



United States Department
of Agriculture

Rush Watershed



Hydrologic Unit Code 11020012

Natural Resources
Conservation Service

Lakewood, Colorado

Rapid Assessment

RWA 11020012

July 2007



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

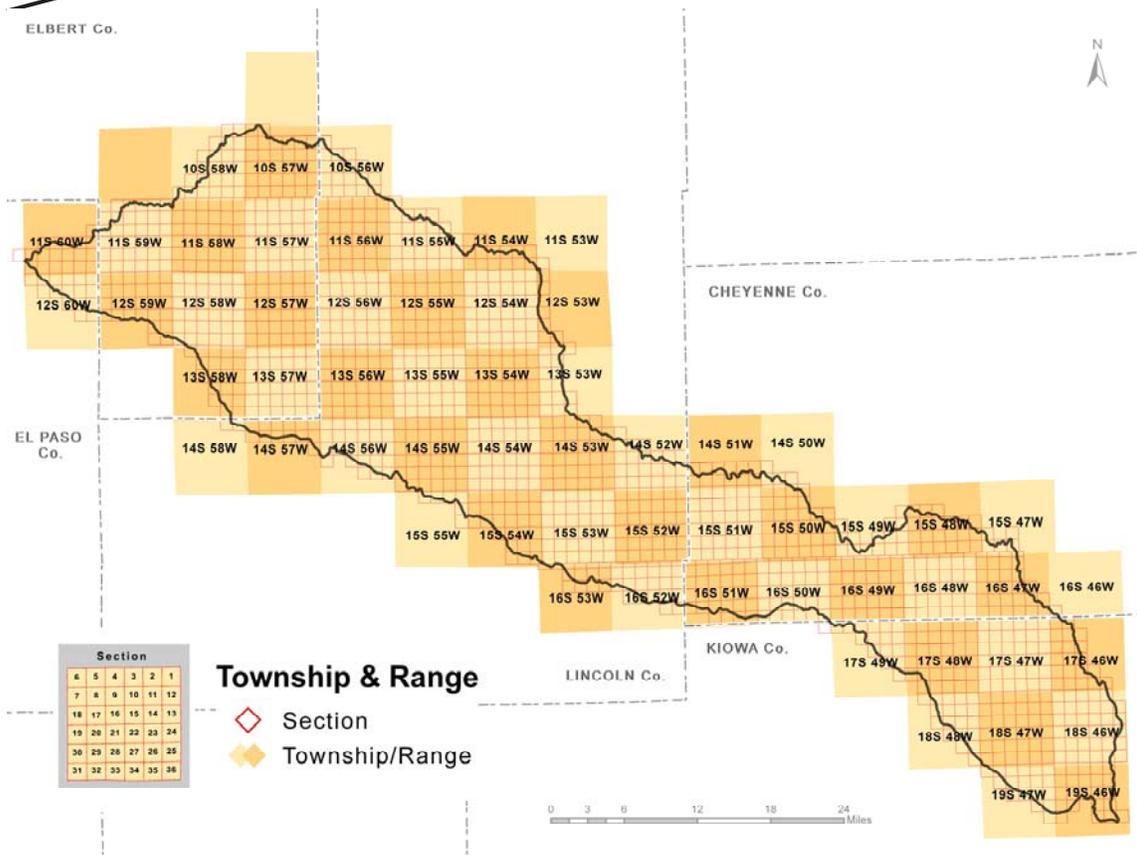
While rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide the benefits of NRCS locally-led planning in less time and at a reduced cost. The benefits include:

- 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.

