



wetlands

OF THE SAN JUAN MOUNTAIN REGION

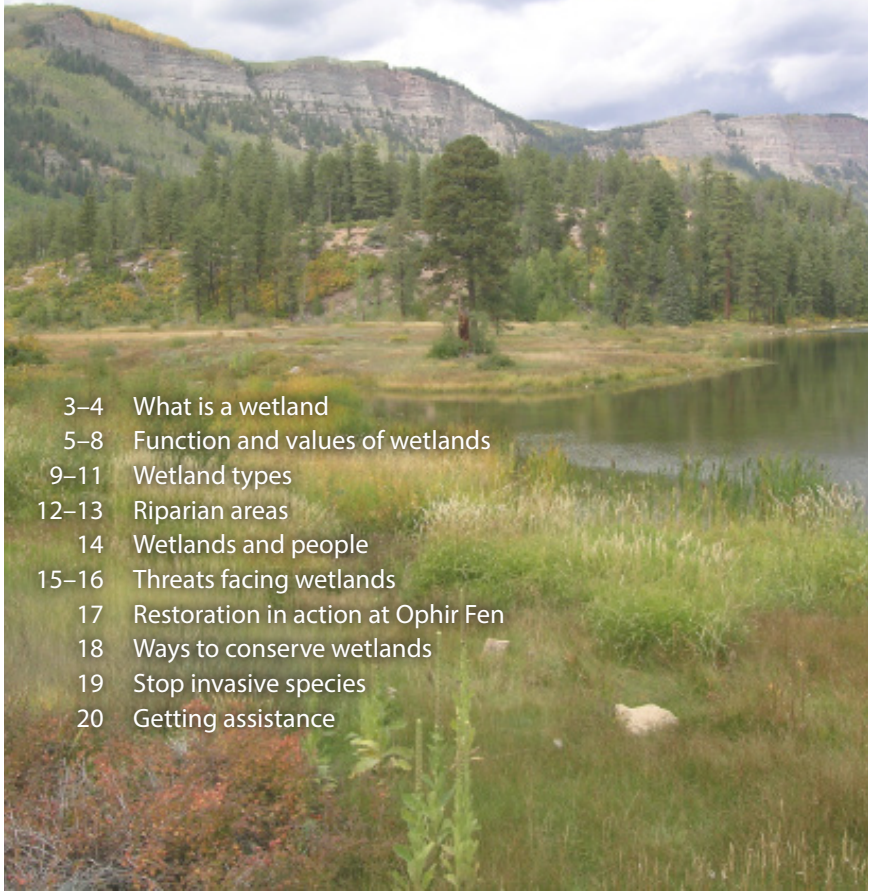
INFORMATION AND GUIDANCE
FOR RESIDENTS AND LAND MANAGERS



Mountain Studies Institute

SAN JUAN MOUNTAINS COLORADO

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A MARSH FRINGING ELEKTRA LAKE, LA PLATA COUNTY, CO

This booklet provides information and guidance to help landowners, residents and land managers learn about the value of wetlands, the services they provide, and how to protect them.

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what is a wetland?

This connection to the water table supports soil conditions, vegetation, and organisms that are adapted to the presence of standing water for a period of time during the growing season. Wetlands vary from stream and lake-side environments that can be found in the uplands to inundated deep water systems.

Riparian areas can contain wetlands and act as the interface between streams and dry land, and land ecosystems. Since Riparian areas often contain wetlands it's a bit strange to say that riparian areas

maintain wetlands. It's kind of like saying a forest is important to maintain the function of trees.

In the San Juan Mountains, wetlands and riparian areas occur at almost every elevation. Wetlands are found near mountain tops, within forests and meadows, and lower down in valley environments.

Wetlands occur in protected areas, such as the Weminuche Wilderness, but also are found on multi-use U.S. Forest Service (USFS) and Bureau of Land Management (BLM) land, state, county and city land, tribal reservations and private property."



ESMÉ CADIENTE

what is a wetland?

{ CONTINUED }



JUNCUS ARCTICUS IN FULL BLOOM IN THE TELLURIDE VALLEY FLOOR. ANAYELI PICASSO



THE ROCKY MOUNTAIN FRINGED GENTIAN REQUIRES WETLAND CONDITIONS TO SURVIVE. GARY MONROE

Water floods or saturates wetland soils for at least part of the year making wetlands a physiologically harsh environment. Most plants drown in wetlands because saturated soils do not contain oxygen for their roots.

