juniperus scopulorum* (1-11%), *Salix ligulifolia* (1-10%), *Lonicera involucrata* (0.1-10%), *Equisetum arvense* (0.1-18%), *Oxypolis fendleri* (1-11%), *Urtica dioica* ssp. *gracilis* (1-10%), *Prunus virginiana* var. *melanocarpa* (1-7%), *Maianthemum stellatum* (0.1-10%), *Osmorhiza depauperata* (1-4%), *Achillea millefolium* var. *occidentalis* (0.1-12%), *Clematis ligusticifolia* (1-3%), *Juncus balticus* var. *montanus* (1-6%), *Vicia americana* (1-5%), *Mertensia ciliata* (1-5%), *Galium triflorum* (1-4%), *Thalictrum fendleri* (1-5%), *Geum macrophyllum* var. *perincisum* (1-6%), *Geranium richardsonii* (1-5%), *Fragaria virginiana* ssp. *glauca* (1-5%), *Chamerion angustifolium* ssp. *circumvagum* (1-3%), *Galium boreale* (1-3%), *Mentha arvensis* (1-4%), *Symphoricarpos oreophilus* (1-3%), *Galium trifidum* ssp. *subbiflorum* (1-3%), *Actaea rubra* ssp. *arguta* (0.1-3%), *Phleum pratense* (1%), *Equisetum laevigatum* (0.1-1%).



## Narrowleaf cottonwood / River birch Woodland

### *Populus angustifolia* / *Betula occidentalis*

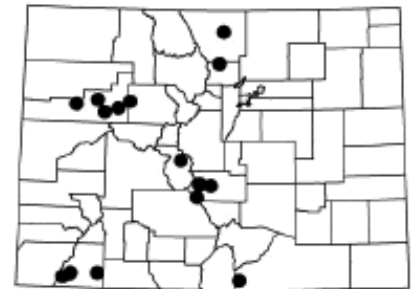
Global rank/State rank:

G3 / S2

HGM subclass: R3/4

Colorado elevation range:

6,000-8,400 ft (1,830-2,600 m)



### General Description

This plant association is a lush deciduous community of *Populus angustifolia* (narrowleaf cottonwood) and *Betula occidentalis* (river birch) growing in a thick band along the stream banks. The community is one of the wetter *Populus angustifolia* plant associations, which indicates a perennial source of water and possibly lateral seepage to the channel. Some stands occur on hillside seeps.

This plant association occurs on stream banks and benches along narrow, somewhat steep streams with little to moderate floodplain development. It also occurs on immediate stream banks or steep-sided overflow channel areas along larger streams with well-developed floodplains. Stream channels are steep and narrow with rocky beds or broad and meandering. Soils have a surface layer of partially decomposed organic matter 2-4 inches (5-10 cm) thick. Subsurface layers are very coarse with 10-60% gravel or cobbles. Subsurface textures range from clay loams to loamy sands.

### Vegetation Description

This plant association is characterized by an overstory of 5-80% cover of *Populus angustifolia* (narrowleaf cottonwood) and a thick shrub understory of *Betula occidentalis* (river birch). Other tree species that can be present include *Pseudotsuga menziesii* (Douglas-fir) and *Juniperus scopulorum* (Rocky Mountain juniper). Other shrubs that can be abundant, but never more than birch include *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Acer glabrum* (mountain maple), *Cornus sericea* (red-osier

dogwood), *Salix bebbiana* (Bebb willow), *Crataegus rivularis* (river hawthorn), *Ribes inerme* (whitestem gooseberry), *Salix ligulifolia* (strapleaf willow), *Rhus trilobata* (skunkbush sumac), *Salix irrorata* (bluestem willow), *Rubus parviflorus* (thimbleberry), and *Prunus virginiana* (chokecherry).

Graminoid and forb cover is minor, except in degraded stands, where introduced, non-native species can be abundant. These include *Poa pratensis* (Kentucky bluegrass), *Taraxacum officinale* (dandelion), *Melilotus* spp. (sweetclover). Native herbaceous species include *Maianthemum stellatum* (starry false Solomon seal), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower), *Carex utriculata* (beaked sedge), and *Angelica ampla* (giant angelica).

### Ecological Processes

The *Populus angustifolia*/*Betula occidentalis* (narrowleaf cottonwood/river birch) plant association is considered to be early- to mid-seral. *Betula occidentalis* becomes abundant along stream banks with perennial stream flow and well-aerated soils. With continued aggradation of the alluvial surface and shading from a thick shrub canopy, successful *Populus angustifolia* reproduction may cease and the stand may become a *Betula occidentalis* dominated shrubland with a graminoid understory. *Populus angustifolia* appears to be reproducing in two of the stands sampled, however, the individuals may be sprouting from roots rather than developing from seeds.

Potential conservation areas containing this association are Los Pinos at Bayfield North and South, Middle La Plata River PCAs.

Avg. Cover		Species Name	# Plots (N=24)
%	(Range)		
41	(4-80%)	<i>Populus angustifolia</i>	24
35	(8-67%)	<i>Betula occidentalis</i>	24
19	(1-59%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	10
16	(1-63%)	<i>Agrostis gigantea</i>	5
11	(1-20%)	<i>Cornus sericea</i>	7
10	(2-18%)	<i>Poa compressa</i>	5
9	(1-24%)	<i>Pseudotsuga menziesii</i>	8
9	(1-22%)	<i>Acer glabrum</i>	5
8	(0.1-23%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasianдра</i>	3
8	(0.1-28%)	<i>Melilotus officinalis</i>	5
8	(1-20%)	<i>Poa pratensis</i>	12
7	(1-20%)	<i>Glyceria striata</i>	3
6	(1-14%)	<i>Trifolium repens</i>	8
6	(0.1-20%)	<i>Dactylis glomerata</i>	4
6	(0.1-30%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	8
6	(1-10%)	<i>Clematis ligusticifolia</i>	5
6	(1-18%)	<i>Salix bebbiana</i>	7

#### Other species with < 5% average cover present in at least 10% of plots:

*Calamagrostis canadensis* (1-10%), *Salix exigua* (1-7%), *Salix ligulifolia* (1-10%), *Geranium richardsonii* (1-7%), *Juniperus scopulorum* (1-15%), *Equisetum arvense* (0.1-15%), *Medicago lupulina* (1-5%), *Ribes inerme* (0.1-10%), *Prunus virginiana* var. *melanocarpa* (1-11%), *Carex microptera* (1-5%), *Taraxacum officinale* (1-11%), *Conioselinum scopulorum* (1-7%), *Heracleum maximum* (1-5%), *Cirsium arvense* (1-5%), *Rosa woodsii* (1-7%), *Populus tremuloides* (1-5%), *Urtica dioica* ssp. *gracilis* (1-4%), *Deschampsia caespitosa* (1-3%), *Quercus gambelii* (0.1-5%), *Bromus inermis* (0.1-5%), *Osmorhiza depauperata* (1-3%), *Maianthemum stellatum* (0.1-5%), *Amelanchier utahensis* (1-3%), *Thalictrum fendleri* (0.1-5%), *Achillea millefolium* var. *occidentalis* (0.1-2%), *Oxypolis fendleri* (1%), *Bromus ciliatus* var. *ciliatus* (1%), *Equisetum hyemale* var. *affine* (1%), *Senecio triangularis* (1%), *Cynoglossum officinale* (0.1-1%), *Veronica americana* (0.1-1%), *Equisetum laevigatum* (0.1-1%).



## Narrowleaf cottonwood / Red-osier dogwood Woodland

### *Populus angustifolia* / *Cornus sericea*

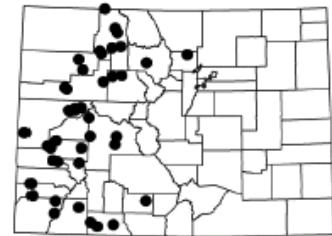
Global rank/State rank:

G4 / S3

HGM subclass: R3/4

Colorado elevation range:

5,400-8,700 ft (1,800-2700 m)



### General Description

The *Populus angustifolia*/*Cornus sericea* (narrowleaf cottonwood/red-osier dogwood) plant association is found along moderate-size rivers in the montane zone. It is highly variable in the number of conifer and shrub species present along the reach. However, it is generally recognized by a clear dominance of *Populus angustifolia* (narrowleaf cottonwood), which is often twice the abundance of other tree species, and a thick understory of *Cornus sericea* (red-osier dogwood).

This association occurs in two distinct settings - one in narrow valleys (30 ft, 10 m) with swift, steep streams (4% gradient) where it occurs on narrow benches, and the other in wide valleys (500 ft, 150 m) on broad floodplains along, moderately steep, meandering rivers (2% gradient). This association usually occurs 2-6 ft (0.5-2 m) above the stream channel. Stream channels vary widely in slope and width and are either broad, moderately sinuous with moderate gradients or broad, highly sinuous with low gradients. Occasionally, stream channels are steep and narrow. Soils are highly variable and stratified. Soil textures include silty clays, silty clay loams, clay loams, sandy clays, sandy clay loam, and loamy sands.

### Vegetation Description

This is one of the most diverse cottonwood-dominated riparian plant associations. The upper canopy can consist of several species, but *Populus angustifolia* (narrowleaf cottonwood) is almost always dominant with 5-85% cover. Other tree species that may be present include *Picea pungens* (blue spruce), *Populus tremuloides* (quaking aspen), *Pseudotsuga menziesii* (Douglas-fir), *Pinus ponderosa* (ponderosa pine), and *Abies lasiocarpa* (subalpine fir).

The shrub layer is dense and diverse with 1-98% cover of *Cornus sericea* (red-osier dogwood). Other shrub species may be as abundant, but not exceeding *Cornus*. Shrub species include *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Amelanchier* spp. (serviceberry), *Rosa woodsii* (Woods rose), *Symphoricarpos oreophilus* (mountain snowberry), *Acer glabrum* (Rocky Mountain maple), *Prunus virginiana* (chokecherry), *Quercus gambelii* (Gambel oak), *Salix ligulifolia* (strapleaf willow), *Crataegus rivularis* (river hawthorn), *Lonicera involucrata* (twinberry honeysuckle), *Salix exigua* (sandbar willow), *Betula occidentalis* (river birch), *Salix drummondiana* (Drummond willow), *Salix lucida* ssp. *caudata* (shining willow), and *Salix monticola* (mountain willow). Stands vary in aspect and shade provided, some are relatively

moist and shady, others are relatively dry and open. In the moister environments, the herbaceous cover can be high (>50%).

### Ecological Processes

In Colorado, some stands of this association appear to be mid- to late-seral mature cottonwood forests that are isolated from frequent flooding and sediment deposition. A seasonally high water table is required to maintain a vigorous *Cornus sericea* layer. Stands of this association growing at lower elevations and on high, drier terraces have greater cover of *Amelanchier utahensis* (Utah serviceberry), *Amelanchier alnifolia* (Saskatoon serviceberry) and *Crataegus rivularis* (river hawthorn) and may have undergone over-grazing in the past. One potential conservation area containing this association is Florida River at Burnt Timber Creek.

Avg. Cover %	(Range)	Species Name	# Plots (N=46)
44	(5-85%)	<i>Populus angustifolia</i>	46
36	(1-98%)	<i>Cornus sericea</i> ssp. <i>sericea</i>	46
18	(3-50%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	25
14	(1-30%)	<i>Crataegus rivularis</i>	7
14	(1-30%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasianдра</i>	6
12	(1-50%)	<i>Picea pungens</i>	10
12	(1-30%)	<i>Amelanchier utahensis</i>	9
10	(1-22%)	<i>Salix ligulifolia</i>	13
8	(1-40%)	<i>Rosa woodsii</i>	41
8	(0.1-30%)	<i>Populus tremuloides</i>	8
8	(1-30%)	<i>Acer glabrum</i>	13
8	(1-30%)	<i>Solidago gigantea</i>	7
8	(1-30%)	<i>Lonicera involucrata</i>	16
7	(1-30%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	19
7	(1-20%)	<i>Salix drummondiana</i>	10
7	(1-30%)	<i>Clematis ligusticifolia</i>	6
7	(1-20%)	<i>Pseudotsuga menziesii</i>	8
7	(1-70%)	<i>Poa pratensis</i>	31
7	(1-44%)	<i>Ribes inerme</i>	17
7	(1-29%)	<i>Quercus gambelii</i>	14
7	(1-30%)	<i>Prunus virginiana</i> var. <i>melanocarpa</i>	19
6	(1-25%)	<i>Actaea rubra</i> ssp. <i>arguta</i>	9
6	(1-31%)	<i>Salix exigua</i>	11
5	(1-20%)	<i>Heracleum maximum</i>	16
5	(1-20%)	<i>Maianthemum stellatum</i>	37
5	(1-10%)	<i>Salix monticola</i>	6
5	(1-12%)	<i>Symphoricarpos oreophilus</i>	23

#### Other species with < 5% average cover present in at least 10% of plots:

*Dactylis glomerata* (1-20%), *Amelanchier alnifolia* (1-10%), *Juniperus scopulorum* (1-20%), *Agrostis gigantea* (1-10%), *Rubus idaeus* ssp. *strigosus* (1-20%), *Taraxacum officinale* (1-20%), *Geranium richardsonii* (1-30%), *Fragaria virginiana* ssp. *glauca* (1-20%), *Mentha arvensis* (1-10%), *Osmorhiza depauperata* (1-10%), *Elymus glaucus* (1-5%), *Phleum pratense* (1-10%), *Equisetum arvense* (0.1-10%), *Calamagrostis canadensis* (1-5%), *Ligusticum porteri* (1-10%), *Viola canadensis* var. *scopulorum* (1-5%), *Vicia americana* (1-10%), *Paxistima myrsinites* (1-5%), *Galium boreale* (1-5%), *Geum macrophyllum* var. *perincisum* (1-5%), *Equisetum laevigatum* (1-5%), *Chamerion angustifolium* ssp. *circumvagum* (1-8%), *Mertensia ciliata* (1-5%), *Galium triflorum* (1-3%), *Thalictrum fendleri* (1-5%), *Equisetum hyemale* var. *affine* (1-5%), *Glyceria striata* (1-3%), *Achillea millefolium* var. *occidentalis* (1-3%), *Conioselinum scopulorum* (1-2%), *Solidago canadensis* (1%).

## Narrowleaf cottonwood / River hawthorn Woodland

### *Populus angustifolia* / *Crataegus rivularis*

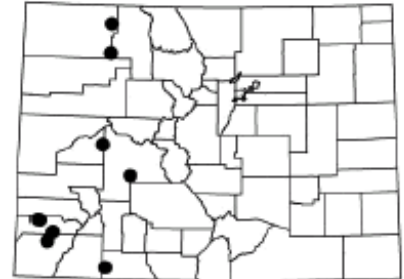
Global rank/State rank:

G2? / S2

HGM subclass: R3/4

Colorado elevation range:

6,900-8,000 ft (2,100-2,400 m)



### General Description

The *Populus angustifolia*/*Crataegus rivularis* (narrowleaf cottonwood/river hawthorn) plant association is characterized by having dense to sparse canopy cover of mature *Populus angustifolia* (narrowleaf cottonwood) trees. The understory is typically very dense and consists of *Crataegus rivularis* (river hawthorn) and other shrub species including *Cornus sericea* (red-osier dogwood) and various tall *Salix* (willow) species. Graminoid and forb cover is minimal. This association generally occurs away from the immediate stream bank in moderately wide valleys. It also occurs along dry backchannels or ephemeral streams.

