



United States Department  
of Agriculture

# Little Beaver Watershed



Hydrologic Unit Code 10250013

Natural Resources  
Conservation Service

## Rapid Assessment

Lakewood, Colorado

RWA 10250013

September 2008





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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:

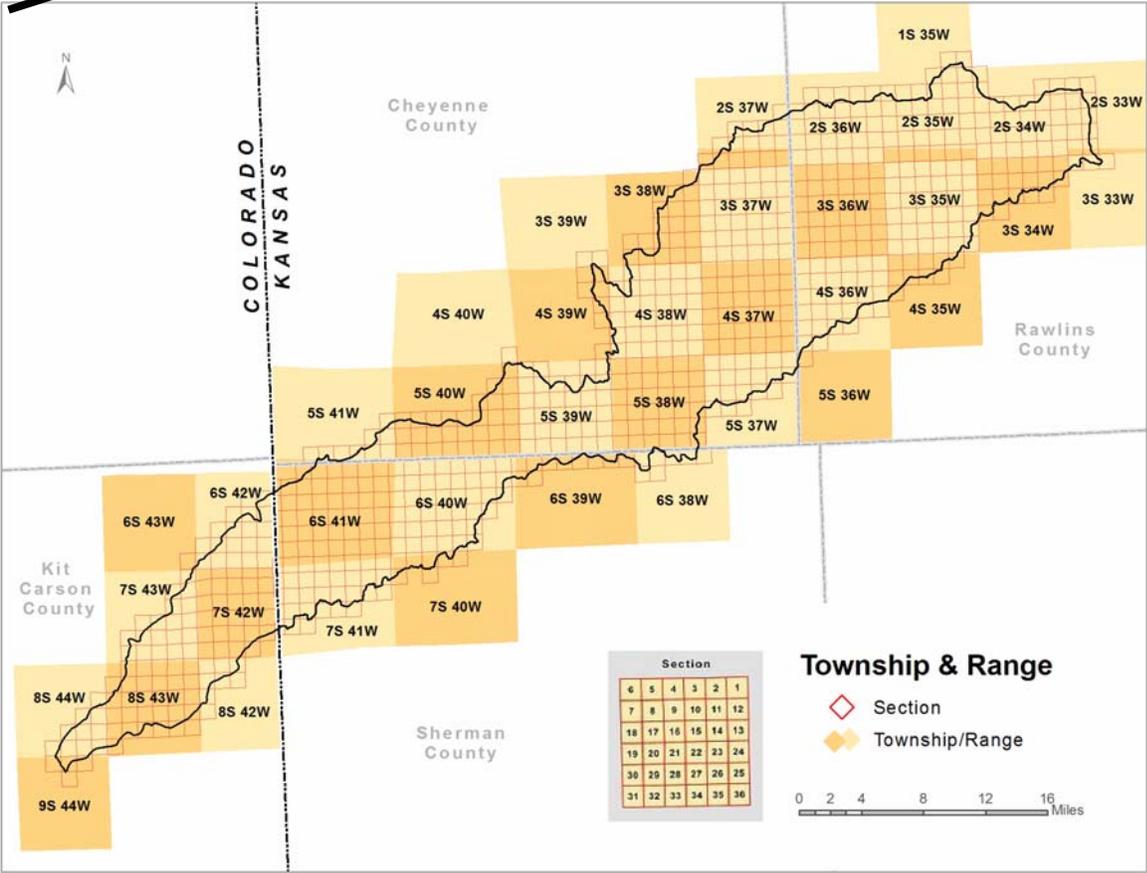
- Quick and inexpensive tools for setting priorities and taking action
- Providing a level of detail that is sufficient for identifying actions that can be taken with no further watershed-level studies or analyses
- Actions to be taken may require further Federal or State permits or ESA or NEPA analysis 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 NRCS programs that will meet their goals
- Plans include the full array of conservation program tools (i.e. cost-share practices, easements, technical assistance)