Wetland plants, however, are specially adapted to survive in these water-saturated conditions. They diffuse oxygen down from the aerial parts of the plant to their roots to meet root respiratory demands. Wetland plants also are very efficient and recycle their leaf nutrients back to the roots when the leaf dies.



ELEPHANT'S HEAD IS A COMMON WETLAND PLANT IN SW COLORADO. ESMÉ CADIENTE

Examples of wetland plants include cattails, bulrushes, sedges, willows, cottonwoods and showy flowers like marsh marigolds, fringed gentian, and elephant's head.

function + values of wetlands



HIGH ALPINE WETLAND IN THE WEMINUICHE WILDERNESS. I. CADIENTE

Although wetlands account for only about two percent (2%) of land in the San Juan Mountains and Colorado as a whole, wetlands provide critical functions known as ecosystem services, that are vital to both humans and wildlife.

WATER STORAGE

Wetlands temporarily store water, releasing it slowly over time. In the San Juan Mountains, snowmelt produces a large quantity of water runoff in the spring and early summer. Wetlands help to distribute this water throughout the growing season. This slowed delivery of water is especially important in maintaining groundwater levels and stream flow during dry periods.

FLOOD REDUCTION

The deep roots of wetlands plants like willows and sedges help retain the soil along stream channels thereby reducing erosion and flooding through bank stabilization. Wetlands also slow down the flow of water, reducing erosion and flooding, and the damages that may result.

RECREATION AND TOURISM

Wetlands are great places for hunting, fishing, boating, and wildflower, bird and wildlife watching. Tourism associated with these activities helps support local economies in the San Juan Mountains.

function + values of wetlands { CONTINUED }

WATER FILTRATION

Wetlands filter sediment and pollutants. Dissolved substances like pesticides, herbicides, and excess nutrients are taken up by soil microorganisms and plant roots. Excess nutrients can come from animal waste, fertilizer, leaking septic tanks, municipal sewage, and air pollution. High levels of metals occur in some surface and ground waters in the San Juan Mountains due to both natural geology and mining. These metals include cadmium, iron, aluminum, copper, manganese, and zinc. High concentrations of metals can be toxic to aquatic life and are sometimes a human health concern. Down-gradient groundwater, streams, and lakes are cleaner as a result.



WATER DRAINING FROM AN ABANDONED MINE FLOWS INTO A WETLAND, WHICH FILTERS OUT SEDIMENT AND METALS. ALEX PULLEN



TOP: AN AMERICAN BITTERN CHICK WAITS FOR ITS NEXT MEAL AMONG MARSH CATTAILS. BOTTOM: A PLUMBEOUS VIREO NESTS IN A NARROWLEAF COTTONWOOD TREE. C. ORTEGA

BIODIVERSITY AND WILDLIFE HABITAT

Wetlands are home to a huge diversity of plant species and provide food and habitat to hundreds of animal species. Big game such as deer, elk, and moose often use wetlands for food and shelter. Wetlands are especially important for songbirds, shorebirds, waterfowl, salamanders, frogs, invertebrates, and reptiles that rely on wetlands for migratory or breeding habitats. Commercial and recreational fisheries rely on wetlands for breeding and nursery grounds. Wetland forage is also good for livestock production. Livestock grazing can be sustained in wetlands without harmful impacts if it is managed well.

function + values of wetlands { CONTINUED }



Did you know...?

- 80% of all bird species in the Rocky Mountains breed in wetland/riparian habitats.
- Wetlands cover 2% of the earth's surface, but store 20%+ of carbon on earth.
- Riparian wetlands account for less than 2% of Colorado's landscape, but are home to about 75% of our plant and animal diversity.
- More than 90% of Colorado's wildlife use riparian wetlands.
- Wetlands are considered the most biologically diverse ecosystems in the world.
- Wetlands provide habitat and nutrients to support aquatic organisms that help sustain healthy fisheries.
- Wetlands are vital to filter, clean and store water, including flood waters.
- Wetland vegetation controls erosion by trapping sediments, interrupting water flows and building peat.

function + values of wetlands { CONTINUED }



FORT LEWIS COLLEGE STUDENTS STUDY THE RELATIONSHIP BETWEEN ENVIRONMENTAL FACTORS AND WETLAND PLANT COMMUNITIES.

GLOBAL CLIMATE

Wetlands store carbon through permanent sequestration (burial), which prevents it from being released into the atmosphere as greenhouse gases such as carbon dioxide. Increased greenhouse gases are responsible for the warming of the Earth's atmosphere.