Stream channels are wide and moderately to highly sinuous. The soils are sandy clays and highly stratified alluvium.

### Vegetation Description

*Populus angustifolia* (narrowleaf cottonwood) forms an open to dense overstory canopy with 4-63% cover. *Crataegus rivularis* (river hawthorn) forms a dense shrub canopy with 10-70% cover, and *Rosa woodsii* (Woods rose) forms a sub-shrub canopy. These three species were present in every stand sampled. Other tree species may be present, including *Pinus ponderosa* (ponderosa pine) and *Pseudotsuga menziesii* (Douglas-fir). Shrub species may include *Symphoricarpos oreophilus* (mountain snowberry), *Quercus gambelii* (Gambel oak), *Dasiphora floribunda* (shrubby cinquefoil), *Cornus sericea* (red-osier dogwood), *Salix bebbiana* (Bebb willow), *Salix ligulifolia* (strapleaf willow), and *Salix monticola* (mountain willow). Graminoid and forb cover is typically low due to dry soil conditions. *Taraxacum officinale* (dandelion) and *Iris missouriensis* (wild iris) are present in nearly all sampled stands. Other herbaceous species present include *Maianthemum stellatum*

(starry false Solomon seal), *Poa pratensis* (Kentucky bluegrass), *Thermopsis Montana* (mountain goldenbanner), *Thalictrum fendleri* (Fendler meadowrue), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower), *Carex praegracilis* (clustered field sedge), and *Delphinium nuttallianum* (Nuttal larkspur).

### Ecological Processes

An abundance of *Crataegus rivularis* (river hawthorn) may indicate a late seral stage of the cottonwood stand. *Crataegus* occupies the driest part of the riparian habitat, and may indicate the surface is no longer flooded. In Montana, thickets of *Crataegus* are considered a grazing disclimax. Cattle will browse *Crataegus* and heavy pressure can cause thickets to become open and increaser species such as *Rosa woodsii* (Woods rose), *Symphoricarpos* (snowberry) and *Poa pratensis* (Kentucky bluegrass) become established and abundant.

Potential conservation areas containing this association are Los Pinos at Bayfield North, Middle Florida River.

Avg. Cover		Species Name	# Plots (N=10)
%	(Range)		
44	(4-63%)	<i>Populus angustifolia</i>	10
35	(1-100%)	<i>Ribes inerme</i>	3
25	(10-70%)	<i>Crataegus rivularis</i>	10
14	(1-30%)	<i>Cornus sericea</i>	5
14	(3-40%)	<i>Symphoricarpos oreophilus</i>	6
10	(1-20%)	<i>Salix monticola</i>	3
10	(1-30%)	<i>Rosa woodsii</i>	10
10	(3-20%)	<i>Pinus ponderosa</i> var. <i>scopulorum</i>	4
8	(1-50%)	<i>Maianthemum stellatum</i>	9
6	(1-15%)	<i>Quercus gambelii</i>	5
6	(1-20%)	<i>Amelanchier alnifolia</i>	6

**Other species with < 5% average cover present in at least 10% of plots:**  
*Rudbeckia laciniata* var. *ampla* (1-10%), *Dasiphora floribunda* (1-10%), *Poa pratensis* (1-10%), *Osmorhiza depauperata* (1-6%), *Melilotus officinalis* (1-10%), *Thalictrum fendleri* (1-9%), *Geranium richardsonii* (1-6%), *Thermopsis montana* (1-3%), *Juncus balticus* var. *montanus* (1-3%), *Phleum pratense* (1-3%), *Fragaria virginiana* ssp. *glauca* (1-3%), *Vicia americana* (1-5%), *Bromus inermis* (1-3%), *Taraxacum officinale* (1-3%), *Achillea millefolium* var. *occidentalis* (1%), *Iris missouriensis* (1%), *Galium triflorum* (1%), *Pseudocymopterus montanus* (1%), *Trifolium longipes* (1%).



## Narrowleaf cottonwood - Rocky Mountain juniper Woodland

### *Populus angustifolia* - *Juniperus scopulorum*

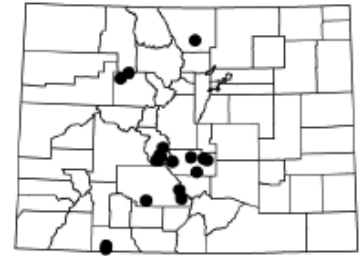
Global rank/State rank:

G2G3 / S3

HGM subclass: R3/4

Colorado elevation range:

6,000-8,600 ft (1,800-2,600 m)



### General Description

*Populus angustifolia* (narrowleaf cottonwood) and *Juniperus scopulorum* (Rocky Mountain juniper) dominated riparian areas are uncommon. The community occurs along lower foothill streams with perennial to intermittent stream flows. Total biomass and canopy cover are often low. The association is characterized by an open canopy of *Populus angustifolia* (narrowleaf cottonwood) and *Juniperus scopulorum* (Rocky Mountain juniper), often with little else growing in the understory. The species composition and percent cover is variable and depends on aspect, elevation, and stream flow, in addition to the degree of disturbance by recreational use and livestock grazing.

Stream channels are steep and narrow with rocky to sandy bottoms. This association can also occur on upper terraces and elevated islands of wide, meandering river reaches such as those found along the Arkansas and Colorado Rivers. Valley widths are typically 700 ft (200 m) or less and stream gradients are generally low to moderate (0.5-2.5%). *Juniperus scopulorum* (Rocky Mountain juniper) is situated at the high water line and above, while the *Populus angustifolia* (narrowleaf cottonwood) grades into the active floodplain area. Soils of this plant association are derived from alluvial deposits. The surface soils consist of loamy sand, clay loams, silty clays or organic matter. Subsurface layers range from sandy loams and loamy sands to clay loams and sandy clay loams with 20-50% gravel and cobbles. Soil depth ranges from 15-25 inches (40 to 65 cm).

### Vegetation Description

This plant association is characterized by an open to closed canopy of 20-100% cover of *Populus angustifolia* (narrowleaf cottonwood) and scattered to abundant *Juniperus scopulorum* (Rocky Mountain juniper) with 5-85% cover. Stands with northern aspects may include *Pseudotsuga menziesii* (Douglas-fir) or *Populus tremuloides*



(quaking aspen). Two stands in the lower San Juan watershed with *Juniperus osteosperma* (Utah juniper), rather than *J. scopulorum* (Rocky Mountain juniper), are included in this type.

There is very little shrub canopy and little to no herbaceous undergrowth due to dry conditions. If present, the shrub canopy may include a wide variety of species, although none is present in every stand. Shrub species may include *Clematis ligusticifolia* (western white clematis), *Acer glabrum* (Rocky Mountain maple), *Rhus trilobata* (skunkbush sumac), *Symphoricarpos oreophilus* (mountain snowberry), *Quercus gambelii* (Gamble oak), and *Berberis fendleri* (Colorado barberry).

Non-native species are some of the more commonly encountered herbaceous components of this association, and generally occur in disturbed stands. Species include *Poa pratensis* (Kentucky bluegrass), *Taraxacum officinale* (dandelion), *Agrostis stolonifera* (creeping bentgrass), and *Melilotus officinalis* (sweet clover).

### Ecological Processes

As with all cottonwood woodlands, this association is found within a continually changing alluvial environment where riparian vegetation is constantly being “re-set” by flooding disturbance. Mature cottonwood stands do not regenerate in place, but regenerate by “moving” up and down a river reach. Over time, a healthy riparian area supports all stages of cottonwood communities. The process of cottonwood regeneration is dependent on flooding disturbance. Periodic flooding allows cottonwood seedlings to germinate and become established on newly deposited, moist sandbars. Natural river processes of bank erosion, deposition and channel migration result in a dynamic patchwork of different age classes, plant associations and habitats. One potential conservation area containing this association is Spring Creek North.

Avg. Cover %	(Range)	Species Name	# Plots (N=20)
51	(12-97%)	<i>Populus angustifolia</i>	20
29	(3-86%)	<i>Juniperus scopulorum</i>	18
12	(6-22%)	<i>Quercus gambelii</i>	3
11	(3-24%)	<i>Carex utriculata</i>	3
10	(1-29%)	<i>Poa pratensis</i>	13
9	(0.1-30%)	<i>Maianthemum stellatum</i>	6
9	(6-12%)	<i>Pseudotsuga menziesii</i>	3
9	(1-23%)	<i>Alnus incana ssp. tenuifolia</i>	3
8	(1-18%)	<i>Acer glabrum</i>	4
7	(1-17%)	<i>Agrostis stolonifera</i>	6
6	(1-27%)	<i>Clematis ligusticifolia</i>	10
6	(1-12%)	<i>Melilotus officinalis</i>	6

**Other species with < 5% average cover present in at least 10% of plots:**  
*Leymus cinereus* (1-10%), *Medicago lupulina* (1-8%), *Equisetum arvense* (1-8%), *Thermopsis divaricarpa* (2-7%), *Trifolium repens* (1-7%), *Thalictrum fendleri* (1-4%), *Juncus balticus* var. *montanus* (1-6%), *Rhus trilobata* var. *trilobata* (1-6%), *Equisetum hyemale* var. *affine* (1-6%), *Rosa woodsii* (0.1-5%), *Salix exigua* (1-3%), *Achillea millefolium* var. *occidentalis* (1-3%), *Symphoricarpos oreophilus* (1-2%), *Taraxacum officinale* (1-3%), *Artemisia ludoviciana* (1-2%), *Bromus tectorum* (1%), *Pascopyrum smithii* (1%), *Tragopogon dubius* (1%).

## Narrowleaf cottonwood / Skunkbush sumac Woodland

### *Populus angustifolia* / *Rhus trilobata*

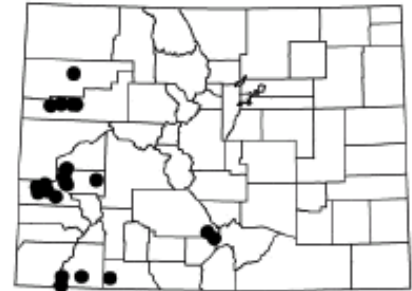
Global rank/State rank:

G3 / S3

HGM subclass: R3/4

Colorado elevation range:

5,000-8,000 ft (1,500-2,440 m)



### General Description

The *Populus angustifolia*/*Rhus trilobata* (narrowleaf cottonwood/skunkbush sumac) plant association is characterized by a scattered overstory of *Populus angustifolia* with an occasional *P. x acuminata* (lanceleaf cottonwood) or *P. deltoides* ssp. *wislizeni* (Rio Grande cottonwood). The shrub understory is a dense layer of *Rhus trilobata*. It occurs in sandstone canyons and on streams adjacent to sand dunes.

This plant association occurs on immediate river banks, floodplain meanders, and narrow benches in narrow to wide, 65-500 ft (20-150 m), sandstone canyons. Stands generally occur within 3 ft (1 m) of the high water mark, but can also occur on higher terraces, up to 10 ft (3 m) above the channel. In the western portion of the Colorado River drainage, this association occurs on small streams in shale canyon areas. Stream channels are wide and highly sinuous or wide and moderately sinuous. Occasionally, stream channels are narrow and steep. The soils associated with this plant association are often alkaline and of a calcareous parent material. The soil textures are fine sandy loams, clay loams, silty clay loams, and silty clay.

### Vegetation Description

This plant association is characterized by the presence and abundance of *Rhus trilobata* (skunkbush sumac) with *Populus angustifolia* (narrowleaf cottonwood), or *P. x acuminata* (lanceleaf cottonwood). The cottonwoods may be young or mature trees. Other trees that may be present in the overstory include *Acer negundo* (boxelder), *Juniperus osteosperma* (Utah juniper), *Juniperus scopulorum* (Rocky Mountain juniper), *Pinus ponderosa* (ponderosa pine), *Pseudotsuga menziesii* (Douglas-fir), *Pinus edulis* (pinyon pine), and *Ulmus pumila* (Siberian elm), an introduced species found in a single plot. The shrub layer is dominated by *Rhus trilobata* (skunkbush sumac). Other shrubs that may be present include *Clematis ligusticifolia* (western white clematis), *Rosa woodsii* (Woods rose), *Quercus gambelii* (Gambel oak), *Salix exigua* (sandbar willow), *Amelanchier utahensis* (Utah serviceberry), *Cornus sericea* (red-osier dogwood), *Forestiera pubescens* (wild privet), *Prunus virginiana* (chokecherry), *Berberis*

*fendleri* (Colorado barberry), *Shepherdia argentea* (silver buffaloberry), and *Acer glabrum* (Rocky Mountain maple). The herbaceous undergrowth is usually sparse.

**Ecological Processes**

In southwestern Colorado, *Rhus trilobata* is present in both young and old cottonwood stands. As the stand matures, *Rhus trilobata* becomes denser and excludes other shrubs. On higher terraces that are less frequently flooded, *Populus angustifolia* does not reproduce. This indicates succession to an upland community. The presence of *Quercus gambelii* (Gambel oak) in some stands may indicate a trend toward an upland oak shrub community.

As with all cottonwood woodlands, this association is found within a continually changing alluvial environment where riparian vegetation is constantly being “re-set” by flooding disturbance. The process of cottonwood regeneration is dependent on flooding disturbance. Periodic flooding allows cottonwood seedlings to germinate and become established on newly deposited, moist sandbars. Natural river processes of bank erosion, deposition and channel migration result in a dynamic patchwork of different age classes, plant associations and habitats.

Potential conservation areas containing this association are Morgan Canyon PCA and Animas River at Durango Site of Local Significance.

Avg. Cover		Species Name	# Plots (N=34)
%	(Range)		
37	(1-99%)	<i>Rhus trilobata</i> var. <i>trilobata</i>	32*
33	(1-80%)	<i>Populus angustifolia</i>	32*
20	(1-50%)	<i>Mahonia repens</i>	5
20	(1-60%)	<i>Populus x acuminata</i>	6
19	(3-40%)	<i>Forestiera pubescens</i>	6
18	(1-40%)	<i>Acer negundo</i> var. <i>interius</i>	8
17	(3-31%)	<i>Prunus virginiana</i> var. <i>melanocarpa</i>	5
16	(1-26%)	<i>Berberis fendleri</i>	5
11	(1-30%)	<i>Shepherdia argentea</i>	4
10	(1-21%)	<i>Maianthemum stellatum</i>	9
9	(1-30%)	<i>Salix exigua</i>	11
9	(1-20%)	<i>Crataegus rivularis</i>	4
8	(1-56%)	<i>Clematis ligusticifolia</i>	22
8	(1-20%)	<i>Quercus gambelii</i>	13
7	(1-30%)	<i>Poa pratensis</i>	19
7	(1-21%)	<i>Pascopyrum smithii</i>	5
6	(1-10%)	<i>Cornus sericea</i>	7
6	(0.1-30%)	<i>Rosa woodsii</i>	18
6	(1-10%)	<i>Artemisia tridentata</i>	8
5	(1-10%)	<i>Juniperus scopulorum</i>	6
5	(1-20%)	<i>Symphoricarpos oreophilus</i>	9
5	(1-10%)	<i>Toxicodendron rydbergii</i>	6

**Other species with < 5% average cover present in at least 10% of plots:**  
*Ericameria nauseosa* ssp. *nauseosa* var. *glabrata* (0.1-10%), *Amelanchier utahensis* (1-10%), *Melilotus officinalis* (0.1-10%), *Equisetum arvense* (1-5%), *Glycyrrhiza lepidota* (1-5%), *Taraxacum officinale* (1-5%), *Vicia americana* (1-5%), *Artemisia ludoviciana* (1-3%), *Bromus tectorum* (1-3%), *Heterotheca villosa* (1%), *Eleocharis palustris* (1%), *Achillea millefolium* var. *occidentalis* (0.1-1%), *Equisetum laevigatum* (0.1-1%).

