



United States Department
of Agriculture

Two Butte Watershed



Hydrologic Unit Code 11020013

Natural Resources
Conservation Service

Lakewood, Colorado

Rapid Assessment

RWA 11020013

July 2007



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

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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 landowners and local leaders set priorities and determine the best actions to achieve their goals.

Benefits of these Activities

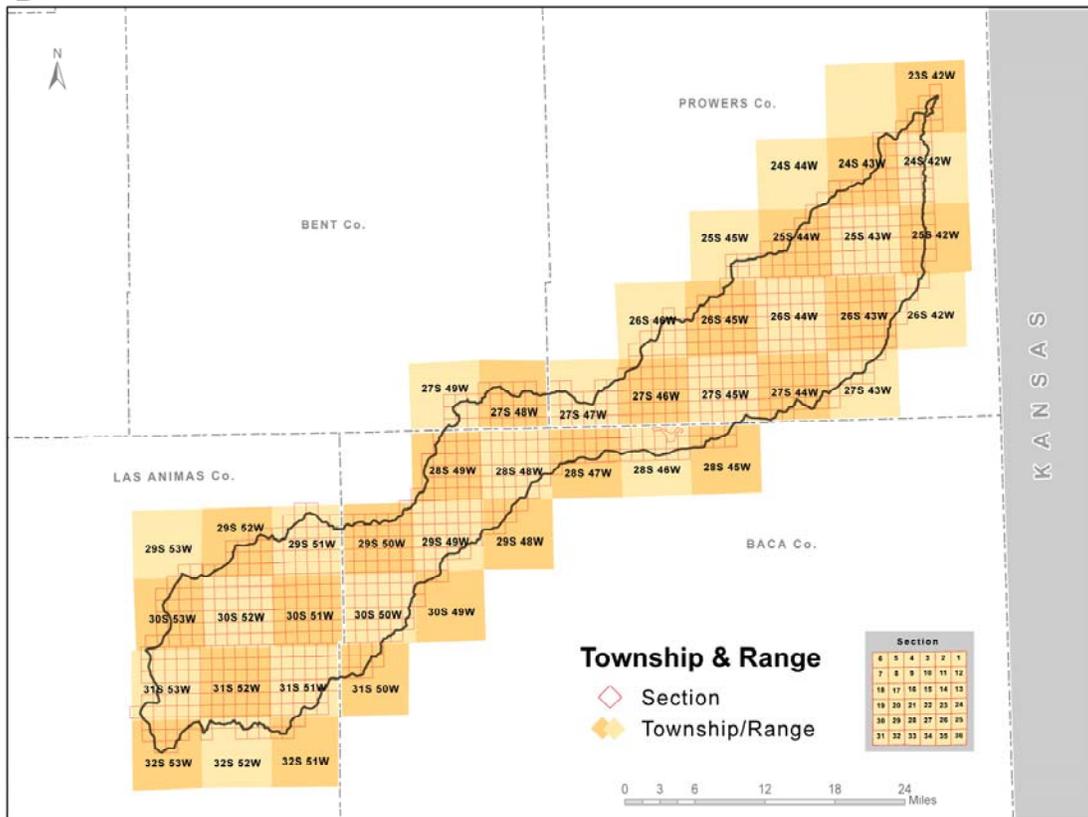
While rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide the benefits of NRCS locally-led planning in less time and at a reduced cost. The benefits include:

- 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 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.