Despite the small amount of land in wetlands, these environments account for up to 30% of carbon storage in soils and peat globally.

A healthy, functioning wetland will act as a carbon sink. Alternatively, when wetlands are drained or dry out, carbon dioxide is released into the atmosphere due to an increase in organic matter decomposition.

Can wetlands save us money?

The water storage, water quality, recreational, and habitat benefits of wetlands worldwide can be translated to monetary values. When compared to the costs of water storage, flood control and damage, infrastructure repair, and water treatment, wetlands are a less costly alternative—an alternative that has benefits far beyond saving money.



wetland types

MAJOR WETLAND TYPES IN THE SAN JUAN MOUNTAINS

Fens and Bogs

Fens are peat-forming wetlands dominated by groundwater and fed by springs that keep soil saturated with water for most of the year.

Fens receive some drainage from surrounding mineral soil. Bogs are dependent on direct precipitation and do not occur in Colorado.

Since fens are saturated with water, the soil has little oxygen and plants decompose very slowly. This means that dead leaves and roots gradually accumulate to form organic-rich soils called peat. Fens require thousands of years to develop and cannot easily be restored once destroyed.

Fens are hotspots of biodiversity. They often are home to rare plants, insects, and small mammals. Larger animals like deer, elk, and moose feed on fen plants.

IRONTON FEN, LOCATED BETWEEN SILVERTON AND OURAY NORTH OF RED MOUNTAIN PASS.



wetland types { CONTINUED }

Iron Fens

Iron fens are fens that have higher levels of minerals such as iron, calcium and magnesium. They have unique soil and water chemistry and are found in areas with geology... They are found in areas with geology that produces acidic, metal-rich soils and groundwater. The San Juan Mountain Range is one of only a few regions in the world that contain iron fens.

Unlike other types of fens in the San Juan Mountains, Sphagnum mosses and bog birch grow in the acidic habitat of iron fens.



EXAMPLE OF AN IRON FEN IN THE SAN JUAN MOUNTAINS

The plant communities found in iron fens are very rare, and some have been described as “nearly irreplaceable.”

Rare plants found in San Juan Mountain iron fens include a liverwort, *Jungermannia rubra*, and a moss *Sphagnum balticum*. This moss species is left over from the last ice age and found nowhere else south of Hudson Bay.

COMMON WETLAND PLANTS TO FIND IN WETLANDS



The plant communities found in iron fens are very rare... some have been described as “nearly irreplaceable.”

wetland types { CONTINUED }

Marshes

Marshes are frequently flooded areas with shallow standing water, mineral soils, and little or no peat accumulation. Marshes often have plants, such as sedges, water lilies, duckweed, cattails, arrowheads, bulrush, and reeds growing in them. This type of wetland is particularly good at moderating floods and providing habitat for waterfowl.



A MARSH POPULATED BY LILY PADS NEAR SPUD MOUNTAIN, ESMÉ CADIENTE

Wet Meadows

Wet meadows are common in the San Juan Mountains and attract visitors in the summer when wildflowers are blooming. The soil in a wet meadow is often waterlogged during snowmelt or after a rainstorm but dry at other times. Irrigation for hay fields may create and maintain some wet meadows. Wet meadows are dominated by grasses and sedges. Wet meadows may look like fens, but they do not have the organic peat or year-round high groundwater levels of a fen. Wet meadows are excellent ecosystems for groundwater recharge.

A DRAGONFLY IS ATTRACTED TO A LILY AT A MARSH, ESMÉ CADIENTE



riparian areas



LEFT: A RIPARIAN AREA WITH WILLOWS, SEDGES, AND SPRUCE IN THE TELLURIDE VALLEY FLOOR. ESMÉ CADIENTE



RIGHT: MONKSHOOD IS A TYPICAL SW COLORADO WILDFLOWER FOUND IN RIPARIAN AREAS AMONG OTHER PLANTS THAT ALSO ENJOY WET ROOTS. ALEX PULLEN

Riparian areas occur along the banks of rivers and streams and along lakeshores.

Riparian zones occur where flowing water erodes and deposits sediment, which creates habitat for riparian plants, such as cottonwood trees and willows. Riparian ecosystems change along an elevation gradient from high mountain headwaters to lowland rivers.

At high elevations (9,500-11,000 feet) spruce and fir trees and shrubs, such as tall fringed bluebells and arrowleaf ragwort, line narrow streambeds.