\* *Populus angustifolia* and *Rhus trilobata* occurred in all stands, but were not captured in every sample plot.

## Narrowleaf cottonwood / Sandbar willow Woodland

### *Populus angustifolia* / *Salix exigua*

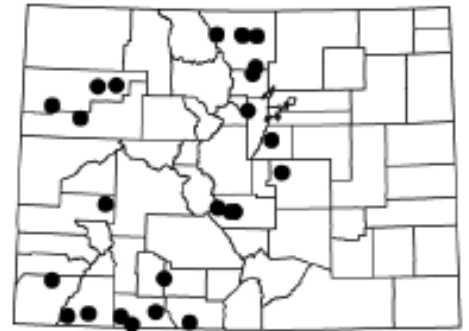
Global rank/State rank:

G4 / S4

HGM subclass: R3/4, R5

Colorado elevation range:

5,200-8,500 ft (1,580-2,600 m)



#### General Description

This is a very common plant association of young seedling and sapling *Populus angustifolia* (narrowleaf cottonwood) intermixed with *Salix exigua* (sandbar willow). The association occupies point bars, gravel bars, benches and low areas that are flooded annually.

This plant association occurs on recently flooded point bars, low terraces, and stream benches. It is usually well within the active channel and immediate floodplain of the stream and does not occur more than 3-6 ft (1-2 m) above the high-water mark.

Stream channels are wide and slightly sinuous, or wide and moderately sinuous. Soils are skeletal (40% gravel and 10-20% cobbles) and shallow, 15 in (35 cm) deep, sands, sandy loams, sandy clay loams, or silty clays over coarse alluvial material.

#### Vegetation Description

This plant association represents the early, successional stage of nearly all *Populus angustifolia* (narrowleaf cottonwood) dominated plant associations, and is characterized by an open to dense stand of *Populus angustifolia* (narrowleaf cottonwood) young trees, seedlings and saplings with *Salix exigua* (sandbar willow).

*Populus x acuminata* (lanceleaf cottonwood) may also be present in similar age classes. Other more widely scattered trees occurring in fewer than 20% of sampled stands include *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), *Pinus ponderosa* (ponderosa pine), and *Picea pungens* (blue spruce).

The shrub canopy is typically at the same height of the seedling and sapling cottonwood trees, although older, transitional, stands will have taller, more mature trees with *Salix exigua* as an understory. Other shrubs that may be present include *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Salix lucida* ssp. *caudata* or ssp. *lasiandra* (shining willow), *Salix ligulifolia* (strapleaf willow), *Salix drummondiana* (Drummond willow), and *Salix bebbiana* (Bebb willow).

The herbaceous undergrowth is generally invasive, non-native and sparse from frequent flooding disturbance. Non-native species include *Poa pratensis* (Kentucky



bluegrass), *Trifolium repens* (white clover), *Agrostis stolonifera* (creeping bentgrass), *Linaria vulgaris* (butter and eggs), *Taraxacum officinale* (dandelion), *Medicago lupulina* (black medick), *Phleum pratense* (timothy), *Melilotus officinalis* (yellow sweetclover), *Dactylis glomerata* (orchardgrass), and *Elymus repens* (quackgrass). Native herbaceous species that can be present include *Equisetum arvense* (field horsetail), *Achillea millefolium* var. *occidentalis* (western yarrow), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower), *Carex microptera* (big head sedge), *Carex pellita* (woolly sedge), and *Mentha arvensis* (wild mint).

### Ecological Processes

*Populus angustifolia*/*Salix exigua* (narrowleaf cottonwood/sandbar willow) is one of the earliest successional stages of a cottonwood-dominated plant association. *Populus angustifolia* and *Salix exigua* seeds often germinate together on freshly deposited sandbars. If the site becomes more stable and less frequently flooded (i.e., the stream channel migrates away from the site), the *Populus angustifolia* saplings mature, but the *Salix exigua* population eventually declines. The association can become one of several mid- or late-seral floodplain types including *Populus angustifolia*/*Alnus incana* ssp. *tenuifolia* (narrowleaf cottonwood/thinleaf alder) and *Populus angustifolia*/*Cornus sericea* (narrowleaf cottonwood/red-osier dogwood). This plant community is common throughout La Plata County.

Avg. Cover		Species Name	# Plots (N=27)
%	(Range)		
38	(15-80%)	<i>Populus angustifolia</i>	27
22	(1-64%)	<i>Salix exigua</i>	24*
17	(0.1-40%)	<i>Agrostis gigantea</i>	5
13	(1-70%)	<i>Poa pratensis</i>	19
11	(1-40%)	<i>Trifolium pratense</i>	5
10	(1-88%)	<i>Equisetum arvense</i>	11
8	(1-20%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasiandra</i>	6
6	(1-30%)	<i>Melilotus officinalis</i>	10
6	(1-38%)	<i>Trifolium repens</i>	12
6	(1-20%)	<i>Medicago lupulina</i>	9
5	(1-12%)	<i>Salix ligulifolia</i>	5
5	(1-19%)	<i>Bromus inermis</i>	6
5	(2-10%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	7
5	(1-10%)	<i>Dactylis glomerata</i>	4

**Other species with < 5% average cover present in at least 10% of plots:**  
*Phleum pratense* (1-10%), *Poa compressa* (1-15%), *Heterotheca villosa* (1-10%), *Juncus balticus* var. *montanus* (0.1-10%), *Juniperus scopulorum* (1-8%), *Eleocharis palustris* (1-5%), *Taraxacum officinale* (0.1-20%), *Rudbeckia laciniata* var. *ampla* (0.1-5%), *Clematis ligusticifolia* (0.1-6%), *Mentha arvensis* (1-5%), *Rosa woodsii* (0.1-5%), *Achillea millefolium* var. *occidentalis* (1-3%), *Carex microptera* (1%).

\**Salix exigua* was present in all stands, but was not captured in every sample plot.



**Narrowleaf cottonwood / Strapleaf willow - Silver buffaloberry  
Woodland**

*Populus angustifolia* / *Salix ligulifolia* - *Shepherdia argentea*

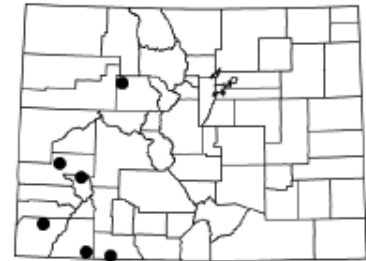
**Global rank/State rank:**

G2 / S2

**HGM subclass:** R3/4

**Colorado elevation range:**

6,000-7,100 ft (1,800-2,200 m)



**General Description**

*Populus angustifolia*/*Salix ligulifolia*-*Shepherdia argentea* (narrowleaf cottonwood/strapleaf willow-silver buffaloberry) is an extremely limited plant association in western Colorado. Historically, it was more widespread and common in broad river valleys. Intense, long-term use by livestock and alterations in the river flow regime have caused a decline in its distribution.

This plant association occurs in narrow to broad, 1,000 ft (300 m) wide, alluvial valleys. Mature stands occur on terraces up to 10 ft (2.5 m) above the active channel. Mature stands spread out across wide floodplains, but also occur on narrow floodplains of constricted reaches. Stream channels are wide and sinuous with low to moderate gradients (1-5%). The soils are deep, sandy loams.

**Vegetation Description**

This plant association is characterized by an overstory canopy of *Populus angustifolia* (narrowleaf cottonwood) and the presence of *Shepherdia argentea* (silver buffaloberry). The tree canopy consists of mature *Populus angustifolia* (narrowleaf cottonwood), with seeding and sapling sized *P. angustifolia* that can occur in bands close to the river's edge. Other trees that may be present include *Pinus edulis* (pinyon pine) and *Populus x acuminata* (lanceleaf cottonwood).

The shrub layer is diverse and widely spaced. *Shepherdia argentea* (silver buffaloberry) is the key characteristic shrub for this association. Low abundance may indicate a degraded occurrence. *Salix ligulifolia* (strapleaf willow) is so widely spaced that it may not be sampled. Other shrub species which may be present include *Rhus trilobata* (skunkbush sumac), *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Cornus sericea* (red-osier dogwood), *Rosa woodsii* (Woods rose), *Crataegus rivularis* (river hawthorne), *Quercus gambelii* (Gambel oak), *Salix exigua* (sandbar willow), *Salix irrorata* (bluestem willow), and *Betula occidentalis* (river birch).

The herbaceous undergrowth is typically dominated by introduced hay grasses including *Agrostis stolonifera* (creeping bentgrass), *Poa pratensis* (Kentucky bluegrass), and *Dactylis glomerata* (orchardgrass). A few native species also occur, including *Maianthemum stellatum* (starry false Solomon seal), *Equisetum arvense* (field horsetail), *Glycyrrhiza lepidota* (American licorice), *Thlaspi montanum* (alpine pennycress), and *Pascopyrum smithii* (western wheatgrass).

### Ecological Processes

No undisturbed stands of the *Populus angustifolia*/*Salix ligulifolia*-*Shepherdia argentea* (narrowleaf cottonwood/strappleaf willow-silver buffaloberry) plant association are known in Colorado. The predominance of non-native grasses in the undergrowth and widely spaced shrubs indicate heavy utilization by cattle.

Potential conservation areas containing this association are Los Pinos at Rattlesnake Hill, Falls Creek, Middle Florida River, Animas at La Posta.

Avg. Cover %	(Range)	Species Name	# Plots (N=7)
34	(1-85%)	<i>Populus angustifolia</i>	7
33	(3-59%)	<i>Shepherdia argentea</i>	7
28	—	<i>Salix irrorata</i>	1
26	—	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasiandra</i>	1
20	—	<i>Agrostis stolonifera</i>	1
18	(1-69%)	<i>Poa pratensis</i>	6
18	—	<i>Populus x acuminata</i>	1
16	(1-30%)	<i>Clematis ligusticifolia</i>	5
11	(1-28%)	<i>Rosa woodsii</i>	4
10	—	<i>Crataegus rivularis</i>	1
10	—	<i>Thlaspi montanum</i>	1
10	—	<i>Quercus gambelii</i>	1
10	—	<i>Salix ligulifolia</i>	1
10	—	<i>Symphoricarpos oreophilus</i>	1
9	(1-40%)	<i>Rhus trilobata</i> var. <i>trilobata</i>	5
9	(1-22%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	4
9	—	<i>Deschampsia caespitosa</i>	1
9	(3-14%)	<i>Betula occidentalis</i>	2
8	(1-27%)	<i>Salix exigua</i>	4
4	(1-11%)	<i>Trifolium repens</i>	3

#### Other species with < 5% average cover present in at least 10% of plots:

*Melilotus officinalis* (3-5%), *Poa compressa* (4-4%), *Dactylis glomerata* (3-3%), *Symphotrichum laeve* var. *geyeri* (3-3%), *Thalictrum fendleri* (3-3%), *Chamerion angustifolium* ssp. *circumvagum* (3-3%), *Amelanchier alnifolia* (3-3%), *Salix monticola* (3-3%), *Pinus edulis* (3-3%), *Heterotheca villosa* (3-3%), *Prunella vulgaris* (3-3%), *Cornus sericea* ssp. *sericea* (1-3%), *Taraxacum officinale* (1-3%), *Pascopyrum smithii* (1-3%), *Glycyrrhiza lepidota* (1-3%), *Elymus lanceolatus* (2%), *Hedysarum boreale* (2%), *Equisetum arvense* (1-3%), *Maianthemum stellatum* (1-3%), *Cirsium arvense* (1-2%), *Phleum pratense* (1%), *Juncus balticus* var. *montanus* (1%), *Carduus nutans* ssp. *macrolepis* (1%), *Elymus trachycaulus* ssp. *trachycaulus* (1%), *Dasiphora floribunda* (1%), *Symphotrichum spathulatum* (1%), *Mahonia repens* (1%), *Equisetum laevigatum* (1%), *Calamagrostis canadensis* (1%), *Toxicodendron rydbergii* (1%), *Asparagus officinalis* (1%), *Arctium minus* (1%), *Apocynum cannabinum* (1%), *Trifolium pratense* (1%), *Poa reflexa* (1%), *Ribes cereum* (1%), *Equisetum hyemale* var. *affine* (1%), *Achillea millefolium* var. *occidentalis* (1%), *Solidago canadensis* (1%), *Ipomopsis aggregata* (1%), *Streptopus amplexifolius* var. *chalmazatus* (1%), *Galium triflorum* (1%), *Galium boreale* (1%), *Oxypolis fendleri* (1%).

## Narrowleaf cottonwood - Douglas-fir Woodland

### *Populus angustifolia* - *Pseudotsuga menziesii*

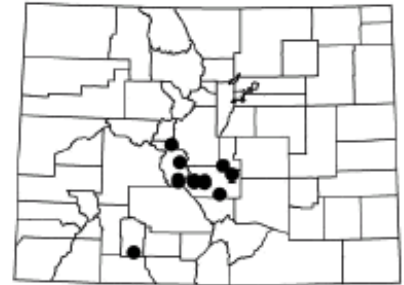
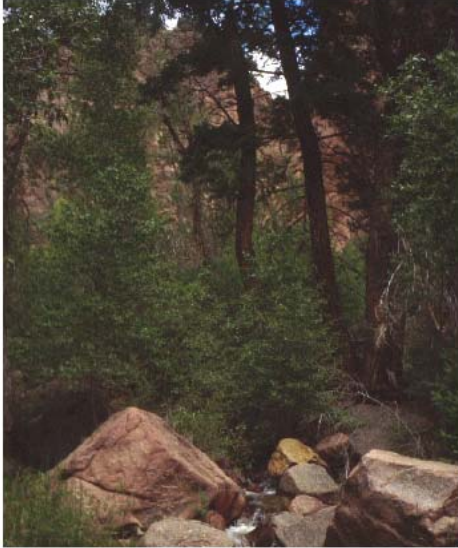
Global rank/State rank:

G3 / S2

HGM subclass: R3/4

Colorado elevation range:

7,100-8,700 ft (2,150-2,700 m)



### General Description

This plant association occurs in the San Juan National Forest and in parts of the upper Arkansas River Basin. It is also expected to occur in narrow foothill canyons of the Colorado Front Range. The *Populus angustifolia*-*Pseudotsuga menziesii* (narrowleaf cottonwood-Douglas-fir) plant association is limited to narrow canyon bottoms and V-shaped valleys where a northern or protected aspect creates cool micro-environments.