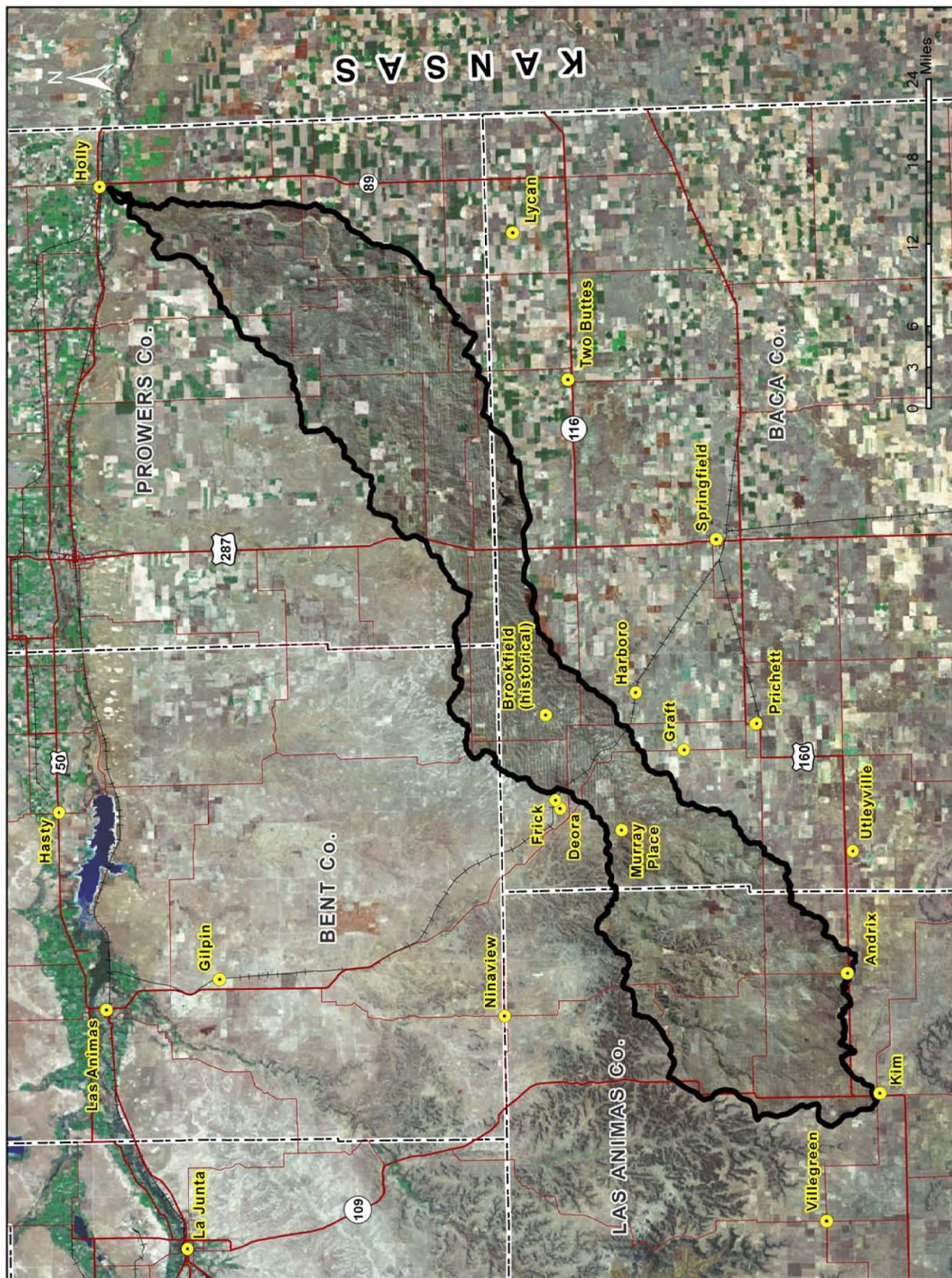
Watershed Overview

The Two Butte Watershed is a rural watershed that covers 516,035 acres and is located in the southern plains of Colorado. The vast majority of the land is used for rangeland with some dryland crops.



	County Acres	County Acres in Two Butte Watershed	% of county in the Watershed	% of Watershed in the county
Baca	1,618,540	127,126	7.9%	24.6%
Bent	986,170	14,795	1.5%	2.7%
Las Animas	3,054,954	149,577	4.9%	29%
Prowers	1,052,815	224,537	21.3%	43.5%

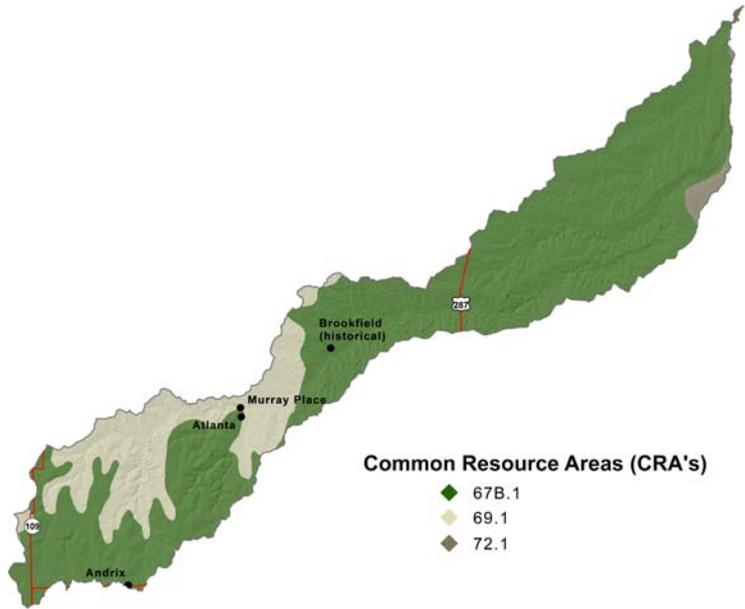
Two Butte Watershed - 11020013



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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.



