United States Department
of Agriculture

Piedra Watershed

Hydrologic Unit Code 14080102

Natural Resources
Conservation Service

Lakewood, Colorado

Rapid Assessment

RWA 14080102

April 2010

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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.

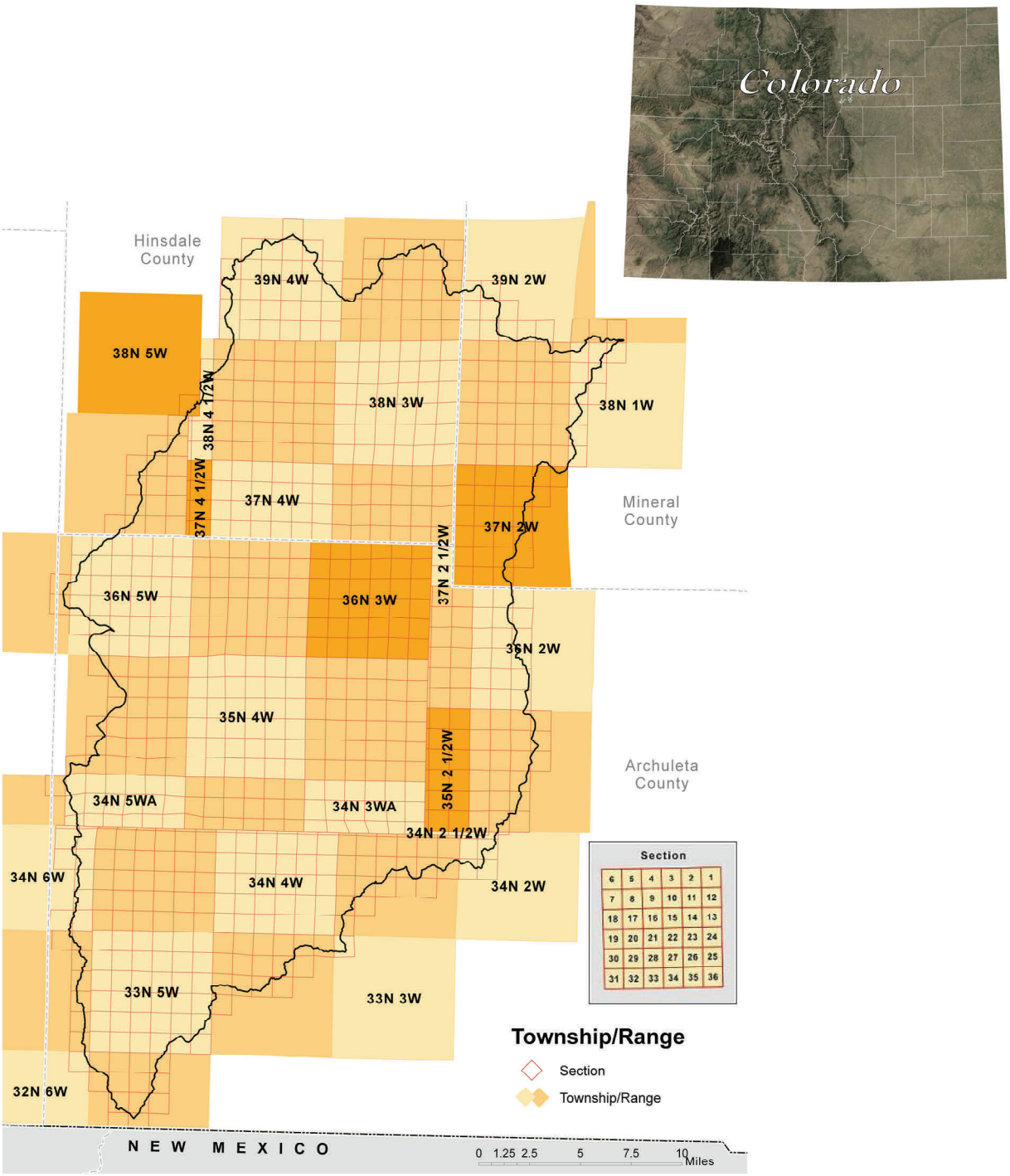
Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best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

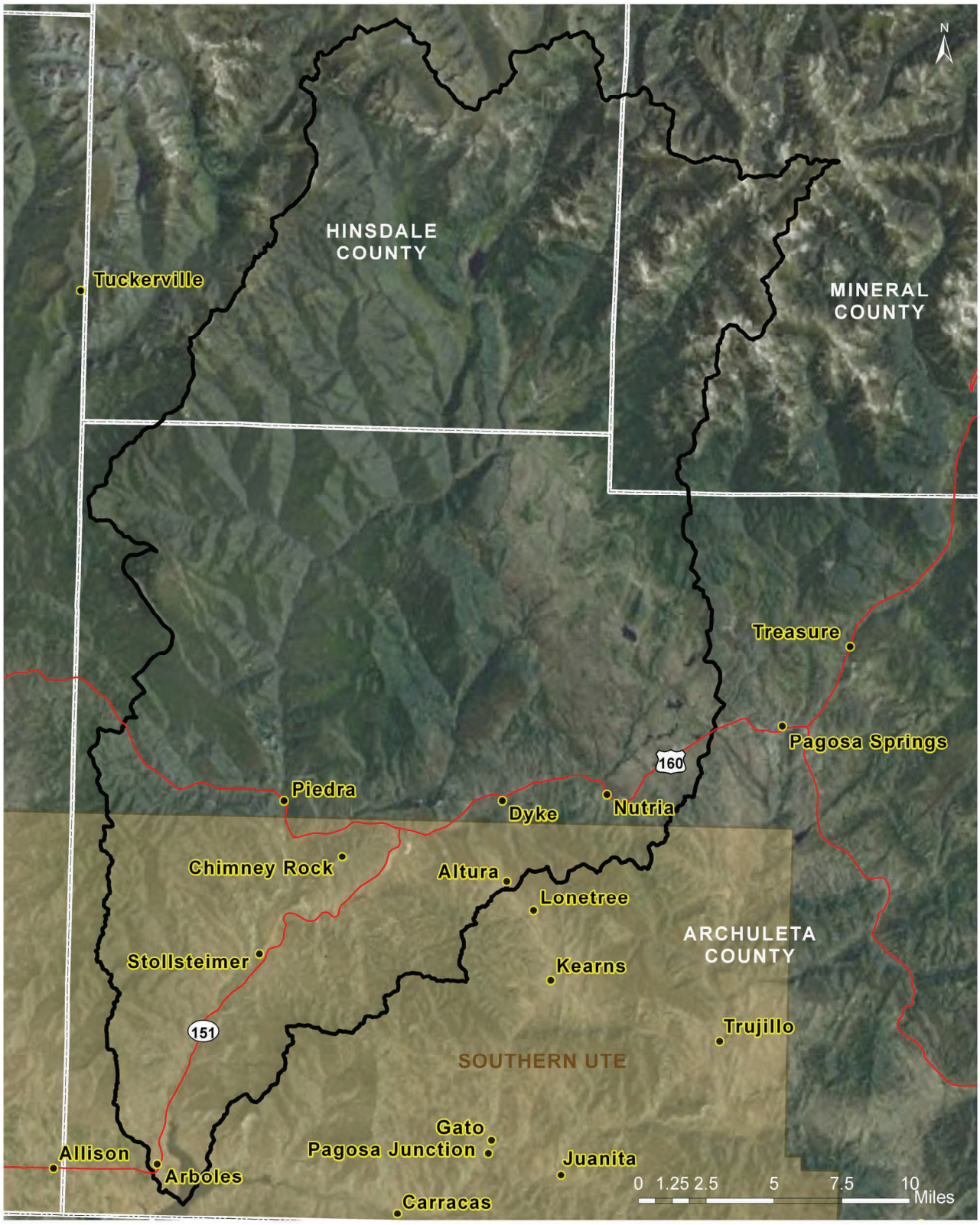
- Quick and inexpensive tools for setting priorities and taking action
- Providing a level of detail that is sufficient for identifying actions that can be taken with no further watershed-level studies or analyses
- Actions to be taken may require further Federal or State permits or ESA or NEPA analysis 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)

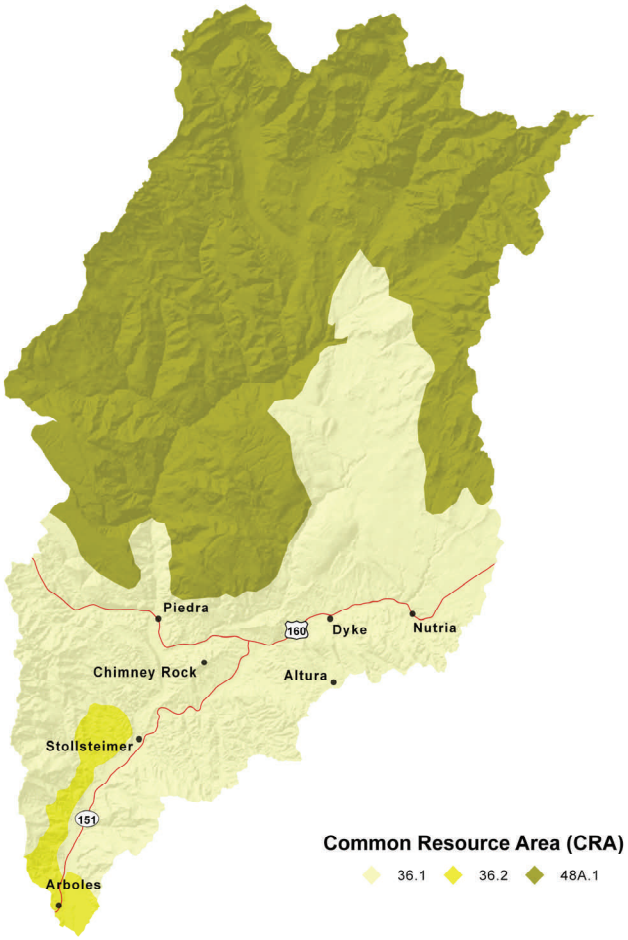
Rapid Watershed Assessments provide information that helps land-owners and local leaders set conservation priorities.



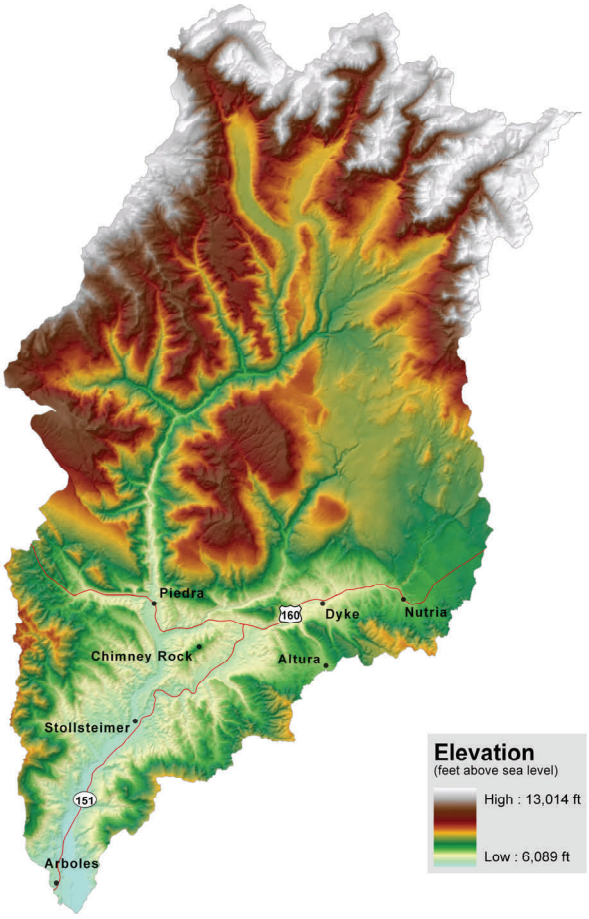
County	County Acres	County Acres in PIEDRA Water-shed	% of County in the Watershed	% of Watershed in the County
Archuleta	859,537	277,618	32.3%	64.1%
Hinsdale	719,387	115,585	16.1%	26.7%
Mineral	562,080	39,754	7.1%	9.2%
		432,957		

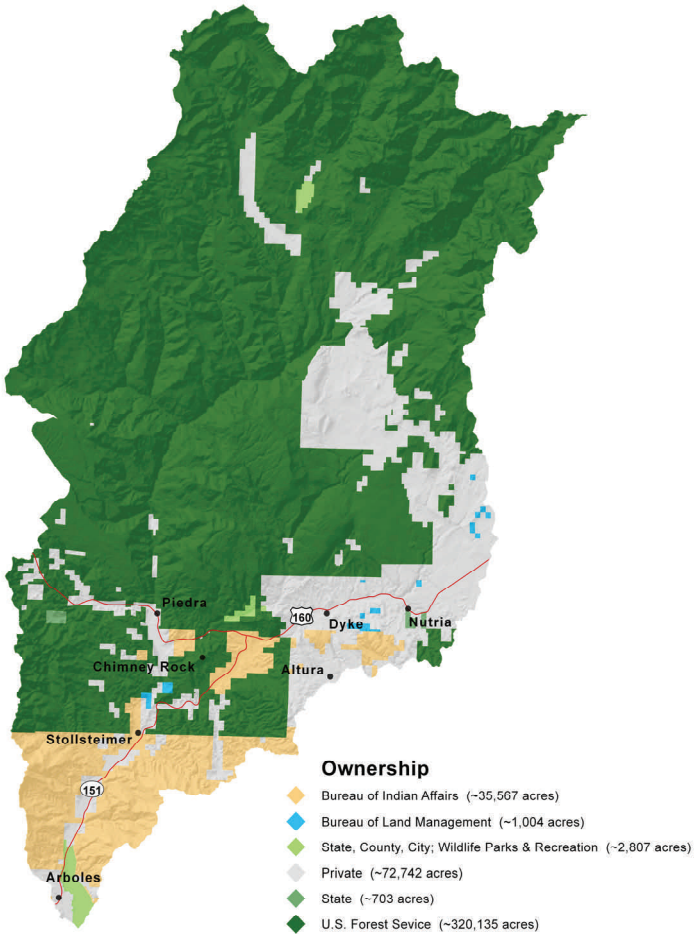
Piedra Watershed - 14080102

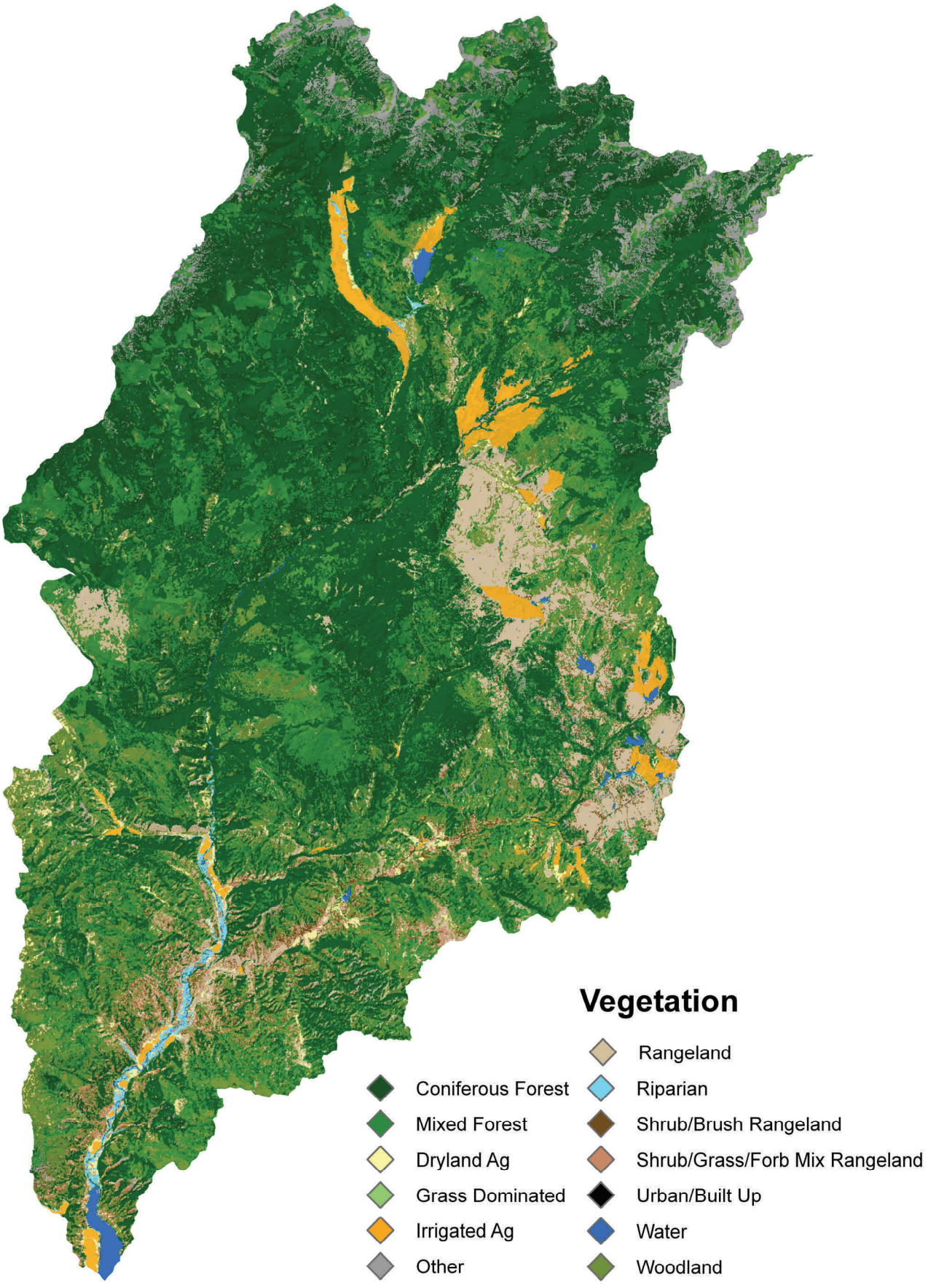




MLRA	CRA	CRA NAME	CRA DESCRIPTION
36	**36.1**	Southwestern Plateaus, Mesas, and Foothills - Cool Subhumid Mesas and Foothills	This area encompasses the higher elevation mesas and foothills that represent a transition to the Southern Rocky Mountains. The temperature regime is frigid, and the moisture 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.


Piedra
160
Dyke
Nutria
Chimney Rock
Altura
Stollsteimer
151
Arboles
Elevation
(feet above sea level)
High : 13,014 ft
Low : 6,089 ft


Piedra
160
Dyke
Nutria
Chimney Rock
Altura
Stollsteimer
151
Arboles
Ownership
Bureau of Indian Affairs (~35,567 acres)
Bureau of Land Management (~1,004 acres)
State, County, City; Wildlife Parks & Recreation (~2,807 acres)
Private (~72,742 acres)
State (~703 acres)
U.S. Forest Sevice (~320,135 acres)

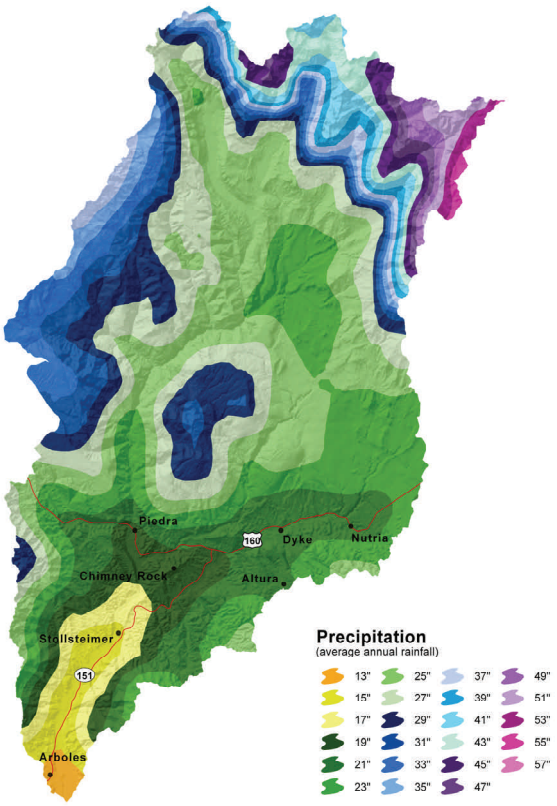

Vegetation
Coniferous Forest
Mixed Forest
Dryland Ag
Grass Dominated
Irrigated Ag
Other
Rangeland
Riparian
Shrub/Brush Rangeland
Shrub/Grass/Forb Mix Rangeland
Urban/Built Up
Water
Woodland

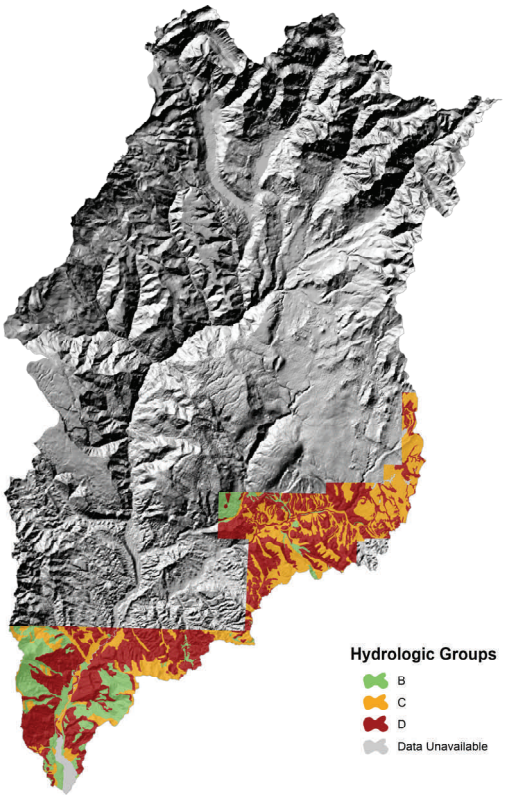
PIEDRA WATERSHED Land Use	Total Acreage	Vegetation	Acreage
Cropland	9,398	Dryland Ag	821.0
		Irrigated Ag*	9,398.0
Rangeland/Grassland	91,920	Gambel Oak	41,817.0
		Grass/Forb Rangeland	32,306.0
		Mesic Mtn Shrub Mix	7,892.8
		Sagebrush/Grass Mix	4,674.5
		Sagebrush Community	5,230.1
Forest	289,256	Aspen	23,786.8
		Douglas Fir	44,472.0
		Douglas Fir/Aspen Mix	3,083.4
		Englemann Spruce/Fir Mix	68,936.5
		P. Pine/Gambel Oak Mix	59,734.2
		Pinon-Juniper	10,323.8
		PJ-mtn Shrub Mix	644.6
		PJ-Oak Mix	2,775.3
		PJ-Sagebrush Mix	4,855.6
		Ponderosa Pine	56,973.1
		Spruce/Fir/Aspen Mix	13,670.6
Riparian	6,219	Herbaceous Riparian	2.2
		Riparian	2,524.3
		Sedge	11.4
		Willow	17.9
		Upland Willow/Shrub Mix	3,663.2
Water	2,201	Water	2,200.5
Other	33,906	Urban/Built Up	55.1
		Rock	19,391.6
		Soil	0.3
		Alpine Grass Dominated	30.2
		Alpine Grass/Forb Mix	12.8
		Alpine Meadow	14,416.4
~Total Watershed Acres			**432,900**

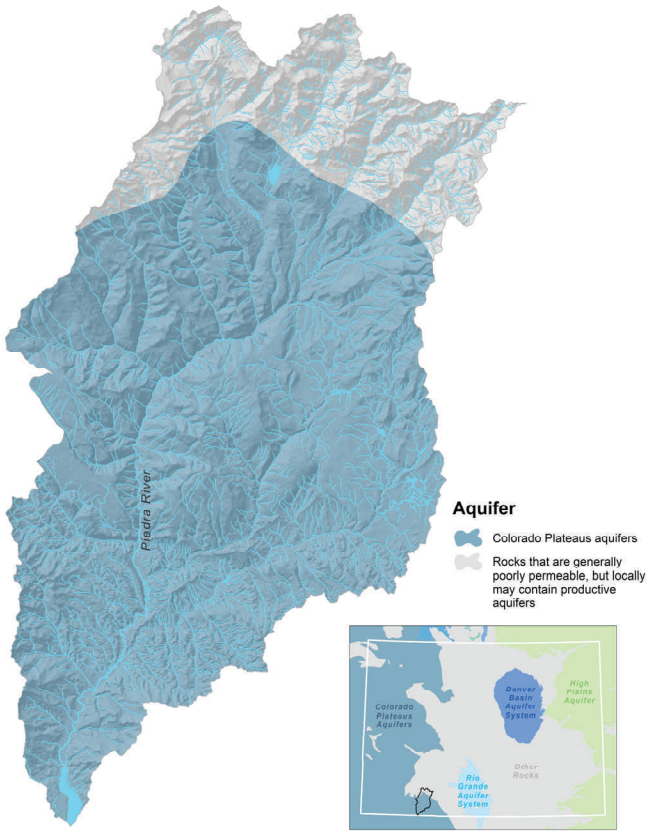
* Colorado Decision Support Systems Data

Precipitation

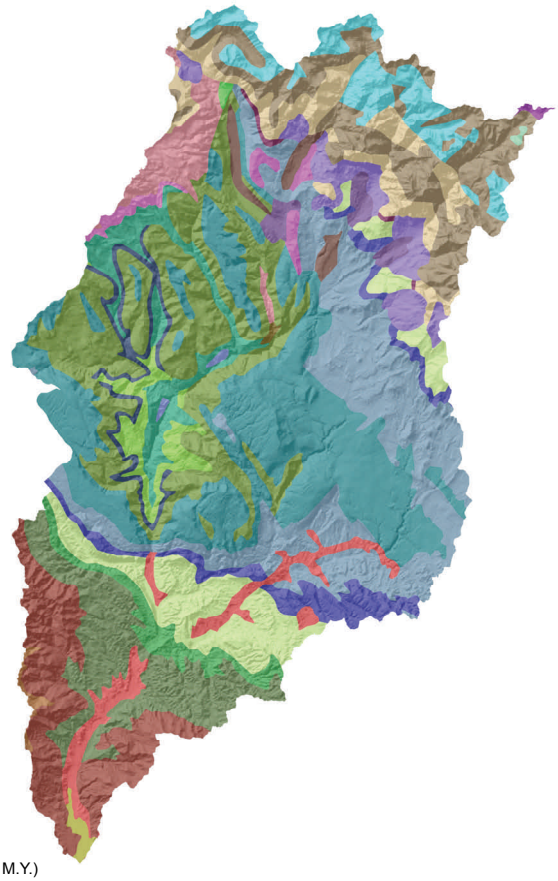
Droughts are regular visitors to the watershed as with the rest of Colorado. Statewide, in the 1900's alone, four prolonged dry spells occurred. There was one in the 1910s. Another, in the '30s, caused the dust-bowl period. The second worst drought on record in the state occurred in the mid-50s. A series 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
- 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
- LEADVILLE LIMESTONE, GILMAN SANDSTONE, DYER DOLOMITE AND PARTING FORMATION
- LEADVILLE, GILMAN, DYER, PARTING, AND SAWATCH FORMATIONS
- MANCOS SHALE
- MESAVERDE GROUP, UNDIVIDED
- MIDDLE TERTIARY INTRUSIVE ROCKS (AGE 20-40 M.Y.)
- MODERN ALLUVIUM
- 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.)
- 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.

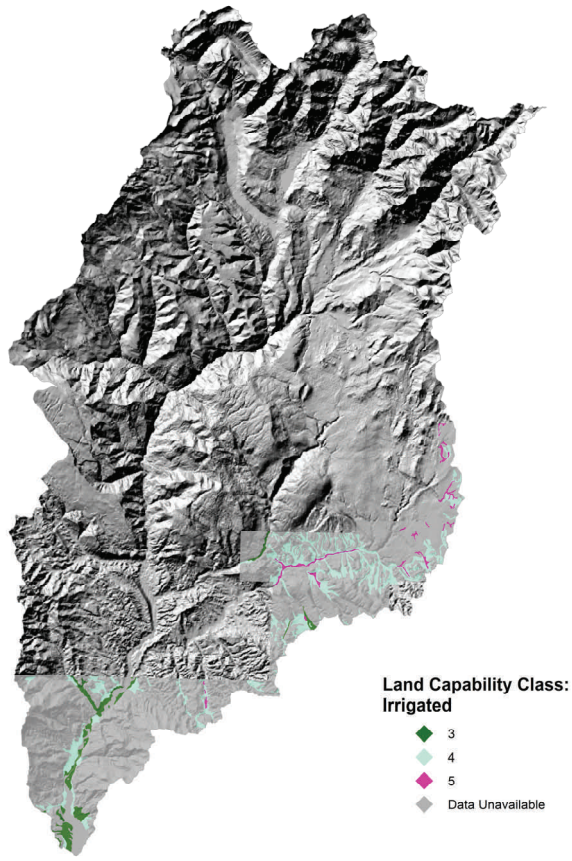
Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

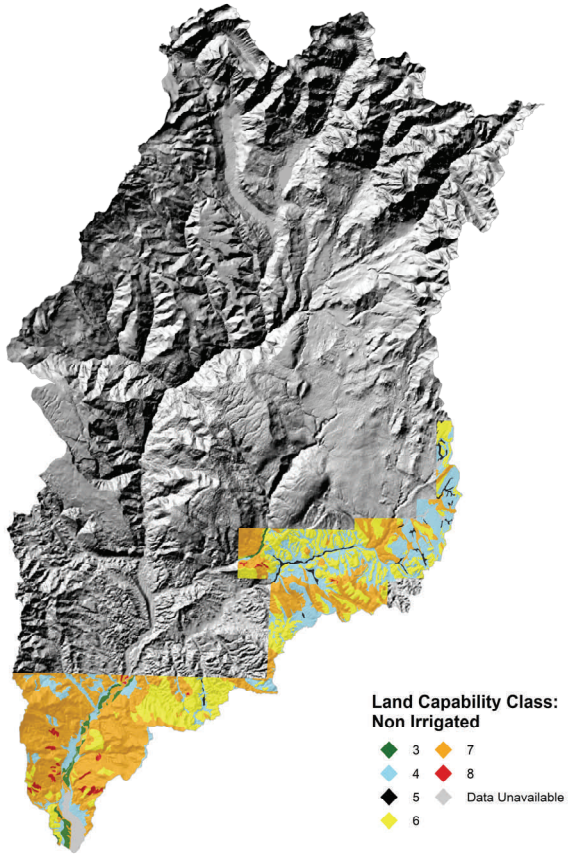
Class 5 - soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

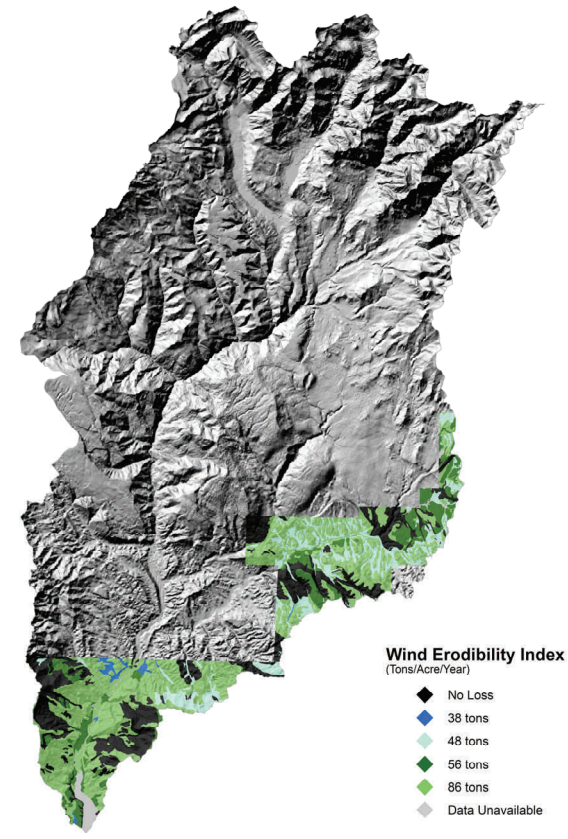
Class 6 - soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

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.

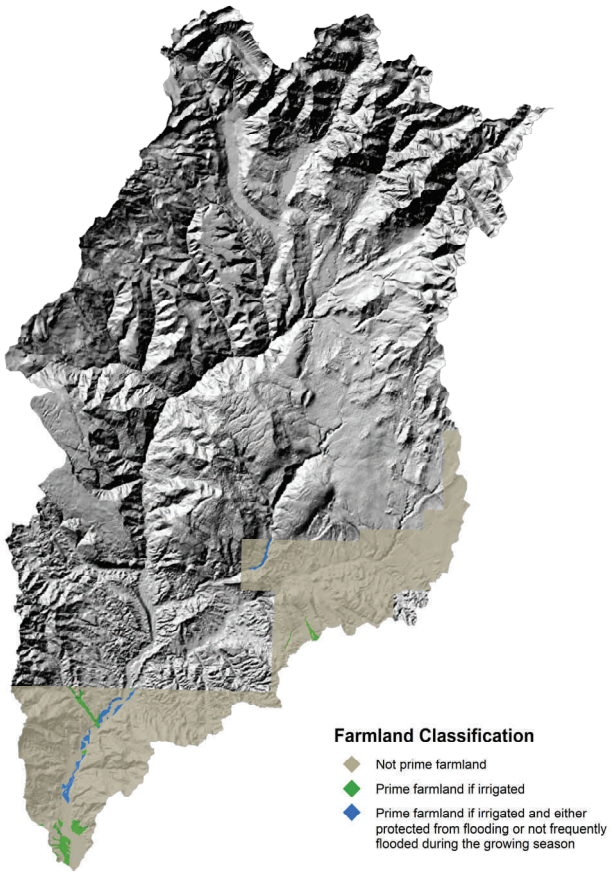


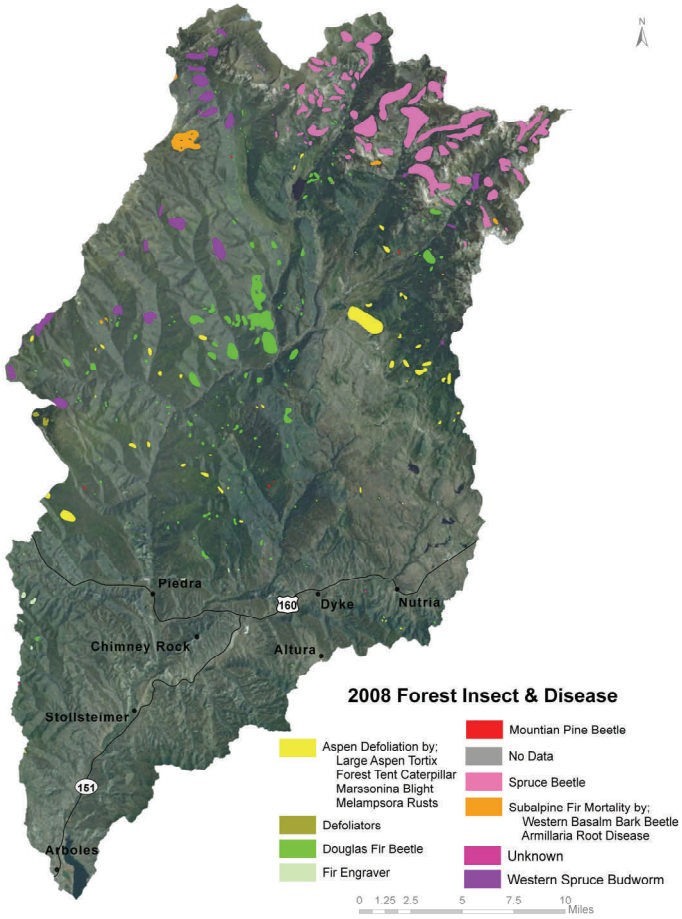


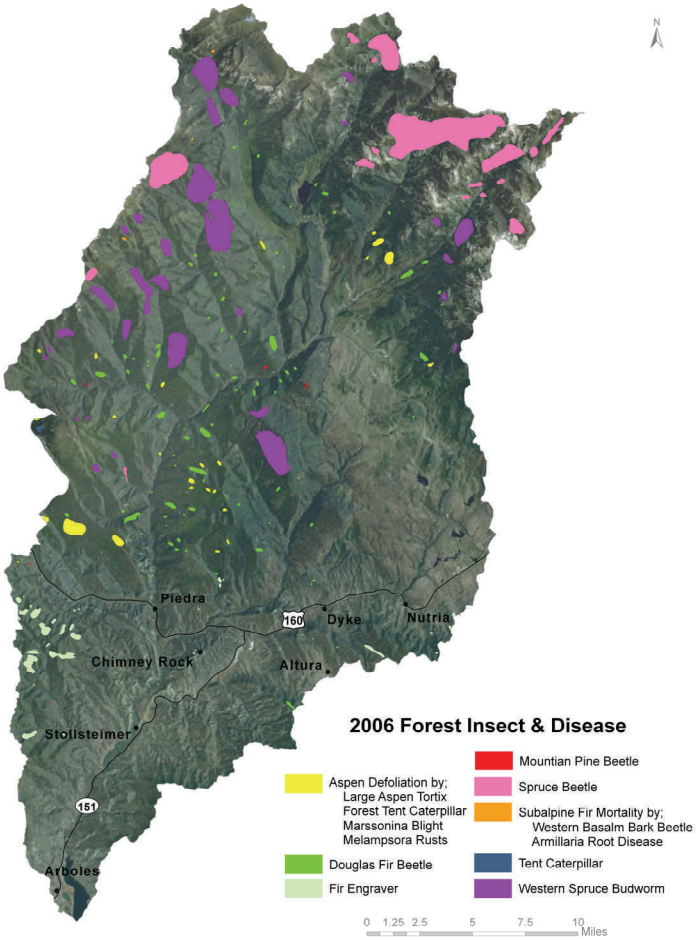


The Wind Erodibility Index (WEI): numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion if it is assumed there is no vegetative cover or management.

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




N
Piedra
160
Dyke
Nutria
Chimney Rock
Altura
Stollsteimer
151
Arboles
2008 Forest Insect & Disease
Aspen Defoliation by;
Large Aspen Tortix
Forest Tent Caterpillar
Marssonina Blight
Melampsora Rusts
Defoliators
Douglas Fir Beetle
Fir Engraver
Mountian Pine Beetle
No Data
Spruce Beetle
Subalpine Fir Mortality by;
Western Basalm Bark Beetle
Armillaria Root Disease
Unknown
Western Spruce Budworm
0 1.25 2.5 5 7.5 10
Miles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Arboles
2006 Forest Insect & Disease
Aspen Defoliation by;
Large Aspen Tortix
Forest Tent Caterpillar
Marssonina Blight
Melampsora Rusts
Douglas Fir Beetle
Fir Engraver
Mountian Pine Beetle
Spruce Beetle
Subalpine Fir Mortality by;
Western Basalm Bark Beetle
Armillaria Root Disease
Tent Caterpillar
Western Spruce Budworm
0 1.25 2.5 5 7.5 10
Miles

State and Federal Threatened, Endangered, and Candidate Species and Species of Special Concern in Piedra Watershed

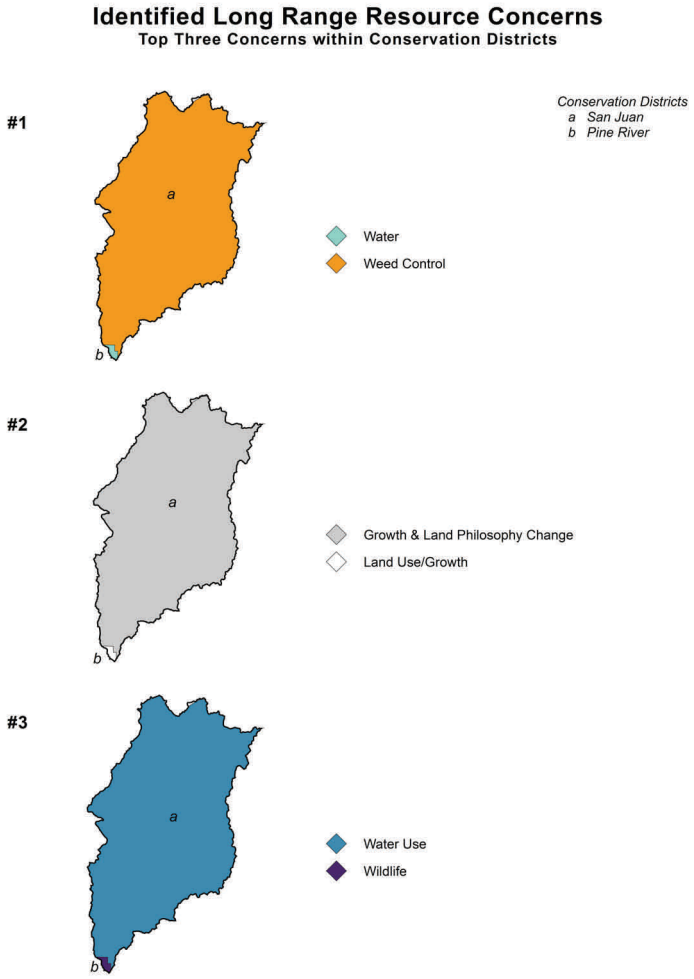
Common Name	Scientific Name	Class	State Status/Federal Status	Comments
American Peregrine Falcon	Falco peregrinus anatum	Birds	Concern/	Occurs and nests in the watershed
Bald Eagle	*Haliaeetus leucocephalus*	Birds	Threatened/None	Year-round resident of the watershed
Boreal Toad	*Bufo boreas boreas*	Amphibians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

The terrestrial habitats in this watershed include small amounts of irrigated land, montane and subalpine grasslands and big sagebrush; oak, pinyon, and juniper shrublands; aspen, ponderosa pine, Douglas fir, and spruce-fir forest; alpine tundra, and a small amount of high elevation grassland. Riparian areas, wetlands, and some 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, and white-tailed ptarmigan. Mountain goats may be found at the extreme western edge of the watershed.

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 the southern half of the watershed and Snow geese are found in or near the Piedra River in the southern part of the watershed.

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



Other Resource Concerns in the Watershed *(extracted from the Stollsteimer Creek Watershed Master Plan, 2006)*

During the summer of 2004 the Natural Resource Conservation Service, San Juan Conservation District, Pagosa Lakes Property Owners Association and several other individuals became concerned about the overall watershed condition in both the upper and lower reaches of the Stollsteimer Creek Watershed, a sub-basin of the. Of particular concern was the rapid growth and development occurring in the upper watershed and stream channel degradation in the lower watershed.

The upper watershed contains several important water storage reservoirs including two primary raw water storage reservoirs that supply the community's drinking water. In addition to the two drinking water storage reservoirs, there are four reservoirs that store water for irrigation purposes as well as providing important recreational opportunities for area residents. These four additional reservoirs could also be used to supply potable water for the area in the event of a severe drought such as the drought year of 2002.

Observations in the upper watershed regarding overall water quality were that several key lake inlet stream channels were exhibiting bank erosion as well as picking up sediments from other human caused activities. These sediments were then entering the reservoirs where large pronounced shallow deltas were forming. The concern was that over time and if unchecked these sediments could lead to substantial storage capacity reduction as well as significant nutrient loading and contaminants entering the reservoirs.

Selected Conservation Practices Applied, FY 2005 through FY 2009

Practice Code	Practice Name	Practice Unit	Applied Amount	Applied Count
511	Forage Harvest Management	ac	399	19
449	Irrigation Water Management	ac	1,243	38
528	Prescribed Grazing	ac	7,103	84

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 338 Prescribed Burning 378 Pond 382 Fence 528 Prescribed Grazing 574 Spring Development 595 Pest Management 614 Watering Facility 645 Upland Wildlife Habitat Management 666 Forest Stand Improvement	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 Plant Condition - Productivity, Health and Vigor Soil Erosion - Sheet and Rill Soil Erosion - Wind

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 431 Above Ground, Multi-Outlet Pipeline 443 Irrigation System, Surface and Subsurface 449 Irrigation Water Management 511 Forage Harvest Management 587 Structure for Water Control	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 Soil Erosion - Wind Water Quantity - Inefficient Water Use on Irrigated Land

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***	***Resource Concerns Addressed***
382 Fence 430DD Irr. Water Conveyance, Pipeline, H 431 Above Ground, Multi-Outlet Pipeline 443 Irrigation System, Surface and Subsurface 449 Irrigation Water Management 511 Forage Harvest Management 528 Prescribed Grazing 587 Structure for Water Control 614 Watering Facility 645 Upland Wildlife Habitat Management	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. 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.	Soil Erosion - Sheet and Rill Soil Erosion - Wind Water Quantity - Inefficient Water Use on Irrigated Land

Estimated Costs of Application of Conservation Systems

Landuse	Estimated Acres Need to be Treated	Estimated Average Cost per Acre ($)	Costs ($)
Range	30,000	30	900,000
Irrigated Pasture	4,500	1,600	7,200,000
Hayland	3,000	880	2,640,000
			Total Costs: $10,740,000

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 & Border State surveys:

Archuleta County Area (CO668) Published 5/1/2006

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 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. 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.

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/