This association represents a transition from lower montane to upper montane habitats.

Nearly all stands observed have an adjacent north-facing slope with *Pseudotsuga menziesii* (Douglas-fir) forests.

The association grows in wash bottoms and on immediate stream banks, cobble bars, and terraces. Stream channels are steep and narrow with streambeds of bedrock, sand, or silt. This association also occurs on slightly meandering floodplains of broad reaches with coarse channel bed material. The soils are derived from alluvial and colluvial deposits and are fairly shallow, 10-30 inches (25-75 cm) thick. The soils become skeletal with depth. Surface layers are sandy loams, clay loams, and loams. Subsurface layers are sandy loams with 10-30% cobbles and gravels. Organic matter from accumulated litter is concentrated in the upper layers.

### Vegetation Description

The upper canopy of this plant association is dominated by *Pseudotsuga menziesii* (Douglas-fir) and *Populus angustifolia* (narrowleaf cottonwood). The mix of these two species as mature trees in the overstory canopy is the diagnostic characteristic for this plant association. *Juniperus scopulorum* (Rocky Mountain juniper) or *Abies concolor* (white fir) may also be present. Several other conifer tree species may be present, but with less than 1% cover. Shrub cover is typically low, but is highly variable and diverse. No single species was present in all stands sampled. Shrub species include *Acer glabrum* (Rocky Mountain maple), *Salix exigua* (sandbar willow), *Betula occidentalis* (river birch), *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Quercus gambelii* (Gambel oak), *Salix lucida* ssp. *caudata* (shining willow), *Clematis ligusticifolia* (western white clematis), and *Ribes cereum* (wax currant).

The herbaceous undergrowth can be sparse and is usually limited by heavy shade and dry soil conditions. Herbaceous species include *Poa pratensis* (Kentucky bluegrass), *Taraxacum officinale* (dandelion), *Achillea millefolium* var. *occidentalis* (western yarrow), *Trifolium repens* (white clover), and *Agrostis stolonifera* (creeping bentgrass).

### Ecological Processes

*Pseudotsuga menziesii* (Douglas-fir) is a non-obligate riparian species and in Colorado riparian communities dominated by this species are uncommon. Observed stands of the *Populus angustifolia*-*Pseudotsuga menziesii* plant association were composed of mature trees, appear to be late-seral, and were limited to narrow canyon bottoms where upland *Pseudotsuga menziesii* forests grade into the riparian corridor or invade late successional terraces. Narrow canyons with steep slopes create pockets of moist, cool air by funneling cold-air downwards and providing a microsite for *Pseudotsuga menziesii*. Well-drained colluvial soils favor *Pseudotsuga menziesii* establishment. Along broader, meandering rivers, *Pseudotsuga menziesii* can occur on upper terraces with stands of *Populus angustifolia*. These stands likely represent a drier occurrence of a *Populus angustifolia* community where *Pseudotsuga menziesii* is not an indicator of riparian condition. However, at lower elevations and in narrow valleys with cold air drainage, *Pseudotsuga menziesii*, co-dominating with *Populus angustifolia* on stream banks and floodplains, represents a perpetual riparian community.

Avg. Cover		Species Name	# Plots (N=9)
%	(Range)		
39	(26-59%)	<i>Populus angustifolia</i>	9
24	(8-45%)	<i>Pseudotsuga menziesii</i>	9
11	(5-17%)	<i>Clematis ligusticifolia</i>	2
10	(5-15%)	<i>Trifolium repens</i>	3
8	(1-18%)	<i>Acer glabrum</i>	5
7	(4-13%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	3
6	(1-14%)	<i>Ribes cereum</i>	3
6	(2-8%)	<i>Juniperus scopulorum</i>	6
6	(1-10%)	<i>Melilotus officinalis</i>	2
5	(2-11%)	<i>Salix exigua</i>	3
4	(1-13%)	<i>Poa pratensis</i>	8

**Other species with < 5% average cover present in at least 10% of plots:**  
*Geranium richardsonii* (1-15%), *Abies concolor* (2-5%), *Achnatherum hymenoides* (1-6%),  
*Agrostis stolonifera* (1-6%), *Elymus repens* (2-3%), *Bromus inermis* (2-3%), *Taraxacum officinale*  
(1-4%), *Holodiscus dumosus* (1-2%), *Rosa woodsii* (1-2%), *Thalictrum fendleri* (1-2%),  
*Symphoricarpos oreophilus* (1-2%), *Achillea millefolium* var. *occidentalis* (1%), *Bromus tectorum*  
(1%), *Medicago lupulina* (1%), *Heterotheca villosa* (1%), *Heracleum maximum* (1%), *Elymus*  
*trachycaulus* ssp. *trachycaulus* (1%), *Ribes inerne* (1%).



## Quaking aspen / Red-osier dogwood Forest

### *Populus tremuloides* / *Cornus sericea*

**Global rank/State rank:**

G4 / S2S3

**HGM subclass:** R3/4

**Colorado elevation range:**

6,600-8,200 ft (2,000-2,500)



### General Description

The *Populus tremuloides*/*Cornus sericea* (quaking aspen/red-osier dogwood) plant association is located in narrow ravines where upland *Populus tremuloides* (quaking aspen) forests intermix with the riparian shrub vegetation. Obligate riparian shrub species distinguish this association from upland *Populus tremuloides* communities. This association occurs in the Colorado River Basin and the San Juan National Forest. This plant association occurs in deep, narrow (6-20 m) valleys along banks of first-order streams. Stands are located 1-3 ft (0.25-1 m) above the channel bankfull level. Stream channels are narrow and have relatively steep gradients (5-40%). Occasionally stream channels are somewhat wider and more gradual. Soils range from skeletal, shallow, sandy and sandy clay loams to deeper sandy and silty clay loams.

### Vegetation Description

This association is characterized by an overstory canopy of *Populus tremuloides* (quaking aspen), with an abundance of *Cornus sericea* (red-osier dogwood) in the shrub canopy. Several other tree species may be present, but none as consistently or in as high abundance as *Populus tremuloides* (quaking aspen). Other tree species include *Abies concolor* (white fir) and *Pseudotsuga menziesii* (Douglas-fir). Other shrub species include *Lonicera involucrata* (twinberry honeysuckle), *Salix drummondiana* (Drummond willow), *Salix boothii* (Booth willow), *Salix ligulifolia* (strapleaf willow), *Symphoricarpos oreophilus* (mountain snowberry), and *Alnus incana* ssp. *tenuifolia* (thinleaf alder).

The herbaceous undergrowth is relatively sparse, but diverse, with *Osmorhiza depauperata* (bluntseed sweetroot), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower), *Heracleum maximum* (common cowparsnip), *Maianthemum stellatum* (starry false Solomon seal), *Aconitum columbianum* (Columbian monkshood), *Mertensia franciscana* (Franciscan bluebells), and *Equisetum arvense* (field horsetail).

### Ecological Processes



*Populus tremuloides* (quaking aspen) forests and woodlands can be self-perpetuating climax plant associations or early-seral stages of coniferous types. *Populus tremuloides* is a non-obligate riparian species and often occurs in upland settings. Where valley bottoms are moist and stable, *Populus tremuloides* can dominate the riparian area, while also occurring on adjacent mesic hillslopes. Mesic shrub understories composed of *Alnus incana* ssp. *tenuifolia* (thinleaf alder) or *Cornus sericea* (red-osier dogwood) can become dominated by *Symphoricarpos* spp. (snowberry) with heavy grazing. This is likely to occur in valley bottom stands where grazing has dried the soil and dropped the water table. One potential conservation area containing this association is Vallecito Reservoir Tributary PCA.

Avg. Cover %	(Range)	Species Name	# Plots (N=3)
49	(23-90%)	<i>Cornus sericea</i>	3
37	(20-59%)	<i>Populus tremuloides</i>	3
29	(25-32%)	<i>Lonicera involucrata</i>	2
22	(12-31%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	2
18	(5-30%)	<i>Maianthemum stellatum</i>	2
14	—	<i>Salix drummondiana</i>	1
14	—	<i>Abies concolor</i>	1
13	—	<i>Heracleum maximum</i>	1
11	—	<i>Salix boothii</i>	1
10	(2-18%)	<i>Pseudotsuga menziesii</i>	2
10	—	<i>Salix ligulifolia</i>	1
10	—	<i>Mertensia franciscana</i>	1
9	—	<i>Equisetum arvense</i>	1
6	(5-7%)	<i>Aconitum columbianum</i>	2
6	—	<i>Elymus glaucus</i>	1
5	—	<i>Geranium richardsonii</i>	1

**Other species with < 5% average cover present in at least 10% of plots:**  
*Chamerion angustifolium* ssp. *circumvagum* (4%), *Alnus incana* ssp. *tenuifolia* (4%), *Equisetum pratense* (1-6%), *Sorbus scopulina* (3%), *Salix geyeriana* (3%), *Oxypolis fendleri* (3%), *Ligusticum porteri* (3%), *Quercus gambelii* (3%), *Carex geyeri* (2%), *Carex capillaris* (2%), *Osmorhiza depauperata* (1-3%), *Viola canadensis* var. *scopulorum* (1-2%), *Taraxacum officinale* (1%), *Galium trifidum* ssp. *subbiflorum* (1%), *Galium boreale* (1%), *Abies lasiocarpa* (1%), *Acer glabrum* (1%), *Actaea rubra* ssp. *arguta* (1%), *Amelanchier utahensis* (1%), *Angelica grayi* (1%), *Poa pratensis* (1%), *Symphoricarpos oreophilus* (1%), *Rubus idaeus* ssp. *strigosus* (1%), *Juncus balticus* var. *montanus* (1%), *Pseudostellaria jamesiana* (1%), *Glyceria striata* (1%), *Paxistima myrsinites* (1%), *Mertensia brevistyla* (1%).

## Barrenground willow / Mesic forb Shrubland

### *Salix brachycarpa* / Mesic forb



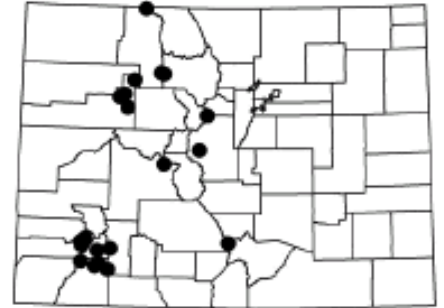
**Global rank/State rank:**

G4 / S4

**HGM subclass:** S1/2, R1, R2

**Colorado elevation range:**

8,500-11,500 ft (2,600-3,500 m)



### General Description

Typically, the *Salix brachycarpa*/mesic forb (barrenground willow/mesic forb) plant association occurs on well-drained slopes in subalpine valleys. This association may be considered part of a *Salix planifolia*-*Salix brachycarpa* (planeleaf willow-barrenground willow) mixed type. However, *Salix brachycarpa* occurs on slightly drier sites and is often adjacent to wetter, pure stands of *Salix planifolia*. The two species intermix at the ecotone between the wetter and drier sites. This plant association occurs in subalpine areas of the San Juan Mountains, the San Miguel/Dolores, Gunnison, Colorado and White River Basins, the Routt National Forest, and Rio Grande/Closed Basin.

The *Salix brachycarpa*/mesic forb (barrenground willow/mesic forb) plant association occurs along the drier fringes of broad, glaciated basins and along broad, straight streams in the subalpine zone. This association occupies elevated hummocks and drier side slopes, often surrounding wetter, low areas vegetated with *Salix planifolia* (planeleaf willow) associations. Stream channels are wide and shallow, or narrow, deep and sinuous. Soil textures range from silty clay loams to fine sandy loams with some mottling.

### Vegetation Description

*Salix brachycarpa* (barrenground willow) occurs in almost pure stands on hummocks and well-drained slopes adjacent to the valley floor. *Salix planifolia* (planeleaf willow) dominated associations occur within the same riparian/wetland mosaic in lower, poorly-drained areas and intermix with the *Salix brachycarpa* (barrenground willow) association at their ecotone. Within the *Salix brachycarpa* (barrenground willow) association, *Salix planifolia* (planeleaf willow) may occur with 2-30% cover. Other shrubs may include *Salix wolfii* (Wolf willow) and *Betula nana* (= *glandulosa*) (bog birch) in high, subalpine stands; and *Salix monticola* (mountain willow), and *S. drummondiana* (Drummond willow).

The herbaceous undergrowth is dominated by forb cover, which exceeds total

graminoid cover, although no one forb species is dominant nor present in every stand. Forb species include *Senecio triangularis* (arrowleaf ragwort), *Mertensia ciliata* (tall fringed bluebells), *Cardamine cordifolia* (heartleaf bittercress), *Caltha leptosepala* (marsh marigold), *Thalictrum* spp. (meadowrue), *Pseudocymopterus montanus* (alpine false springparsley), *Fragaria virginiana* (strawberry), *Oxypolis fendleri* (Fendler cowbane) and *Ligusticum* spp. (licoriceroot). Graminoid species may include *Deschampsia caespitosa* (tufted hairgrass), *Carex aquatilis* (water sedge) and *Calamagrostis canadensis* (bluejoint reedgrass). Lichen and moss-covered boulders are often present.

### Ecological Processes

*Salix planifolia* (planeleaf willow), *Salix brachycarpa* (barrenground willow) and *Salix wolfii* (Wolf willow) are abundant low-stature (1-3 ft, 0.3-1 m) willows of first- and second-order streams of subalpine elevations of Colorado. *Salix planifolia* and *Salix brachycarpa* can form extensive stands, often creating intricate mosaics in broad, subalpine valleys. In general, *Salix planifolia* occupies the wettest micro-habitats on peat soils, although it can grow well on mineral soils. *Salix brachycarpa* is more often found on slightly drier and more well-drained micro-habitats than *Salix planifolia*. *Salix wolfii* grows on deep, undecomposed peat, while *Salix planifolia* tends to grow on more decomposed (humified) organic soils. *Salix brachycarpa* grows on lateral moraines, coarse-textured stream banks, ridge tops and on small hummocks. This plant association appears to be stable, but little is known about its successional trends. It is sometimes intensely grazed by sheep, which may alter the species composition. Potential conservation areas containing this association are Middle Hermosa Creek, Cumberland Basin and Indian Creek at Tuckerville PCAs.