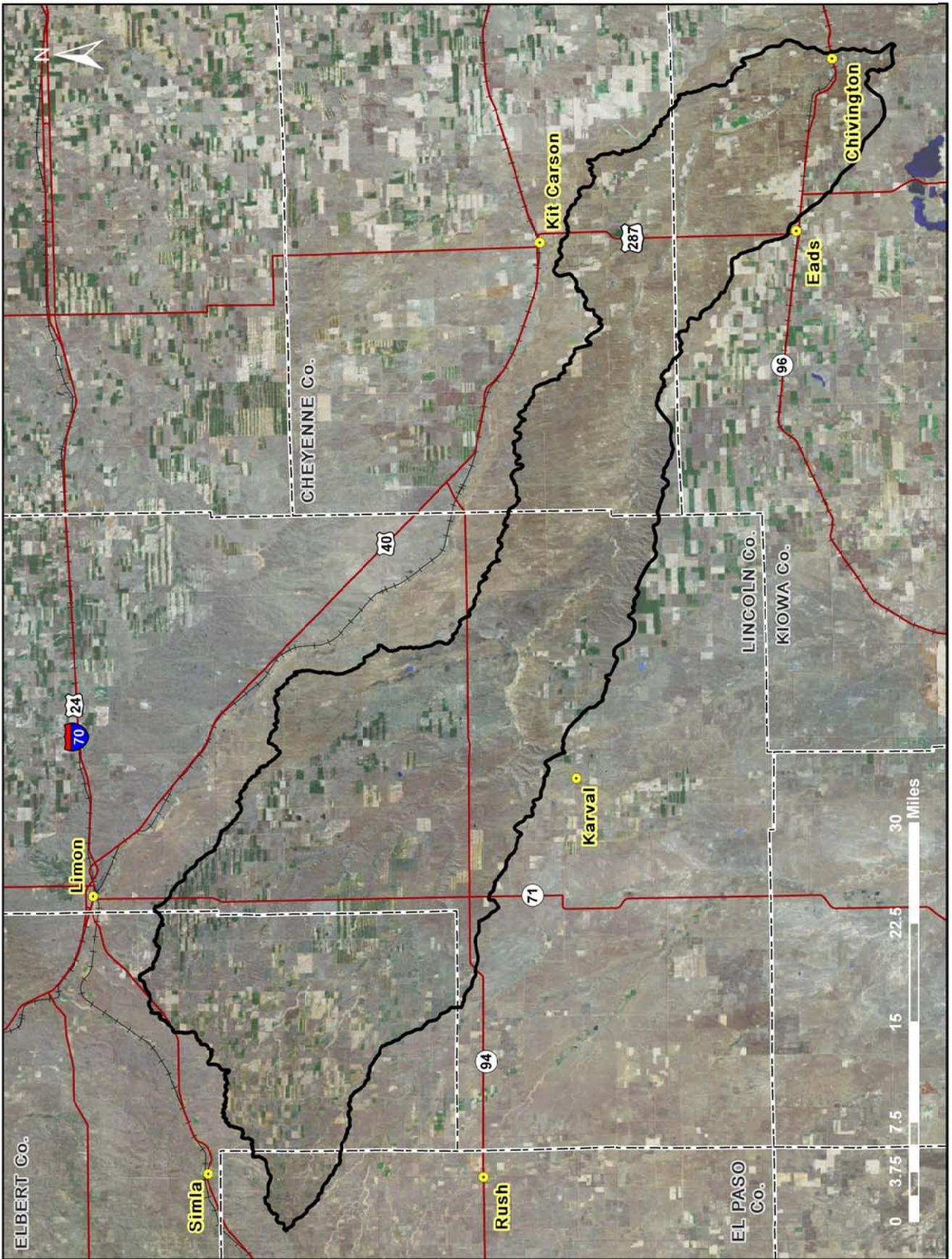
Watershed Overview

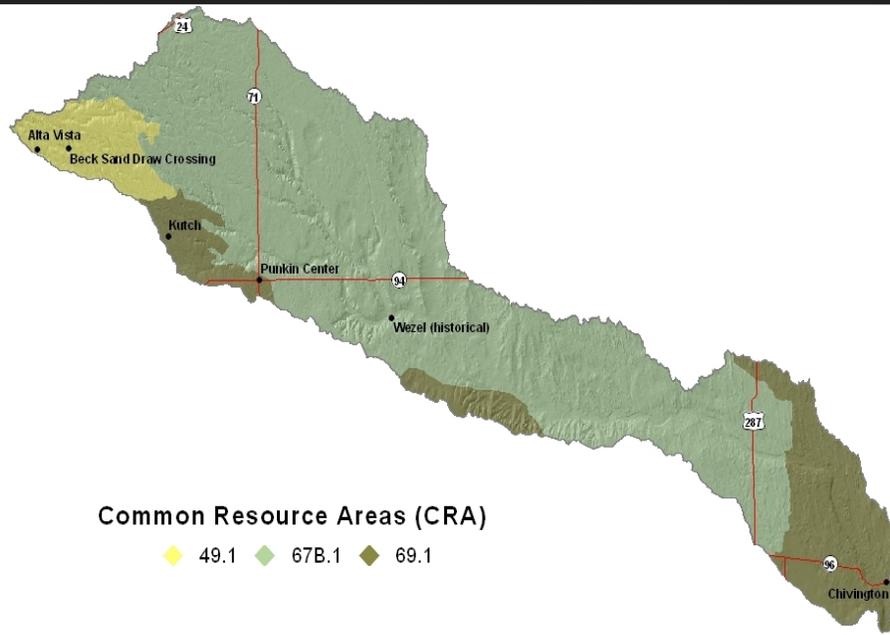
The Rush Watershed is located in the Lower Arkansas River Basin on the eastern plains of Colorado. This highly agricultural watershed is 861,240 acres in size. There are approximately 385 farms and ranches covering 718,000 acres in the watershed. As of April 2005 there are 64,329 acres of land in the Conservation Reserve Program



	County Acres	County Acres in Rush Watershed	Watershed % of county	County % of Watershed
Cheyenne	1,140,413	152,294	13.4	17.7
El Paso	1,362,305	14,439	1.1	1.7
Elbert	1,183,409	188,937	16.0	21.9
Kiowa	1,142,976	130,958	11.5	15.2
Lincoln	1,654,532	374,504	22.6	43.5

Rush Watershed - 11020012





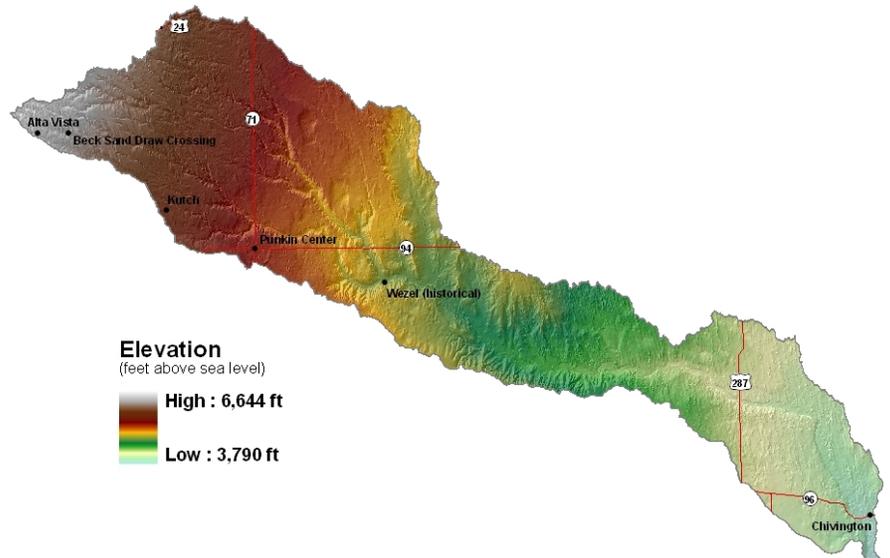
Common Resource Areas (CRA): Geographical areas where resource concerns, problems, and treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographical boundaries of the common resource area.