Lower down, from about 7,000 to 10,000 feet, mountain and Drummond's willow and thin leaf alder dominate these areas, and are often home to beaver and other wildlife.

As narrow forested streams flow into broad valleys, the streams become winding rivers. Fremont cottonwood trees and willow are common natural vegetation along valley rivers. At about 8,500 feet, narrowleaf cottonwood forests begin to appear, often with pretty red osier dogwood shrubs. Non-native species, such as Russian olive and tamarisk (salt cedar), may take over in areas with altered water flow and other human impacts.

Riparian areas can also be considered a wetland type. In this case, the riparian area is an ecosystem with a high water table, usually due to its proximity to a water source. Riparian wetlands are also known as a bosque, floodplain forest or riparian buffer.



ABOVE: A RIPARIAN BUFFER ALONG THE SAN MIGUEL RIVER THAT CONSISTS OF NATURAL VEGETATION. ESMÉ CADIENTE



RIGHT: SECTIONS OF THE ANIMAS RIVER IN THE ANIMAS VALLEY LACK A RIPARIAN BUFFER. ALEX PULLEN

THE IMPORTANCE OF RIPARIAN AREAS

Riparian areas provide food and shelter to a variety of wildlife: black bear, moose, elk, deer, otter, waterfowl, warblers, and many other species.

Riparian plants are important to stream and lake food webs. Dead leaves, branches, and other plant parts fall into streams, rivers, and lakeshores. This decaying organic material (and the microorganisms that grow on it) is habitat and food for aquatic insects, which are eaten

by fish. When riparian inputs are removed, the insects and fish that rely on them for food and shelter are reduced.

An intact riparian buffer will reduce potentially damaging floods and filter out sediments, excess nitrogen, phosphorus, metals, and pollutants from water. Buffers also provide shaded, stable stream banks that are important for fish, such as trout, that require cold, well-oxygenated water.

wetlands and people



DISPLACED PEAT FLOATS ASHORE AFTER BEING SUBMERGED BY A RESERVOIR. PEAT SUCH AS THIS TAKES THOUSANDS OF YEARS TO DEVELOP. TIM CUTTER

Wetlands are some of the most valuable land in Colorado in terms of flood control, water storage, water quality, tourism, outdoor recreation, wildlife habitat, and livestock forage production.

Colorado is one of the fastest-growing states in the country. According to 2010 Census data, the Western Slope of Colorado alone is projected to increase its population by half a million people between 2015 and 2040. La Plata experienced a 17% increase in population and San Juan County experienced a 25% increase from 2000-2010. Many people choosing to move to Colorado are living in rural areas that may contain sensitive wetlands.

More and more people – including farmers, ranchers, landowners, hunters, anglers, members of conservation organizations, and community leaders – are becoming interested in the future of our wetland resources.



WETLANDS FACE THREATS FROM DEVELOPMENT, WHICH RAISES QUESTIONS OF HOW TO BALANCE THE INHERENT VALUE OF WETLANDS WITH THE RIGHTS OF PROPERTY OWNERS.

How can we...

- balance the values of wetlands with the rights of property owners to develop, farm, or ranch their land?
- conserve both publicly and privately owned wetlands and their important functions and still allow traditional land uses to continue?

threats facing wetlands

Understanding threats to wetlands is critical to balancing ecosystem and human needs.

DIRECT EFFECTS

Threats to wetlands include activities that impact the wetland directly by infilling, draining, soil compaction, or damage to wetland plants.

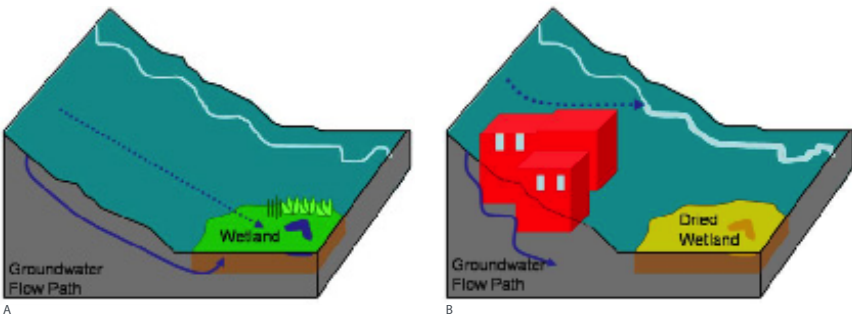
INDIRECT EFFECTS

Threats to wetlands also include changes to the upland watershed that may alter the wetland's water source (surface or groundwater) or "drown" it in mineral sediment.