Avg. Cover		Species Name	# Plots (N=20)
%	(Range)		
48	(10-98%)	<i>Salix brachycarpa</i>	20
20	(3-70%)	<i>Salix wolfii</i>	5
16	(10-22%)	<i>Carex aquatilis</i>	6
15	(3-50%)	<i>Salix monticola</i>	8
14	(2-30%)	<i>Salix planifolia</i>	10
12	(2-30%)	<i>Caltha leptosepala</i>	6
10	(1-25%)	<i>Picea engelmannii</i>	7
8	(1-20%)	<i>Fragaria virginiana</i> ssp. <i>glauca</i>	9
7	(1-20%)	<i>Thalictrum alpinum</i>	5
6	(1-10%)	<i>Dasiphora floribunda</i>	9
6	(1-20%)	<i>Senecio triangularis</i>	11
6	(1-20%)	<i>Carex utriculata</i>	5
6	(1-20%)	<i>Ligusticum porteri</i>	7
6	(1-26%)	<i>Deschampsia caespitosa</i>	11
5	(1-16%)	<i>Taraxacum officinale</i>	12
5	(1-13%)	<i>Hymenoxys hoopesii</i>	7
5	(1-13%)	<i>Calamagrostis canadensis</i>	8

**Other species with < 5% average cover present in at least 10% of plots:**  
*Geranium richardsonii* (1-11%), *Mertensia ciliata* (1-16%), *Oxypolis fendleri* (1-13%), *Bromus ciliatus* var. *ciliatus* (1-10%), *Aconitum columbianum* (3-5%), *Carex microptera* (1-10%), *Cardamine cordifolia* (1-14%), *Valeriana edulis* (1-6%), *Equisetum arvense* (1-6%), *Poa pratensis* (1-10%), *Achillea millefolium* var. *occidentalis* (1-8%), *Geum macrophyllum* var. *perincisum* (1-5%), *Erigeron coulteri* (1-7%), *Phleum alpinum* (1-5%), *Rhodiola rhodantha* (1-9%), *Pedicularis groenlandica* (1-3%), *Stellaria longifolia* (1%), *Luzula parviflora* (1%), *Veronica wormsjoldii* (1%).

## Drummond willow / Mesic forb Shrubland

*Salix drummondiana* / Mesic forb



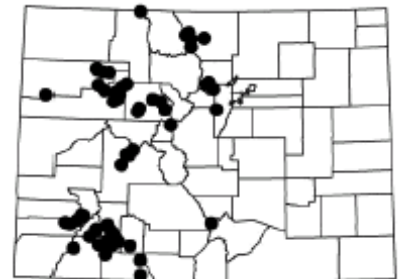
**Global rank/State rank:**

G4 / S4

**HGM subclass:** S3/4, R2, R3/4

**Colorado elevation range:**

7,500-11,300 ft (2,400-3,500 m)



### General Description

The *Salix drummondiana*/mesic forb (Drummond willow/mesic forb) plant association most commonly occurs on relatively steep streams and rarely forms more than a narrow, 5-25 ft (1.5-7.5 m) wide, band along streambanks. The closed to partially open canopy of *Salix drummondiana* and a thick carpet of many forb species characterize this plant association. This plant association occurs throughout the Western Slope and in montane regions along the Colorado Front Range.

The association occurs as a narrow band along high gradient streams in narrow, V-shaped valleys and as large willow carrs in the broad valleys of low gradient (1-3%), moderately sinuous streams. It is also located along broad, highly sinuous streams and broad, actively downcutting channels. This association also occurs near seeps. Soils range from deep sandy loams and sandy clay loams with no coarse fragments to shallow silty clay loams and sandy clay loams over coarse, angular cobbles.

### Vegetation Description

*Salix drummondiana* (Drummond willow) forms an open to closed, narrow canopy of tall shrubs lining the stream bank. Other shrub species may be present with cover equal to but not exceeding that of *Salix drummondiana*. Mature trees may be present as a few individuals scattered through the shrubland or as canopy from an adjacent forested association. Stands with an overstory canopy of aspen are currently included in this association, although a *Populus tremuloides*/*Salix drummondiana* type may be separated at a later date. The herbaceous undergrowth may be sparse or richly diverse. In general, total forb cover exceeds that of graminoid cover, and no single species is dominant.



## Ecological processes

The *Salix drummondiana*/mesic forb (Drummond willow/mesic forb) association is often an early colonizer of first-order, boulder-strewn, steep streams. This association could be an early-seral stage of the *Abies lasiocarpa*-*Picea engelmannii* (subalpine fir-Engelmann spruce) plant association which also occurs along steep streams and alternates with the willow carrs. In wider valleys, this association occurs as a broad willow carr on well-developed soils near seeps or downstream from beaver dams. It appears to be a stable community in these environments.

One potential conservation area containing this association is Vallecito Creek and Johnson Creek PCA.

Avg. Cover		Species Name	# Plots (N=60)
%	(Range)		
55	(20-98%)	<i>Salix drummondiana</i>	60
15	(2-37%)	<i>Salix planifolia</i>	7
13	(1-75%)	<i>Populus tremuloides</i>	10
12	(1-21%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	17
11	(0.1-40%)	<i>Salix monticola</i>	33
10	(0.1-44%)	<i>Mertensia ciliata</i>	41
9	(1-29%)	<i>Carex utriculata</i>	12
8	(1-40%)	<i>Heracleum maximum</i>	39
8	(1-26%)	<i>Mertensia franciscana</i>	9
8	(1-34%)	<i>Picea engelmannii</i>	21
8	(1-30%)	<i>Delphinium barbeyi</i>	8
8	(1-60%)	<i>Equisetum arvense</i>	30
7	(1-20%)	<i>Carex aquatilis</i>	7
6	(0.1-30%)	<i>Lonicera involucrata</i>	36
6	(1-40%)	<i>Cardamine cordifolia</i>	44
6	(1-24%)	<i>Ligusticum porteri</i>	12
6	(0.1-30%)	<i>Calamagrostis canadensis</i>	31
6	(1-30%)	<i>Oxypolis fendleri</i>	24
5	(1-20%)	<i>Ribes inerme</i>	14
5	(1-20%)	<i>Agrostis gigantea</i>	7
5	(1-21%)	<i>Arnica cordifolia</i>	8
5	(1-13%)	<i>Picea pungens</i>	10
5	(1-34%)	<i>Saxifraga odontoloma</i>	19

**Other species with < 5% average cover present in at least 10% of plots:**  
*Hydrophyllum fendleri* (1-17%), *Rudbeckia laciniata* var. *ampla* (1-14%), *Dasiphora floribunda* (1-19%), *Senecio triangularis* (1-24%), *Abies lasiocarpa* (1-12%), *Geranium richardsonii* (1-20%), *Aconitum columbianum* (1-20%), *Elymus glaucus* (1-10%), *Osmorhiza depauperata* (1-10%), *Sambucus racemosa* var. *racemosa* (1-10%), *Chamerion angustifolium* ssp. *circumvagum* (1-12%), *Maianthemum stellatum* (1-10%), *Poa pratensis* (1-20%), *Conioselinum scopulorum* (1-8%), *Bromus ciliatus* var. *ciliatus* (1-5%), *Carex microptera* (1-10%), *Deschampsia caespitosa* (1-7%), *Thalictrum fendleri* (1-5%), *Veratrum tenuipetalum* (1-5%), *Viola canadensis* var. *scopulorum* (1-10%), *Geum macrophyllum* var. *perincisum* (1-10%), *Taraxacum officinale* (0.1-8%), *Galium triflorum* (1-5%), *Fragaria virginiana* ssp. *glaucula* (1-6%), *Phleum pratense* (1-5%), *Urtica dioica* ssp. *gracilis* (1-5%), *Achillea millefolium* var. *occidentalis* (0.1-5%), *Streptopus amplexifolius* var. *chalastratus* (1-5%), *Rubus idaeus* ssp. *strigosus* (1-5%), *Mitella pentandra* (1-4%), *Symphoricarpos oreophilus* (1-5%), *Mimulus guttatus* (1-3%), *Glyceria striata* (1-4%), *Thlaspi montanum* (1%), *Pedicularis groenlandica* (1%), *Descurainia incana* (1%).



## Strapleaf willow Shrubland

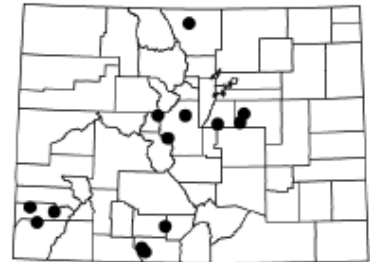
*Salix ligulifolia* (= *S. eriocephala* var. *ligulifolia*)

**Global rank/State rank:**

G2G3 / S2S3

**HGM subclass:** S1/2, R2, R3/4

**Colorado elevation range:**  
6,350-10,200 ft (1,900-3,100 m)



### General Description

The *Salix ligulifolia* (strapleaf willow) plant association is a medium- to tall-willow shrubland occurring on saturated floodplains and stream banks of montane and lower subalpine elevations. *Salix ligulifolia* often mixes with *Salix exigua* (sandbar willow) and *Salix lucida* (shining willow) in the foothills, forming the *Salix exigua*-*Salix ligulifolia* (sandbar willow-strapleaf willow) plant association. In the mountains, *Salix ligulifolia* mixes with *Salix monticola* (mountain willow) and *Salix drummondiana* (Drummond willow) where it grows in relatively broad valley bottoms.

This association occurs in moderately wide valleys along low terraces and floodplains, and stream banks of narrower reaches. The plant association occurs along reaches with vegetated islands between multiple channels below an active beaver pond, along slightly sinuous broad channels, along more sinuous channels with well developed floodplains, and along steep narrow gullies. Soils are saturated sandy loams and clay loams with a high organic matter content in the upper layers.

### Vegetation Description

This association has a canopy dominated by *Salix ligulifolia* (strapleaf willow), usually mixed with several other willow species. *Salix ligulifolia* (strapleaf willow) is the key diagnostic species, other willows may have equal cover, but in general do not exceed that of *Salix ligulifolia*. Other willows that may be present include *Salix monticola* (mountain willow), *Salix geeyeriana* (Geyer willow), *Salix bebbiana* (Bebb willow), *Salix lucida* (ssp. *caudata* or ssp. *lasiandra*) (shining willow), *Salix wolfii* (Wolf willow), and *Salix planifolia* (planeleaf willow). Additional shrubs that may be present include *Alnus incana* ssp. *tenuifolia* (thinleaf alder), *Cornus sericea* (red-osier dogwood), and *Dasiphora floribunda* (shrubby cinquefoil).

The herbaceous undergrowth can be dense in undisturbed stands with *Carex utriculata* (beaked sedge), *Carex nebrascensis* (Nebraska sedge), *Carex pellita* (woolly sedge), *Juncus balticus* var. *montanus* (mountain rush), and *Calamagrostis canadensis* (bluejoint reedgrass). Forb cover is generally low, but some species are abundant, including *Taraxacum officinale* (dandelion), *Achillea millefolium* var. *occidentalis*

(western yarrow), *Thalictrum fendleri* (Fendler meadowrue), and *Fragaria virginiana* (strawberry). No herbaceous species was consistently present with high abundance, so none was chosen as diagnostic.

### Ecological Processes

This association appears to be a long-lived mid to late-seral type since it is associated with beaver activity and saturated soils throughout the growing season.

One potential conservation area containing this association is Sauls Creek PCA.

Avg. Cover %	(Range)	Species Name	# Plots (N=13)
34	(18-66%)	<i>Salix ligulifolia</i>	13
26	(15-36%)	<i>Carex nebrascensis</i>	2
20	(3-41%)	<i>Carex utriculata</i>	5
17	(1-35%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasiandra</i>	7
15	(3-43%)	<i>Salix monticola</i>	9
13	(1-25%)	<i>Salix exigua</i>	6
12	(2-27%)	<i>Calamagrostis canadensis</i>	6
12	(6-21%)	<i>Salix planifolia</i>	3
11	(2-26%)	<i>Carex aquatilis</i>	3
10	(1-19%)	<i>Thalictrum fendleri</i>	2
10	(1-28%)	<i>Poa pratensis</i>	10
9	(1-25%)	<i>Juncus balticus</i> var. <i>montanus</i>	6
8	(3-13%)	<i>Typha latifolia</i>	2
8	(1-34%)	<i>Trifolium repens</i>	6
7	(5-8%)	<i>Scirpus microcarpus</i>	2
6	(3-10%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	3
6	(5-7%)	<i>Betula nana</i>	2
5	(1-10%)	<i>Taraxacum officinale</i>	8
5	(2-8%)	<i>Chamerion angustifolium</i> ssp. <i>circumvagum</i>	2
5	(3-6%)	<i>Poa palustris</i>	2

#### Other species with < 5% average cover present in at least 10% of plots:

*Dasiphora floribunda* (1-10%), *Salix geyeriana* (1-12%), *Carex pellita* (1-8%), *Mentha arvensis* (1-9%), *Fragaria virginiana* ssp. *glauca* (1-12%), *Eleocharis palustris* (1-7%), *Cirsium arvense* (2-4%), *Salix bebbiana* (3%), *Equisetum arvense* (1-6%), *Mertensia ciliata* (1-4%), *Achillea millefolium* var. *occidentalis* (1-7%), *Conioselinum scopulorum* (2-3%), *Geranium viscosissimum* var. *incisum* (1-4%), *Agrostis stolonifera* (2-3%), *Geum macrophyllum* var. *perincisum* (1-4%), *Deschampsia caespitosa* (1-4%), *Trifolium pratense* (1-3%), *Carex microptera* (1-3%), *Pheum pratense* (1-3%), *Heracleum maximum* (1-2%), *Iris missouriensis* (1-2%), *Juncus articulatus* (1-2%), *Picea pungens* (1-2%), *Bromus inermis* (1-2%), *Potentilla pulcherrima* (1-2%), *Cicuta douglasii* (1-2%), *Oxypolis fendleri* (1%), *Platanthera dilatata* var. *albiflora* (1%), *Plantago major* (1%), *Populus angustifolia* (1%), *Galium triflorum* (1%), *Medicago lupulina* (1%), *Ambrosia artemisiifolia* var. *elatior* (1%), *Maianthemum stellatum* (1%), *Rumex crispus* (1%), *Carex hassei* (1%).

## Shining willow Shrubland

*Salix lucida* ssp. *lasiandra* or ssp. *caudata*



**Global rank/State rank:**

G3Q / S2S3

**HGM subclass:** R2, R3/4

**Colorado elevation range:**

6,500-9,500 ft (1,980-2,900 m)



### General Description

The *Salix lucida* ssp. *caudata* or ssp. *lasiandra* (shining willow) plant association is a tall willow community often found within a mosaic of several other riparian communities. It is generally a small patch type on large floodplain ecosystems and is more or less confined to the montane to lower subalpine belt (5,000-8,000 ft) in Colorado.

This plant association occurs in saturated areas, usually adjacent to the channel flow. It is found on low point bars and islands, as well as on low stream banks and overflow channels of larger rivers. It also occurs in steep foothill tributary streams. Soils have high organic matter content with reduced conditions.

### Vegetation Description

This association is dominated by *Salix lucida*, either ssp. *caudata* or ssp. *lasiandra* (shining willow). Stands may consist of one or several willow species. The particular composition of willows is highly variable, depending on the stand's elevation and location. Other willows that may be present include *Salix ligulifolia* (strapleaf willow), *Salix boothii* (Booth willow), and *Salix geyeriana* (Geyer willow). Other shrub species that may be present included: *Ribes montigenum* (gooseberry currant), *Alnus incana* ssp. *tenuifolia* (thinleaf alder), and *Betula occidentalis* (river birch). One higher elevation stand had *Pinus contorta* (lodgepole pine).