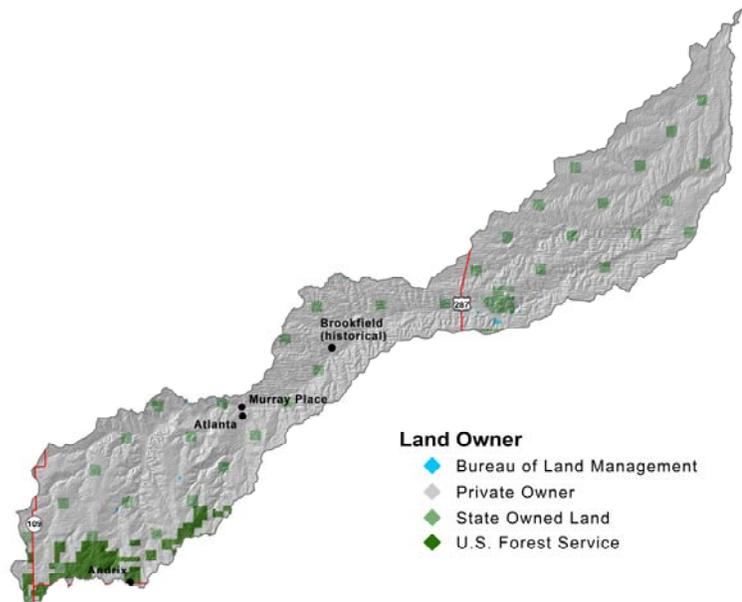
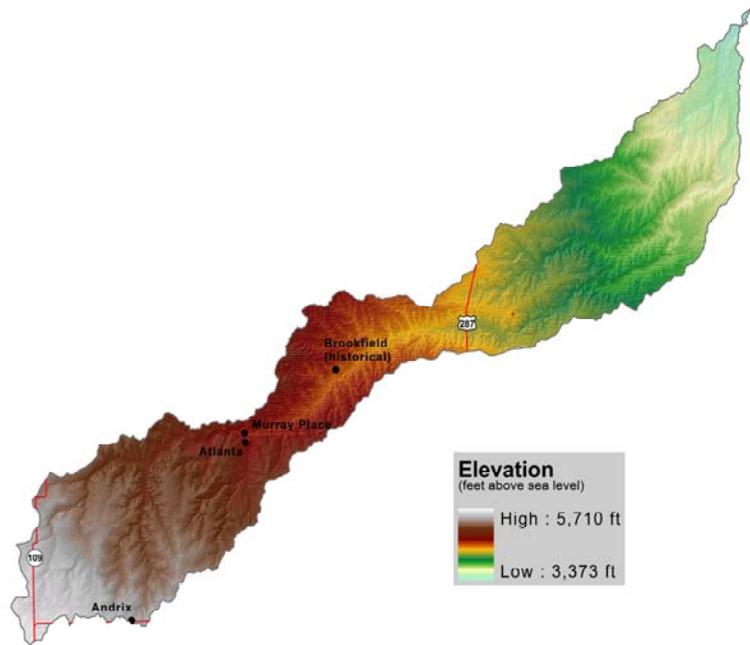
MLRA	CRA	CRA NAME	CRA DESCRIPTION
67B	67B.1	Central Great Plains, Southern Part	The Central High Plains, Southern Part CRA is broad, undulating to rolling plains dissected by streams and rivers. Local relief is measured in tens of feet on the plains. Soils are deep and formed in eolian and alluvial materials. Pre-settlement vegetation was short grass prairies. Nearly all of this area in fallow cropland rotations or rangeland. Some cropland areas are irrigated.
69	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, eolian, alluvial and outwash materials. Pre-settlement vegetation was short grass prairies and piñon 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.
72	72.1	Central High Tableland	The Central High Tableland CRA is broad, level to gently rolling, loess mantled tableland. Local relief is measured in feet on the tableland and tens of feet in major river valleys bordered by steep slopes. Soils are deep. Pre-settlement vegetation was short grass prairies. Nearly all of this area in cropland, both dryland small grain crops and irrigated corn and grain sorghum.

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 slopes down to the lowest elevation to the east.

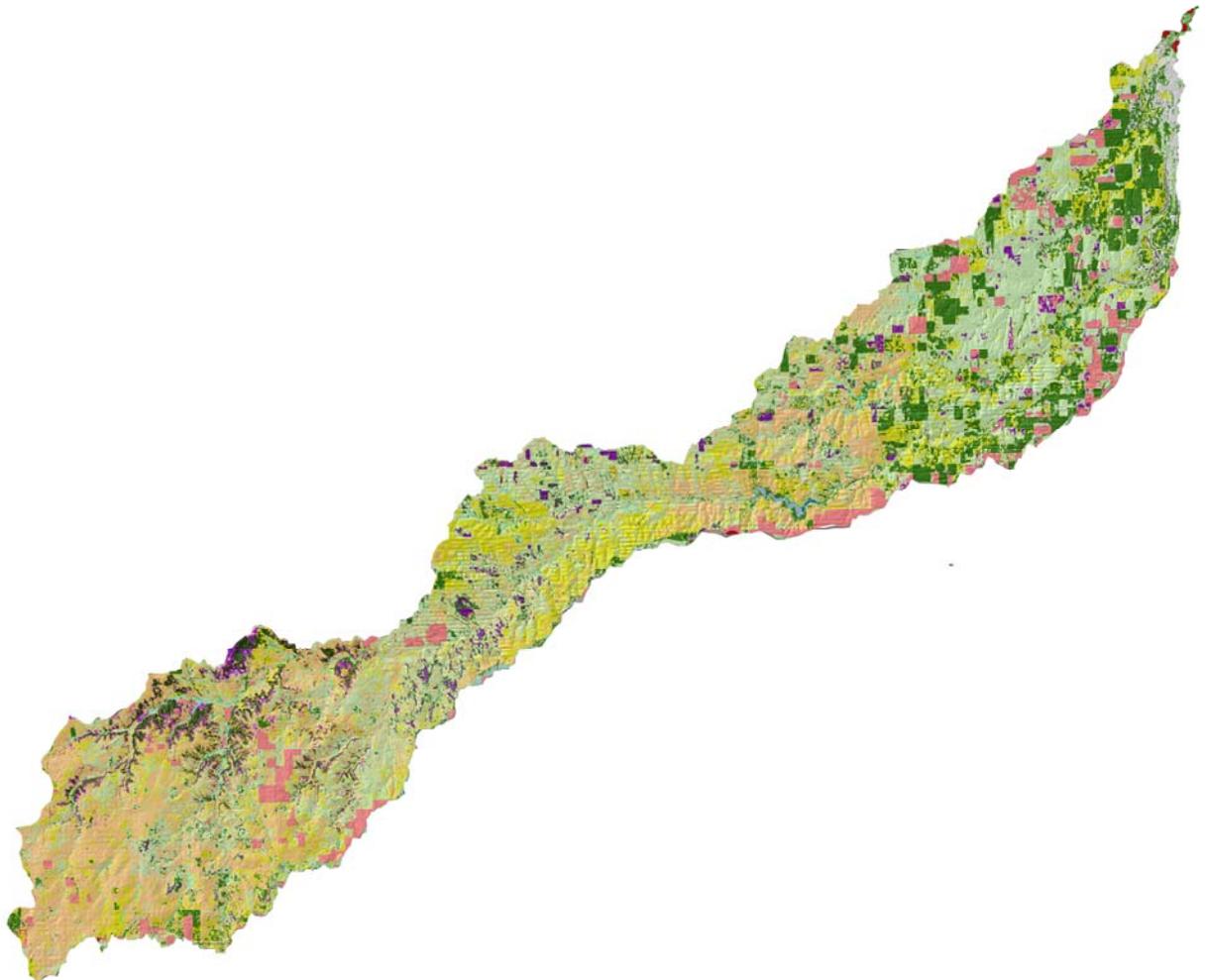
The vast majority of the Two Butte Watershed consists of rangeland. Cropland is almost all dryland crops.