Even if wetlands are not directly touched, activities such as road, parking lot, and building excavation can change surface and/or groundwater flow patterns and dry up wetlands (see diagram).

Wetlands face threats such as:

- Community development
- Highway and road construction
- Off-road and off-trail recreation
- Livestock grazing
- Mining and mineral extraction
- Hydrologic modification
- Ground water withdrawal
- Water pollution – urban and agricultural
- Draining, dredging and filling
- Logging and access roads



INDIRECT EFFECTS TO A WETLAND'S WATER SOURCE MAY HARM A WETLAND. THE WATER SOURCE MIGHT NOT BE VISIBLE. IT MAY COME FROM GROUNDWATER FLOW UNDERGROUND, AS SHOWN IN THESE SIMPLIFIED DIAGRAMS.

A) GROUNDWATER FLOW IS THE SOURCE OF WATER FOR A WETLAND AT THE BOTTOM OF THE SLOPE.

B) EXCAVATION AND BUILDING UNDERGROUND MAY DISRUPT THE GROUNDWATER FLOW AND DRY OUT THE WETLAND.

threats facing wetlands



DAMAGE FROM DITCHING, SUCH AS THIS DITCH AT OPHIR FEN, CAN LEAVE SCARS IN WETLANDS FOR CENTURIES. TIM CUTTER

ROADS AND LOGGING

Roads and logging increase erosion by removing vegetation, compacting soils, and increasing water runoff. Resulting sediment deposition may drown a wetland in mineral sediment.

MINING

may concentrate acidic, metal-rich water in areas that naturally received lower inputs and may starve other areas of groundwater.

OVERUSE

Overuse damages wetlands by killing plants, compacting soils, and creating trails, which can drain the wetland of its water. Once disconnected from the water table, a wetland has little chance to survive and is subject to erosion. Scars from these activities can be visible in wetlands for decades.

HYDROLOGIC MODIFICATION

Ditching, draining, damming, diverting and groundwater pumping are hydrologic modifications of wetlands that disconnect the wetland from its water table drying them out and altering soils, vegetation, biologic and sediment behavior. Dams and water diversion upstream can rob riparian habitat of floodwaters, which are crucial for maintaining natural wetland communities such as willow and cottonwood. Groundwater pumping also can intercept water that sustains marshes, fens, and wet meadows. Irrigation diversions are a big source of hydrologic modification in southwest Colorado.

restoration in action at ophir fen

Some wetland impacts can be restored, however, wetland restoration costs money and time. Ophir Pass Fen is an example of a restoration opportunity that has exhibited success thus far. The goal of the Ophir Pass Fen Restoration Project is to restore the hydrologic and ecological function of the fen from historical mining and other disturbances. Specifically, the project aims to: (1) restore hydrological and ecological function of the fen, (2) reduce metal loading from sediment eroding into Mineral Creek, and (3) advance the state of practice for fen/wetland restoration in mountain environments.

A natural hydrologic regime will support native wetland vegetation, thereby reducing sediment transport and slow erosion. The Ophir Pass Fen project involved grading bare slopes, infilling and damming six ditches, and

installing sediment controls of mulch, transplanted vegetation, matting made from natural materials to restore a thousands year old iron fen.

Visual inspections of past efforts reveal that most of the activities have been successful.

The restoration efforts are a collaboration of combined efforts of MSI, Michigan Technological University, Durango Mountain Resort, National Forest Foundation, San Juan National Forest, Colorado Mountain Club, San Juan Citizens Alliance, Colorado Water Conservation Board, and many volunteer partners.



OPHIR PASS FEN BEFORE RESTORATION BEGAN IN 2012 AND THREE YEARS AFTER CONSTRUCTION. TIM CUTTER

ways to conserve wetlands

CONSERVING WETLANDS CAN:

- Recharge groundwater
- Moderate floods that can damage property
- Help filter out water pollutants, which might come from leaky septic tanks, concentrated livestock areas, or acid-mine drainage
- Provide habitat for wildlife and birds
- Provide excellent areas for hunting and fishing
- Provide healthy forage for livestock

A LANDOWNER'S EXPERIENCE

"Originally, our creek was in real disrepair. The land was overgrazed. There were deep-cut banks, a lot of erosion, and poor water quality. We controlled the grazing, and almost immediately the willow growth started coming back. The water table started to rise. We had less erosion and water quality improved. The end result is that we re-established a trout fishery. Besides the agricultural and water quality benefits, the most satisfying thing was the aesthetic benefit."