The undergrowth is dominated by mesic grasses and sedges including *Calamagrostis canadensis* (bluejoint reedgrass), and several *Carex* (sedge) species. Forb cover is insignificant. In degraded stands, the undergrowth includes non-native grasses such as *Agrostis gigantea* (redtop), *Phleum pratense* (timothy), and *Poa pratensis* (Kentucky bluegrass).

## Ecological Processes

The *Salix lucida* (shining willow) plant association establishes on deep alluvial materials and is considered to be early-seral. It is often associated with abandoned beaver ponds or occurs along steeper reaches below beaver ponds. It appears to colonize areas that have been or are currently filling in with silt. This association will eventually be replaced by slightly drier-site willow species. However, with disturbance such as overuse by livestock, willow cover may decline. With severe disturbance, the willows will disappear. This association will then become dominated by *Rosa woodsii* (Woods rose) and eventually *Poa pratensis* (Kentucky bluegrass).

Avg. Cover		Species Name	# Plots (N=13)
%	(Range)		
44	(8-82%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasianдра</i>	12*
35	(1-80%)	<i>Salix ligulifolia</i>	4
21	(12-30%)	<i>Salix boothii</i>	2
18	(10-30%)	<i>Agrostis gigantea</i>	4
16	(8-23%)	<i>Calamagrostis canadensis</i>	2
14	(1-30%)	<i>Poa pratensis</i>	7
13	(4-25%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	7
13	(1-40%)	<i>Salix monticola</i>	4
10	(1-42%)	<i>Phleum pratense</i>	6
9	(3-14%)	<i>Carex pellita</i>	2
8	(6-10%)	<i>Salix geyeriana</i>	3
8	(3-21%)	<i>Juncus balticus</i> var. <i>montanus</i>	5
8	(2-13%)	<i>Equisetum pratense</i>	2
7	(1-15%)	<i>Trifolium repens</i>	5
5	(1-12%)	<i>Mertensia ciliata</i>	3
5	(1-9%)	<i>Thermopsis montana</i>	2
5	(3-7%)	<i>Bromus inermis</i>	2
5	(1-9%)	<i>Taraxacum officinale</i>	8

### Other species with < 5% average cover present in at least 10% of plots:

*Geranium richardsonii* (1-15%), *Rosa woodsii* (1-12%), *Salix exigua* (1-10%), *Eleocharis palustris* (1-5%), *Ribes montigenum* (1-7%), *Prunella vulgaris* (1-5%), *Carex aquatilis* (1-6%), *Rudbeckia laciniata* var. *ampla* (1-5%), *Carex utriculata* (1-4%), *Mentha arvensis* (1-5%), *Dasiphora floribunda* (1-4%), *Equisetum arvense* (1-4%), *Fragaria virginiana* ssp. *glauca* (1-2%), *Maianthemum stellatum* (1-3%), *Deschampsia caespitosa* (1-2%), *Galium boreale* (1-2%), *Achillea millefolium* var. *occidentalis* (1-5%), *Heracleum maximum* (1-2%), *Conioselinum scopulorum* (1-1%), *Ribes aureum* (1-1%), *Geum macrophyllum* var. *perincisum* (1-1%), *Dactylis glomerata* (1-1%), *Melilotus officinalis* (1-1%), *Glyceria striata* (1-1%), *Castilleja sulphurea* (1-1%), *Epilobium ciliatum* ssp. *glandulosum* (1-1%), *Potentilla diversifolia* (1-1%), *Thalictrum fendleri* (1-1%), *Amelanchier alnifolia* (1-1%), *Vicia americana* (1-1%), (-%),

\**Salix lucida* occurred in all stands, but was not captured in every sample plot.



## Mountain willow / Mesic forb Shrubland

### *Salix monticola* / Mesic forb

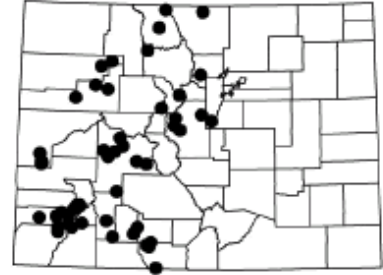
Global rank/State rank:

G4 / S3

HGM subclass: S1/2, R2, R3/4

Colorado elevation range:

6,800-10,700 ft (2,070-3,260 m)



### General Description

The *Salix monticola*/mesic forb (mountain willow/mesic forb) plant association is a tall (5-8 ft, 1.5-2.5 m), deciduous shrubland with a dense or open canopy and an herbaceous layer dominated by a variety of forbs and grasses. While no single herbaceous species is a clear dominant, total forb cover is generally greater than 30% and exceeds total graminoid cover.

This association occurs along broad, swift-moving streams and active floodplains in narrow to moderately wide valleys. The ground surface is usually undulating, from past flooding or beaver activity. Stands form narrow bands at the stream edge, ranging from 1-6 ft (0.1-2 m) above the channel elevation. In wider valley bottoms, stands occur further from the bank, but never more than 2.5 ft (0.75 m) above the annual high water mark. Most stands occur adjacent to straight, wide, and shallow channels ranging from bedrock to silty-bottomed reaches. A few stands occur on meandering, cobble-bottomed reaches or streams braided by beaver activity. Soils are fine textured sandy clays to silty and sandy clay loams.

### Vegetation Description

*Salix monticola* (mountain willow) forms a dense to open canopy, and if not the clear dominant, then it is the matrix willow. The matrix species is the willow with the highest abundance, even though other willow species combined may have greater canopy cover. Other shrub species that may be present include *Ribes inerme* (whitestem gooseberry), *Salix drummondiana* (Drummond willow), *S. planifolia* (planeleaf willow), *S. bebbiana* (Bebb willow), *S. geyeriana* (Geyer willow), *S. brachycarpa* (barrenground willow), *S. wolfii* (Wolf willow), *S. lucida* ssp. *caudata* or *lasiandra* (shining willow), *Alnus incana* ssp. *tenuifolia* (thinleaf alder) and *Lonicera involucrata* (twinberry honeysuckle).

Total forb cover ranges from 10-70%. No one forb species is noticeably more abundant than any other, nor is any species consistently present in all stands. Forb species that may be present include *Heracleum maximum* (common cowparsnip), *Rudbeckia laciniata* var. *ampla* (cutleaf coneflower), *Mertensia ciliata* (tall fringed bluebells), and *Fragaria virginiana* (strawberry). Graminoid cover may be absent or up to 50% cover; in general it does not exceed the total forb cover. Graminoid species



that may be present include *Calamagrostis canadensis* (bluejoint reedgrass) and *Carex utriculata* (beaked sedge). Generally, forbs are dominant under shrubs on hummocks and ridges while graminoids dominate the undergrowth in low-lying, wetter swales. Exotic graminoid and forb species include *Poa pratensis* (Kentucky bluegrass), *Trifolium repens* (white clover), and *Taraxacum officinale* (dandelion).

### Ecological Processes

*Salix monticola* (mountain willow) dominated plant associations appear to be long-lived and stable. They occur on mesic sites that support a diversity of graminoids and forbs. *Salix monticola* appears to grow only where the water table does not drop below 3 ft (1 m) of the surface. It appears to be limited to cold, wet environments in broad valley bottoms at high elevations. Due to the colder environments, organic matter builds up in the soils, and it is likely that succession to other associations is slow. This plant association occurs on mesic sites and supports a rich diversity of forbs. On broad, hummocky floodplains stands can form extensive willow carrs. Sites with a higher abundance of exotic forbs and graminoids may be grazing-induced. At higher elevations, this association grades into the *Salix planifolia*/mesic forb (planeleaf willow/mesic forb) association. Potential conservation areas containing this association are Florida River at Burnt Timber Creek, Middle Hermosa Creek PCAs.

Avg. Cover		Species Name	# Plots (N=93)
%	(Range)		
58	(1-100%)	<i>Salix monticola</i>	93
17	(1-40%)	<i>Ribes lacustre</i>	26
16	(0.1-60%)	<i>Salix drummondiana</i>	31
16	(1-75%)	<i>Heracleum maximum</i>	49
12	(1-70%)	<i>Ribes inerme</i>	23
11	(1-40%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	16
10	(1-30%)	<i>Salix geyeriana</i>	15
9	(1-50%)	<i>Poa pratensis</i>	42
9	(0.1-30%)	<i>Salix bebbiana</i>	15
9	(1-20%)	<i>Salix brachycarpa</i>	11
9	(0.1-60%)	<i>Mertensia ciliata</i>	55
9	(1-30%)	<i>Salix planifolia</i>	18
8	(1-28%)	<i>Rudbeckia laciniata</i> var. <i>ampla</i>	13
8	(0.1-30%)	<i>Calamagrostis canadensis</i>	31
7	(1-60%)	<i>Juncus balticus</i> var. <i>montanus</i>	10
7	(1-22%)	<i>Trifolium repens</i>	10
6	(1-14%)	<i>Picea pungens</i>	14
6	(0.1-30%)	<i>Cardamine cordifolia</i>	22
6	(1-20%)	<i>Lonicera involucrata</i>	43
6	(1-25%)	<i>Urtica dioica</i> ssp. <i>gracilis</i>	21
5	(0.1-20%)	<i>Equisetum arvense</i>	44
5	(1-16%)	<i>Aconitum columbianum</i>	18
5	(1-20%)	<i>Carex utriculata</i>	13

**Other species with < 5% average cover present in at least 10% of plots:**  
*Picea engelmannii* (1-13%), *Bromus ciliatus* var. *ciliatus* (0.1-20%), *Conioselinum scopulorum* (0.1-15%), *Hydrophyllum fendleri* (1-10%), *Carex aquatilis* (1-10%), *Dasiphora floribunda* (0.1-13%), *Fragaria virginiana* ssp. *glauca* (0.1-10%), *Geranium richardsonii* (0.1-10%), *Senecio triangularis* (1-10%), *Taraxacum officinale* (0.1-12%), *Maianthemum stellatum* (0.1-12%), *Achillea millefolium* var. *occidentalis* (1-10%), *Chamerion angustifolium* ssp. *circumvagum* (0.1-11%), *Thalictrum fendleri* (0.1-9%), *Ligusticum porteri* (0.1-10%), *Geum macrophyllum* var. *perincisum* (1-5%), *Rosa woodsii* (0.1-5%), *Oxypolis fendleri* (1-5%), *Vicia americana* (0.1-5%).

## Mountain willow / Mesic graminoid Shrubland

### *Salix monticola* / Mesic graminoid

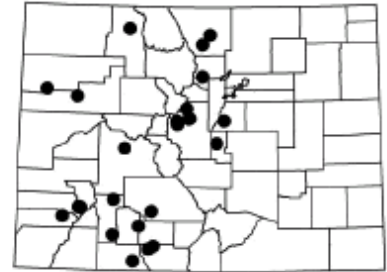


**Global rank/State rank:**

G3 / S3

**HGM subclass:** S1/2, S3/4, R2

**Colorado elevation range:**  
6,600-11,000 ft (2,000-3,350 m)



### General Description

The *Salix monticola*/mesic graminoid (mountain willow/mesic graminoid) plant association is a tall (5-8 ft, 1.5-2.5 m), deciduous shrubland, with an open to closed canopy of willows on broad, gentle floodplains, or in narrow canyon bottoms. The herbaceous undergrowth is diverse, with a variety of graminoid and forb species. This association is distinguished from the *Salix monticola*/mesic forb association by having a higher cover of graminoid species. Stands with predominantly non-native graminoid species in the undergrowth are considered grazing-induced. Stands are considered high quality when their undergrowth is predominantly native graminoid species. The *Salix monticola*/mesic graminoid (mountain willow/mesic graminoid) plant association dominates stream reaches in narrow to wide valleys, 65-400 ft (20-120 m) wide, with active floodplains and broad, swift-moving streams. Stands usually occur > 2 ft (0.5 m) above the bankfull channel along the stream edge or away from the channel up to 50 ft (15 m). The ground surface is usually undulating due to past flooding or beaver activity. Stream channels can be fairly steep and narrow with cobble beds, moderately wide and sinuous with cobble beds or broad, meandering rivers with a developed floodplain. Some stands also occur along channels that are braided due to beaver activity. Soils are fine textured clay loams and sandy clay loams of varying depths, 4-18 inches (10-45 cm). Mottling and gleyed layers often occur within 5 inches (12 cm) of the ground surface.

### Vegetation Description

*Salix monticola* (mountain willow) forms a dense to open canopy. If it is not the clear dominant, then it is the matrix willow. The matrix species is the willow with the highest abundance, even though other willow species combined may have greater canopy cover. Other shrubs that may be present at higher elevations include *Salix planifolia* (planeleaf willow), *S. geyeriana* (Geyer willow), and *S. brachycarpa* (barrenground willow). At lower elevations, other shrubs that may be present include *Salix irrorata* (bluestem willow), *S. lucida* ssp. *caudata* (shining willow), *Alnus*

*incana* ssp. *tenuifolia* (thinleaf alder) and *Dasiphora floribunda* (shrubby cinquefoil). Total graminoid cover ranges from 10-55% and exceeds that of total forb cover. No single species is particularly dominant over the others, and no one species is present in every stand. Graminoid species that may be present include *Poa pratensis* (Kentucky bluegrass), *Juncus balticus* var. *montanus* (mountain rush), *Carex aquatilis* (water sedge), and *Equisetum arvense* (field horsetail). Forb cover ranges from 5-20% and forbs generally are not as abundant as graminoids. Forb species that may be present include *Heracleum maximum* (common cowparsnip), *Fragaria virginiana* (strawberry) and *Achillea millefolium* var. *occidentalis* (western yarrow). In stands with pronounced hummock micro-topography underneath the willow canopy, graminoids will typically dominate the low-lying swales, while forbs will dominate the better drained hummocks and ridge tops.

### Ecological Processes

The *Salix monticola*/mesic graminoid (mountain willow/mesic graminoid) plant association appears to be a stable, long-lived community. Stands with an abundance of *Poa pratensis* (Kentucky bluegrass) or *Agrostis stolonifera* (creeping bentgrass) may be a grazing-induced disclimax. Stands with abundant *Salix planifolia* (planeleaf willow) may indicate a transition between higher elevational sites dominated by *Salix planifolia* and lower elevational sites where *Salix monticola* is more abundant.

One potential conservation area containing this association is Florida River at Burnt Timber Creek PCA.

