

Mancos Conservation
District
Mancos Colorado

Mancos Watershed

with the assistance of

Hydrologic Unit Code 14080107

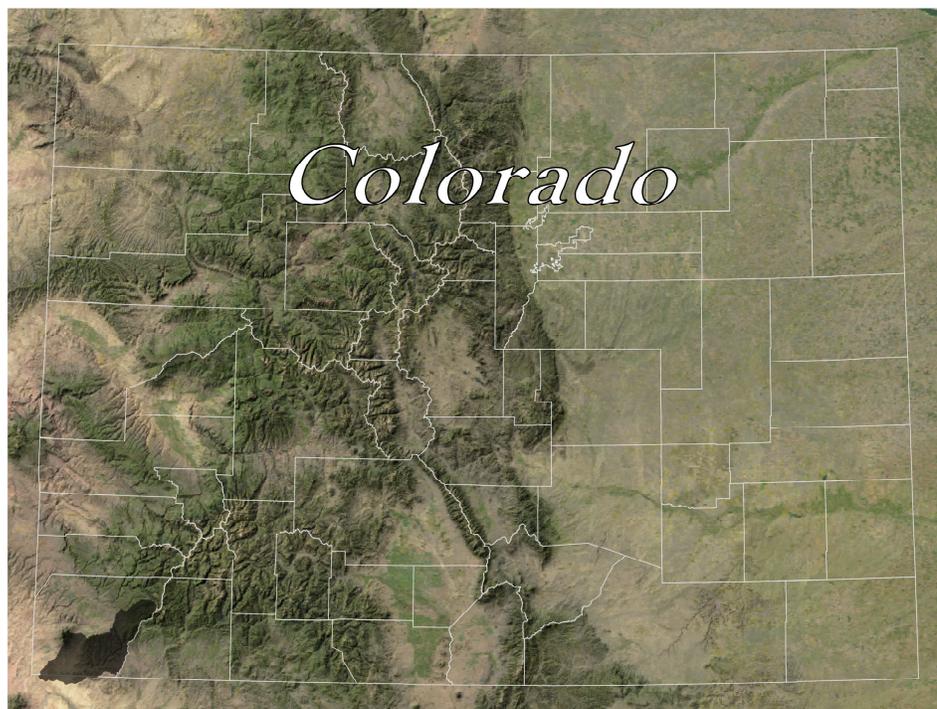
United States Department
of Agriculture

Rapid Assessment



RWA 14080107

March 2008



Satellite Imagery: ArcIMS Server - Geographic Network Services hosted by ESRI

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.)

Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington DC 20250-9410, or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

Introduction

Background Information

The Natural Resources Conservation Service (NRCS) is encouraging the development of rapid watershed assessments in order to increase the speed and efficiency generating information to guide conservation implementation, as well as the speed and efficiency of putting it into the hands of local decision makers.

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals.

Benefits of these Activities

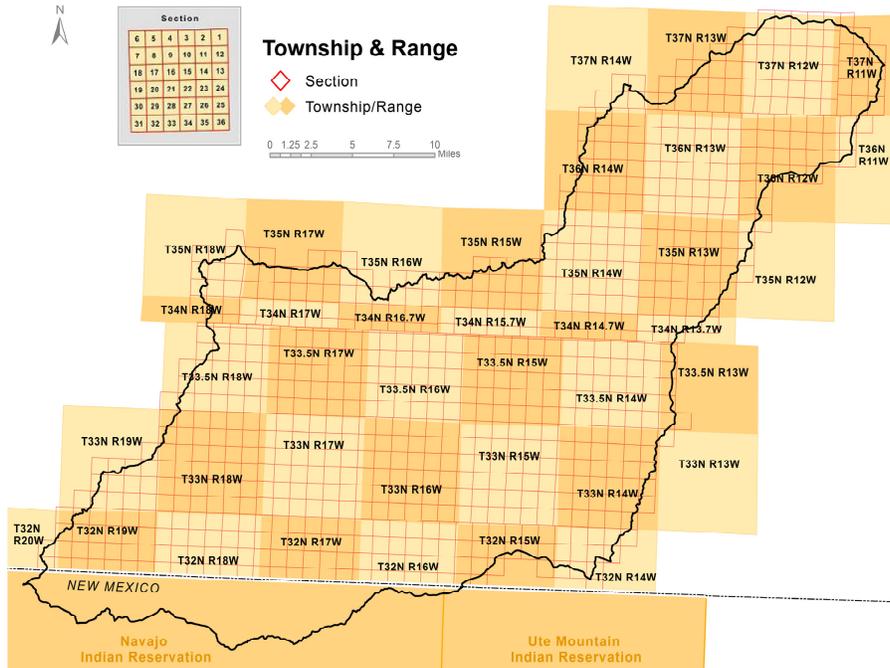
While rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide the benefits of NRCS locally-led planning in less time and at a reduced cost. The benefits include:

- Quick and inexpensive tools for setting priorities and taking action
- Providing a level of detail that is sufficient for identifying actions that can be taken with no further watershed-level studies or analyses
- Actions to be taken may require further Federal or State permits or ESA or NEPA analysis but these activities are part of standard requirements for use of best management practices (BMPs) and conservation systems
- Identifying where further detailed analyses or watershed studies are needed
- Plans address multiple objectives and concerns of landowners and communities
- Plans are based on established partnerships at the local and state levels
- Plans enable landowners and communities to decide on the best mix of NRCS programs that will meet their goals
- Plans include the full array of conservation program tools (i.e. cost-share practices, easements, technical assistance)

Rapid Watershed Assessments provide information that helps land-owners and local leaders set conservation priorities.

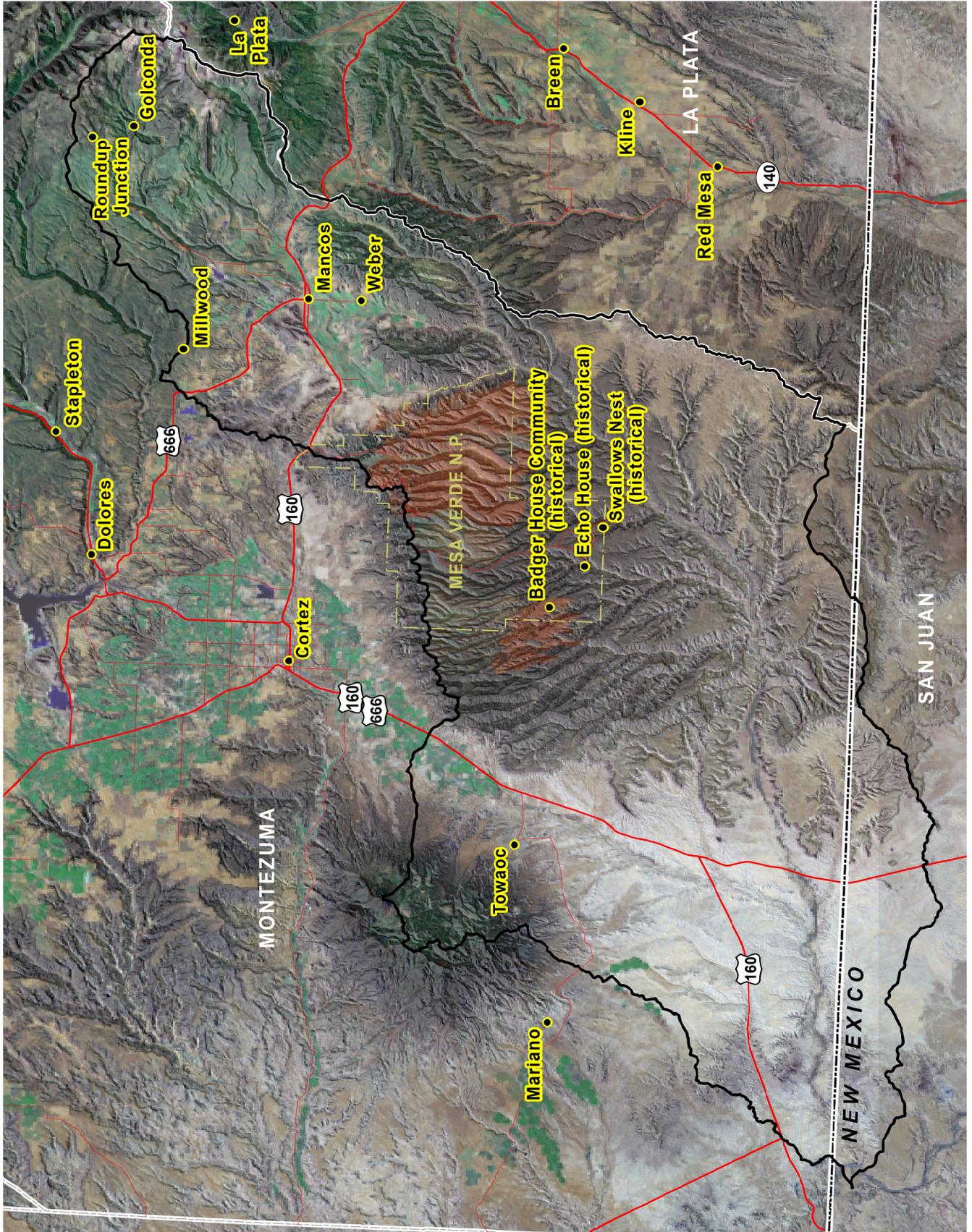


Satellite Imagery, AerialGIS Source - Geographic Network Services hosted by ESRI



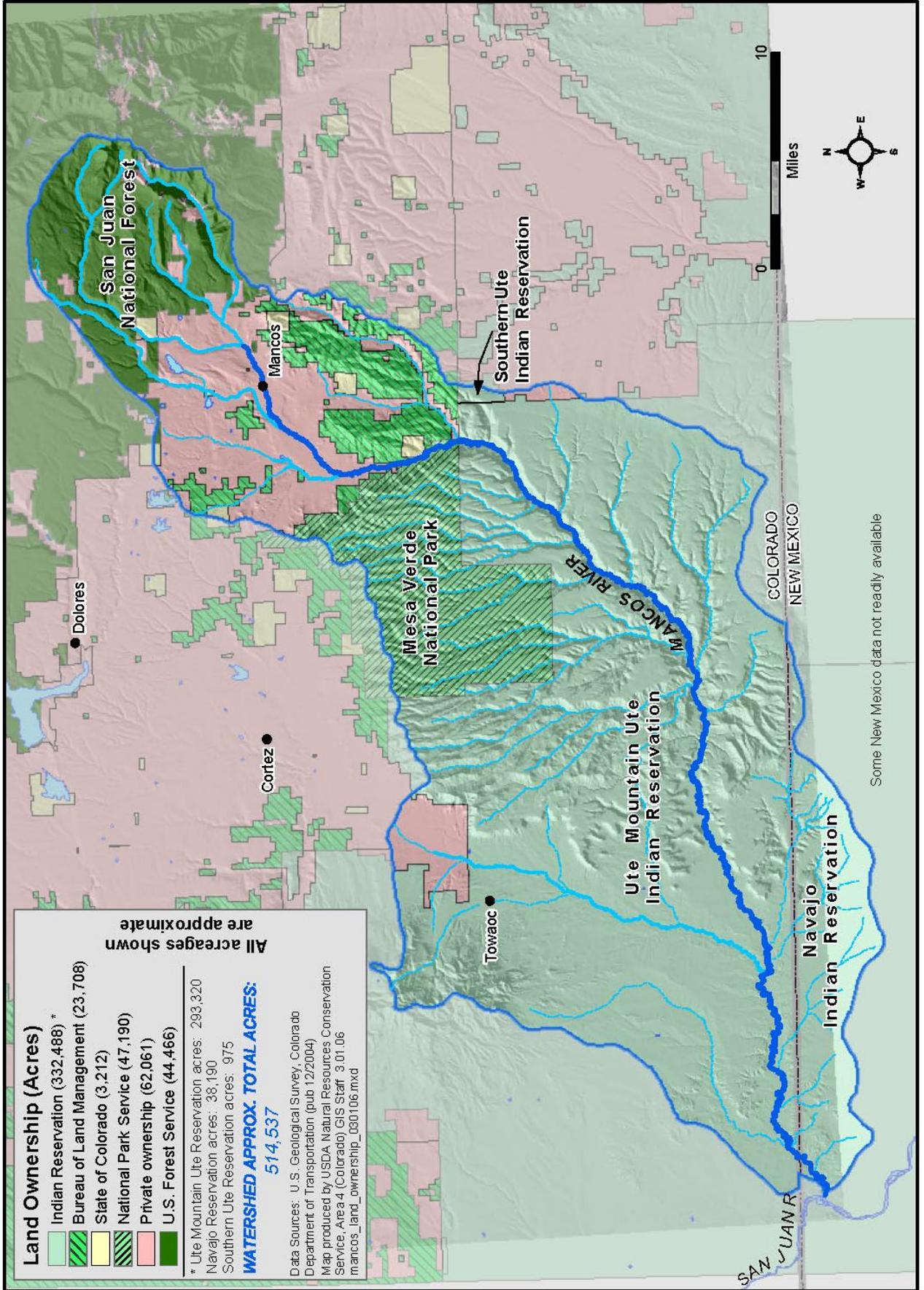
County	County Acres	County Acres in MANCOS Water-	% of Water-shed in the County
Montezuma, Colorado	1,307,815	476,716	92.6%
San Juan, New Mexico	3,549,745	37,821	7.4%
Total Watershed Acres			514,537

Mancos Watershed - 14080107



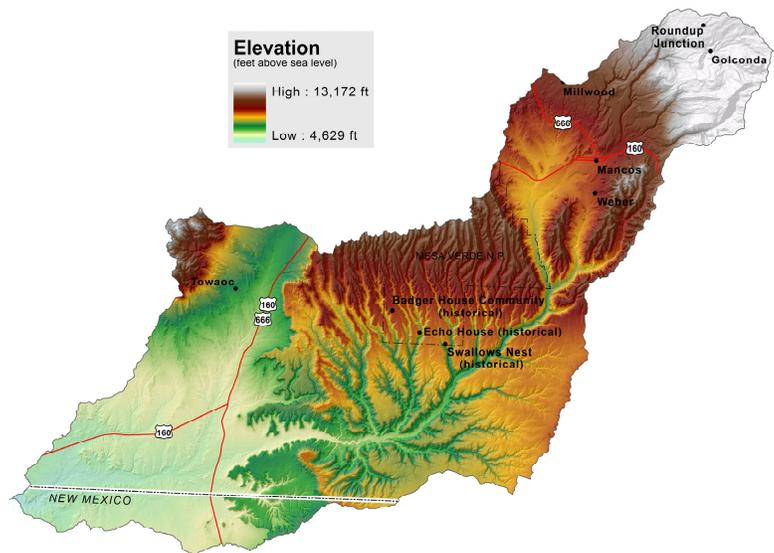
Satellite Imagery: ArcIMS Server - Geography Network hosted by ESRI