Precipitation averages about 16 inches a year but can vary widely from year to year.



Vegetation

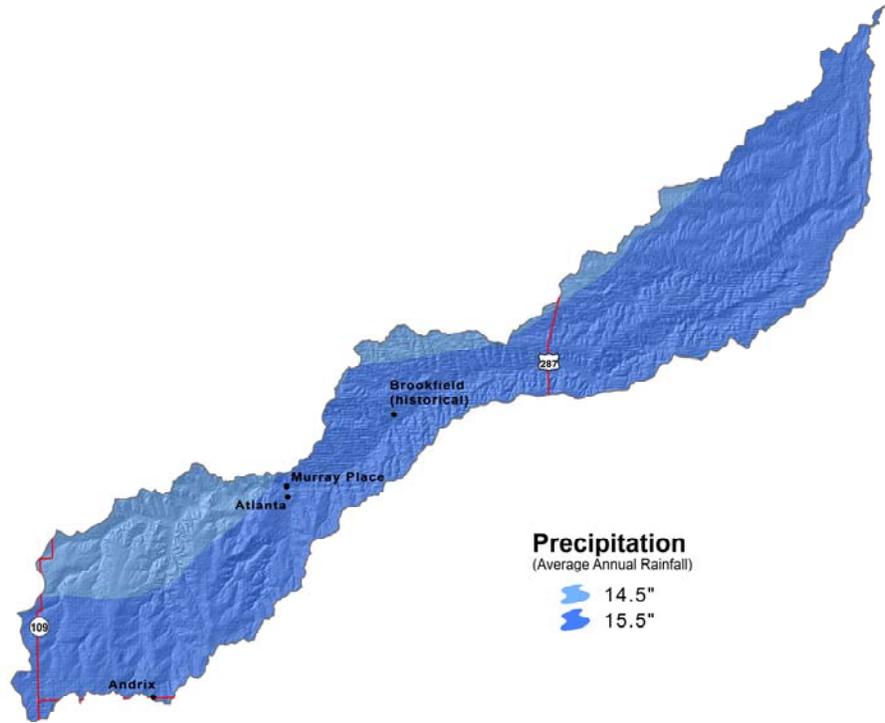
- | | |
|---------------------------|---------------------------------|
| ◆ No Data | ◆ PJ-Oak Mix |
| ◆ Agriculture | ◆ PJ-Mtn Shrub Mix |
| ◆ Dryland Ag | ◆ Sparse PJ/Shrub/Rock Mix |
| ◆ Irrigated Ag | ◆ Sparse Juniper/Shrub/Rock Mix |
| ◆ Grass Dominated | ◆ Barren Land |
| ◆ Grass/Forb Mix | ◆ Soil/Fallow |
| ◆ Mid-Grass Prairie | ◆ Riparian |
| ◆ Short-Grass Prairie | ◆ Forested Riparian |
| ◆ Sparse Grass (Blowouts) | ◆ Herbaceous Riparian |
| ◆ Sagebrush Community | ◆ Water |
| ◆ Greasewood | |
| ◆ Shrub/Grass/Forb Mix | |
| ◆ Sagebrush/Grass Mix | |
| ◆ Grass/Misc. Cactus Mix | |
| ◆ Pinon-Juniper | |
| ◆ Juniper | |
| ◆ Gambel Oak | |



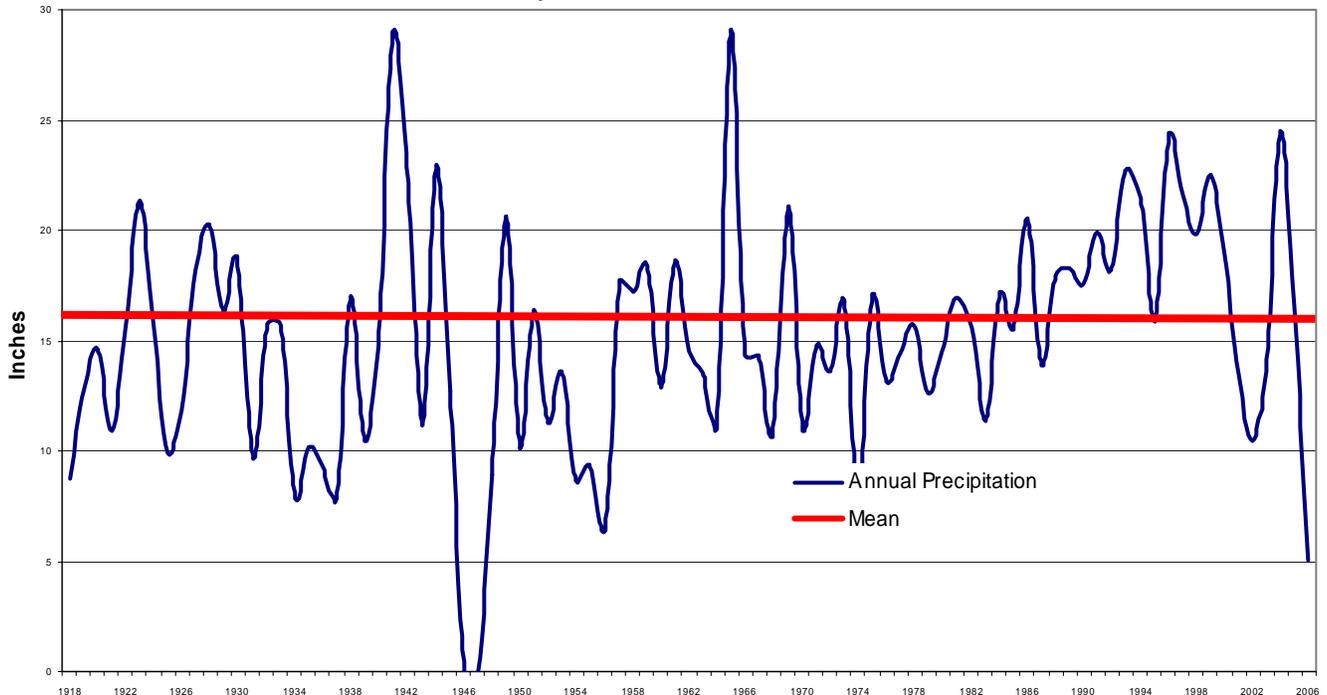
Land Use	Landuse Acreage	Vegetation	Vegetation Acreage
Cropland	29,091	Dryland Ag	27,582
		Irrigated Ag	695
		Ag Land	814
Rangeland/Grassland	469,014	Grass Dominated	172,665
		Grass/Forb Mix	69,134
		Grass/Misc. Cactus Mix	117,709
		Greasewood	54
		Piñon-Juniper	2
		PJ-Oak Mix	23
		PJ-Mtn Shrub Mix	0.7
		Sparse PJ/Shrub/Rock Mix	35
		Sagebrush Community	987
		Sagebrush/Grass Mix	5,761
		Shrub/Grass/Forb Mix	85,045
		Soil	1,020
		Sparse Grass (Blowouts)	9,484
		Sparse Juniper/Shrub/Rock Mix	5,504
		Short-grass Prairie	1,059
Mid-Grass Prairie	531		
Forest	11,711	Juniper	11,711
		Gambel Oak	0.2
Riparian	6,053	Herbaceous Riparian	5,402
		Riparian	651
Water	102	Water	102
Other	64	Barren Land	4
		Rock	0.2
		No Data	60
Total Watershed Acres			516,035

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.



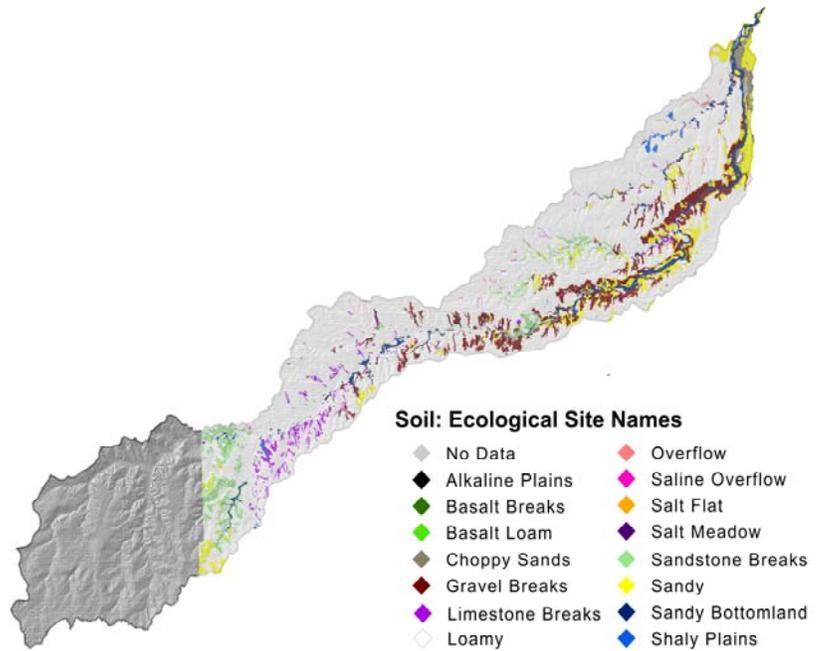
Precipitation
Holly Climate Station 1918-2006



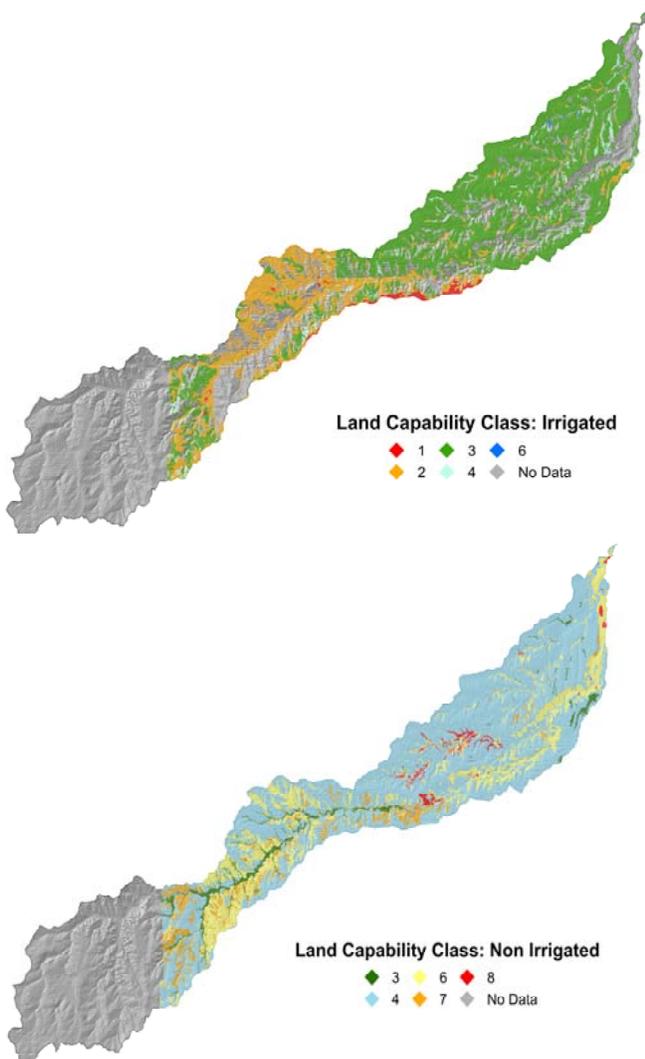
Ecological Sites

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.

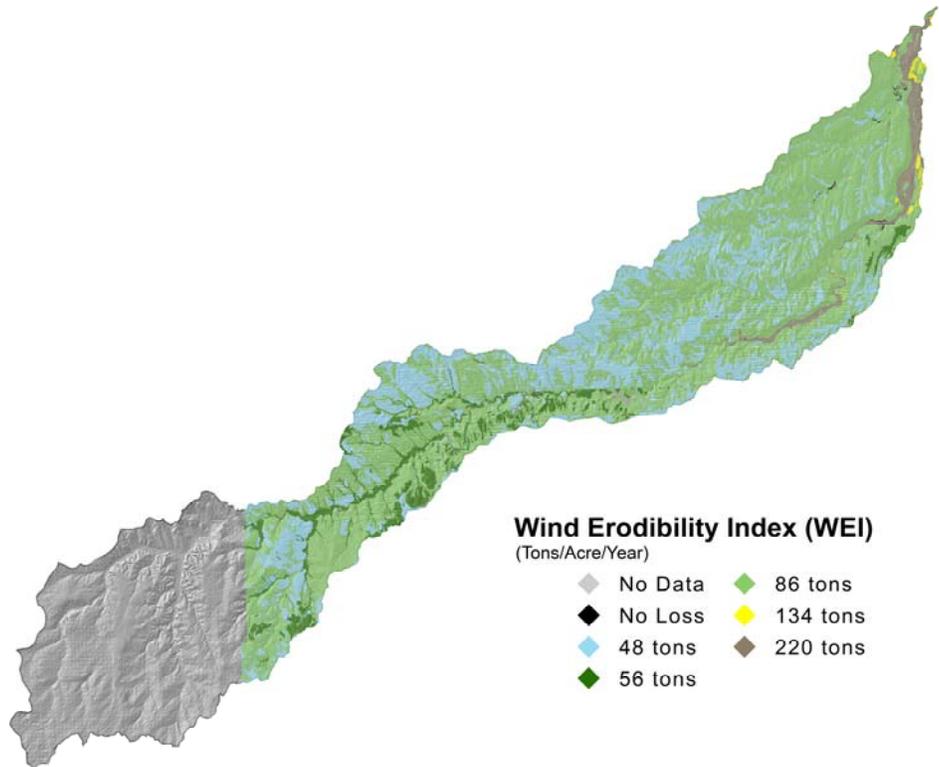
Class 7 - soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

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.