Avg. Cover		Species Name	# Plots (N=31)
%	(Range)		
52	(7-90%)	<i>Salix monticola</i>	31
25	(5-48%)	<i>Salix drummondiana</i>	5
22	(2-40%)	<i>Salix planifolia</i>	6
18	(0.1-60%)	<i>Juncus balticus</i> var. <i>montanus</i>	13
17	(1-50%)	<i>Carex aquatilis</i>	11
15	(4-20%)	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	4
14	(1-40%)	<i>Poa pratensis</i>	18
12	(0.1-40%)	<i>Carex utriculata</i>	13
11	(1-30%)	<i>Salix geyeriana</i>	8
8	(1-20%)	<i>Calamagrostis canadensis</i>	10
7	(0.1-21%)	<i>Dasiphora floribunda</i>	11
7	(1-30%)	<i>Deschampsia caespitosa</i>	6
6	(0.1-25%)	<i>Salix lucida</i> ssp. <i>caudata</i> , <i>lasiandra</i>	7
6	(1-15%)	<i>Phleum pratense</i>	4
5	(0.1-22%)	<i>Taraxacum officinale</i>	19
5	(1-15%)	<i>Picea pungens</i>	5
5	(0.1-16%)	<i>Salix bebbiana</i>	7

**Other species with < 5% average cover present in at least 10% of plots:**  
*Equisetum arvense* (0.1-20%), *Lonicera involucrata* (1-10%), *Carex microptera* (1-10%), *Trifolium repens* (0.1-6%), *Dodecatheon pulchellum* (0.1-10%), *Achillea millefolium* var. *occidentalis* (0.1-8%), *Mertensia ciliata* (0.1-10%), *Ribes inerme* (1-5%), *Salix brachycarpa* (1-5%), *Geranium richardsonii* (1-4%), *Conioselinum scopulorum* (1-5%), *Fragaria virginiana* ssp. *glauca* (1-3%), *Heracleum maximum* (1-3%), *Geum macrophyllum* var. *perincisum* (0.1-3%), *Equisetum pratense* (1-3%), *Cardamine cordifolia* (0.1-3%).

## Planeleaf willow / Marsh-marigold Shrubland

### *Salix planifolia* / *Caltha leptosepala*

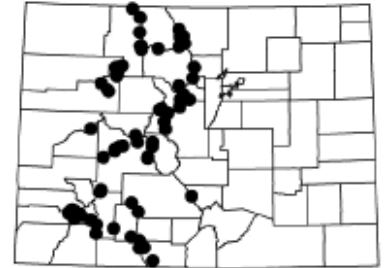
**Global rank/State rank:**

G4 / S4

**HGM subclass:** S1/2, R1

**Colorado elevation range:**

8,900-11,800 ft (2,700-3,600 m)



### General Description

The *Salix planifolia*/*Caltha leptosepala* (planeleaf willow/marsh marigold) plant association is a common and abundant upper montane and subalpine community occurring on very wet to saturated soils. This association is characterized by low-stature shrubs, less than 2 ft (0.5 m) tall, and a thick carpet of forbs in the undergrowth. There may be scattered patches of other willows present. This is a major subalpine wetland plant association that occurs throughout the Rocky Mountains of Colorado.

This plant association typically occurs in wide, glaciated valleys adjacent to streams. It occurs in swales, depressions, and on slopes where snowmelt runoff saturates soils for much of the growing season. The ground may be flat or uneven with raised hummocks. Stream gradients range from <1% in broad floodplains to 14% in steep snowmelt basins. Stream channels vary. Channels may be steep and narrow, first-order streams in snow melt basins, relatively wide and straight, narrow, relatively deep, and meandering in broad, glaciated valleys or braided, multiple channels below beaver dams. Soil textures are highly variable. Mineral soils vary along a moisture gradient. Wet sites have soil textures of silty clays and silt loams, while slightly drier sites have loamy sands and sandy loams overlying gravelly alluvium. Some stands occur on well-drained, mineral soils with well-oxygenated water and no mottled or gleyed layers. Other sites have a shallow organic layer overlying a gravel or cobble layer within 10-20 inches (20-50 cm) of the surface. The water table at these sites is usually near the surface throughout the growing season and may be perched by a clay horizon. Still other stands occur on deep, dark clay loams with high organic content or a fibrous layer on top.

### Vegetation Description

*Salix planifolia* (planeleaf willow) may form nearly pure stands with 10-100% cover. Other willows that may be present at lower elevations include *Salix geeyeriana* (Geyer willow) and *S. monticola* (mountain willow). At higher elevations, other shrubs that may be present include *Salix brachycarpa* (barrenground willow) on drier sites, or *Betula nana* (= *glandulosa*) (bog birch) and *Salix wolfii* (Wolf willow) on wetter sites. *Picea engelmannii* (Engelmann spruce) is occasionally scattered throughout the stand. Typically, the willow canopy is nearly closed and an herbaceous undergrowth occurs only in openings between willow patches. The undergrowth is characterized by an



abundance of forbs with few graminoids. *Caltha leptosepala* (marsh marigold) is usually present. Other wet species such as *Trollius laxus* (American globeflower), *Cardamine cordifolia* (heartleaf bittercress), *Senecio triangularis* (arrowleaf ragwort), *Mertensia ciliata* (tall fringed bluebells), *Pedicularis groenlandica* (elephant head lousewort) and *Rhodiola rhodantha* (redpod stonecrop) are also indicators of this type. Graminoid species that may be present include *Calamagrostis canadensis* (bluejoint reedgrass) and *Carex aquatilis* (water sedge).

### Ecological Processes

*Salix planifolia* (planeleaf willow), *S. brachycarpa* (barrenground willow) and *S. wolfii* (Wolf willow) are abundant low-stature willows of first- and second-order streams of subalpine elevations of Colorado. *Salix planifolia* and *Salix brachycarpa* can form extensive stands, often creating intricate mosaics in broad, subalpine valleys. In general, *Salix planifolia* occupies the wettest micro-habitats on peat soils, although it can grow well on mineral soils. *Salix brachycarpa* is more often found on slightly drier and more well-drained micro-habitats than *Salix planifolia*. *Salix wolfii* grows on deep, undecomposed peat, while *Salix planifolia* tends to grow on more decomposed (humified) organic soils. *Salix planifolia* also grows at elevations below the subalpine, and becomes a much taller willow due to a longer growing season. In montane elevations, *Salix planifolia* is often a co-dominant in *Salix monticola* plant associations. This association occurs in wet swales that are saturated throughout most or all of the growing season. It is a long-lived, stable association that changes with fluctuations in the water table and degree of soil saturation.

One potential conservation area containing this association is Indian Creek at Tuckerville PCA.

Avg. Cover %	(Range)	Species Name	# Plots (N=73)
65	(12.4-100%)	<i>Salix planifolia</i>	73
19	(1-64%)	<i>Caltha leptosepala</i>	69
11	(0.1-30%)	<i>Salix brachycarpa</i>	15
9	(1-48%)	<i>Salix wolfii</i>	14
9	(1-40%)	<i>Salix monticola</i>	13
9	(0.1-40%)	<i>Carex aquatilis</i>	46
7	(1-30%)	<i>Senecio triangularis</i>	51
7	(1-58%)	<i>Cardamine cordifolia</i>	43
7	(0.1-36%)	<i>Calamagrostis canadensis</i>	34
6	(1-18%)	<i>Picea engelmannii</i>	21
5	(1-20%)	<i>Erigeron peregrinus</i> ssp. <i>callianthemus</i>	13
5	(1-20%)	<i>Geranium richardsonii</i>	15
5	(0.1-20%)	<i>Mertensia ciliata</i>	46
5	(1-11%)	<i>Carex utriculata</i>	13

#### Other species with < 5% average cover present in at least 10% of plots:

*Aconitum columbianum* (1-20%), *Saxifraga odontoloma* (1-16%), *Oxypolis fendleri* (1-14%), *Conioselinum scopulorum* (0.1-10%), *Pedicularis groenlandica* (0.1-19%), *Fragaria virginiana* ssp. *glauca* (1-10%), *Deschampsia caespitosa* (1-11%), *Rhodiola rhodantha* (0.1-11%), *Swertia perennis* (0.1-10%), *Chamerion angustifolium* ssp. *circumvagum* (1-6%), *Achillea millefolium* var. *occidentalis* (1-5%), *Polygonum bistortoides* (1-10%), *Phleum alpinum* (1-10%), *Veronica wormskjoldii* (0.1-8%), *Polygonum viviparum* (1-6%), *Taraxacum officinale* (1-5%), *Luzula parviflora* (1-4%).



## Planeleaf willow / Beaked sedge Shrubland

### *Salix planifolia* / *Carex utriculata*

**Global rank/State rank:**

G3G4 / S2

**HGM subclass:** S1/2

**Colorado elevation range:**

8,900-10,760 ft (2,700-3,280 m)



### General Description

The *Salix planifolia*/*Carex utriculata* (planeleaf willow/beaked sedge) plant association is a low-stature willow shrubland that grows in wet to saturated soils above 8,900 ft (2,700 m). It appears to be much less common than the related *Salix planifolia*/*Carex aquatilis* (planeleaf willow/water sedge) association, and is probably indicative of wetter sites.

This plant association occurs in wide, wet valleys on snowmelt fed swales. It also occurs in narrow valleys with sinuous streams and wet floodplains associated with beaver ponds. Soils have an organic peat top layer over mineral silty clays, heavy silty clay loams, silty loams, sandy loams, or loamy sands.

### Vegetation Description

This plant association is characterized by 30-90% cover of low-stature (1-5 ft, 0.5-1.5 m) *Salix planifolia* (planeleaf willow). Other willows that may be present include *Salix monticola* (mountain willow), *Salix wolfii* (Wolf willow) and *Salix geeyeriana* (Geyer willow). *Betula nana* (= *glandulosa*) (bog birch) and *Dasiphora floribunda* (shrubby cinquefoil) may also be components of the shrub layer.

Diversity of associated forb and graminoid species is typically low, although one plot from North Park had 22 herbaceous species present with cover values <5%. The herbaceous undergrowth is dominated by 11-80% cover of *Carex utriculata* (beaked sedge). Other graminoid species that may be present include *Carex aquatilis* (water sedge), *Calamagrostis canadensis* (bluejoint reedgrass), and *Bromus ciliatus* var. *ciliatus* (fringed brome). Total forb cover is typically less than 20%. Species that were most frequently present include *Conioselinum scopulorum* (Rocky Mountain hemlockparsley), *Geum macrophyllum* var. *perincisum* (largeleaf avens) and *Swertia perennis* (star gentian).

### Ecological Processes

*Salix planifolia* (planeleaf willow), *Salix brachycarpa* (barrenground willow) and *Salix wolfii* (Wolf willow) are abundant low-stature willows of first- and second-order streams of subalpine elevations of Colorado. *Salix planifolia* and *Salix brachycarpa* can form extensive stands, often creating intricate mosaics in broad, subalpine valleys. In general, *Salix planifolia* occupies the wettest micro-habitats on peat soils, although

it can grow well on mineral soils. *Salix brachycarpa* is more often found on slightly drier and more well-drained micro-habitats than *Salix planifolia*. *Salix planifolia* also grows at elevations below the subalpine, and becomes a much taller willow due to a longer growing season. At montane elevations, *Salix planifolia* is often a co-dominant in *Salix monticola* plant associations.

*Carex utriculata* (beaked sedge), *Carex aquatilis* (water sedge), and *Calamagrostis canadensis* (bluejoint reedgrass) are common dominant undergrowth of several *Salix* plant associations. These three graminoids indicate different micro-environments, generally separating out along a moisture gradient related to the depth of the water table, and can represent different stages of succession of the floodplain.

*Carex utriculata* (beaked sedge) occurs on the wettest sites, such as shallow pond margins, low-lying swales, and overflow channel with the shallowest water tables.

*Carex aquatilis* (water sedge) occurs on intermediate sites that have saturated but not inundated soils. *Calamagrostis canadensis* (bluejoint reedgrass) dominates the drier sites with lower water tables. As wetter sites become drier, it can colonize stands of *Carex utriculata* (beaked sedge) and *Carex aquatilis* (water sedge).

One potential conservation area containing this association is Upper Elbert Creek PCA.

Avg. Cover		Species Name	# Plots (N=7)
%	(Range)		
65	(30-89%)	<i>Salix planifolia</i>	7
48	(11-80%)	<i>Carex utriculata</i>	7
10	—	<i>Salix wolfii</i>	1
10	—	<i>Salix monticola</i>	1
7	(1-20%)	<i>Carex aquatilis</i>	3
6	(2-10%)	<i>Betula nana</i>	2
5	—	<i>Dasiphora floribunda</i>	1

**Other species with < 5% average cover present in at least 10% of plots:**

*Conioselinum scopulorum* (1-6%), *Swertia perennis* (2-5%), *Calamagrostis canadensis* (1-5%), *Campylyum stellatum* (3%), *Luzula parviflora* (3%), *Geum macrophyllum* var. *perincisum* (1-3%), *Bromus ciliatus* var. *ciliatus* (2%), *Climacium dendroides* (2%), *Stellaria umbellata* (2%), *Agrostis scabra* (1%), *Mertensia ciliata* (1%), *Pedicularis groenlandica* (1%), *Cardamine cordifolia* (1%), *Caltha leptosepala* (1%), *Dodecatheon pulchellum* (1%), *Fragaria virginiana* ssp. *glauca* (1%), *Galium trifidum* ssp. *subbiflorum* (1%), *Galium triflorum* (1%), *Rhodiola rhodantha* (1%), *Viola canadensis* var. *scopulorum* (1%), *Veronica wormsjoldii* (1%), *Symphyotrichum foliaceum* (1%), *Senecio triangularis* (1%), *Geranium richardsonii* (1%), *Salix geyeriana* (1%), *Gentianopsis thermalis* (1%), *Poa pratensis* (1%), *Phleum alpinum* (1%), *Lonicera involucrata* (1%), *Viola macloskeyi* ssp. *pallens* (1%), *Juncus drummondii* (1%).

## Hardstem bulrush - Softstem bulrush Herbaceous Vegetation

*Schoenoplectus acutus* var. *acutus* - *Schoenoplectus tabernaemontani*



**Global rank/State rank:**

G3 / S2S3

**HGM subclass:** D2/3, D4/5?

**Colorado elevation range:**  
4,300-10,000 ft (1,300-3,050 m)

### General Description

The *Schoenoplectus acutus* var. *acutus*-*Schoenoplectus tabernaemontani* (hardstem bulrush-softstem bulrush) plant association occurs in marshes, along the margins of lakes and ponds, and in backwater areas of rivers in water up to 3 ft (1 m) deep. This association occurs in small patches, below 10,000 ft (3,050 m). It is highly threatened by development, agricultural conversion, stream flow alterations, and wetland filling activities.

The *Schoenoplectus acutus* var. *acutus*-*Schoenoplectus tabernaemontani* (hardstem bulrush-softstem bulrush) plant association occurs in wet swales and overflow channels with standing water. It also occurs at the edges of beaver ponds, ditches, and railroad embankments. One stand occurred on a saturated floodplain where a perched water table emerged from the surrounding bedrock. Streams are large and slightly meandering. Soils of this association are deep heavy clays and silty loams with a high organic matter content. Soils remain saturated for most of the growing season and often have an anoxic gleyed layer within 20 inches (50 cm) of the soil surface, although the water table can drop as far as 3 ft (1 m) below the surface.

### Vegetation Description

This association is characterized by nearly pure stands of *Schoenoplectus acutus* var. *acutus* (= *Scirpus acutus*) (hardstem bulrush) and/or *Schoenoplectus tabernaemontani* (= *Scirpus tabernaemontani*) (softstem bulrush), with a few other wetland species that may include *Eleocharis palustris* (common spikerush), *E. rostellata* (beaked spikerush), *Mimulus guttatus* (seep monkeyflower), *Sagittaria* spp. (arrowhead), *Carex* spp. (sedge), and *Nuphar lutea* ssp. *polysepala* (Rocky Mountain pondlily). Other emergent wetland vegetation is commonly found with this plant association, such as stands of *Typha* spp. (cattail) and other *Scirpus* or *Schoenoplectus* spp. (bulrush species). Within the riparian zone, *Populus deltoides* (cottonwood) and *Salix amygdaloides* (peachleaf willow) may be present on the floodplain. On the open prairies along small streams, adjacent riparian vegetation types include stands of *Carex nebrascensis* (Nebraska sedge).