Mancos River Watershed Land Ownership/Jurisdiction



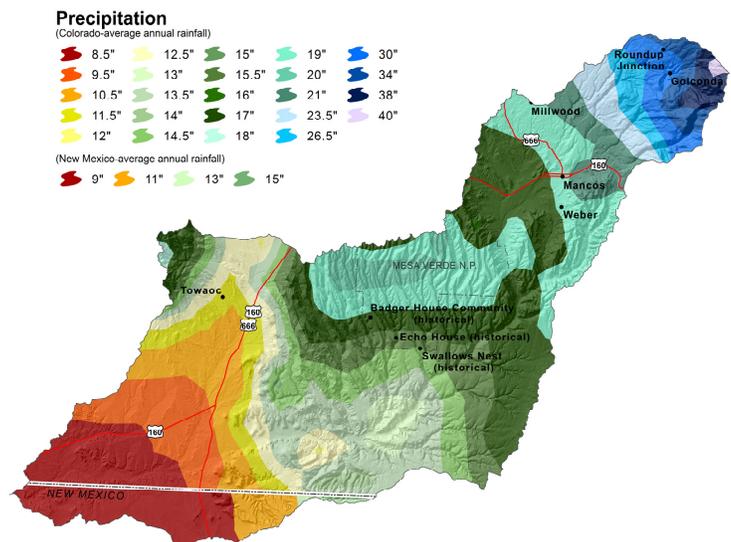
Physical Description of the Mancos River - from FUNCTIONAL ASSESSMENT OF THE MANCOS RIVER WATERSHED: MANCOS VALLEY AND ADJACENT AREAS Peter B. Stacey Department of Biology University Of New Mexico, 2007

The Mancos River originates in the western flanks of the La Plata Mountains, a western subrange of the San Juan Mountains in southwestern Colorado. It then flows southwest through the Mancos Valley and Mancos Canyon, until it joins the San Juan River in northwestern New Mexico. The river is 116 miles in length, including the major upstream tributaries, and drains an area of approximately 800 square miles. The Mancos River watershed is part of the Colorado Plateau geologic region, and is often divided into two main parts: an upper watershed of approximately 203 square miles that includes Mancos Valley and the surrounding mountains; and a lower area that begins in Mancos Canyon at the confluence of Weber Creek, and drains the mesa and desert lowland country of Mesa Verde National Park, the Ute Mountain Ute Indian Reservation and the surrounding regions.



Four main tributaries begin among the ridges and peaks of the upper watershed (the highest are Hesperus Mountain and Lavender Peak at 13,232 ft., and 13,240 ft. respectively). They are the East, Middle, and West Mancos Rivers, and Chicken Creek. A fifth major tributary, Mud Creek, drains the lower elevation regions in the northwestern part of the upper watershed. In the lower watershed, numerous small side canyons and ephemeral washes enter the river as it moves through Mancos Canyon. The river then flows through relatively flat desert country until it enters the San Juan River.

Mean annual precipitation in the overall watershed ranges from over 40 inches at the highest elevations in the mountains to less than 8 inches where the Mancos enters the San Juan River.



The Mancos River travels through almost all of the major vegetation life zones found in the Colorado Plateau region, including Alpine Tundra, Sub-alpine Coniferous Forests, Spruce-Fir forests, mixed conifer forests, ponderosa pine forests, pinon-juniper forests, plains-mesa grasslands, and savannah (now primarily converted to agriculture), and desert scrublands. As a result, the biological diversity of both the aquatic and terrestrial riparian communities across the entire watershed is high.

Hydrogeomorphic conditions vary according to elevation. The high elevation reaches in the mountains, (generally above 9500 ft), are characterized by small, straight, narrow, and high gradient streams. The banks and channel bottom are typically either bedrock or comprised of boulders and other material from nearby rock formations. The surrounding vegetations is characteristic of southern Rocky Mountain alpine tundra,

sub-alpine, and spruce fir forests.

The Upper plateau and canyon reaches, generally between 7500-9500 ft., are where the major tributaries of the Mancos form deep canyons that cut through relatively flat plateaus. The canyon walls are steep, often forming cliffs, and the bottoms are relatively flat. The canyons progressively widen as one moves further downstream. The stream channel tends to be deeper than reaches further upstream, and the bottom and banks are comprised primarily of cobble and larger material that has been washed downstream from the mountains. In some cases, the channel also exhibits limited meanders. The surrounding vegetation is primarily southern Rocky Mountain mixed conifer and Douglas fir forests at the higher elevations, and ponderosa pine at the lower elevations, although many different species of conifer occur together within the canyons themselves. Riparian species include willows, aspen and narrow-leaf cottonwood.

The Mancos Valley (6500-7500 ft.) is relatively flat and the river in this section has a medium gradient. The flood plain is relatively wide, particularly in the middle sections of the valley. Most of the river in this section has been channelized, and there are many levees along one or both banks. Remnant fluvial landforms in the flood plain indicate that there were originally numerous meanders in the past, prior to channelization. The bottom of the channel is primarily medium to large cobble that has been washed down from the surrounding mountains; because the cobble “armors” the bottom there has been little down-cutting of the river in this section. In a few areas, particularly in the lower parts of the valley, the channel rests on bedrock, including the Mancos Shale formation. The surrounding soils in the valley are composed primarily of gravels and alluvial deposits. The Valley is used at the present time primarily for agriculture, although the number of houses in the town of Mancos and elsewhere is rapidly increasing. There is also a large amount of aggregate mining in the valley because of the gravel and alluvial deposits.

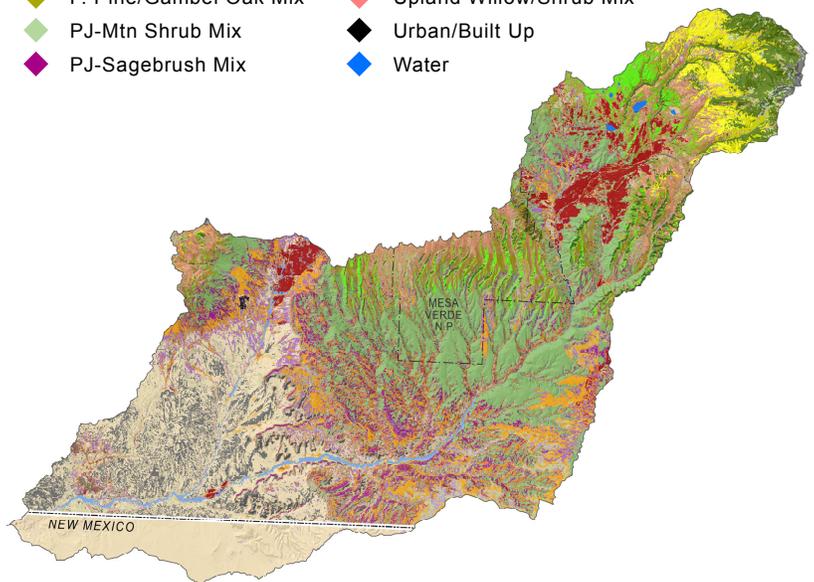
The original vegetation was probably primarily piñon-juniper woodland with scattered native grasslands. Riparian vegetation in this section includes narrow-leaf and Fremont cottonwoods. There are numerous willows and buffalo berry in the lower parts of the valley, but most of the native riparian shrub community that would be expected to occur at this elevation is absent.

The lower mesa and canyon areas comprise of elevations between 5300-6500 ft. this section consists of

Vegetation

COLORADO - CVCP

- | | |
|----------------------------|--------------------------------|
| ◆ No Data | ◆ Pinon-Juniper |
| ◆ Agriculture Land | ◆ Ponderosa Pine |
| ◆ Alpine Meadow | ◆ Rabbitbrush/Grass Mix |
| ◆ Aspen | ◆ Riparian |
| ◆ Barren Land | ◆ Rock |
| ◆ Douglas Fir | ◆ Sagebrush Community |
| ◆ Englemann Spruce/Fir Mix | ◆ Sagebrush/Grass Mix |
| ◆ Gambel Oak | ◆ Saltbush Community |
| ◆ Grass/Forb Rangeland | ◆ Sparse PJ/Shrub/Rock Mix |
| ◆ Greasewood | ◆ Spruce/Fir/Aspen Mix |
| ◆ Mesic Mountain Shrub Mix | ◆ Talus Slopes & Rock Outcrops |
| ◆ P. Pine/Gambel Oak Mix | ◆ Upland Willow/Shrub Mix |
| ◆ PJ-Mtn Shrub Mix | ◆ Urban/Built Up |
| ◆ PJ-Sagebrush Mix | ◆ Water |



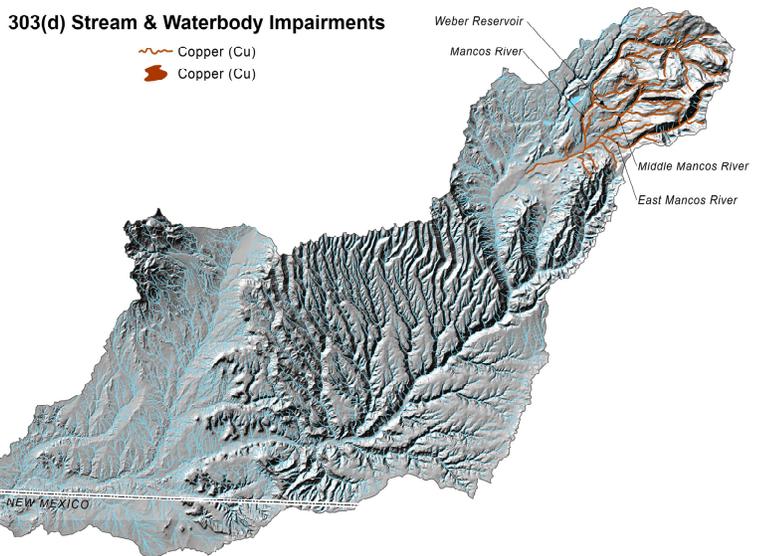
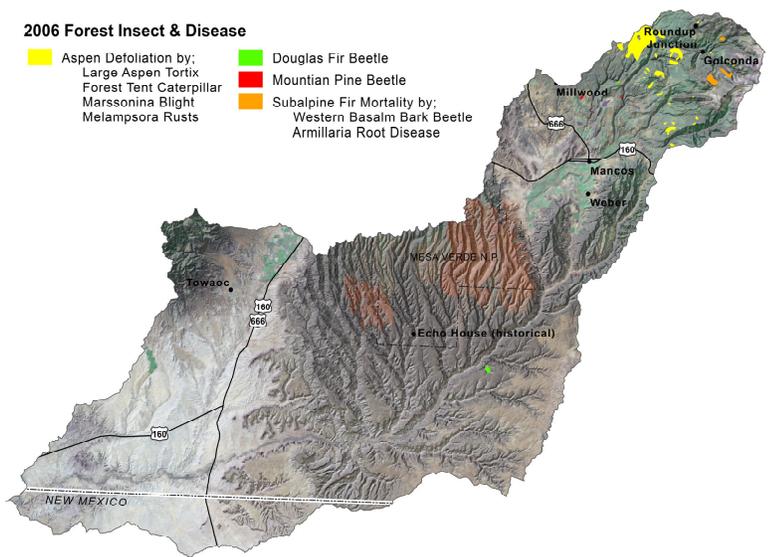
Mancos Canyon. Numerous small side canyons and ephemeral washes enter the river from the surrounding mesas. The gradient is relatively low, and the channel varies in width and depth. There is considerable sediment and only small cobbles on the bottom toward the upper reach. The riverbanks consist primarily of fine and medium sediments, and there is considerable meandering of the channel within the flood plain. Native riparian vegetation includes willow and Fremont cottonwood, and junipers are common along the side of the canyon.

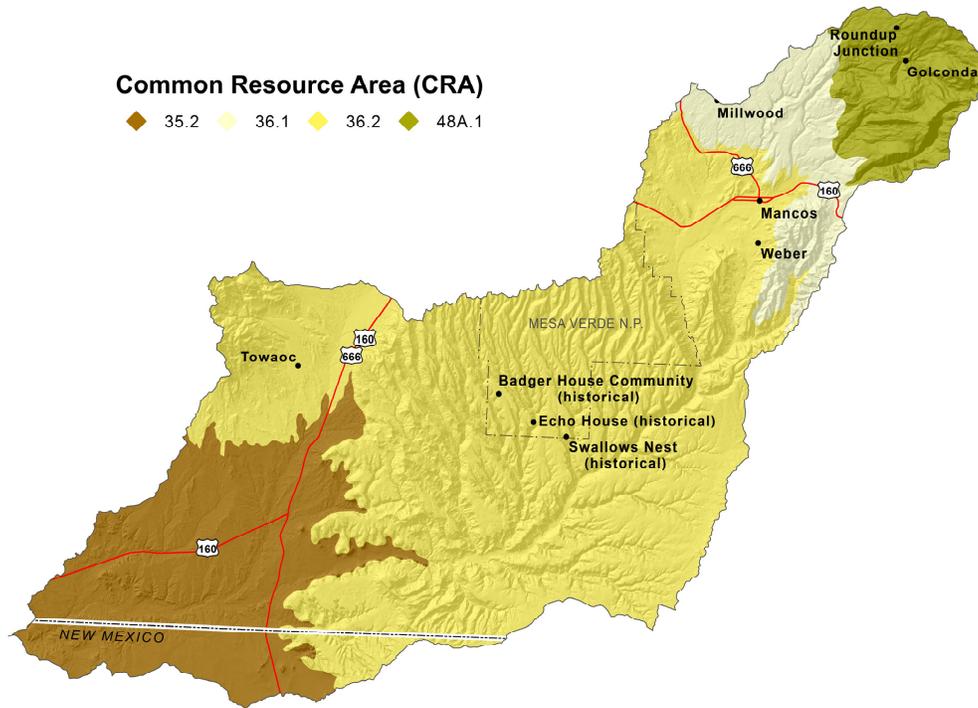
At its lowest elevations, 4600 – 6500, the section between the mouth of Mancos Canyon and the confluence with the San Juan River on the Ute Mountain Ute Tribe, the river has a low gradient, the channel is wide and shallow, with a regular meander pattern. Most of the banks consist either of exposed bedrock or fine sediments, including wind-blown sand. The surrounding vegetation is Great Basin desert shrub. The primary riparian vegetation appears to be willows and salt cedar.

Aquatic habitat health: The Mancos River at the lower elevations has populations of Flannel mouth suckers and short-tailed chub, both Native fish species, managed by the Mesa Verde National Park and by the Ute Mountain Ute Tribe respectively. However, portions of the river regularly dry up below the Valley during the summer months when agriculturalists divert water for crops. Fish have had to be removed and taken to hatcheries several times in the past decades during the summer in order to survive.

Higher in the watershed, the Middle and West forks of the river support healthy trout populations. However, the East Fork is a 303-d listed river, and is basically dead.

Mancos River flow is dominated by precipitation falling on higher elevations in the northeast portion of the watershed, in the San Juan National Forest. The East, Middle, and West branches of the Mancos River and Chicken Creek drain these higher precipitation areas. Mud Creek drains the lower elevations in the northwest. The lower valley is divided by Weber and Menefee Mountains, between which the Weber Drainage flows, as a result of irrigation overflow. The confluence of the Mancos River and Weber drainage marks the lower end of the Valley. Immediately below the valley is the border with Mesa Verde National Park, and four miles downstream is the Ute Mountain Ute Reservation. Sixty seven miles of river run through the reservation. The last mile or so of the river runs through the Navajo Nation, where it meets the San Juan River.





Common Resource Areas (CRA): Geographical areas where resource concerns, problems, and treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographical boundaries of the common resource area.

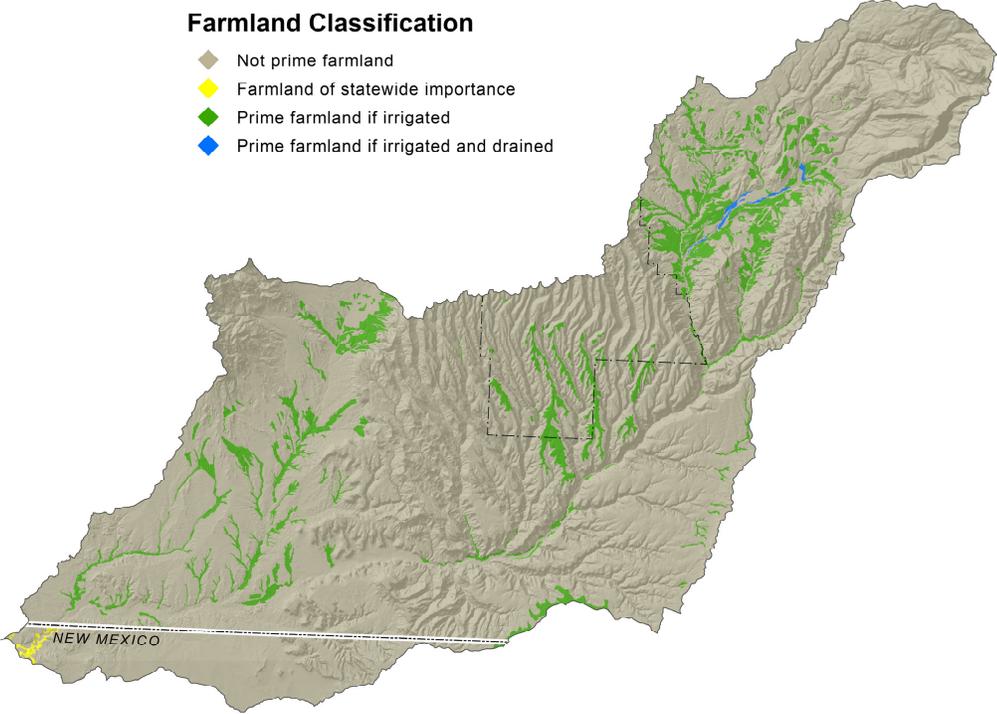
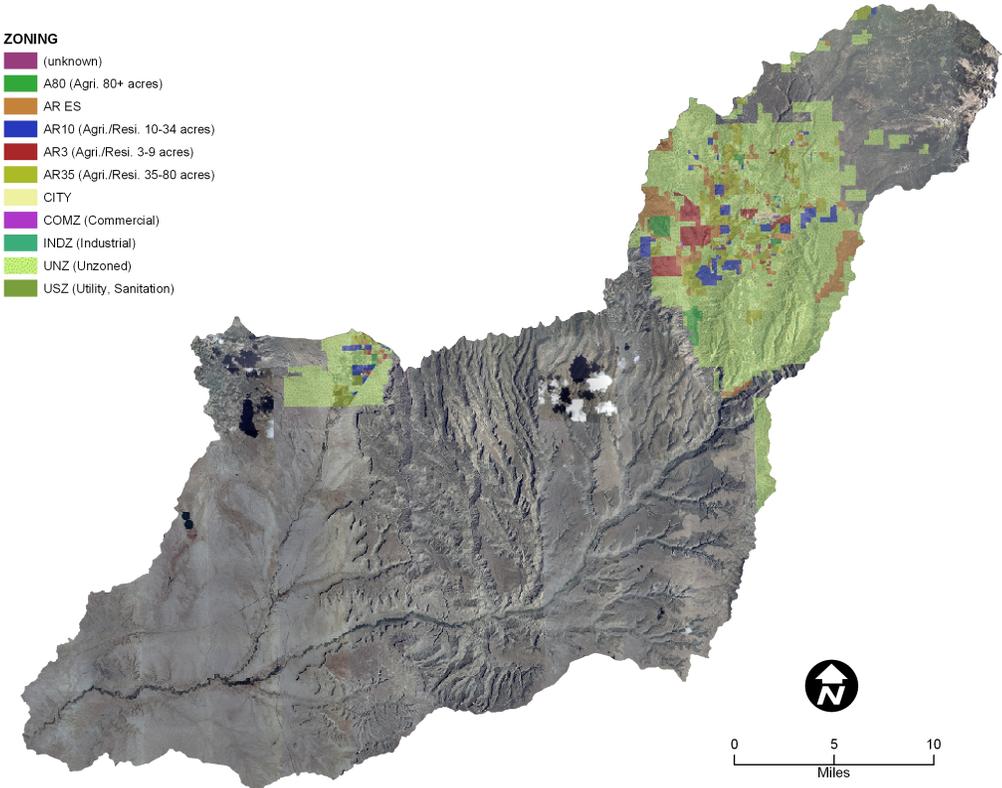
<u>MLRA</u>	<u>CRA</u>	<u>CRA NAME</u>	<u>CRA DESCRIPTION</u>
35	35.2	Colorado Plateau Shrub - Grasslands	This unit occurs within the Colorado Plateau Physiographic Province and is characterized by gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Volcanic fields occur in places. Elevations range from 3500 to 5500 feet. Precipitation averages 6 to 10 inches per year. The soil temperature regime is mesic and the soil moisture regime is typic aridic. Vegetation includes shadscale, fourwing saltbush, mormon tea, Indian ricegrass, galleta, and blue and black grama.
36	36.1	Southwestern Plateaus, Mesas, and Foothills - Cool Subhumid Mesas and Foothills	This area encompasses the higher elevation mesas and foothills that represent a transition to the Southern Rocky Mountains. The temperature regime is frigid, and the moisture regime is ustic. The typical vegetation is big sagebrush, Gambel oak, and ponderosa pine. Land use is mainly forest and grazing land.
36	36.2	Southwestern Plateaus, Mesas, and Foothills - Warm Semiarid Mesas and Plateaus	This area encompasses the lower elevation mesas and plateaus. The temperature regime is mesic and the moisture regime is transitional from ustic to aridic. Vegetation is typically twoneedle pinyon, Utah juniper, and big sagebrush. Cropland is a significant land use in parts of this area, particularly on soils formed in thick deposits of eolian material. Precipitation ranges from 10 to about 16 inches. Elevations range from about 6,000 to 7,000 feet.
48A	48A.1	Southern Rocky Mountains - High Mountains and Valleys	This area is best characterized by steep, high mountain ranges and associated mountain valleys. The temperature regimes are mostly frigid and cryic; moisture regimes are mainly ustic and udic. Vegetation is sagebrush-grass at low elevations, and with increasing elevation ranges from coniferous forest to alpine tundra. Elevations range from 6,500 to 14,400 feet.

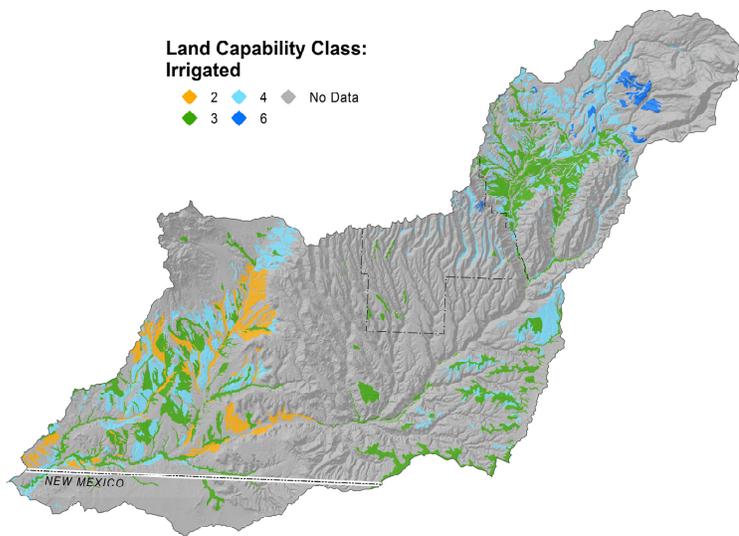
Mancos Watershed Land Cover

Land Use	Total Acreage	Vegetation	Acreage
Cropland	17,202	Agriculture Land	17,201.5
Rangeland/ Grassland	375,087	Alpine Meadow	1,889.4
		Gambel Oak	24,172.8
		Grass/Forb Rangeland	39,593.7
		Greasewood	3,129.2
		Mesic Mountain Shrub Mix	13,982.3
		P. Pine/Gambel Oak Mix	22,048.4
		PJ-Mtn Shrub Mix	761.6
		PJ-Sagebrush Mix	24,716.7
		Pinon-Juniper	93,484.0
		Rabbitbrush/Grass Mix	44,260.3
		Sagebrush Community	31,280.2
		Sagebrush/Grass Mix	4,518.1
		Saltbush Community	62,432.4
		Sparse PJ/Shrub/Rock Mix	8,293.4
		Upland Willow/Shrub Mix	525.0
Forest	48,189	Aspen	14,871.3
		Douglas Fir	6,670.6
		Englemann Spruce/Fir Mix	12,918.9
		Ponderosa Pine	12,221.5
		Spruce/Fir/Aspen Mix	1,506.5
Riparian	5,135	Riparian	5,135.0
Water	528	Water	528.4
Other	32,093	Barren Land	439.0
		No Data	21.4
		Rock	30,343.4
		Talus Slopes & Rock Outcrops	1,010.9
		Urban/Built Up	277.8

Total Colorado Watershed Acres

478,234





Land Capability Classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use.

Class 1 - soils have few limitations that restrict their use.

Class 2 - soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 - soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 - soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

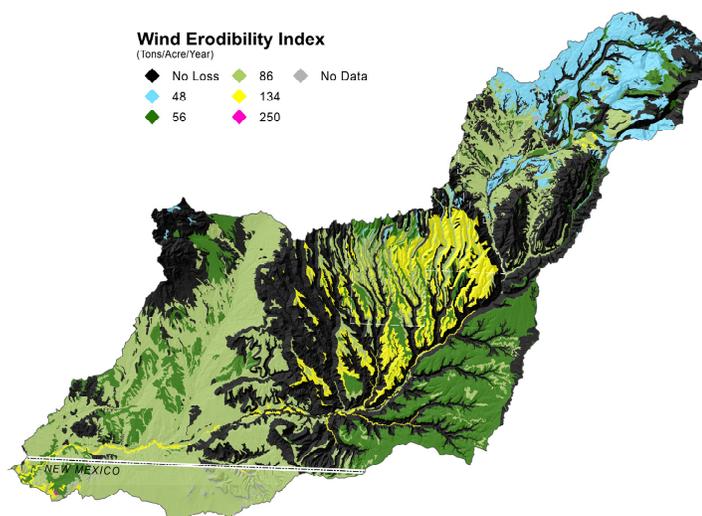
Class 6 - soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 - soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 - soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.

The Wind Erodibility Index (WEI), is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion if it is assumed there is no vegetative cover or management.

Soils with an erodibility index equal to or greater than 8 are considered highly erodible.



State and Federal Threatened, Endangered, Candidate Species and Species of Special Concern

Common Name	Scientific Name	Class	State Status/Federal Status	Comments
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	Birds	Concern/None	Occurs in the watershed
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Birds	Threatened/None	Occurs in the watershed
Black-footed Ferret	<i>Mustela nigripes</i>	Mammals	Endangered/Endangered	May occur in the watershed
Boreal Toad	<i>Bufo boreas boreas</i>	Amphibians	Concern/None	May occur in the watershed
Burrowing Owl	<i>Athene cunicularia</i>	Birds	Threatened/None	May occur in the watershed
Canada Lynx	<i>Lynx canadensis</i>	Mammals	Endangered/Threatened	May occur in the watershed
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Fish	Endangered/Endangered	May occur in the watershed
Colorado River Cutthroat Trout	<i>Oncorhynchus clarki virginalis</i>	Fish	Concern/None	Occurred historically in the watershed; not currently known
Colorado Roundtail Chub	<i>Gila robusta</i>	Fish	Concern/None	May occur in the watershed
Common Kingsnake	<i>Lampropeltis geluta</i>	Reptiles	Concern/None	May occur in the watershed
Ferruginous Hawk	<i>Buteo regalis</i>	Birds	Concern/None	May occur in the watershed
Longnose Leopard Lizard	<i>Gambelia wislizenii</i>	Reptiles	Concern/None	May occur in the watershed
Mancos Milkvetch	<i>Astragalus humilimus</i>	Plants	None/Endangered	Occurs in/near to the watershed
Mesa Verde Cactus	<i>Sclerocactus mesae-verdae</i>	Plants	None/Threatened	Occurs in/near to the watershed
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Birds	Threatened/Threatened	May occur in the watershed
Midget Faded Rattlesnake	<i>Crotalus viridis concolor</i>	Reptiles	Concern/None	May occur in the watershed
Northern leopard frog	<i>Rana pipiens</i>	Amphibians	Concern/None	Occurs in the watershed
Razorback Sucker	<i>Xyrauchen texanus</i>	Fish	Endangered/Endangered	May occur in the watershed
River Otter	<i>Lontra Canadensis</i>	Mammals	Threatened/None	May occur in the watershed
Sleeping Ute Milkvetch	<i>Astragalus tortipes</i>	Plants	None/Concern	Occurs in the watershed
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Birds	Endangered/Endangered	May occur in the watershed
Townsend's big-eared bat (pale ssp)	<i>Corynorhinus townsendii pallescens</i>	Mammals	Concern/None	May occur in the watershed
Western Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Birds	Concern/Candidate	May occur in the watershed

The terrestrial habitats in this watershed include significant amounts of pinon-juniper, greasewood, and rabbitbrush shrub communities, grassland, and agricultural land. Smaller amounts of aspen and an Englemann spruce-fir mix dominate high elevation areas. Small amounts of Douglas fir and ponderosa pine are found in lower elevation drainages. Riparian areas and wetlands provide important aquatic habitats for a number of species providing food, cover, or water at some life stage.

Wildlife found at the highest elevations in the Mancos watershed include lynx and white-tailed ptarmigan. Several economically important species found throughout the watershed include: black bear, elk, mule deer, mountain lion, and trout. Wild turkey are found in the north half of the watershed.

Social Data

	Montezuma	San Juan
	36.5% of county in the watershed	0.01% of county in the watershed
Demographics (US Census, American Factfinder)		
Total population	23,830	558
Male	11,716	293
Female	12,114	265
Median age (years)	38	43.7
White	19,474	542
Black or African American	33	0
American Indian and Alaska Native	2676	4
Asian	48	1
Native Hawaiian and Other Pacific Islander	15	2
Some other race	1015	4
Hispanic or Latino (of any race)	2263	41
Economic Characteristics (US Census, American Factfinder)		
In labor force (population 16 years and over)	11,434	329
Median household income (dollars)	32,083	30,764
Median family income (dollars)	38,071	40,000
Per capita income (dollars)	17,003	17,584
Families below poverty level	859	21
Individuals below poverty level	3836	115
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)		
Farms (number)	829	1
Land in farms/ranches (acres)	818,677	
Average size farm/ranch (acres)	988	
Median size farm (acres)	105	
Average age of farmer or rancher	56	
Net cash return from ag sales (\$1,000)	-2,661	
Cattle and calves (number)	15,000	

Mancos Watershed Natural Resource Concerns

Note: The Mancos Conservation District identified and prioritized the following natural resource concerns on private lands during facilitated public meetings and are included in their Long Range Plan:

Priority	Natural Resource Concern
1	Water Resource Management
2	Noxious Weed Control
3	Rangeland Improvement

Additional Resource Concerns

At the request of the Mancos Conservation District, an investigation was undertaken by the USDA Natural Resources Conservation Service in 2001 with assistance from Reclamation's UC Region, the Colorado River basin states, and the U.S. Geological Survey to determine the feasibility of implementing salinity control measures on irrigated agricultural lands in the Mancos Valley.

The Mancos River contributes an average of 42,300 to 43,000 tons of salt annually to the Colorado River. Approximately 26,000 tons comes from irrigation practices.

The proposed project will reduce seepage from 60 percent of the 26 ditches and increase irrigation efficiency to reduce deep percolation on 5,400 acres of agricultural land. The project plans to convert 228,940 linear feet of earthen irrigation ditches to underground pipelines. Another 71,558 feet of irrigation ditch will be treated with polyacrylamide to reduce seepage. Sprinkler irrigation systems will be installed on 4,070 acres; improved surface irrigation systems will be installed on 1,330 acres. The planned total annual salt load reduction is approximately 12,000 tons. The total federal cost of project implementation is calculated as \$8,753,357.

Other Assessments and Studies

Functional Assessment of the Mancos Watershed: Mancos Valley and Adjacent Areas, by Peter Stacey, Department of Biology, University of New Mexico, <http://biology.unm.edu/stacey/Functional%20Assessment%20of%20the%20Mancos%20River%20Watershed.pdf>

Mancos Valley Salinity Control Report, USDA, NRCS, Lakewood Colorado, 80215, Contact: Frank Riggle,

Additional Resource Concerns

Salinity

At the request of the Mancos Conservation District, an investigation was undertaken by the USDA Natural Resources Conservation Service in 2001 with assistance from Reclamation's UC Region, the Colorado River basin states, and the U.S. Geological Survey to determine the feasibility of implementing salinity control measures on irrigated agricultural lands in the Mancos Valley.

The Mancos River contributes an average of 42,300 to 43,000 tons of salt annually to the Colorado River. Approximately 26,000 tons comes from irrigation practices.

The proposed project will reduce seepage from 60 percent of the 26 ditches and increase irrigation efficiency to reduce deep percolation on 5,400 acres of agricultural land. The project plans to convert 228,940 linear feet of earthen irrigation ditches to underground pipelines. Another 71,558 feet of irrigation ditch will be treated with polyacrylamide to reduce seepage. Sprinkler irrigation systems will be installed on 4,070 acres; improved surface irrigation systems will be installed on 1,330 acres. The planned total annual salt load reduction is approximately 12,000 tons. The total federal cost of project implementation is calculated as \$8,753,357.

Mancos Valley Water Conversions

In an effort to accommodate the growth of the Mancos Valley, Mancos Rural Water Company and the Mancos Water Conservancy designed a system to convert agricultural water rights to Municipal and Industrial use.

Other Assessments and Studies

Mancos Valley Salinity Control Report, USDA, NRCS, Lakewood Colorado, 80215, Contact: Frank Riggle, ASTC, Water Resources, 720-544-2804.

Ute Mountain Ute Tribe – Written by Scott Clow, Water Quality Specialist with the Environmental Programs Department, Ute Mountain Ute Tribe

Slightly over half of the Mancos Watershed landmass falls within the Ute Mountain Ute Reservation boundaries. An overview of the primary environmental concerns as documented by the Tribe's Environment Resource Department reports that selenium levels coming out of Navajo Wash, a primary tributary to the Mancos River, are at dangerously high levels. The overview also discusses the threats to their fisheries, the challenges posed by erosion from forest fire areas along the eastern escarpment of Mesa Verde National Park, and from upstream diversion.

Mesa Verde Natural Resources Priority Checklist –Written by George San Miguel

George San Miguel, Natural Resource Manager for Mesa Verde National Park, wrote a summary of natural resource priorities for the park.

The East Fork of the Mancos River

The Mancos River forms three channels from its origins in Rush Basin; the East Fork, Middle Fork, and West Fork. One of these, the East Fork, has up to twenty legacy mine sites. The East Fork is listed on the Colorado state list of impaired water bodies. Over the course of assembling this watershed assessment, we have found at least four different water quality studies done on the East Fork. One was a San Juan National Forest Service Study performed in 1998. One was a Master's Thesis project done in 2003 by a student from Arizona State University. A third study was a joint project between the US Forest Service and the USGS. A fourth study was done by the Colorado DPHE in 2005 at the request of a landowner who noticed green water in the East Fork. Contact Felicity Broennan at felicitytoys@hotmail.com if you are interested in learning more about these studies.

Other Assessments and Studies, continued

Mancos River Riparian Corridor Study – Written by Dr. Peter Stacey, Research Professor, University of New Mexico Biology Department

In June of 2006, the Mancos Conservation District hired Dr. Pete Stacey to perform an evaluation of the Mancos River riparian corridor using the Rapid Assessment of the Functional Conditions of Stream Riparian Ecosystems of the American Southwest protocol. Dr. Stacey studied 17 reaches along the River including a reach along Chicken Creek and on the Mesa Verde National Park reach of the river. The five ecosystem criteria used were: 1) water quality and pollution 2) stream channel and flood plain morphology and the ability of the system to limit erosion and withstand flooding without damage, 3) the presence of habitat for native fish and other aquatic species, 4) vegetation structure and composition, including the occurrence and relative dominance of exotic or non-native species, and , 5) suitability as habitat for terrestrial wildlife, including threatened or endangered species.

The survey sites were selected according to geomorphology and overall representation of a particular area. They were performed throughout the watershed beginning upstream at an elevation of approx. 8,000 ft. and ending on Mesa Verde National Park land at approx. 6,000 ft. elevation.

Our preliminary findings note that the Mancos Valley has a unique opportunity to restore some highly impacted corridors and protect what appears to be overall, fairly healthy, especially when compared to similar southwestern riparian areas.

Selected Conservation Application Data							
	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Total
Total Conservation Systems Planned (Acres)	0	9,569	na	23,419	138,874	28,847	200,709
Total Conservation Systems Applied (Acres)	0	9,116	na	1,126	159,622	27,892	197,756
Practices Applied							
Prescribed Grazing	0	8,603	0	0	170,582	23,041	202,226
Wildlife Habitat Management-upland and wetland	0	0	0	287	83	246	616
Irrigation Water Management	0	0	5	63	90	194	352

Conservation Systems to Address Major Resource Concerns

Primary Resource Concern: Rangeland Health				
Conservation System Description:	Prescribed Grazing—planned management that provides adequate recovery opportunity between grazing events and proper stocking of animals. Estimate 144,900 acres to be treated on a median sized ranch of acres.			Based on Conservation System Guide Code: CO 36.1-GR-01-R-Grazing
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost per Median Sized Ranch (\$)
Prescribed Grazing				
Fence (382)	Ft.	1,100	1.00	1,100.00
Pest Management (595)	Ac.	50	65.00	3,250.00
Pipeline (516)	Ft.	1,000	3.00	3,000
Upland Wildlife Habitat Management (645)	Ac.	10	na	0
Watering Facility (614)	No.	1	500	500.00
Costs to apply prescribed grazing per median sized ranch of 1,050 acres	No.	138		7,850.00
Subtotal Rangeland costs:				\$1,083,300

Conservation Systems to Address Major Resource Concerns (cont'd)

Primary Resource Concern: Water Quality-Salinity				
Conservation System Description: Improved Irrigation Water Management			Reference Conservation System Guide Code: CO-36.1-CR-Pivot	
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Irrigation Water Management	ac	7,020	na	\$8,753,357
Upland and Wetland Wildlife Habitat	ac	TBD		
Subtotal Irrigated Crops: \$8,753,357				

General Effects, Impacts, and Estimated Costs of Application of Conservation Systems

Landuse	Resource Concern	Measurable Effects	Non-measurable Effects	Estimated Cost (\$)
Rangeland	Plants		Improved plant condition, productivity, health and vigor. Grazing animals have adequate feed, forage, and shelter.	\$1,083,300
Irrigated Crop	Water	12,000 tons of salt reduction annually	Nutrients and organics are stored, handled, disposed of, and managed so that surface water uses are not adversely affected. Wildlife is not adversely impacted	\$8,753,357
Estimated Total Costs to Address Major Resource Concerns:				\$9,836,657

REFERENCES

(DATA AND INFORMATION NOT CITED IN DOCUMENT)

303(d) listed streams within the Watershed were created using data from Colorado Department of Public Health & Environment's Water Quality & Control Commission. Impaired streams are current as of April 30, 2006. For a list of all Colorado impaired streams, locations and priority ratings, visit <http://www.cdphe.state.co.us/regulations/wqccregs/100293wqlimitedsegtmdls.pdf>.

Threatened and Endangered Species information was gathered by the NRCS State Biologist, 720-544-2813.

Maps were generated using Soil Survey Geographic Database (SSURGO) tabular and spatial data. SSURGO data was downloaded for the following Colorado & New Mexico surveys:

- Ute Mountain Area (CO670) Published 01/08/2007
- Cortez Area (CO671) Published 01/10/2007
- Animas-Dolores Area (CO672) Published 01/08/2007
- San Juan County (NM717) Published 01/13/2007

Vegetation data was generated using the Colorado Division of Wildlife's "Colorado Vegetation Classification Project" (CVCP) data. Completed in 2003, the CVCP is a landscape level vegetation dataset created using Landsat TM imagery and then formatted for GIS use. The species identified are an overview of the most common species associated in each cover type, in order of greatest occurrence. For more information on the Colorado Vegetation Classification Project, visit <http://ndis.nrel.colostate.edu/coveg>.

All border states (if applicable) vegetation data courtesy of the National Land Cover Dataset (NLCD). For more information visit http://www.mrlc.gov/mrlc2k_nlcd.asp

Common Resource Area (CRA), a subdivision of the Major Land Resource Area (MLRA), is a geographical area where resource concerns, problems, or treatment needs are similar. Geographic boundaries of a CRA are determined by landscape conditions, soil, climate, human considerations and other natural resource information. For more information on Common Resource Areas visit <http://soils.usda.gov/survey/geography/cra.html>.

Average Annual Precipitation data was developed through a partnership between the Natural Resources Conservation Service's (NRCS) National Water and Climate Center (NWCC), the National Cartography and Geospatial Center (NCGC), and the PRISM (the Parameter-elevation Regressions on Independent Slopes Model) group at Oregon State University (OSU), developers of PRISM. Mean annual precipitation maps were developed calculating averages of rainfall for the period of 1961-1990. For more information on PRISM data visit <http://www.ncgc.nrcs.usda.gov/products/datasets/climate/docs/fact-sheet.html> or for more information about technical aspects of PRISM, visit the PRISM website at <http://www.ocs.orst.edu/prism>.

Land Ownership (status,07/22/2006 dataset) data was obtained from the Bureau of Land Management, Colorado State Office. For more information, visit http://www.blm.gov/co/st/en/BLM_Programs/geographical_sciences/gis.html

Relief & Elevation maps were created using the National Elevation Dataset (NED), 30m Digital Elevation Model (DEM) raster product assembled by the U.S. Geological Survey (USGS). A hillshade grid was created from the 30m DEM to create a 3D effect. For more information about the NED visit <http://ned.usgs.gov>. The data was downloaded from the NRCS Geospatial Data Gateway at <http://datagateway.nrcs.usda.gov>.

Conservation Systems to address major resource concerns were extracted from the Conservation Systems Guides (CSG) compiled from local conservationists by the NRCS Ecological Sciences Section at the Lakewood State Office. Contact is Eugene Backhaus, 720-544-2868.

Effects and Impacts of application of conservation systems were extracted from Colorado eFOTG, Section III, Resource Quality Criteria, NRCS, Colorado, March 2005 and USDI, Bureau of Reclamation, <http://www.usbr.gov/dataweb/html/mancos1.html>.

Mancos Valley Salinity Control Project, Plan and Environmental Assessment, USDA-Natural Resources Conservation Service, 2004.