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, most soils in the Two Butte Watershed are considered highly erodible.



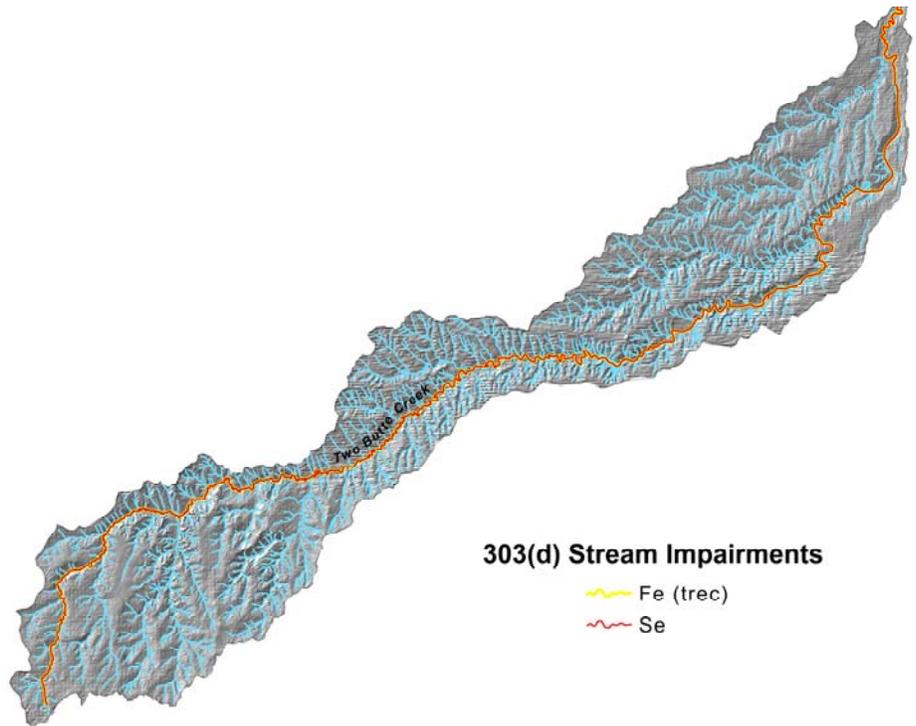
Section 303(d) of the Clean Water Act requires states to identify and list all water bodies where state water quality standards are not being met. Thereafter, TMDLs compromising quantitative objectives and strategies have been or will be developed for these impaired waters within the watershed in order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

Impairment Definition

Selenium (Se): 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.

Iron (Fe): Iron is the fourth most abundant, by weight, of the elements that make up the earth's crust . The ferrous, orbivalent (Fe⁺⁺), and the Ferric, or trivalent (Fe⁺⁺⁺) irons are the primary forms of concern in the aquatic environment. Fe⁺⁺ can persist in waters void of dissolved oxygen and originate from groundwaters or mines when these are pumped or drained.



Two Butte Watershed Natural Resource Concerns

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

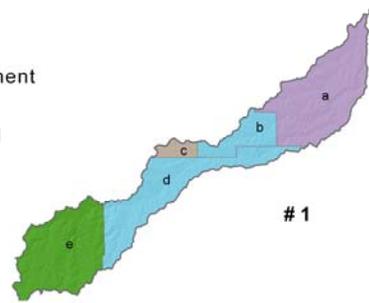
Map Legend—Conservation Districts

- a—Northeast Prowers
- b—Prowers
- c—Bent
- d—Baca
- e—Branson-Trinchera

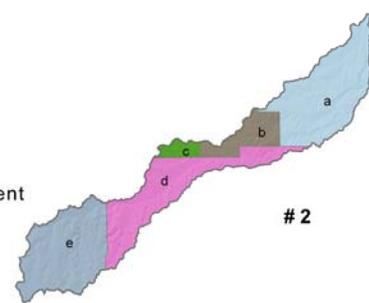
Note:

The Colorado Conservation Districts identified and prioritized these resource concerns during facilitated public meetings and are included in their Long Range Plans.

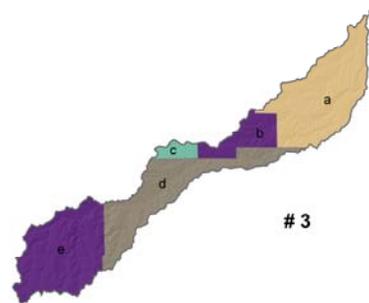
- ◆ Irrigation Water Management
- ◆ Range Management
- ◆ Soil Loss-Erosion Control
- ◆ Water Quality & Quantity



- ◆ Noxious Weeds
- ◆ Range Management
- ◆ Soil Erosion
- ◆ Water Quality
- ◆ Water Quality/ Management



- ◆ Pest Infestation
- ◆ Soil Erosion
- ◆ Water Quality
- ◆ Wildlife



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.