### Ecological Processes

*Schoenoplectus* spp. (bulrush) stands are generally considered permanent wetland communities. They will remain in place unless the hydrologic regime is severely altered. Stands of *Schoenoplectus* are important to wildlife species, especially birds, for cover and nesting habitat.

One potential conservation area containing this association is Mitchell Lakes PCA.

Avg. Cover		Species Name	# Plots (N=29)
%	(Range)		
77	(5-100%)	<i>Schoenoplectus acutus/tabernaemontani</i>	29
12	(1-38%)	<i>Typha latifolia</i>	8
9	(1-30%)	<i>Eleocharis palustris</i>	10
8	(0.1-38%)	<i>Rorippa palustris</i> ssp. <i>hispida</i>	5
7	(1-15%)	<i>Rorippa nasturtium-aquaticum</i>	3
6	(0.1-15%)	<i>Lemna minor</i>	4
5	(0.1-15%)	<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	7
<b>Other species with &lt; 5% average cover present in at least 10% of plots:</b>			
<i>Hippuris vulgaris</i> (1-5%), <i>Mentha arvensis</i> (1%), <i>Ranunculus cymbalaria</i> (1%).			

## Rare and Imperiled Animals, fishes, birds dependent of wetlands of La Plata County

### *Dendroica graciae* (Grace's Warbler)

#### Taxonomy

Class: Aves

Order: Passeriformes

Family: Parulidae

Genus: *Dendroica*

**Taxonomic Comments:** Grace's Warbler may constitute a super-species with *D. Dominics*, *D. adelaidae* and *D. pityphila* (AOU 1998).



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**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.



Distribution in Colorado  
(adapted from Kingery 1999)

**Global Range:** The Grace's Warbler subspecies found in Colorado breeds 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 cited in Hall et al. 1997), 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. Breeding populations were established in five mountain ranges in southern Nevada by the early 1970s (Johnson 1994). DeSante and George (1994) 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 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 clearcutting and extensive overstory removal is detrimental (NatureServe 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, 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 Area** that supports *Dendroica graciae* (Grace's Warbler) is the Lower Hermosa Creek PCA in La Plata County.

***Gila robusta* (Roundtail chub)**

**Taxonomy:**

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

**Taxonomic Comments:** Subclass Neopterygii

**CNHP Ranking:** G3 S2

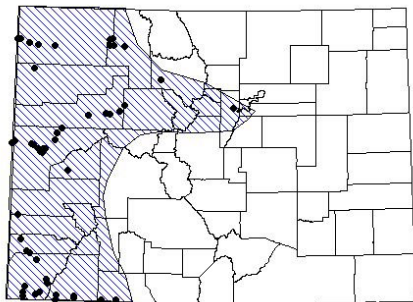
**State/Federal Status:** Colorado Species of Special Concern, BLM Sensitive Species

**Habitat Comments:** The Roundtail chub occurs in large streams and intermediate sized rivers (Page and Burr 1991).

**Distribution:** The Roundtail Chub is endemic to the Colorado River basin (Page and Burr 1991). In Colorado, this species occurs in the Colorado River mainstem and its larger tributaries, including the White, Yampa, Dolores, San Juan, and Gunnison rivers.



Photograph copyright Kara Inci.



Distribution in Colorado

**Important Life History Characteristics:**

Roundtail chub occupies slow moving water adjacent to areas of faster water. Gravel substrates are required for spawning (Woodling 1985).

**Known Threats and Management Issues:** Threats include low water temperatures, attributed to cold water releases from dams, that may affect reproductive patterns (Woodling 1985; Vanicek and Kramer 1969), and interactions of watershed changes such as reductions in suitable habitat due to impoundment, channel downcutting, substrate sedimentation, water diversion, and groundwater pumping, and displacement through invasion of non-native predatory and competitive species (Hubbs 1954, Miller 1961, Minckley and Deacon 1968, Meffe 1985). The importance of retaining a natural flow regime in southwestern streams has been emphasized repeatedly (e.g., see Meffe and Minckley 1987).

Management needs include careful monitoring of existing populations and eliminating detrimental water and land use and exposure to non-native fishes. Large stream areas that incorporate diverse habitats (pools, riffles, runs, backwaters, adequate substrate, and current diversity) are especially important. Fish barriers (or enhancing natural barriers) can help protect populations not impacted by non-native species. Barrier design should not significantly alter stream flow and the potential impact on natural upstream and downstream movements of native fishes should be assessed.

**Potential Conservation Area** that supports the roundtail chub is the Lower Florida River PCA in La Plata County.

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

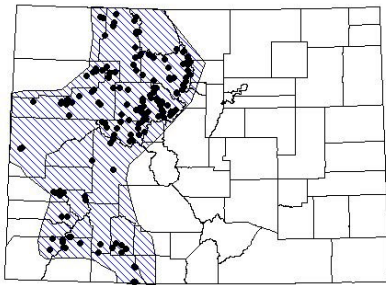
**Taxonomy**

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). Genetic variation is under study by D. Shiozawa and R. Evans at BYU (Starnes 1995).

**CNHP Ranking:** G4T3 S3



Distribution in Colorado

**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. In Trappers Lake (Colorado), repeat spawners comprised 16% of the spawning run and most Colorado River cutthroat had spawned the previous year, but the incidence of repeat spawning in fluvial or

resident populations is poorly known (Spahr et al. 1991, Young 1995).

**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 1996). 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, *Oncorhynchus clarki pleuriticus* is at present limited to a few small headwater streams of the Green and Colorado River drainages.

**Habitat Comments:** Inhabits clear, cold, well-oxygenated mountain streams with moderate gradients, rocky to gravelly substrates, and abundant riparian vegetation; also is 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, with an additional 55 reintroduced populations; not all of these reintroduced populations are self-sustaining (Young et al. 1996). Only 83 of the populations are known to be genetically pure (Young et al. 1996), and only about 20 populations are indigenous, genetically pure, above a barrier, and in a drainage not recently stocked. And some of these 20 populations may be too small to remain viable (Young et al. 1996).

The Colorado Division of Wildlife has reintroduced Colorado River cutthroat trout at many sites in the Green and Colorado River drainages.

**Known Threats and Management Issues:** The decline in Colorado River cutthroat trout populations was caused by several factors related to human activities. The major factor 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 (U.S. Fish and Wildlife Service 1998). Introduced brook trout (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* are Big Bend Creek and East Fork Hermosa Creek.

## Rare and Imperiled Plants dependent on wetlands of La Plata County

### *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 2001). The populations in Colorado are likely *A. racemosa* subsp. *bicrenata*.

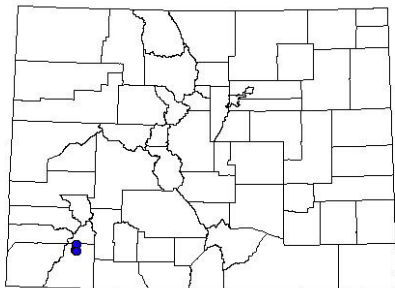
**CNHP Ranking:** G4G5 S1

**State/Federal Status:** None

**Phenology:** 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.



Distribution in Colorado

**Habitat Comments:** The plants grow in shaded ravines or streambanks. 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.

**Known Threats and Management Issues:** Collection for herbal trade, hydrology.

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



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*Carex viridula* (Green sedge)

**Taxonomy**

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

**Taxonomic Comments:** *Carex viridula* Michaux was described

**CNHP Ranking:** G5 S1

**State/Federal Status:** None

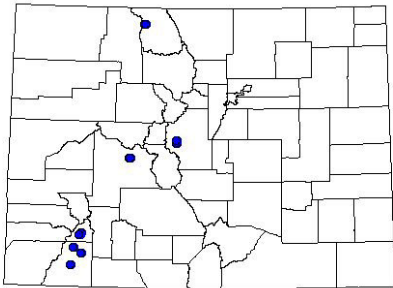
**Phenology:** Green sedge forms small bunches on wet stream banks and the edges of ponds. Its light yellow-green spikes are subtended by a long, slender leaf-like bract. The pistillate scales are shorter and narrower than the perigynium.

**Habitat Comments:** Wetlands in the montane alpine zone, between 8000 and 10,000 ft. It is often found in association with peatlands.



Photograph copyright CNHP by P. Lyon

**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.



Distribution in Colorado

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

**Distribution/Abundance:** There are 13 occurrences documented in the CNHP database. 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 Area** in La Plata County that supports *Carex viridula* is Haviland Lake.

*Commelina dianthifolia* (Birdbill dayflower)

**Taxonomy**

Class: Dicotyledoneae  
Order: Commelinales  
Family: *Commelinaceae* (Spiderwort family)  
Genus: *Commelina*

**Taxonomic Comments:** *Commelina dianthifolia* Delile.

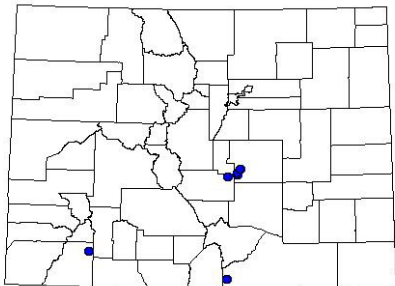
**CNHP Ranking:** G5 S1

**State/Federal Status:** None

**Phenology:** 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. Photograph copyright CNHP by P. Lyon



Distribution in Colorado

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

**State Range:** Previously four occurrences in 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 Area** in La Plata County that supports *Commelina dianthifolia* is Vallecito Creek.

*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).



Photograph copyright CNHP

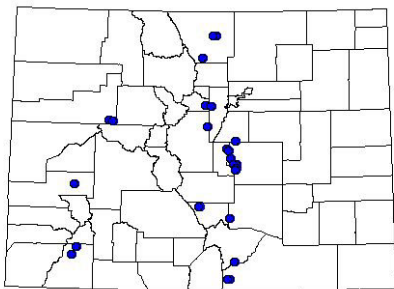
**CNHP Ranking:** G5 S1

**State/Federal Status:** None

**Phenology:** 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. CU 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.

**Potential Conservation Area** in La Plata County that supports *Cypripedium parviflorum* is Haviland Lake PCA.



*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. It is distinguished from var. *spectabilis* by having sessile appressed malpighiaceae or cruciform trichomes on its lower stems, as opposed to the spreading simple trichomes of var. *spectabilis*. This variety is not recognized by Weber & Wittman (2001). 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



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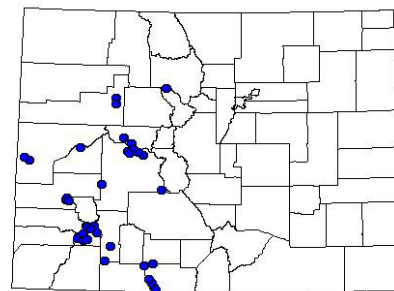
cruciform or malpighiaceae hairs on the lower stems, rather than the simple hairs of the var. *spectabilis*. The two varieties are similar, and their ranges overlap in Colorado, but var. *spectabilis* occurs from southwestern Colorado west to Utah, while var. *oxyloba* extends north to Wyoming (Rollins 1993).

**CNHP Ranking:** G3?T3Q S3S4

**State/Federal Status:** None

**Phenology:** *D. spectabilis* var. *oxyloba* is a perennial, sometimes rhizomatous yellow flowered mustard. Plants flower in mid-summer and produce fruit in late summer. 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.

**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).



Distribution in Colorado

**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.

**Potential Conservation Areas** that support *Draba spectabilis* var. *oxyloba* are Cave Basin Trail, Columbine Pass, Cumberland Basin, Highline Trail, Indian Creek at Tuckerville, Johnson Creek, Lime Mesa and Sheephead 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, has multiple heads and leaf blades nearly as long as the stems. Like the Altai chickweed, it is closely related to plants found in Siberia

**CNHP Ranking:** G4?T3? S3

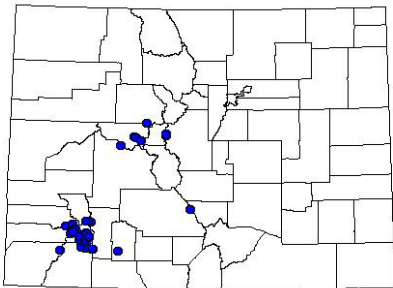
**State/Federal Status:** None

**Phenology:** The plants are rhizomatous, with solitary white fleecy heads on the tops of the stems, and lacking well-developed leaf blades (Weber and Wittman 2001).



Photograph copyright CNHP by P. Lyon

**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 (*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:** It 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:** Trampling may affect the species. Persistence of the hydrologic regime of the wetlands is critical to the species.

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

*Polypodium hesperium* (Western polypody)

**Taxonomy**

Class: Filicopsida  
Order: Filicales  
Family: *Polypodiaceae*  
Genus: *Polypodium*



**Taxonomic Comments:**

**CNHP Ranking:** G5 S1S2

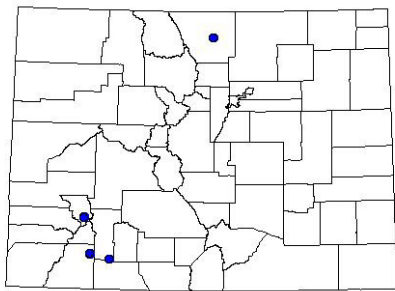
**State/Federal Status:** None

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**Phenology:** Fern with pinnatifid fronds.

**Habitat Comments:** 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.



Distribution in Colorado

**State Range:** La Plata, Larimer and Ouray counties.

**Distribution/Abundance:** Eight occurrences in Colorado, six in Ouray County.

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

**Potential Conservation Area** in La Plata County that supports *Polypodium hesperium* is Vallecito Creek PCA.

***Woodsia neomexicana* (New Mexico cliff fern)**

**Taxonomy**

Class: Filicopsida

Order: *Filicales*

Family: *Dryopteridaceae*

Genus: *Woodsia*

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

**CNHP Ranking:** G4? S2

**State/Federal Status:** None

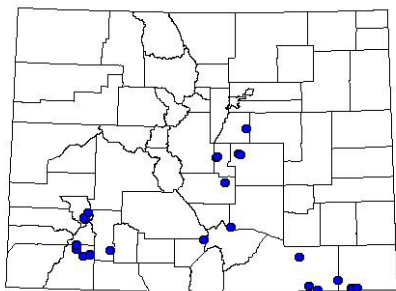
**Phenology:** A fern with pinnately compound fronds. It can be distinguished from the superficially similar common species *Cystopteris fragilis* by the indusium at base of the sorus, which splits evenly all around in a stellate pattern at maturity, as opposed to the one-sided indusium, attached like 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.



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**Habitat Comments:** *Woodsia neomexicana* is always found in crevices of rocks or cliffs, not in soil. Elevations of the species in Colorado range from 4200 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* are Vallecito Creek, Cascade Creek, Electra Lake, and Lost Lake PCAs.

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