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

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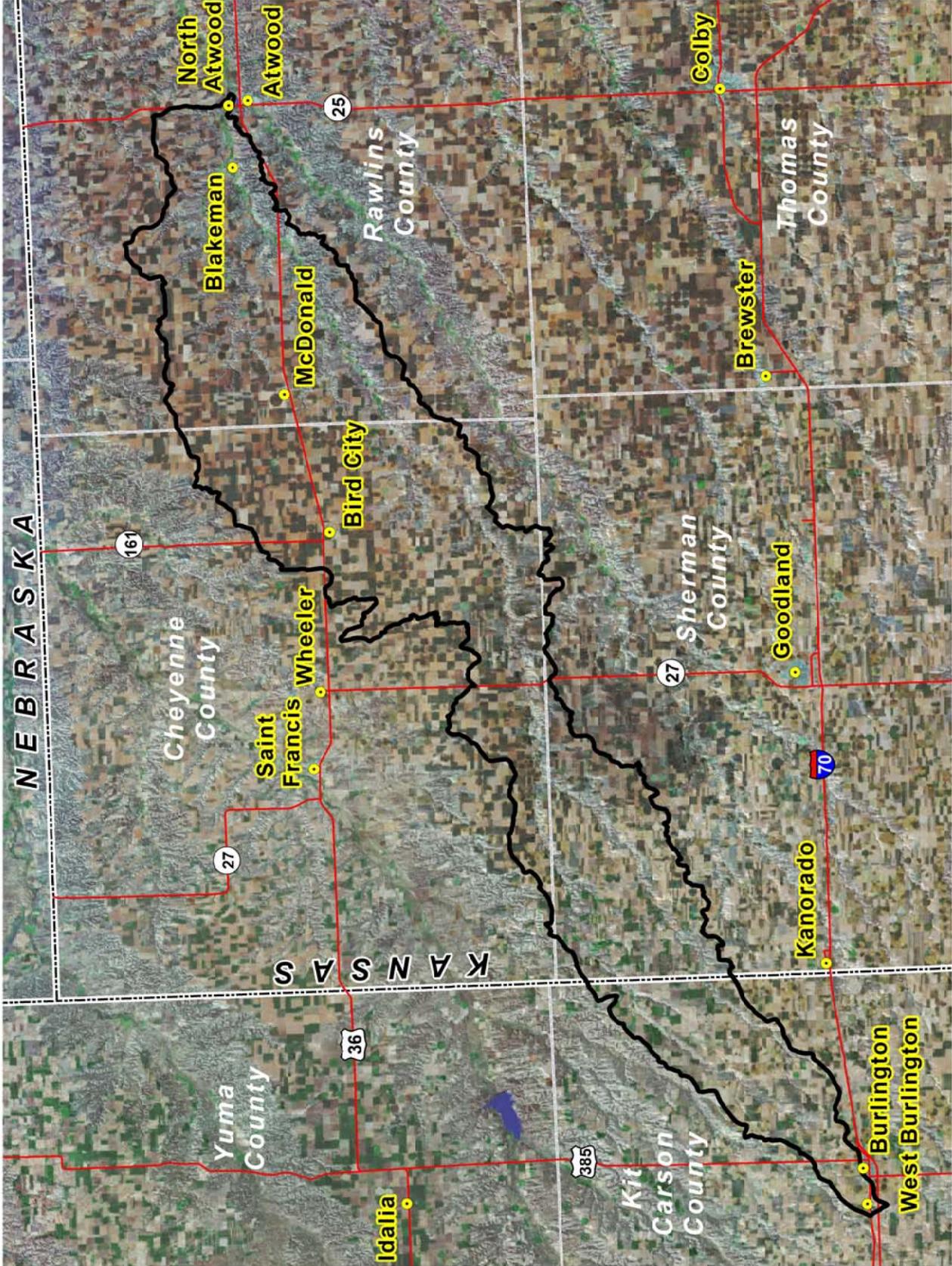
The Little Beaver Watershed is located in the Republican River Basin, on the eastern plains of Colorado. The watershed is 412,686 acres in size, with 58,454 acres in Colorado. The watershed includes approximately 239 farms and ranches, covering 351,525 acres in the entire watershed. As of April 2005, there are 19,760 acres of land in the Conservation Reserve Program.



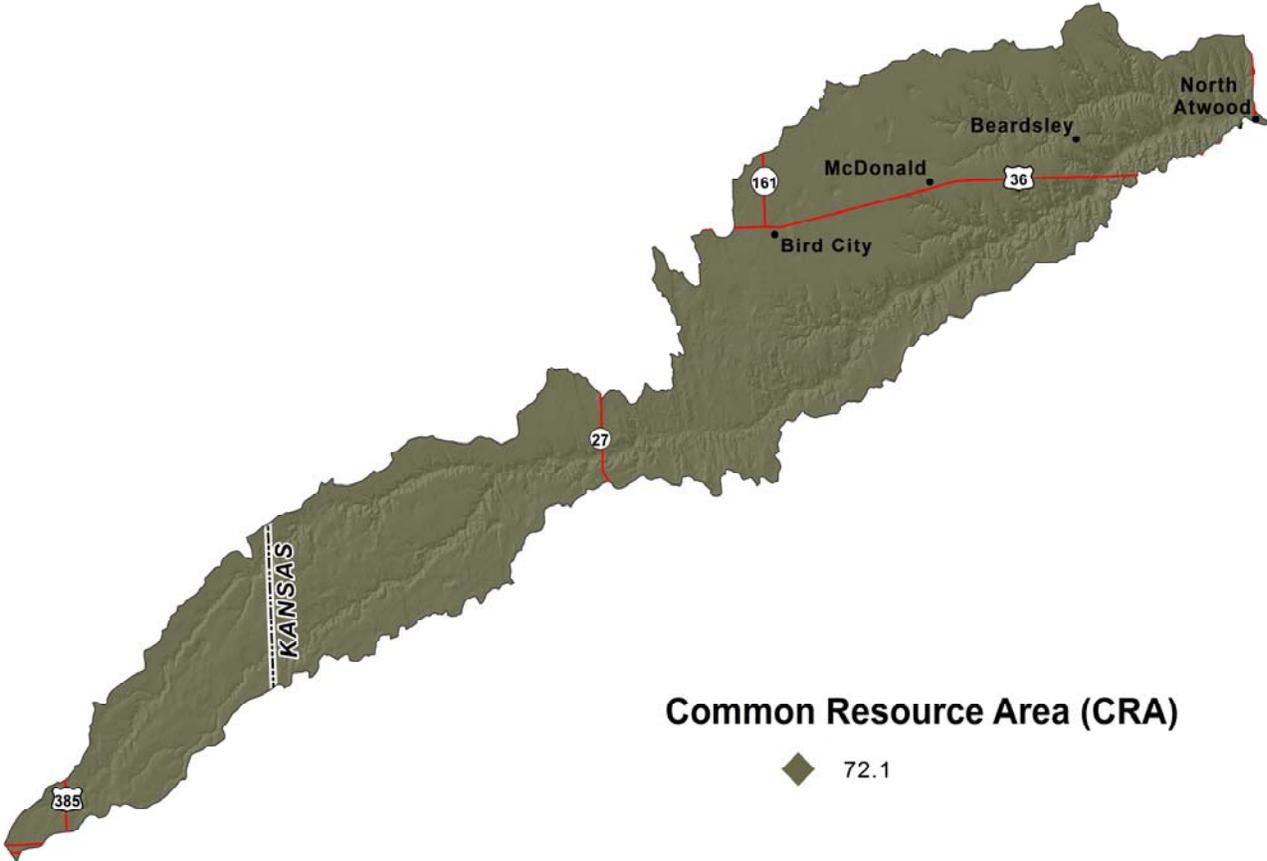
<i><b>COLORADO</b></i> <i><b>County</b></i>	<b>County Acres</b>	<b>County Acres in LITTLE BEAVER Watershed</b>	<b>% of County in the Watershed</b>	<b>% of Watershed in the County</b>
Kit Carson	1,383,890	58,454	4.3%	14.0%

**KANSAS**

Cheyenne	654,065	154,271	23.6%	37.4%
Rawlins	685,972	127,579	18.6%	30.9%
Sherman	676,627	73,042	10.8%	17.7%



Satellite Imagery: Arc IMS Server - Geography Network Services hosted by ESRI



**Common Resource Area (CRA)**

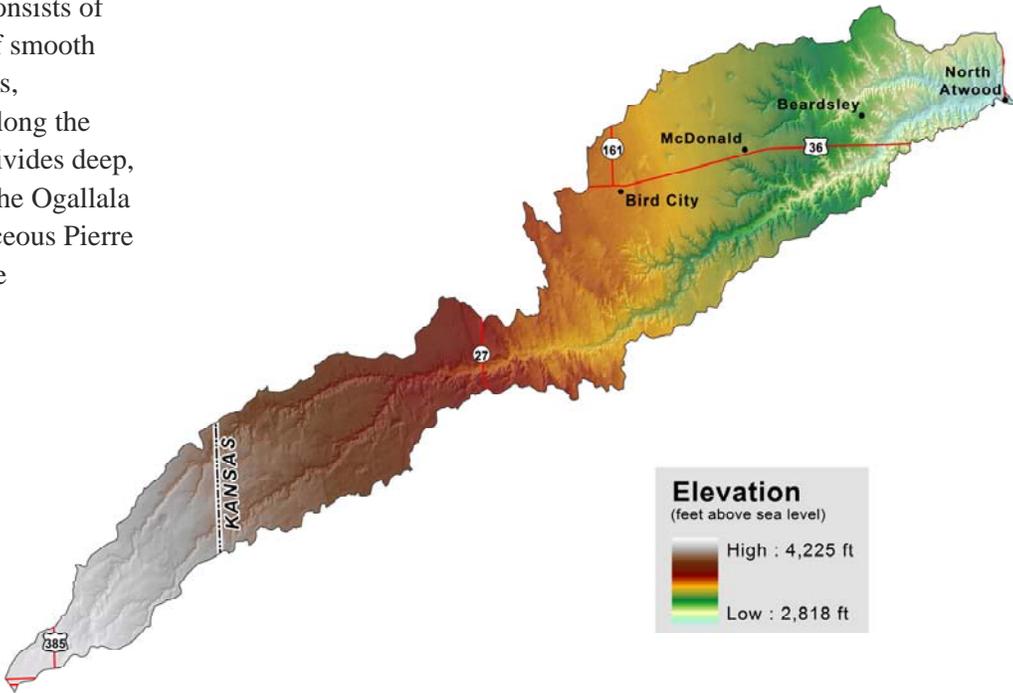
◆ 72.1

**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
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 tens of feet and major river valleys bordered by steep slopes. Soils are deep. Presettlement vegetation was short grass prairies. Nearly all of this area in cropland, both dryland small grain crops and irrigated corn and grain sorghum.