– Larry Garcia, Garcia Ranch,
Archuleta County



What you can do

- Do not select wetland sites for development projects and avoid wetland alteration or degradation during project construction.
- Protect wetland water sources and flow patterns (both surface and ground waters).
- Maintain wetlands and adjacent buffer strips as open space.
- Avoid excessive livestock grazing, logging, or other human-caused disturbances. Fence off sensitive areas from livestock.
- Keep vehicles, bicycles, and horseback riders out of wetlands.
- Restore degraded wetlands.
- Plant native vegetation to stabilize soils and attract wildlife.
- Encourage neighbors, developers, and federal, state, and local governments to protect the function and value of wetlands in your watershed and region.

PHOTO AT TOP: MOTOR VEHICLES ARE RESTRICTED FROM TRAVELING IN A WETLAND NEAR SILVERTON

stop invasive species

Invasive plant species (also known as noxious weeds and exotic plants) are those that are non-native to an area. Invasive species have no natural predators and can be aggressive competitors, robbing the resources from native plants and creating an imbalance in biodiversity.

In these cases, invasive plants are a serious threat to ecosystem stability by out competing native plants. Invasive plants can change fire regimes, alter water quality and availability, and dominate the vegetative cover of an area, which has ripple effects on wildlife that have evolved to be dependent on the native plants for survival.



RUSSIAN OLIVE IS A NOXIOUS WEED SPECIES FOR WHICH THE STATE HAS TAKEN LEGAL MEASURES TO STOP THEIR SPREAD.

CANADA THISTLE IS ALSO A STATE LISTED INVASIVE SPECIES.

TAMARISK IS A WIDESPREAD, NON-NATIVE PLANT THAT CAN CAUSE DEGRADATION TO RIPARIAN AREAS IN SW COLORADO.

Actions you can take

- Prevent introduction of invasive species
 - Educate yourself on invasive plants common in your area
 - Buy weed free products – forage, mulch, restoration materials
 - Beware of what you plant - plant only native species and avoid seed mixes
- Report invasive species to Colorado's State Invasive Species Program: 303-291-7295
- Monitor and eradicate new infestations

getting assistance

There are many government agencies and non-profit groups that provide landowners with funding and technical assistance for wetland protection and restoration. Before altering wetlands seek the advice of a professional.

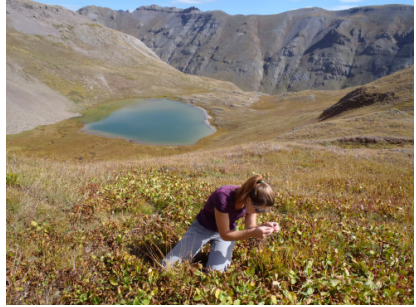
What is my legal responsibility?

A permit will need to be attained from the U.S. Army Corps of Engineers before wetlands and stream channels. If you think you have a wetland, use the list below for professional contacts about legal protections and other wetland assistance programs.

Information regarding the Clean Water Act, permit applications, reports of violations, and requests for jurisdictional determinations may be directed to:

U.S. Army Corps of Engineers,
Durango Regulatory Office
General line to contact representatives
from both Albuquerque and Sacramento
Districts: 970-259-1764

The U.S. Army Corps of Engineers can help determine if you have a jurisdictional wetland. This mapping process is called wetland delineation and is performed by a professional based on three criteria: plant community, soil type, and water flow patterns (hydrology).



THE USFS CONDUCTS A WETLAND DELINEATION NEAR STONY PASS OUTSIDE OF SILVERTON. I. CADIENTE

THE U.S. ENVIRONMENTAL PROTECTION AGENCY

provides information on a variety of programs

EPA Wetlands Hotline
1-800-832-7828
wetlands.hotline@epamail.epa.gov
www.epa.gov/owow/wetlands/

EPA-Region 8 (includes Colorado)
www.epa.gov/region8/water/wetlands/wetlands.html

EPA Environmental Information
Service Center
1-800-227-8917

U.S. FISH & WILDLIFE SERVICE'S PARTNERS

FOR FISH & WILDLIFE PROGRAM

helps fund voluntary wetland restoration on private and tribal lands
www.fws.gov/partners/

WETLANDS RESERVE PROGRAM (PART OF THE 1996 FARM BILL)

USDA Natural Resources Conservation Service's voluntary program offering financial and technical assistance to agricultural landowners.
www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands/