

United States Department
of Agriculture



Natural Resources
Conservation Service

Lakewood, Colorado

RWA 14080101

Upper San Juan Watershed

Hydrologic Unit Code 14080101

May 2010

Rapid Assessment



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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.

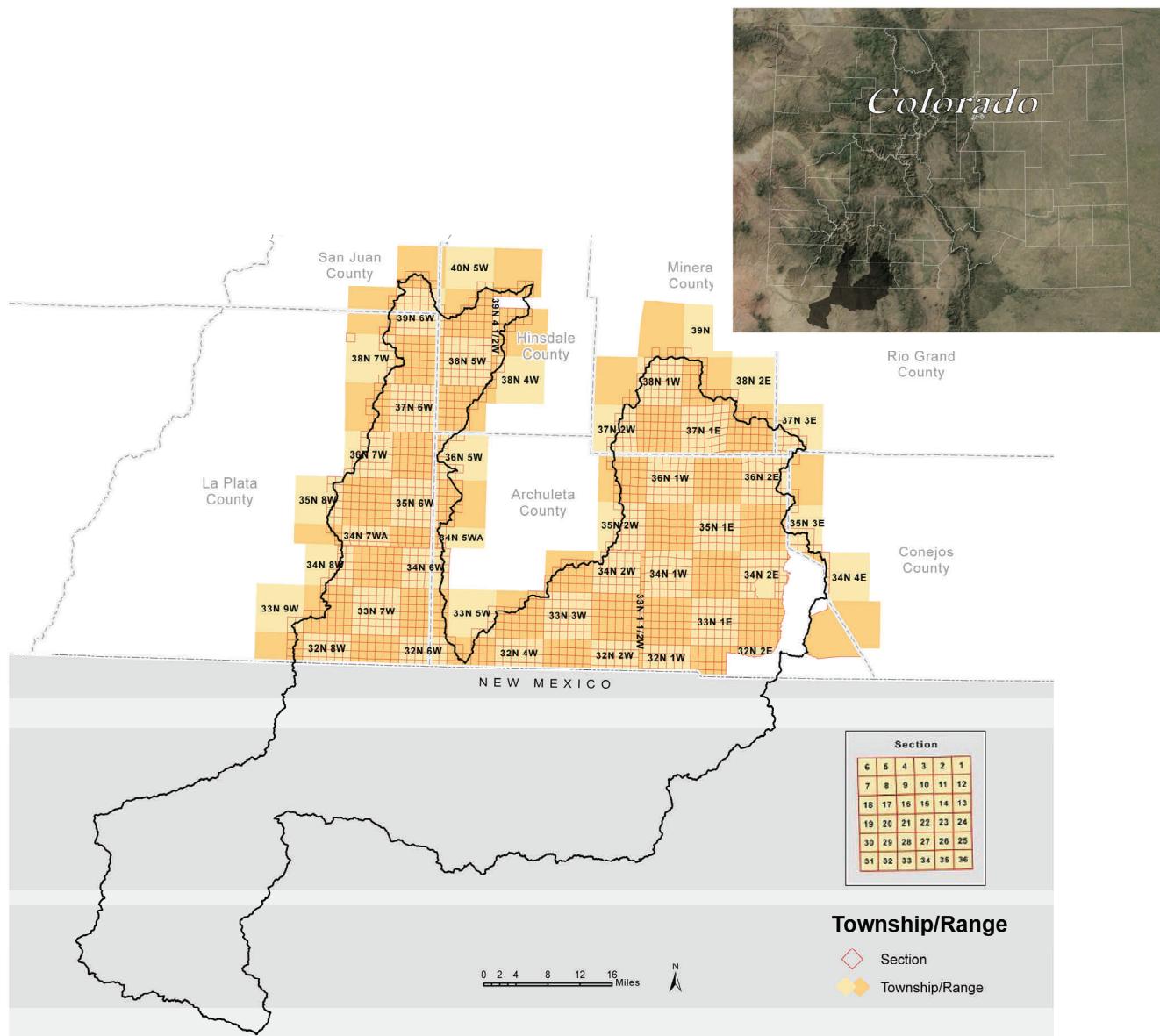
Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best 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.



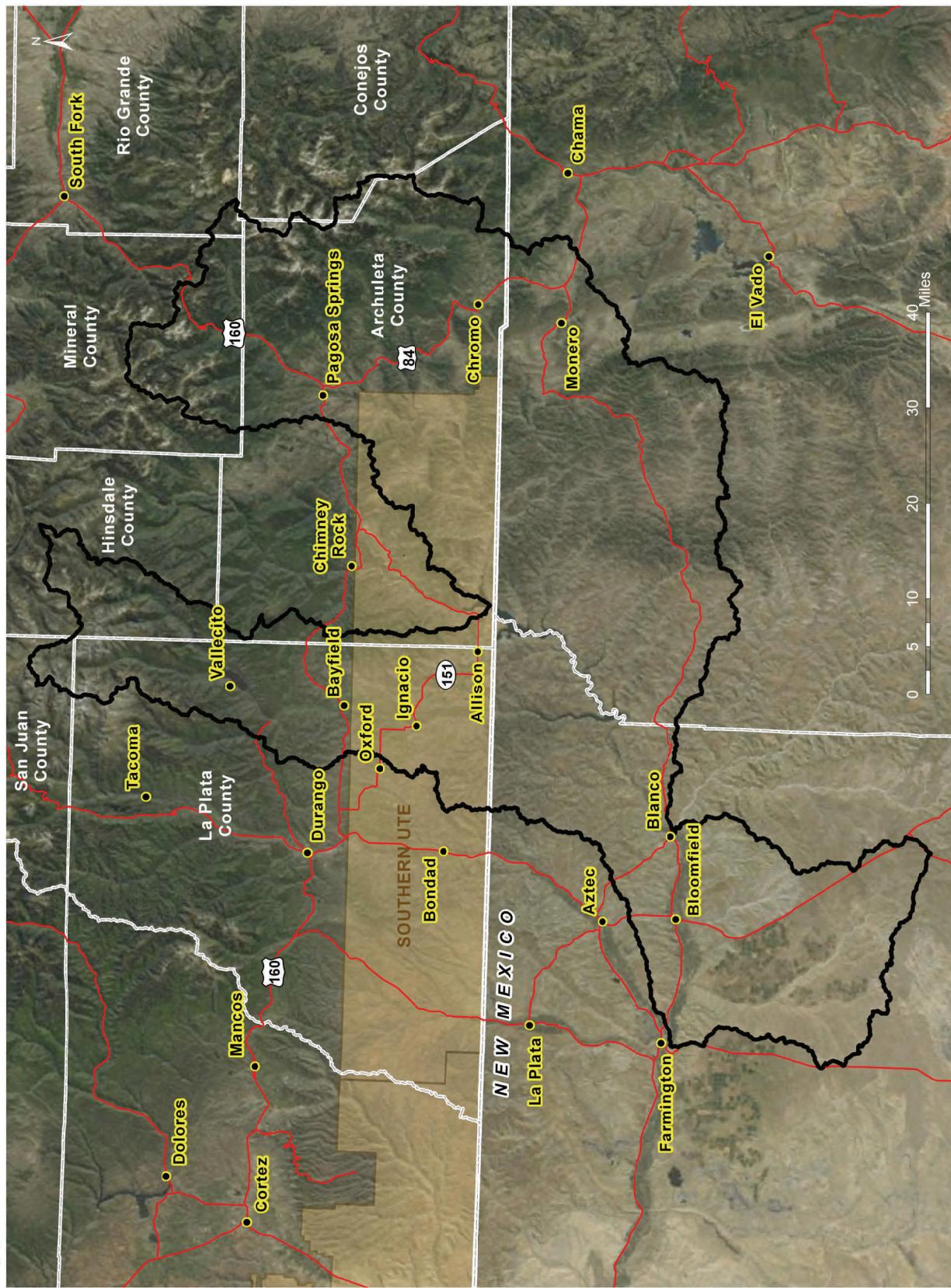
COLORADO County	County Acres	County Acres in UPPER SAN JUAN Watershed	% of County in the Watershed	% of Watershed in the County
Archuleta	859,537	544,610	63.4%	24.8%
Conejos	819,693	6,675	0.8%	0.3%
Hinsdale	719,387	75,254	10.5%	3.4%
La Plata	1,087,734	296,634	27.3%	13.5%
Mineral	562,080	100,298	17.8%	4.6%
Rio Grande	584,463	5,465	0.9%	0.2%
San Juan	249,413	11,911	4.8%	0.5%

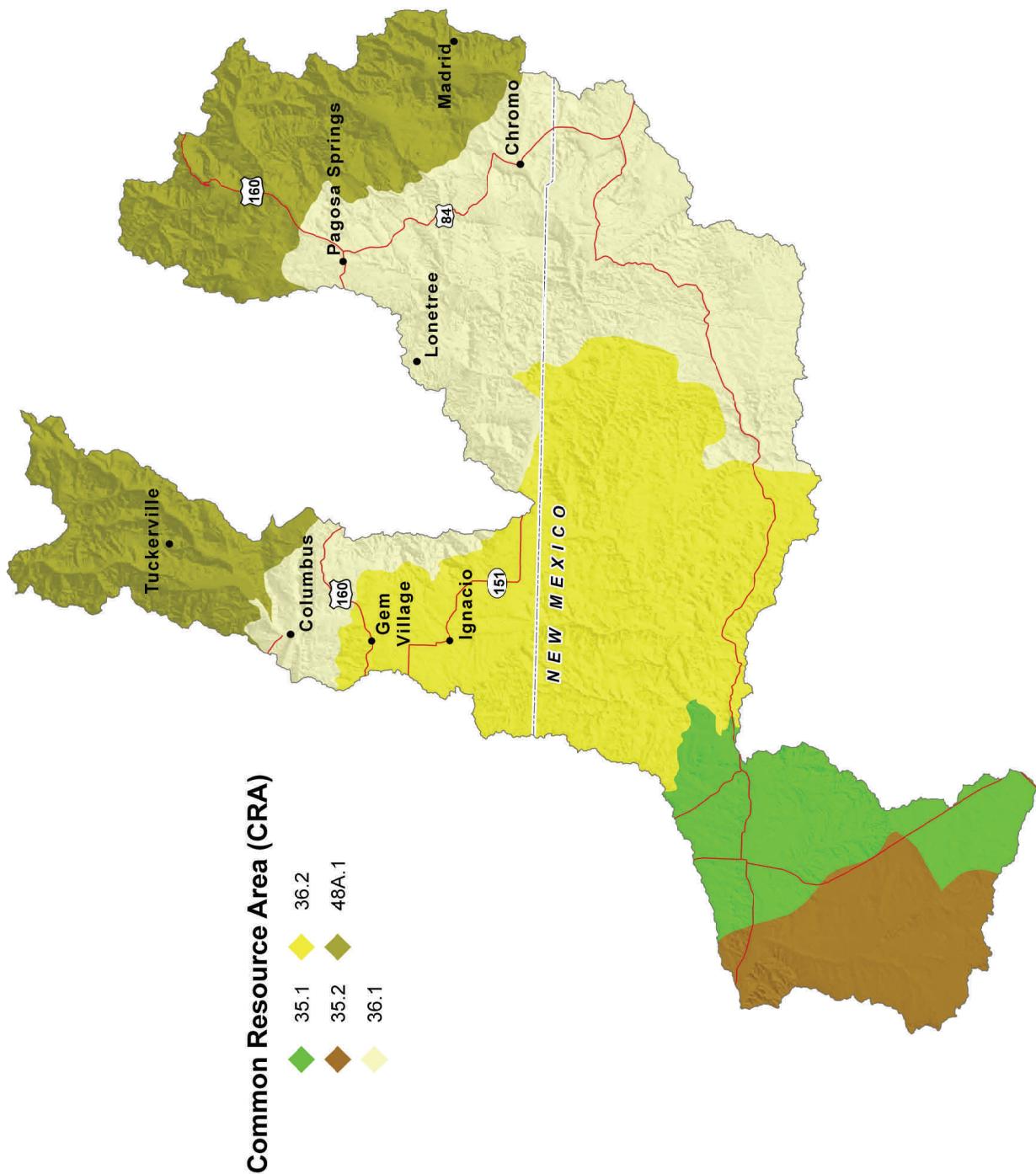
NEW MEXICO

San Juan	3,549,439	569,183	16.0%	25.9%
Rio Arriba	3,772,627	586,476	15.5%	26.7%

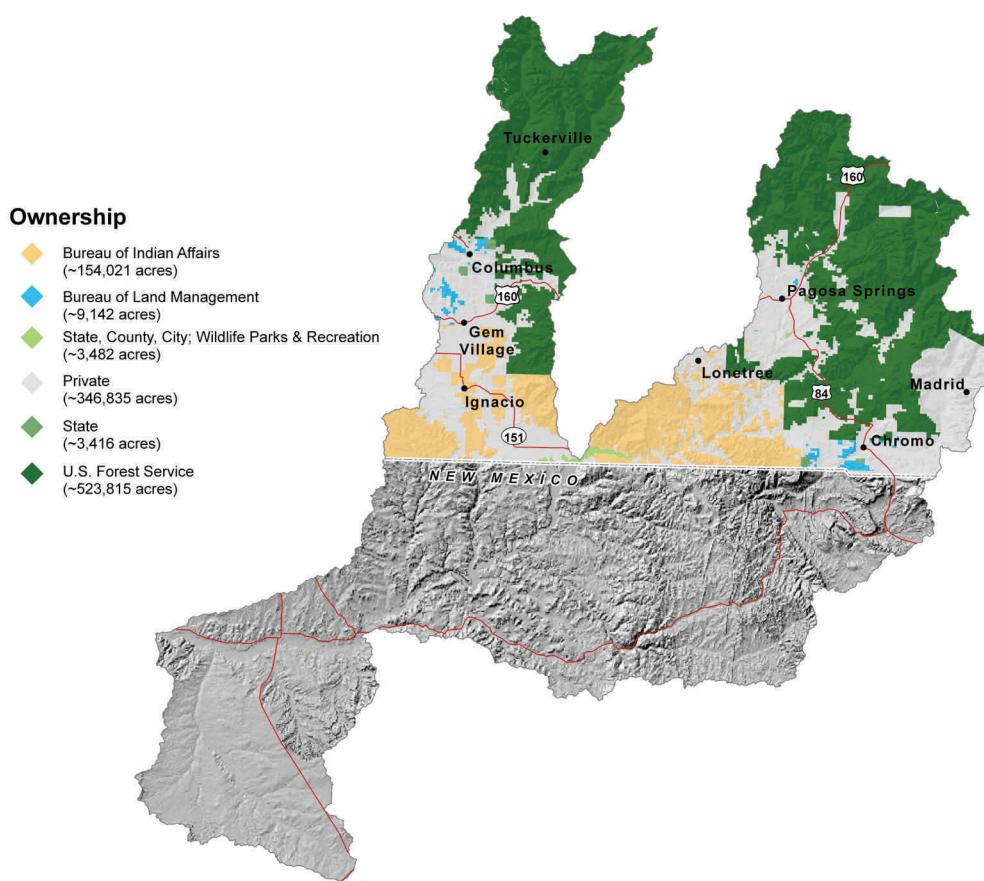
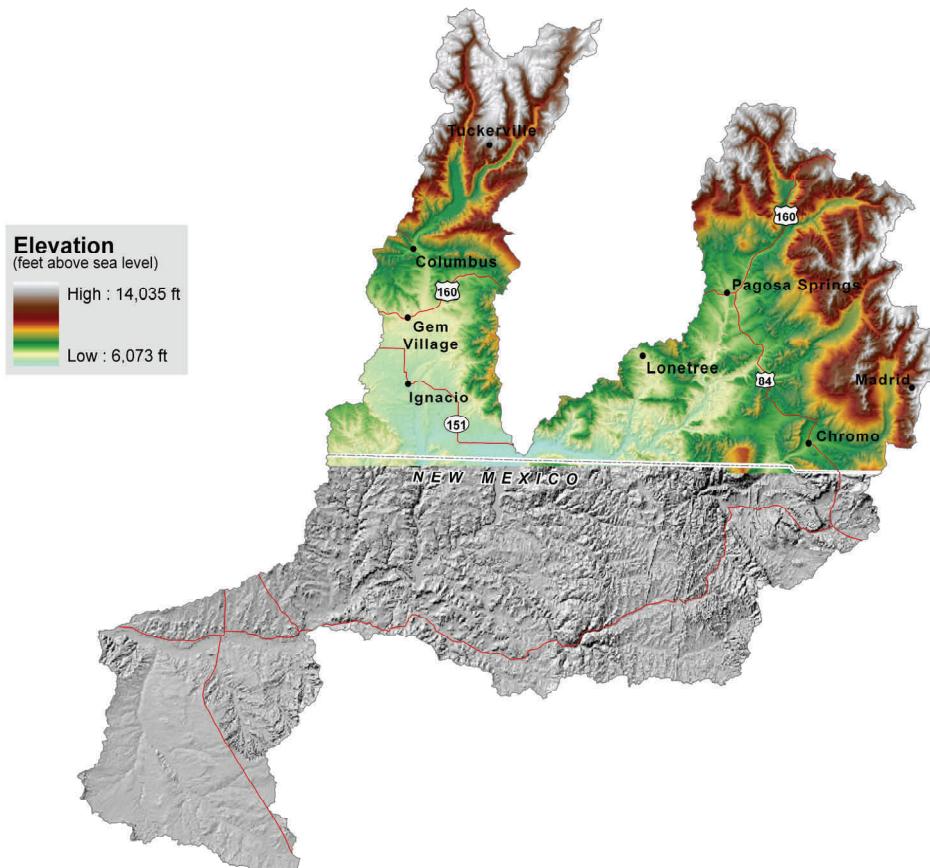
2,196,506

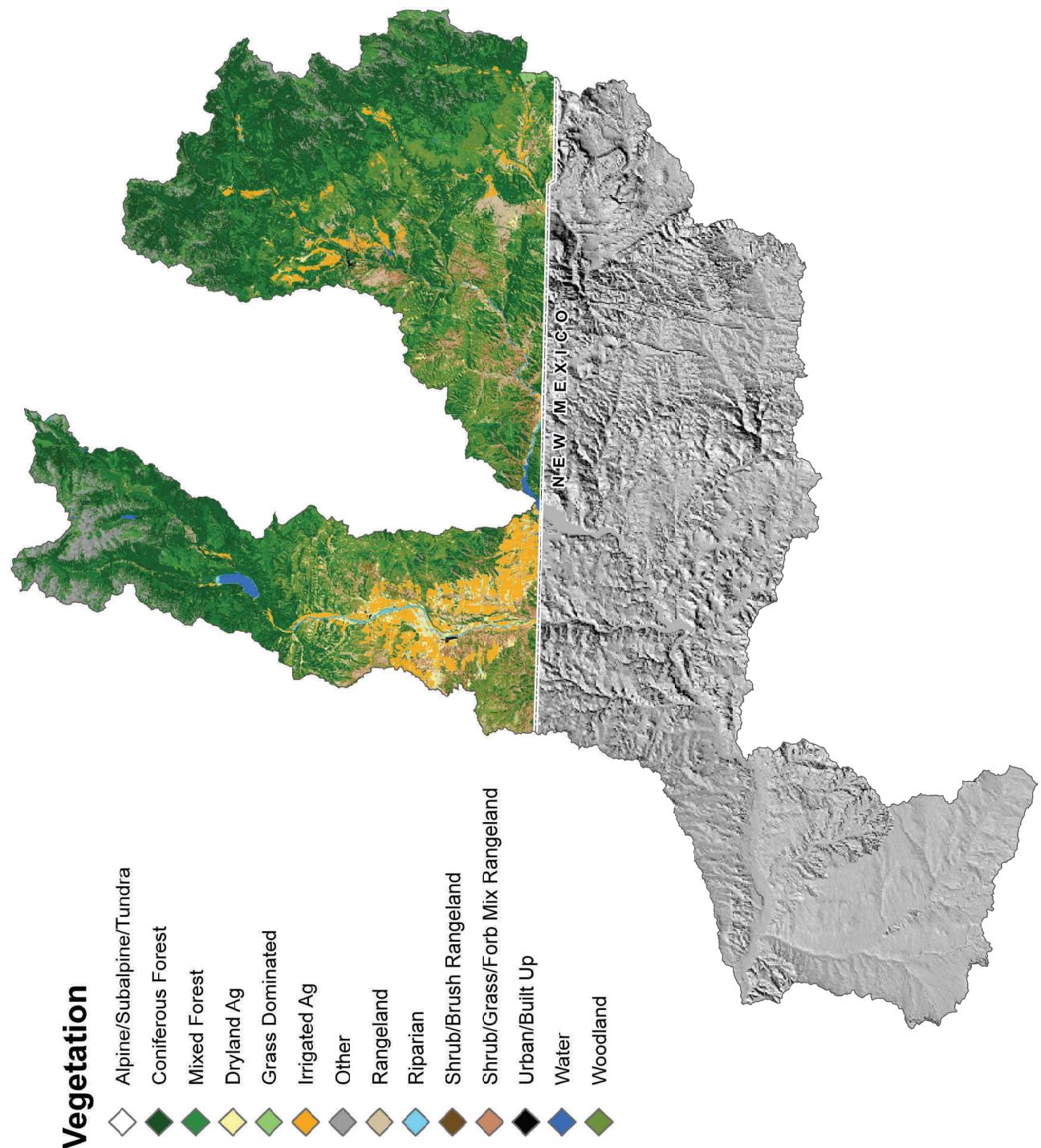
Upper San Juan - 14080101





MLRA	CRA	CRA NAME	CRA DESCRIPTION
35	35.1	Colorado Plateau Mixed Grass Plains	This area occurs at elevations ranging from 5100 to 6000 feet and precipitation averaging 10 to 14 inches per year. Vegetation includes <i>Stipa</i> species, Indian ricegrass, galleta, blue grama, fourwing saltbush, winterfat, and cliffrose. The soils in the area have a mesic soil temperature regime and an ustic aridic soil moisture regime. The dominant soil orders are Aridisols and Entisols. Shallow and deep, moderately coarse to moderately fine-textured, soils occur on sandstone and shale plateaus.
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.



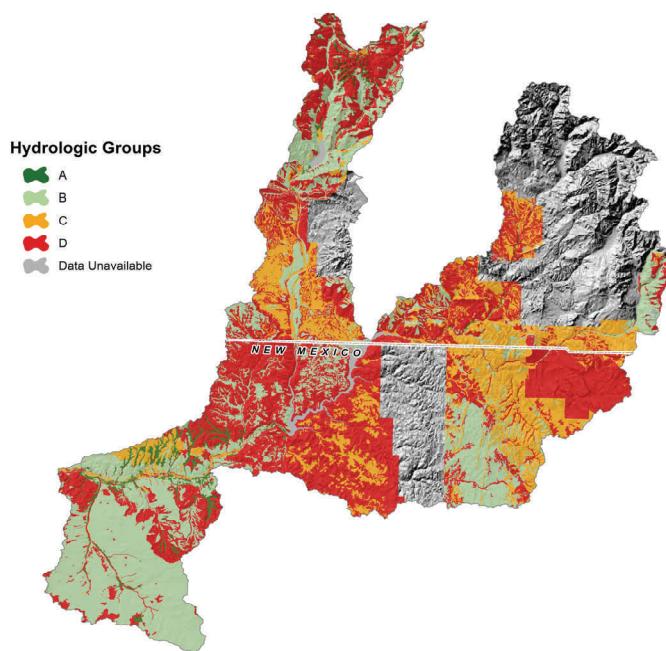
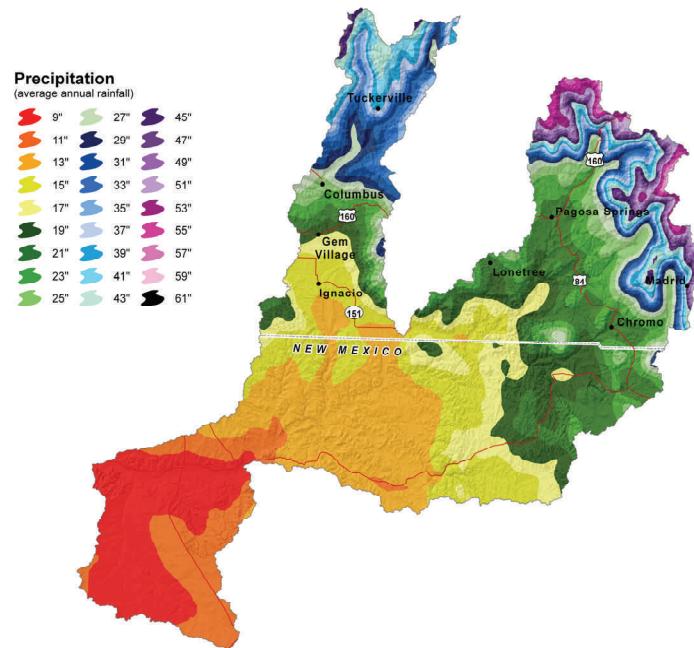


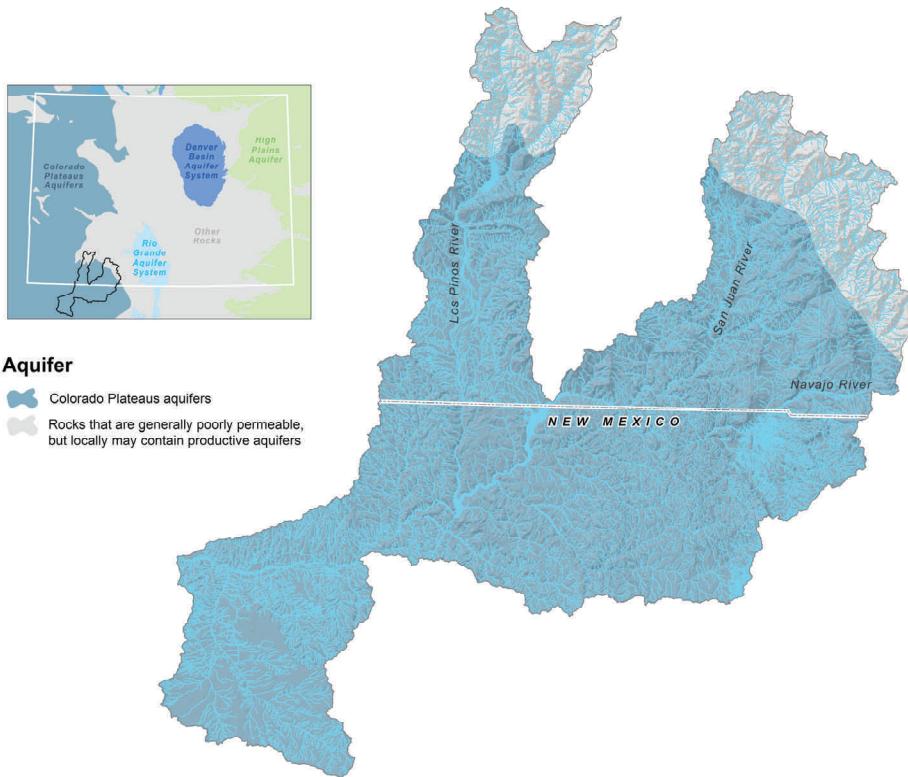
UPPER SAN JUAN WATERSHED Land Use	Total Acreage	Vegetation	Acreage
Cropland	64,371	Dryland Ag Irrigated Ag*	11,670.0 52,701.0
Rangeland/Grassland	323,592	Grass Dominated Grass/Forb Mix Grass/Forb Rangeland Gambel Oak Mesic Mountain Shrub Mix PJ-Mtn Shrub Mix PJ-Oak Mix PJ-Sagebrush Mix Pinon-Juniper Rabbitbrush/Grass Mix Sagebrush Community Sagebrush/Grass Mix Shrub/Grass/Forb Mix Sparse PJ/Shrub/Rock Mix	722.6 0.8 72,867.7 114,477.1 20,247.2 1,007.6 12,694.4 25,736.8 26,691.1 11.6 20,692.5 28,343.9 67.6 30.9
Forest	501,618	Aspen Douglas Fir Douglas Fir/Aspen Mix Douglas Fir/Englemann Spruce Mix Englemann Spruce/Fir Mix P. Pine/Gambel Oak Mix Ponderosa Pine Ponderosa Pine/Aspen Mix Ponderosa Pine/Douglas Fir Mix Spruce/Fir/Aspen Mix	46,958.7 58,763.2 5,486.8 0.8 161,714.0 113,857.4 86,922.0 32.1 102.4 27,780.5
Riparian	18,017	Cottonwood Forested Riparian Herbaceous Riparian Riparian Sedge Shrub Riparian Willow Upland Willow/Shrub Mix	14.2 0.5 32.1 8,720.0 87.6 14.5 248.2 8,899.7
Water	5,720	Water	5,720.2
Other	128,928	Alpine Grass Dominated Alpine Grass/Forb Mix Alpine Meadow Barren Land Rock Soil Talus Slopes & Rock Outcrops Urban/Built Up	678.3 335.8 51,655.8 60.1 75,521.0 4.6 40.2 632.4
~Total Watershed Acres			1,042,246

* Colorado Decision Support Systems Data

Precipitation

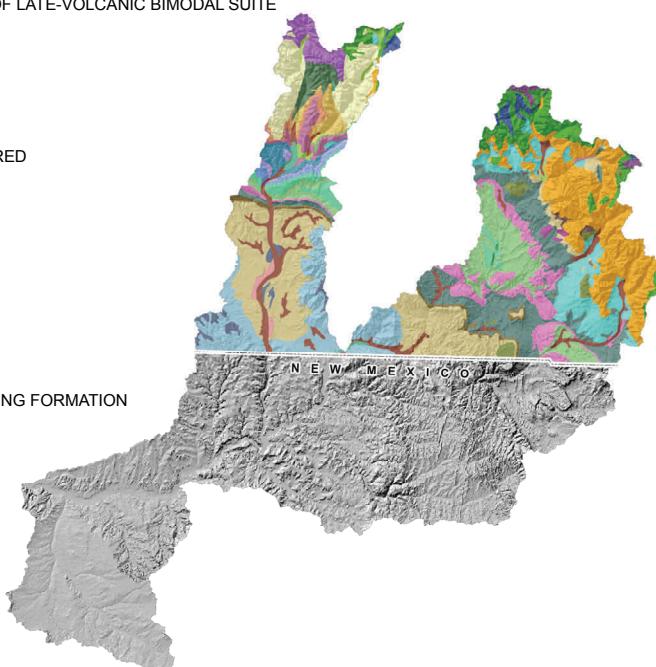
Droughts are regular visitors to the watershed as with the rest of Colorado. Statewide, in the 1900's alone, four prolonged dry spells occurred. There was one in the 1910s. Another, in the '30s, caused the dust-bowl period. The second worst drought on record in the state occurred in the mid-50s. A series of hot, dry summers following a period of scant mountain snowpack created water shortages. The fourth drought hit parts of Colorado in the late 1970s. In this century, the most severe drought since 1723 hit the state in 2002. Prior to the 1700's, researchers looking at tree ring records have found evidence of even more severe droughts, some lasting many years. Rainfall occurs as frontal storms in the spring and early summer and high intensity, convective thunderstorms in late summer. Maximum precipitation is from mid spring through late autumn. Precipitation in winter is usually snow.





Geology

- ANIMAS FORMATION
- ASH-FLOW TUFF OF MAIN VOLCANIC SEQUENCE
- BASALT FLOWS AND ASSOCIATED TUFF, BRECCIA, AND CONGLOMERATE OF LATE-VOLCANIC BIMODAL SUITE
- CUTLER FORMATION
- DAKOTA SANDSTONE AND BURRO CANYON FORMATION
- DOLORES FORMATION
- EOCENE PREVOLCANIC SEDIMENTARY ROCKS
- FELSIC AND HORNBLENDIC GNEISSES, EITHER SEPARATE OR INTERLAYERED
- GLACIAL DRIFT OF PINEDALE AND BULL LAKE GLACIATIONS
- GRANITIC ROCKS OF 1,400-M.Y. AGE GROUP (AGE 1,350-1,480 M.Y.)
- GRAVELS AND ALLUVIUMS (PINEDALE AND BULL LAKE AGE)
- INTRA-ASH FLOW ANDESITIC LAVAS
- INTRA-ASH-FLOW QUARTZ LATITIC LAVAS
- KIRTLAND SHALE AND FRUITLAND FORMATION
- LANDSLIDE DEPOSITS
- LEAVILLE LIMESTONE, GILMAN SANDSTONE, DYER DOLOMITE AND PARTING FORMATION
- LEAVILLE, GILMAN, DYER, PARTING, AND SAWATCH FORMATIONS
- MANCOS SHALE
- MESAVERDE GROUP, UNDIVIDED
- MIDDLE TERTIARY INTRUSIVE ROCKS (AGE 20-40 M.Y.)
- MODERN ALLUVIUM
- MORRISON FORMATION AND WANAKAH FORMATION
- MORRISON, WANAKAH, AND ENTRADA FORMATIONS
- OLDER GLACIAL DRIFT (PRE-BULL LAKE AGE)
- OLDER GRAVELS AND ALLUVIUMS (PRE-BULL LAKE AGE)
- PICTURED CLIFFS SANDSTONE AND LEWIS SHALE
- PRE-ASH-FLOW ANDESITIC LAVAS, BRECCIAS, TUFFS, AND CONGLOMERATES(GENERAL AGE 30-35 M.Y.)
- QUARTZITE, CONGLOMERATE, AND INTERLAYERED MICA SCHIST
- RICO AND HERMOSA FORMATIONS
- SAN JOSE FORMATION
- UNCOMPAHGRE FORMATION (OLDER THAN GRANITES OF 1,400-M. Y. AGE GROUP AND YOUNGER THAN GRANITES OF 1,700 M.Y. AGE GROUP)
- WATER



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.

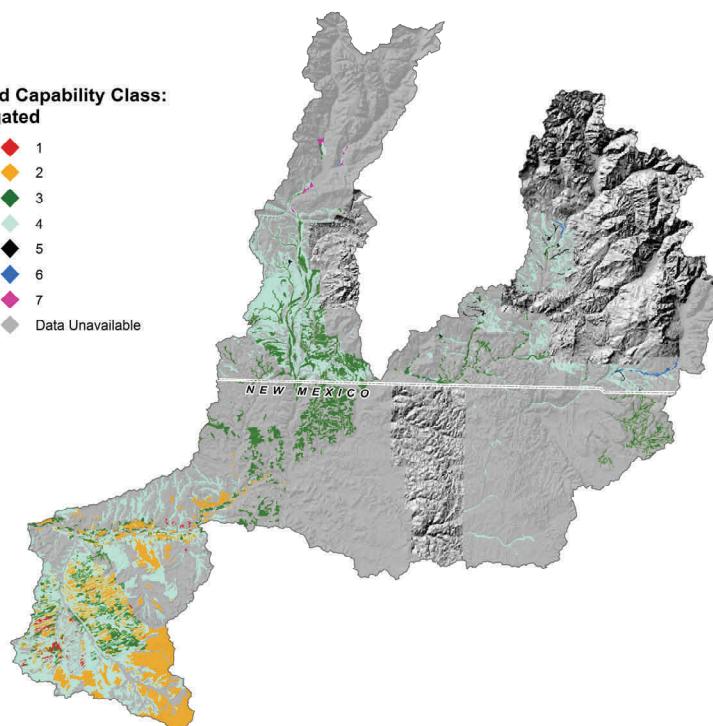
Class 6 - soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

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.

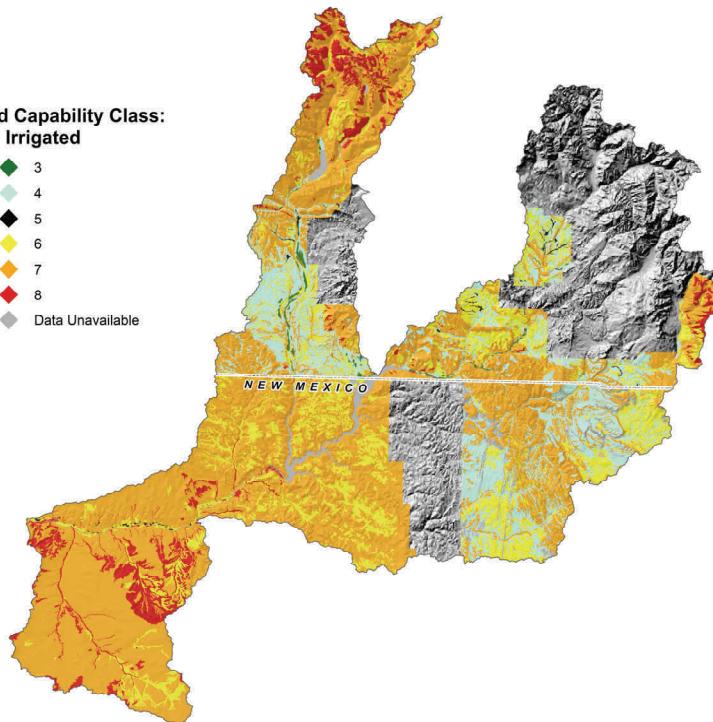
Land Capability Class:
Irrigated

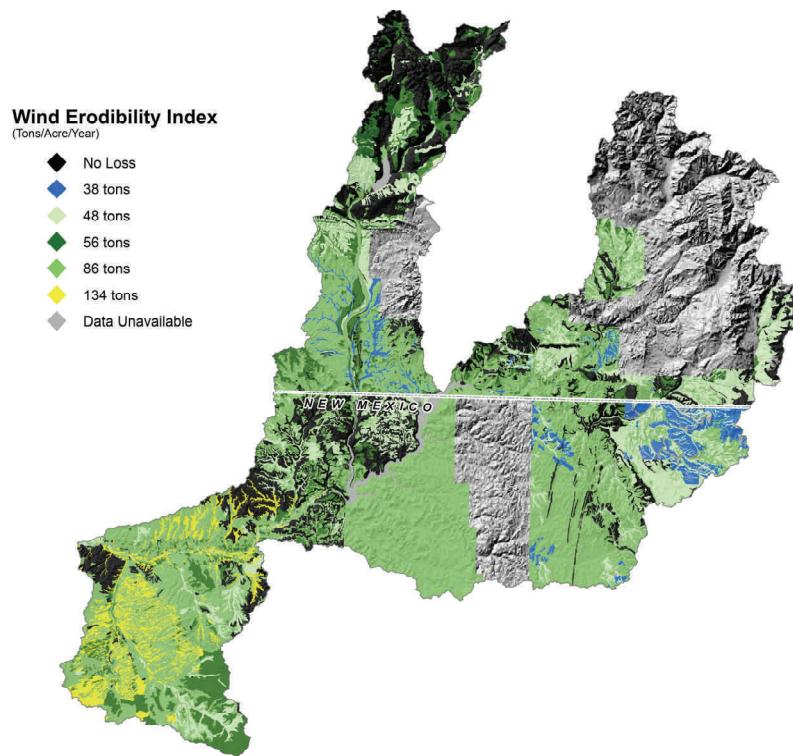
- ◆ 1
- ◆ 2
- ◆ 3
- ◆ 4
- ◆ 5
- ◆ 6
- ◆ 7
- ◆ Data Unavailable



Land Capability Class:
Non Irrigated

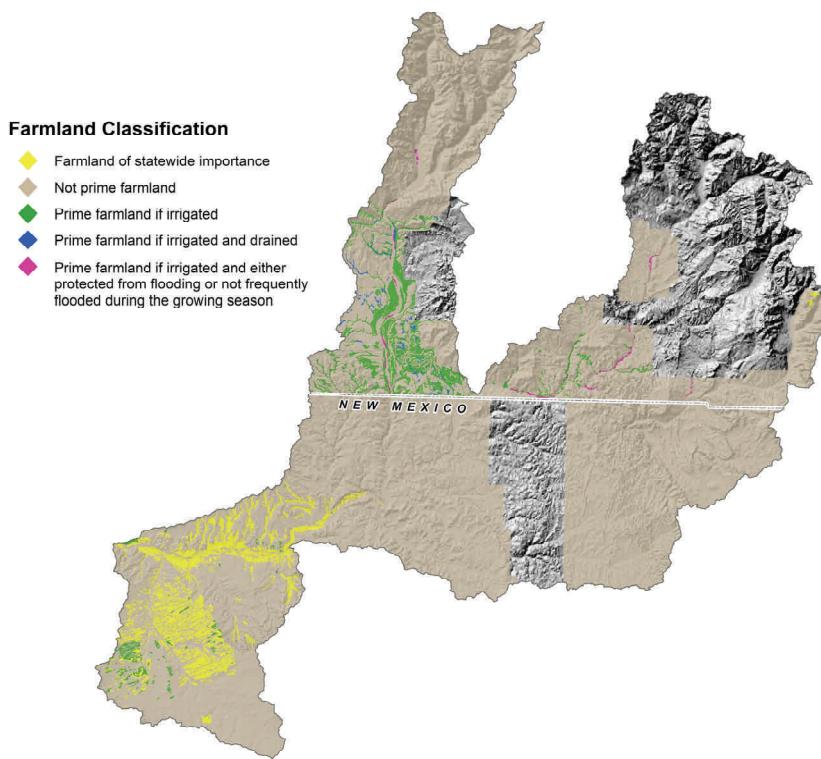
- ◆ 3
- ◆ 4
- ◆ 5
- ◆ 6
- ◆ 7
- ◆ 8
- ◆ Data Unavailable

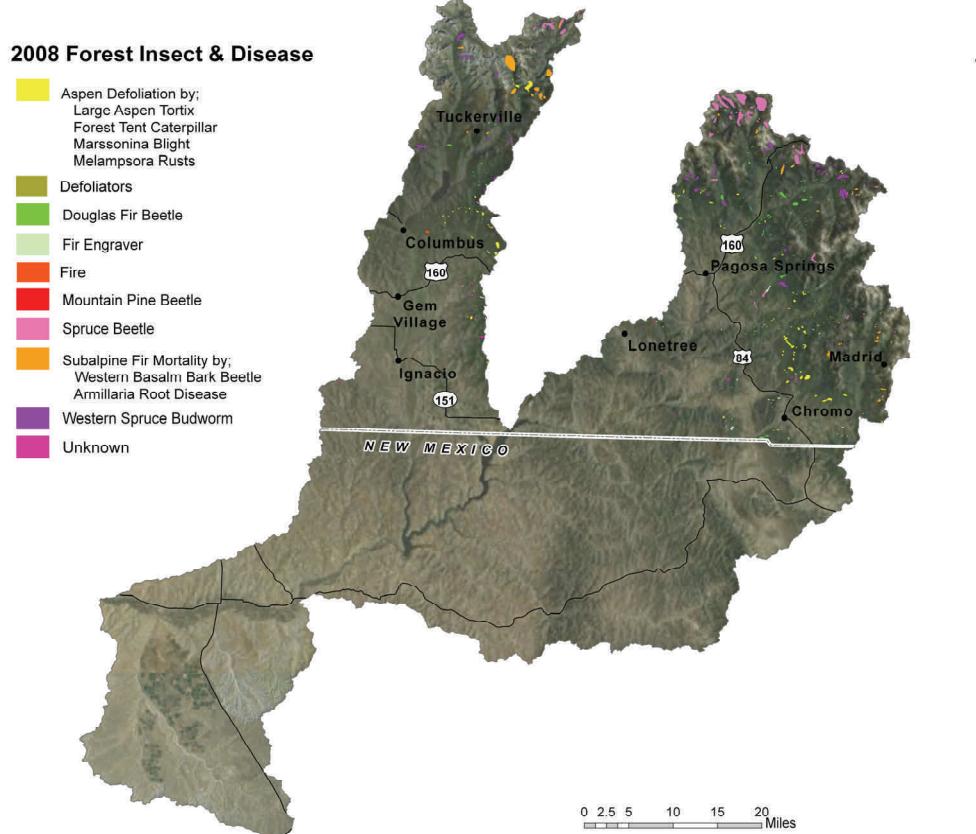
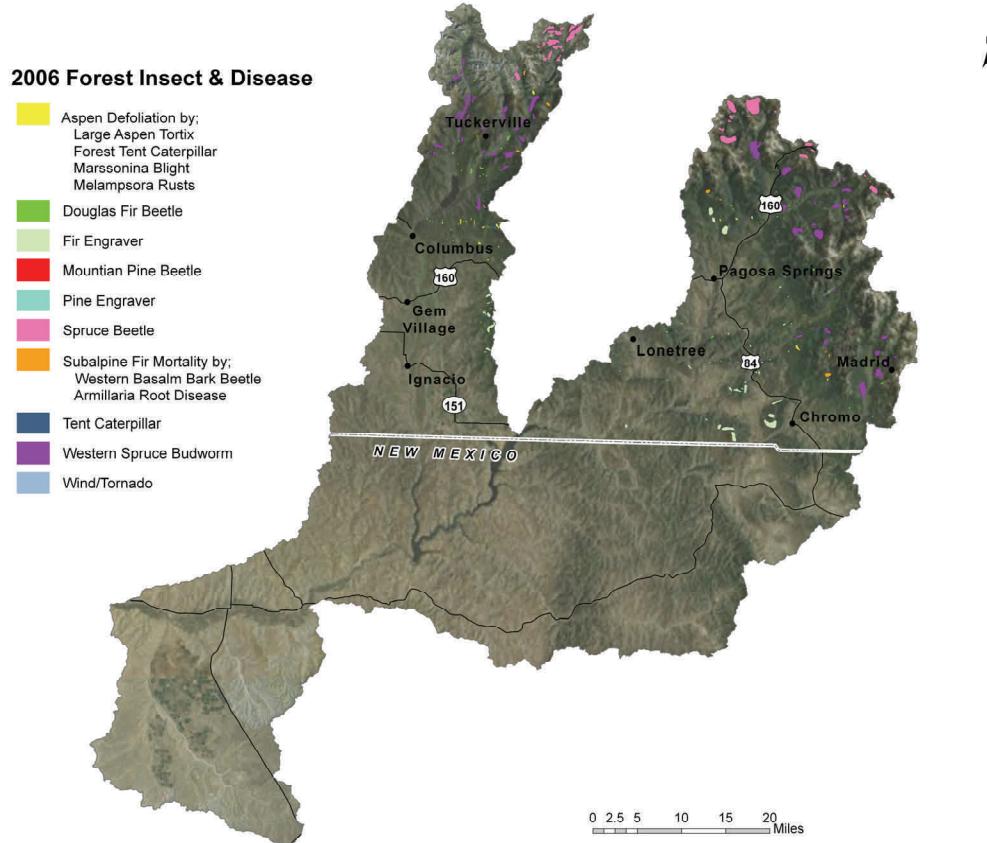




The Wind Erodibility Index (WEI): numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion if it is assumed there is no vegetative cover or management.

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





State and Federal Threatened, Endangered, and Candidate Species and Species of Special Concern in Upper San Juan Watershed

Common Name	Scientific Name	Class	State Status/Federal Status	Comments
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	Birds	Concern/	Occurs and nests in the watershed
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Birds	Threatened/None	Year-round resident of the watershed
Boreal Toad	<i>Bufo boreas boreas</i>	Amphibians	Endangered/None	May occur in the watershed
Canada Lynx	<i>Lynx canadensis</i>	Mammals	Endangered/Threatened	Occurs in the watershed
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Fish	Threatened/Endangered	Water depletions in the watershed may affect downstream habitats/fish
Colorado River Cut-throat Trout	<i>Oncorhynchus clarkii pleuriticus</i>	Fish	Concern/None	Occurs in the watershed
Colorado Roundtail Chub	<i>Gila robusta</i>	Fish	Concern/None	May occur in the watershed
Greater Sandhill Crane	<i>Grus canadensis tabida</i>	Birds	Concern/None	Occurs rarely in the watershed
Gunnison's Prairie Dog	<i>Cynomys gunnisoni</i>	Mammals	None/Candidate	Occurs in the watershed
Knowlton Cactus	<i>Pediocactus knowltonii</i>	Plants	None/Endangered	May occur in the watershed
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Birds	Threatened/Threatened	May occur in the watershed
New Mexico Meadow Jumping Mouse	<i>Zapus hudsonius luteus</i>	Mammals	None/Candidate	May occur in the watershed
Northern leopard frog	<i>Rana pipiens</i>	Amphibians	Concern/None	May occur in the watershed
Northern River Otter	<i>Lutra canadensis</i>	Mammal	Threatened/	Occurs in the watershed
Pagosa Skyrocket	<i>Ipomopsis polyantha</i>	Plants	None/Candidate	May occur in the watershed
Razorback Sucker	<i>Xyrauchen texanus</i>	Fish	Endangered/Endangered	Water depletions in the watershed may affect downstream habitats/fish
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Birds	Endangered/Endangered	May occur at low elevations in the watershed
Townsend's big-eared bat (pale ssp)	<i>Corynorhinus townsendii pallescens</i>	Mammals	Concern/None	Occurs in the watershed
Uncompahgre Fritillary Butterfly	<i>Boloria acrocnema</i>	Insects	None/Endangered	May occur in the watershed
Western Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Birds	Concern/Candidate	May occur in the watershed
Wolverine	<i>Gulo gulo</i>	Mammals	Endangered/None	Suitable habitat in watershed; No current records of occurrence

The terrestrial habitats in this watershed include irrigated land; small amounts of big sagebrush; oak, pinyon, and juniper shrublands; aspen, ponderosa pine, Douglas fir, and spruce-fir forest; and alpine tundra. Riparian areas, wetlands, and some lakes and ponds provide aquatic habitats for a number of species providing food, cover, or water at some life stage.

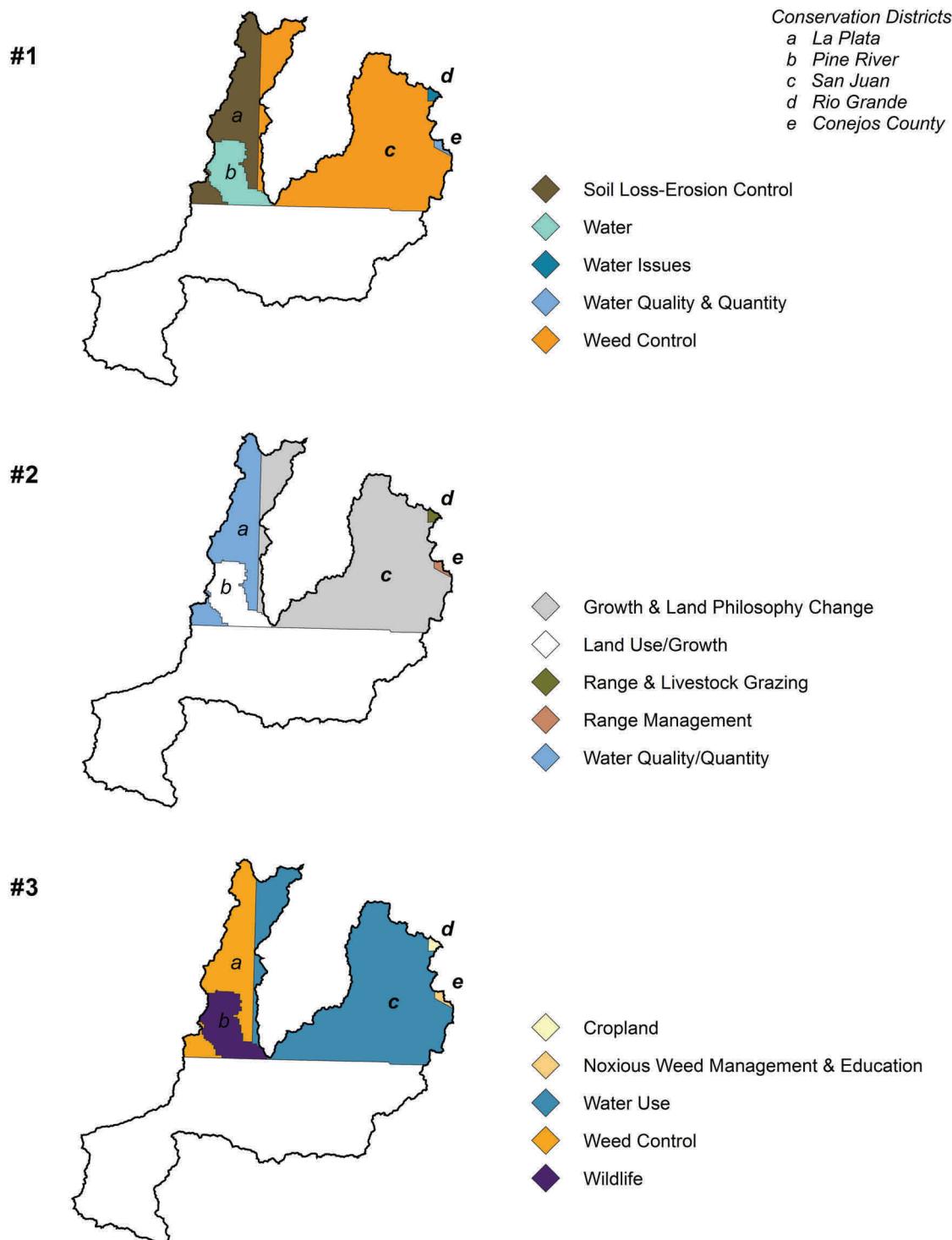
Wildlife found at the highest elevations in the watershed include pika, marmot, lynx, bighorn sheep, mountain goat, and white-tailed ptarmigan.

Economically important species in the watershed include: black bear, elk, moose, mule deer, mountain lion, and trout throughout most of the watershed. Wild turkeys use parts of the watershed and snow geese are found in or near the Los Pinos, Rio Blanco, and San Juan Rivers in the southern part of the watershed.

Social Data	Archuleta	Hinsdale	La Plata	Mineral
Demographics (US Census, American Factfinder)				
Total population	9,898	790	43,941	831
Male	5,016	406	22,362	424
Female	4,882	384	21,579	407
Median age (years)	40.8	43.9	35.6	45
White	8,743	769	38,364	805
Black or African American	35	0	136	0
American Indian and Alaska Native	139	12	2539	7
Asian	31	2	177	0
Native Hawaiian and Other Pacific Islander	3	0	24	0
Some other race	690	3	1712	1
Hispanic or Latino (of any race)	1659	12	4571	17
Economic Characteristics (US Census, American Factfinder)				
In labor force (population 16 years and over)	4,891	459	154,222	428
Median household income (dollars)	37,901	37,279	48,686	34,844
Median family income (dollars)	45,259	42,159	64,088	40,833
Per capita income (dollars)	21,683	22,360	26,963	24,475
Families below poverty level	261	11	x	24
Individuals below poverty level	1148	57	x	85
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)				
Farms (number)	258	19	1564	14
Land in farms/ranches (acres)	103,075	8,681	521,599	4,436
Average size farm/ranch (acres)	400	457	334	317
Median size farm (acres)	177	281	40	350
Average age of farmer or rancher	55.1	54.4	52.9	65.1
Net cash return from ag sales (\$1,000)	504	-333	124	90
Cattle and calves (number)	5,000	1,000	40,000	

Identified Long Range Resource Concerns

Top Three Concerns within Conservation Districts



Selected Conservation Practices Applied, FY 2005 through FY 2009*

Practice Code	Practice Name	Practice Unit	Applied Amount	Applied Count
511	Forage Harvest Management	ac	11,143	429
449	Irrigation Water Management	ac	10,308	430
528	Prescribed Grazing	ac	80,872	155

*Practices applied in Colorado portion of the watershed

Conservation Systems to Address Major Resource Concerns *from the Field Office Technical Guide*

Grazed Rangeland—The grazing Resources need improved plant condition (similarity index), productivity, health and vigor. Animals need feed, forage, and shelter. The animals are adapted to the climatic and ecological condition of the resources.

CO 36.2-GR-01

Practices	Description	Resource Concerns Addressed
314 Brush Management	This area encompasses the lower elevation mesas and Plateaus that represent the transition to the Southern Rocky Mountains. The typical vegetation is a scattered overstory of two needle pinyon and Utah juniper with a understory of big sagebrush and perennial bunchgrasses. In some areas pinyon and juniper can increase and become a dominant species.	Fish and Wildlife - T&E Species: Declining Species, Species of Concern
338 Prescribed Burning		Plant Condition - Productivity, Health and Vigor
378 Pond		
382 Fence		Soil Erosion - Sheet and Rill
528 Prescribed Grazing		Soil Erosion - Wind
574 Spring Development		
595 Pest Management		
614 Watering Facility		
645 Upland Wildlife Habitat Management		
666 Forest Stand Improvement		

Hayland—Wild flood irrigation system converted to Structure for Water Control, Underground & Gated Pipeline, IWM, and Forage Harvest Mgt.

CO 36.2-HY-Pipe-R-1

Practices	Description	Resource Concerns Addressed
430DD Irr. Water Conveyance, Pipeline, H	Cool season grasses, alfalfa, or alfalfa/grass hay. Annual precipitation ranges from 8 - 20". Moisture usually lacking in the summer during peak ET and supplemented with gravity irrigation, the water source may be ground or surface water; rainfall often comes in short intense spring and early summer storms and as snowfall in the winter. Wildlife potential for use by elk, deer and other wildlife.	Soil Erosion - Sheet and Rill
431 Above Ground, Multi-Outlet Pipeline		Soil Erosion - Wind
443 Irrigation System, Surface and Subsurface		Water Quantity - Inefficient Water Use on Irrigated Land
449 Irrigation Water Management		
511 Forage Harvest Management		
587 Structure for Water Control		

Pasture—This system is a converted wild flood to gated pipe irrigation system. Prescribed Grazing, Forage Harvest Management, Upland Wildlfie Habitat Mgt., and IWM are applied to improve plant health and production.	CO 48.1-PA-Gated–R-01
Practices	Description
382 Fence	Pasture consists of cool season grasses or a mix of cool season grasses and legumes. Pasture is often grazed during or after the growing season but sometimes one cutting of hay harvested and the regrowth is grazed in the fall or winter.
430DD Irr. Water Conveyance, Pipeline, H	Soil Erosion - Sheet and Rill
431 Above Ground, Multi-Outlet Pipeline	Soil Erosion - Wind
443 Irrigation System, Surface and Subsurface	Water Quantity - Inefficient Water Use on Irrigated Land
449 Irrigation Water Management	The Irrigation system is improved by installing a structure and gated pipe. The system efficiency is 35% with a net irrigation requirement of 16 inches.
511 Forage Harvest Management	
528 Prescribed Grazing	
587 Structure for Water Control	
614 Watering Facility	
645 Upland Wildlife Habitat Management	

Estimated Costs of Application of Conservation Systems

Landuse	Estimated Acres Need to be Treated	Estimated Average Cost per Acre (\$)	Costs (\$)
Range	40,000	30	1,200,000
Irrigated Pasture	14,500	1,600	23,200,000
Hayland	13,000	880	11,440,000
Total Costs: \$35,840,000			

FOOTNOTES/ BIBLIOGRAPHY

Threatened and Endangered Species information was gathered using data from the Colorado Division of Wildlife (CDOW) Natural Diversity Information Source (NDIS). NDIS GIS data may be downloaded at <http://ndis.nrel.colostate.edu>. For more information on Colorado's Endangered & Threatened Species, as well as Species of Concern, visit <http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/ThreatenedEndangeredList>ListOfThreatenedAndEndangeredSpecies.htm> or <http://mountainprairie.fws.gov/endspp/CountyLists/COLORADO.htm>

Resource Concerns were identified using the Colorado Association of Conservation Districts' (CACD) long range (10 year) plans from the period of 1996-2000. Only the top three environmental resource concerns for each district were used. For more information on Colorado's Conservation Districts, visit <http://www.cacd.us>.

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

- Archuleta County Area (CO668) Published 5/1/2006
- La Plata County Area (CO669) Published 1/4/2007
- Animas-Dolores Area (CO672) Published 1/8/2007
- San Juan County (NM618) Published 12/9/2008
- Rio Arriba Area (NM650) Published 4/15/2007
- Jicarilla Apache Nation (NM698) Published 4/15/2007

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.

All border state (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.

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>.

Forest Insect & Disease data obtained from the U.S. Forest Service annual aerial survey. For more information visit <http://www.fs.fed.us/r2/resources/fhm/aerialsurvey/>