<u>CRA</u>	<u>CRA Name</u>	<u>Description</u>
49.1	Southern Rocky Mountain Foothills	This area is generally a transition between the Great Plains and the Southern Rocky Mountains. The temperature regime is mesic or frigid, and moisture regime is ustic. Characteristic native vegetation ranges from grasslands and shrubs to ponderosa pine and Rocky Mountain Douglas fir forest.
67B.1	Central Great Plains, Southern Part	The Central High Plains, Southern Part CRA is broad, undulating to rolling plains dissected by streams and rivers. Local relief is measured in tens of feet on the plains. Soils are deep and formed in aeolian and alluvial materials. Pre-settlement vegetation was short grass prairies. Nearly all of this area is in fallow cropland rotations or rangeland. Some cropland areas are irrigated.
69.1	Upper Arkansas Valley Rolling Plains	The Upper Arkansas Valley Rolling Plains CRA is broad, undulating to rolling shale plains occurring along the upper tributaries of the Arkansas River. Local relief reaches 200 feet. Soils are shallow to deep and formed in loess, aeolian, alluvial and outwash materials. Pre-settlement vegetation was short grass prairies and pinion and juniper stands on the stony and rocky soils. Nearly all of this area is in rangeland. Small areas of irrigated cropland occur along the floodplains and terraces.

Physical Description

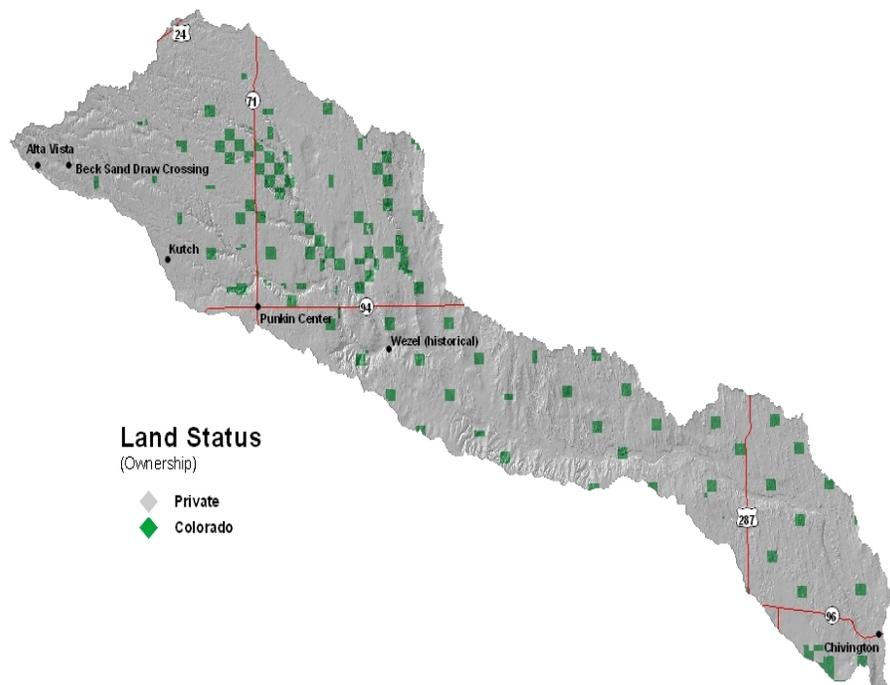
This area is characterized by broad, undulating to rolling plains dissected by streams and rivers. The highest elevations are on the western side of the watershed and gently slopes down to the lowest elevation to the east. Nearly all of this watershed is farmed in fallow, dry cropland rotations or is in rangeland. Some cropland areas along the flood plains and terraces are irrigated.

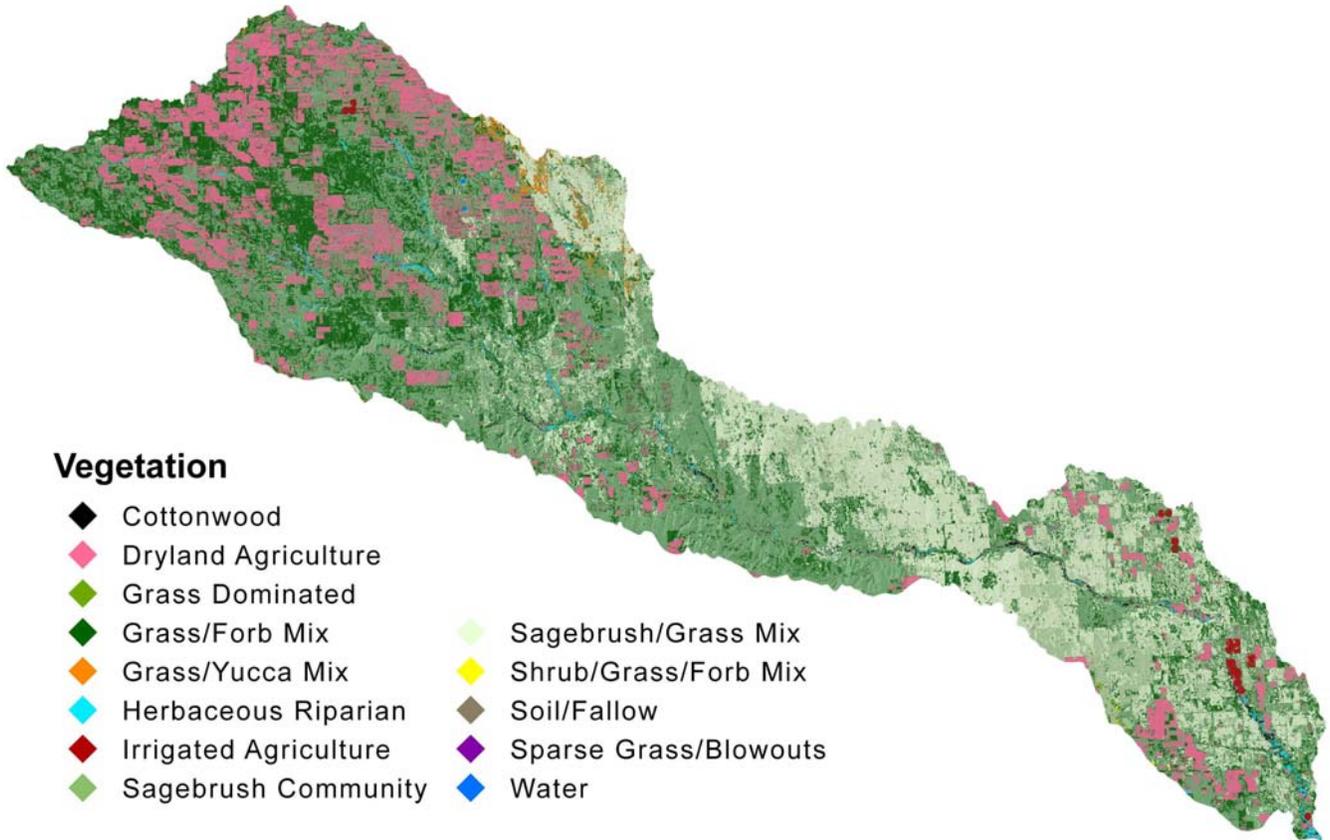
The majority of the watershed consists of elevated, smooth to slightly irregular plains consisting of sediments deposited by rivers that drained the young and actively eroding Rocky Mountains. Soils in the watershed are very shallow to very deep, and generally well drained and loamy.



Land Ownership

Approximately 807,113 acres in the Rush Watershed are privately owned. There are 54,059 acres of state controlled land and no federally controlled lands.





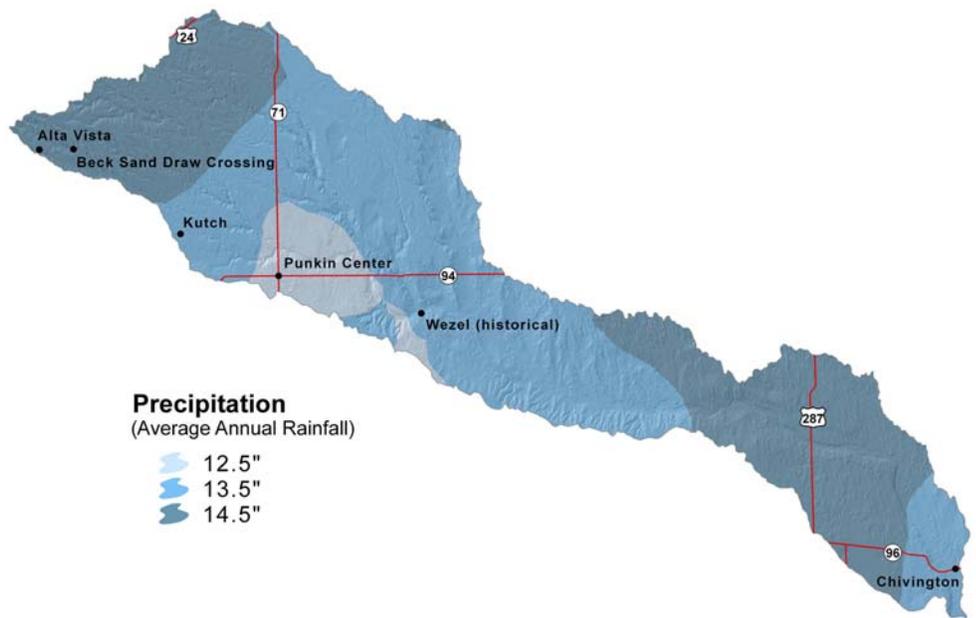
Vegetation

- ◆ Cottonwood
- ◆ Dryland Agriculture
- ◆ Grass Dominated
- ◆ Grass/Forb Mix
- ◆ Grass/Yucca Mix
- ◆ Herbaceous Riparian
- ◆ Irrigated Agriculture
- ◆ Sagebrush Community
- ◆ Sagebrush/Grass Mix
- ◆ Shrub/Grass/Forb Mix
- ◆ Soil/Fallow
- ◆ Sparse Grass/Blowouts
- ◆ Water

Land Use/Land Cover			
Land Use	Acreage	Vegetation	Acreage
Cropland	135,280	Dryland Agriculture	119,110
		Irrigated Agriculture	2,720
		Soil/Fallow	13,450
Rangeland/Grassland	725,610	Sparse Grass/Blowouts	10
		Grass Dominated	313,820
		Grass/Yucca Mix	4,840
		Grass/Forb Mix	180,300
		Shrub/Grass/Forb Mix	290
		Sagebrush/Grass Mix	182,250
		Sagebrush Community	34,930
		Herbaceous Riparian	6,040
Water	280	Cottonwood	3,130
		Water	280
Total Watershed Acres			861,170

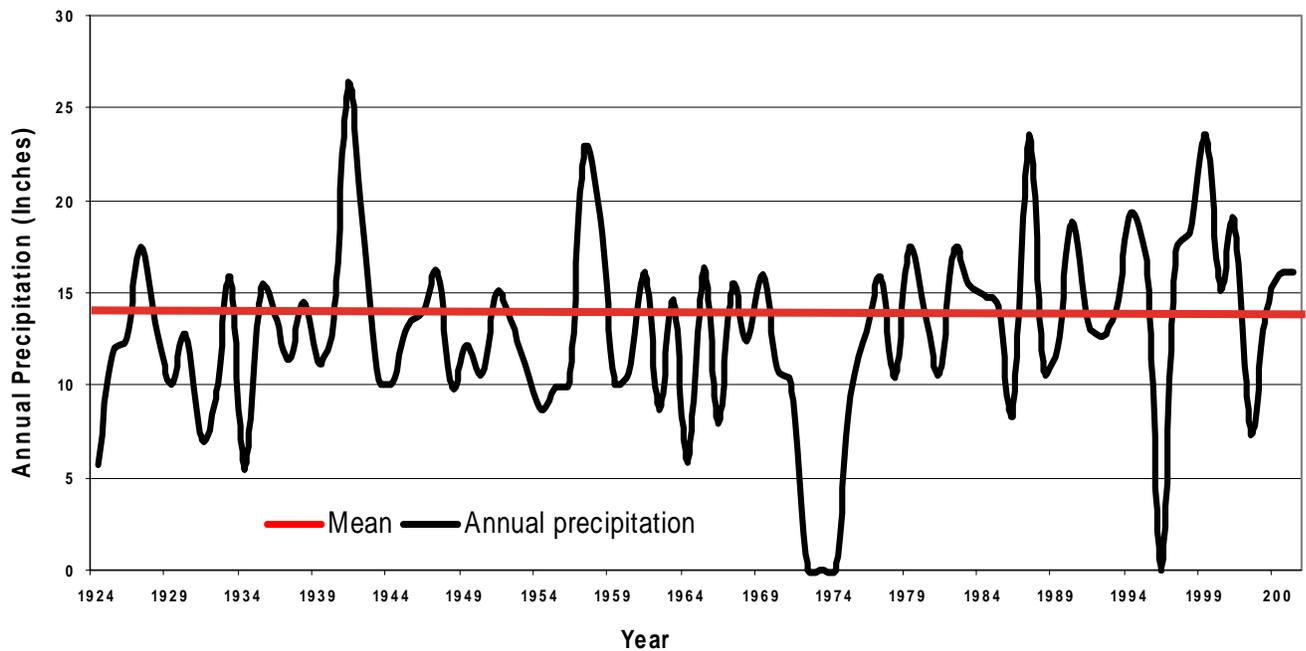
Precipitation

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 snow. The average annual temperature is from 45 to 55 degrees F. The frost free period averages 162 days but ranges from 133 to 191 days.

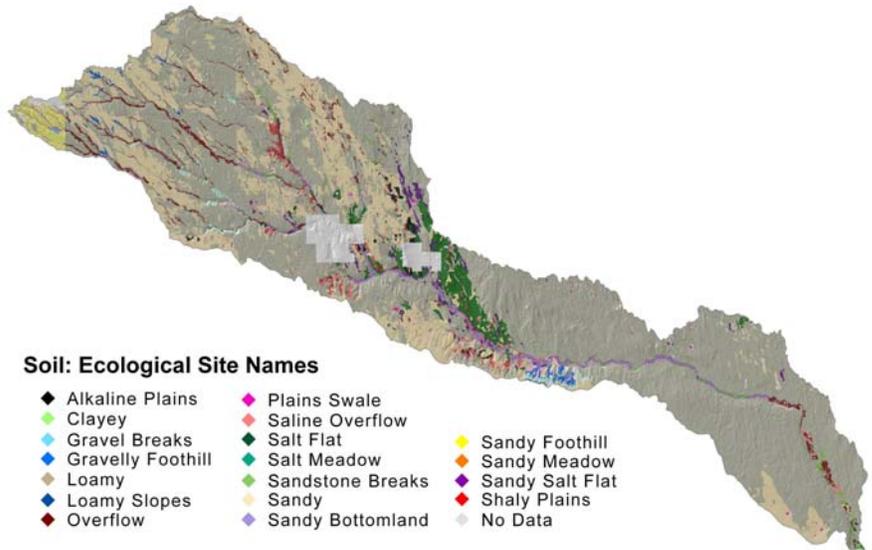
Rush Watershed Annual Precipitation, 1924-2006



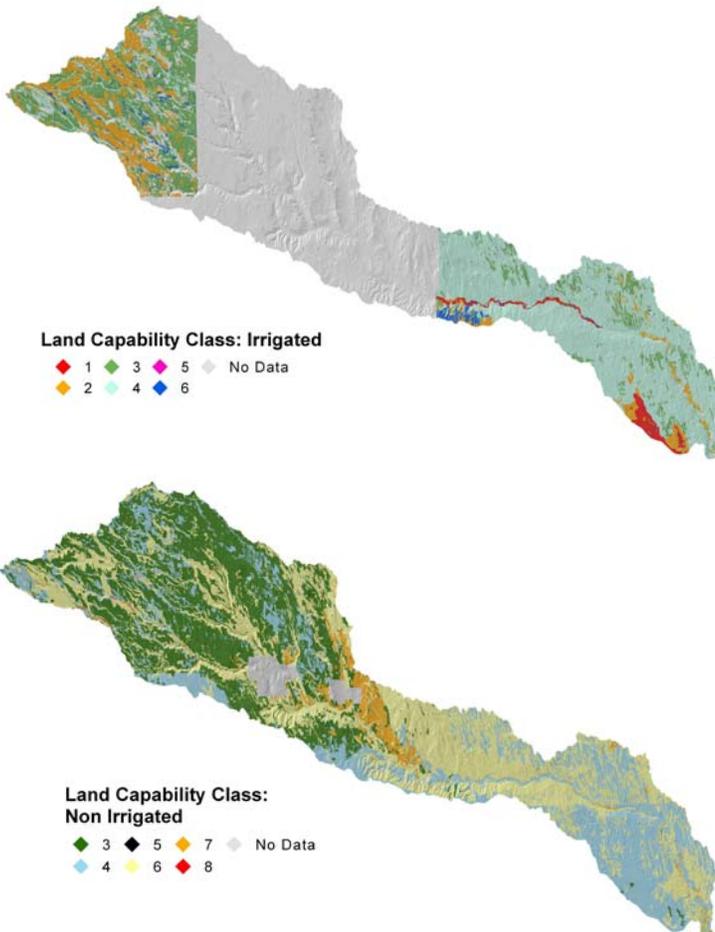
Ecological Sites

The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

Ecological Site maps give an overall indication of the soils plant relationship in the area. More detailed descriptions of ecological sites are provided in the Field Office Technical Guide (FOTG). The FOTG is available in local offices of the Natural Resources Conservation Service (NRCS) and online at <http://www.nrcs.usda.gov/technical/efotg/>.



Land Capability Classification



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.

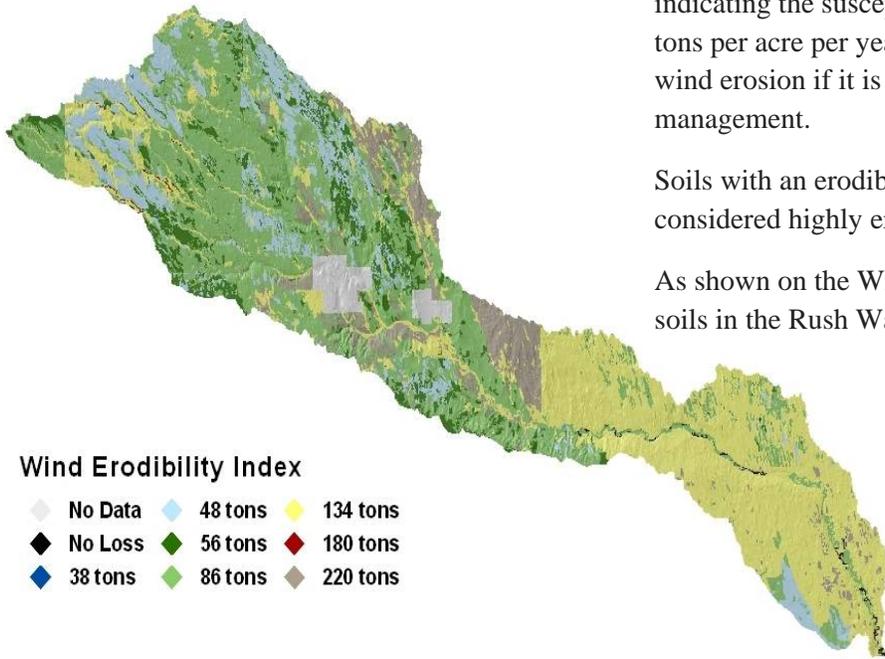
Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

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.



Wind Erodibility Index

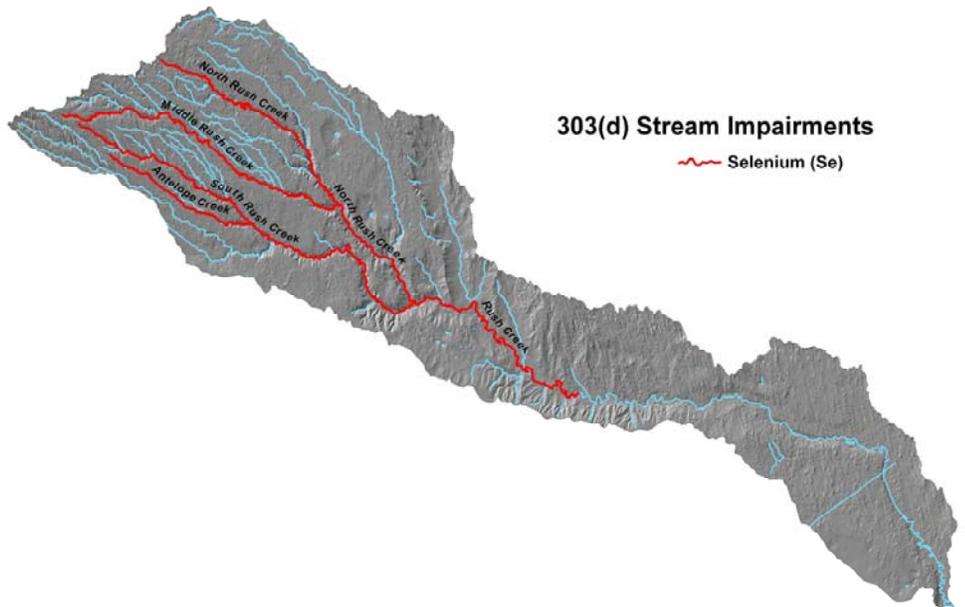
- ◊ No Data ◊ 48 tons ◊ 134 tons
- ◆ No Loss ◆ 56 tons ◆ 180 tons
- ◆ 38 tons ◆ 86 tons ◆ 220 tons

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.

As shown on the Wind Erodibility Index map below, most soils in the Rush Watershed are highly erodible.

This map shows stream locations within the watershed that are listed on the 303d list. Section 303(d) of the Clean Water Act requires states to identify and list all water bodies where state water quality standards are not being met. Thereafter, TMDLs compromising quantitative objectives and strategies have been or will be developed for these impaired waters within the watershed in order to achieve their water quality standards.



303(d) Stream Impairments

— Selenium (Se)

Impairment Definition

Selenium: A naturally occurring metal in marine shale that serves as a micronutrient. Excessive amounts impair aquatic life and bioaccumulation up the food chain occurs causing toxicity to birds, mammals, and humans.

Rush Watershed Natural Resource Concerns

I. Conservation District's (CD) Ranking of Natural Resource Concerns

All Identified Resource Concerns

Resource Concern By Priority	Double EI	High Plains	Prairie	Chey.	Kiowa County	Totals
1. Rangeland/ Grazingland Health and Productivity	5	4	4	5	3	24
2. Soil Erosion	4	5	5		5	19
3. Plants-Invasive Species		3	3	1	4	11
4. Wildlife Habitat	2	2	2		2	8
5. Sustainable Cropland				4		4
6. Water Quality/ Quantity				3		3
6. Small Acreage Development	3					3
7. Trees				2		2
8. Flood Control	1					1

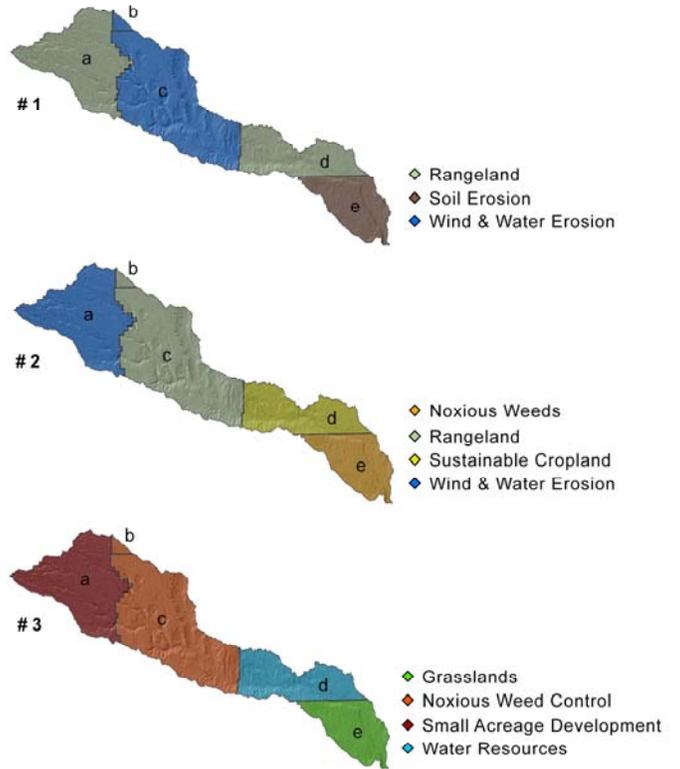
Source:

The Conservation Districts identified and prioritized these resource concerns during facilitated public meetings held between 1998 and 2000 and are part of the Conservation District's Long Range Plans.

Map Legend

- a—Double EI CD
- b—High Plains CD
- c—Prairie CD
- d—Cheyenne CD
- e—Kiowa County CD

Top Three Identified Resource Concerns



II. Other Identified Resource Concerns

Colorado State University

- On-going research in the Arkansas River has increased awareness of the following trends in agriculture and the environment in the river valley:
 - * Saline High Water Tables
 - Soil Waterlogging/Salinization
 - Crop Yield Reduction
 - * Salt and Selenium Dissolution in the aquifer
 - Substantial return flow of salts and trace metals to the river
 - * High Water Tables Under Fallow Land and Invasive Phreatophytes
 - Nonbeneficial water consumption

NRCS—Major Land Resource Area Descriptions

- As more agricultural drainage is returned to the rivers, the level of dissolved solids and sediment causes some problems in this watershed.
- Major resource concern in this watershed include wind erosion, soil compaction due to tillage practices, increased salinization of cropland due to irrigation water management practices, and overall degradation of soil quality.

Shortgrass prairie and sandsage-mixed grass rangeland are the dominant terrestrial habitat type in this watershed. Burrowing owl, mountain plover, black-tailed prairie dog, massasauga, and swift fox are representative species for the shortgrass habitat. Lesser prairie chickens use the sand sage-mixed grass rangeland habitats in the southeastern half of the watershed. Water is scarce and the native species in this watershed are those that can survive without abundant water supplies. Riparian areas, playa lakes, and the occasional stock pond provide seasonal to intermittent aquatic habitats. Economically important wildlife species that occur in the watershed include black bullhead, sunfish, pronghorn (antelope), mule and white-tailed deer, mourning dove, and scaled quail.



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

Common Name	Scientific Name	Class	State Status/Federal Status	Comments
Arkansas Darter	<i>Etheostoma cragini</i>	Fish	Threatened/Candidate	Occurs in the watershed
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Birds	Threatened/None	May migrate through watershed
Black-footed Ferret	<i>Mustela nigripes</i>	Mammals	Endangered/Endangered	No current records of occurrence
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Mammals	Concern/None	Occurs in the watershed
Burrowing Owl	<i>Athene cunicularia</i>	Birds	Threatened/None	Occurs in the watershed
Ferruginous Hawk	<i>Buteo regalis</i>	Birds	Concern/None	Occurs in the watershed
Least Tern	<i>Sterna antillarum</i>	Birds	Endangered/Endangered	Not currently known in the watershed. Occurs nearby.
Lesser Prairie Chicken	<i>Tympanuchus pallidicinctus</i>	Birds	Threatened/Candidate	Occurs in the watershed
Long-Billed Curlew	<i>Numenius americanus</i>	Birds	Concern/None	Occurs in the watershed
Massasauga	<i>Sistrurus catenatus</i>	Reptiles	Concern/None	Occurs in the watershed
Mountain Plover	<i>Charadrius montanus</i>	Birds	Concern/None	Occurs in the watershed
Northern leopard frog	<i>Rana pipiens</i>	Amphibians	Concern/None	Occurs in the watershed
Piping Plover	<i>Charadrius melodus circumcinctus</i>	Birds	Threatened/Threatened	Not currently known in the watershed. Occurs nearby.
Plains Leopard Frog	<i>Rana blairi</i>	Amphibians	Concern/None	Occurs in the watershed
Swift fox	<i>Vulpes velox</i>	Mammals	Concern/None	Occurs in the watershed
Yellow mud turtle	<i>Kinosternon flavescens</i>	Reptiles	Concern/None	Occurs in the watershed