Wildlife Information

Shortgrass prairie and sandsage-mixed grass rangeland are the dominant terrestrial habitat types 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 bunchgrass rangeland habitats in the northeast part of the watershed. Water is scarce on the shortgrass prairie and the native species using this habitat are those that can survive without abundant water supplies. Scattered livestock ponds and riparian areas provide a limited amount of 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, wild turkey, pheasant, mourning dove, and scaled quail. Bobwhite quail may occasionally be found along the southeast edge of the watershed.

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	Not known in the watershed. May occur near Arkansas River.
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
Common Kingsnake	<i>Lampropeltis getula</i>	Reptiles	Concern/None	Occurs in the watershed
Couch's Spadefoot Toad	<i>Scaphiopus couchii</i>	Amphibians	Concern/None	May occur in the watershed
Ferruginous Hawk	<i>Buteo regalis</i>	Birds	Concern/None	Occurs in the watershed
Great Plains narrowmouth toad	<i>Gastrophryne olivacea</i>	Amphibians	Concern/None	Occurs in the watershed
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	May occur in the watershed
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
Texas blind snake	<i>Leptotyphlops dulcis</i>	Reptiles	Concern/None	May occur in the watershed
Texas Horned Lizard	<i>Phrynosoma cornutum</i>	Reptiles	Concern/None	Occurs in the watershed
Triploid checkered whiptail	<i>Cnemidophorus neotesselatus</i>	Reptiles	Concern/None	May occur in the watershed
Yellow Mud Turtle	<i>Kinosternon flavescens</i>	Reptiles	Concern/None	Occurs in the watershed

Social Data

	Baca	Bent	Las Animas	Prowers
Demographics (US Census, American Factfinder)				
Total population	4517	5,998	15,207	14,483
Male	2247	3,379	7,441	7,278
Female	2270	2,619	7,766	7,205
Median age (years)	42.9	37.3	40.9	32.4
White	4,234	4,770	12,566	11,379
Black or African American	2	219	60	43
American Indian and Alaska Native	54	134	387	177
Asian	7	34	57	54
Native Hawaiian and Other Pacific Islander	4	0	30	4
Some other race	135	315	1525	2487
Hispanic or Latino (of any race)	317	1814	14816	4766
Economic Characteristics (US Census, American Factfinder)				
In labor force (population 16 years and over)	2,072	2,303	6,558	6,976
Median household income (dollars)	28,099	28,125	28,273	29,935
Median family income (dollars)	34,018	34,096	34,072	34,202
Per capita income (dollars)	15,068	13,567	16,829	14,150
Families below poverty level	165	231	572	546
Individuals below poverty level	749	988	2573	2755
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)				
Farms (number)	608	265	567	531
Land in farms/ranches (acres)	1,080,386	735,826	2,304,766	861,778
Average size farm/ranch (acres)	1,777	2,777	4,065	1,623
Median size farm (acres)	1,120	580	1,000	640
Average age of farmer or rancher	57.2	53.9	57.6	53.3
Net cash return from ag sales (\$1,000)	5,944	5,898	1,798	8,467
Cattle and calves (number)	56,000	45,000	47,000	110,000

Selected Conservation Application Data

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	Total
Total Conservation Systems Planned (Acres)	143,918	44,427	Not Avail.	89,999	97,584	375,748
Total Conservation Systems Applied (Acres)	115,823	101,027	Not Avail.	45,314	44,186	306,350
Practices						
Prescribed Grazing	75,925	101,859	2,418	35,529	13,947	229,678
Upland Wildlife Habitat Management	4,766	13,730	605	13,616	5,852	38,569
Conservation Cropping System	Not Avail.	Not Avail.	0	1,520	4,473	5,993
Residue Management, Seasonal	Not Avail.	Not Avail.	0	0	0	0

Conservation Systems to Address Major Resource Concerns

Primary Resource Concern: Rangeland Health				
Conservation System Description:		Based on Conservation System Guide Code: CO 67B.1-GR-01-R-Grazing		
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost per Median Sized Ranch (\$)
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.	33	54,842	1,809,786
Subtotal Rangeland costs:				\$1,809,786

Resource Concern:		Soil Erosion By Wind on Dryland Crops		
Conservation System Description:	Seasonal residue management with Conservation crop rotation, Nutrient and Pest Mgt		Reference Conservation System Guide Code:	
			CO 69.1-CR-Dryland-R-2	
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Conservation Crop Rotation (328)	Ac	21,589	10	215,890
Residue Mgmt, Seasonal (344)	Ac	24,219	5	121,095
Nutrient Management (590)	Ac	24,219	5	121,095
Pest Management (595)	Ac	24,219	15	363,285
Subtotal: Dryland crop costs				\$912,365

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.	1,809,786
Dryland Crop	Soil	145,314 Total Tons/Year saved	Cropland sustainability	912,365
Estimated Total Costs to Address Major Resource Concerns:				\$2,722,151

FOOTNOTES/ BIBLIOGRAPHY

303(d) listed streams within Two Butte 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, locations and priority ratings, visit <http://www.cdphe.state.co.us/regulations/wqccregs/100293wqlimitedsegmdls.pdf>.

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 surveys:

- Baca County (CO009) Published 12/07/2005
- Bent County (CO011) Published 12/07/2005
- Las Animas County Area (CO628) Published 05/01/2006
- Prowers County (CO099) Published 12/20/2005

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.

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>.

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>.

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.