Social Data

	Lincoln <i>23% in Rush WS</i>	Kiowa <i>12% in Rush WS</i>	El Paso <i>1% in Rush WS</i>	Elbert <i>16% in Rush WS</i>	Cheyenne <i>13% in Rush WS</i>
Demographics	Number	Number	Number	Number	Number
Total population	6,087	1,622	516,929	19,872	2,231
Male	3,451	811	259,598	9,966	1,119
Female	2,636	811	257,331	9,906	1,112
Median age (years)	37.8	39.7	33	37.2	37.9
White	5,253	1,559	419,673	18,923	2,072
Black or African American	302	8	33,670	128	11
American Indian and Alaska Native	57	18	4,725	125	17
Asian	34	0	13,099	74	3
Native Hawaiian and Other Pacific Islander	2	1	1,256	18	0
Some other race	344	23	24,293	255	114
Hispanic or Latino (of any race)	519	51	58,401	766	181
Economic Characteristics	Number	Number	Number	Number	Number
In labor force (population 16 years and over)	2,535	776	280,574	11,056	1,066
Median household income (dollars)	31,914	30,494	46,844	62,480	37,054
Median family income (dollars)	39,738	35,536	53,995	66,740	44,394
Per capita income (dollars)	15,510	16,382	22,005	24,960	17,850
Families below poverty level	114	43	7,690	145	53
Individuals below poverty level	590	195	40,318	791	244
County Agricultural Characteristics					
Farms (number)	455	357	1,175	1,153	283
Land in farms/ranches (acres)	1,428,400	896,772	811,931	1,068,359	740,486
Average size farm/ranch (acres)	3,139	2,512	691	927	2,617
Median size farm (acres)	1,497	1,280	160	160	1,528
Average age of farmer or rancher	55.6	55.2	54.1	52.8	57.2
Net cash return from ag sales (\$1,000)	4,829	944	2,485	108	1,829
Cattle and calves (number)	43,500	15,000	25,000	39,000	22,000

Selected Conservation Application Data

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	Total
Total Conservation Systems Planned (Acres)	382,232	120,747	Not Avail.	84,993	382,232	870,204
Total Conservation Systems Applied (Acres)	73,273	76,574	Not Avail.	64,886	73,273	288,006
Practices						
Prescribed Grazing	2,326	13,303	18,136	36,898	14,898	85,561
Upland Wildlife Habitat Management	4,730	2,956	1,883	8,088	0	17,657
Conservation Cropping System	Not Avail.	Not Avail.	2,339	6,873	9	
Mulch Tillage	Not Avail.	Not Avail.	0	209	0	

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..			Based on Conservation System Guide Code: CO 67B.1-GR-01-R-Grazing	
	Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Prescribed Grazing					
Fence (382)	Ft.	21,120	0.6	12,672	
Pest Management (595)	Ac.	300	4,500	4,500	
Pipeline (516)	Ft.	15,000	2.40	36,000	
Upland Wildlife Habitat Management (645)	Ac.	300	na	0	
Watering Facility (614)	No.	2	410	820	
Windbreak/Shelterbelt Establishment (380)	Ft.	1,000	.85	850	
Costs to apply prescribed grazing per median sized ranch of 4,500 acres	No.	160	54,842		
Subtotal: Rangeland costs				\$8,774,720	

Conservation Systems to Address Major Resource Concerns (continued)

Resource Concern:	Soil Erosion By Wind			
Conservation System Description:	Seasonal residue management with Conservation crop rotation, Nutrient and Pest Mgt			Reference Conservation System Guide Code:
				CO 67B.1-CR-Dryland-R-1
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Conservation Crop Rotation (328)	Ac	51730	10	517,300
Residue Mgmt, Mulch Till (345)	Ac	60742	5	303,710
Nutrient Management (590)	Ac	60951	5	304,755
Pest Management (595)	Ac	60951	15	914,265
Subtotal: cropland costs				\$2,040,030

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

Landuse	Resource	Measurable Effects	Non-measurable Effects	Cost (\$)
Rangeland	Plants		Improved plant condition, productivity, health and vigor. Grazing animals have adequate feed, forage, and shelter.	8,774,720
Dryland Crop	Soil	258,650 Total Tons/Year saved	Cropland sustainability	2,040,030
Total Costs				\$10,814,750

Footnotes/Bibliography

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

- Cheyenne County* (CO017) Published 12/19/2005
- Kiowa County* (CO061) Published 12/19/2005
- Lincoln County* (CO073) Published 12/19/2005
- Elbert County East* (CO624) Published 12/16/2005
- El Paso County Area* (CO625) Published 12/19/2005

To download SSURGO data, visit <http://soildatamart.nrcs.usda.gov>. The surveys were then loaded into Soil Data Viewer <http://soildataviewer.nrcs.usda.gov> (a tool built as an extension to ArcMAP for quick geospatial analysis of soil data for use in resource assessment) and the subsequent data was exported to a shapefile.

Land Ownership (status, 2004 dataset) data was obtained from the Colorado Department of Transportation (CDOT). For more information, visit <http://www.dot.state.co.us>.

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>.

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>.

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>.

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

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

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>

Footnotes/Bibliography continued

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 CSG.

Cost Estimates to apply conservation systems were developed by estimating costs per median size farm and ranch and calculating costs from the field office cost lists.