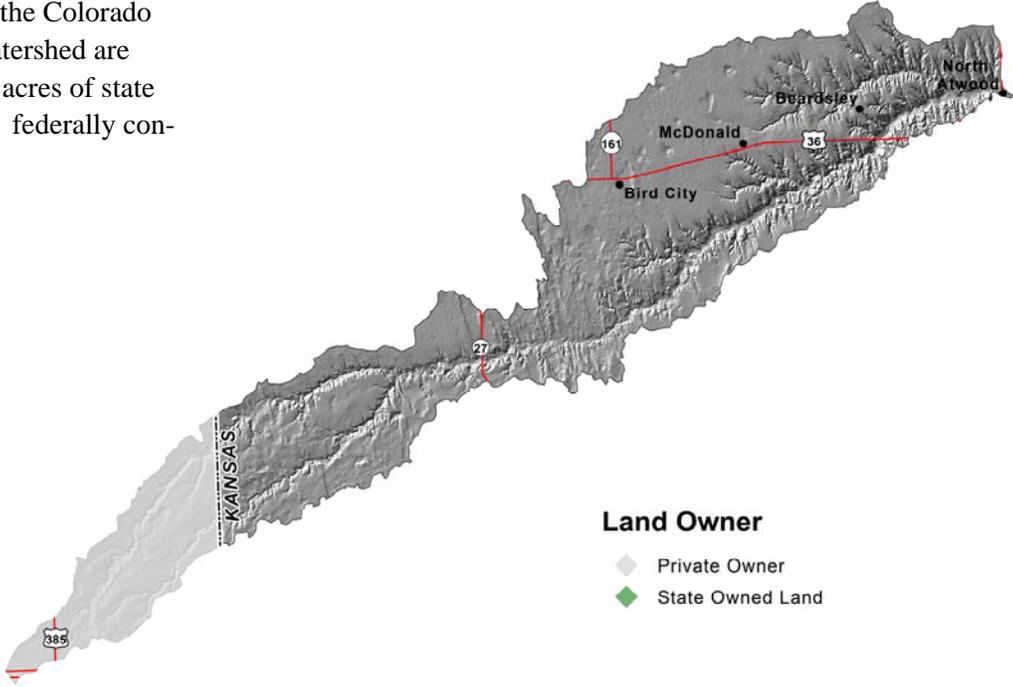
### Physical Description

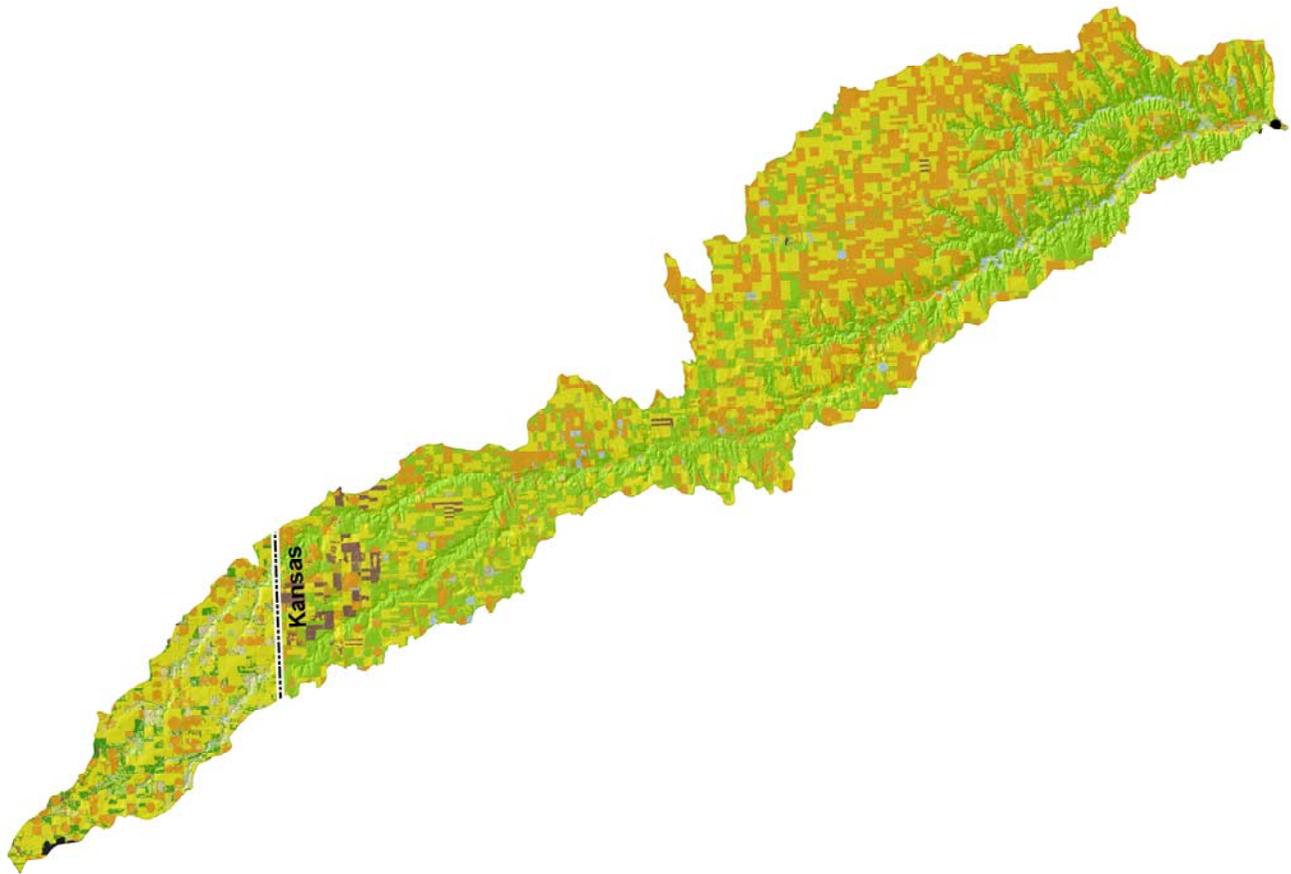
The Little Beaver watershed consists of broad, inter-valley remnants of smooth plain, with gently rolling slopes, punctuated by steeper slopes along the drainages. The Little Beaver divides deep, well-drained soils overlaying the Ogallala formation, and cuts into Cretaceous Pierre shale on the eastern edge of the watershed.



### Land Ownership

Approximately 57,753 acres of the Colorado portion in the Little Beaver Watershed are privately owned. There are 16 acres of state controlled land and no acres of federally controlled lands.



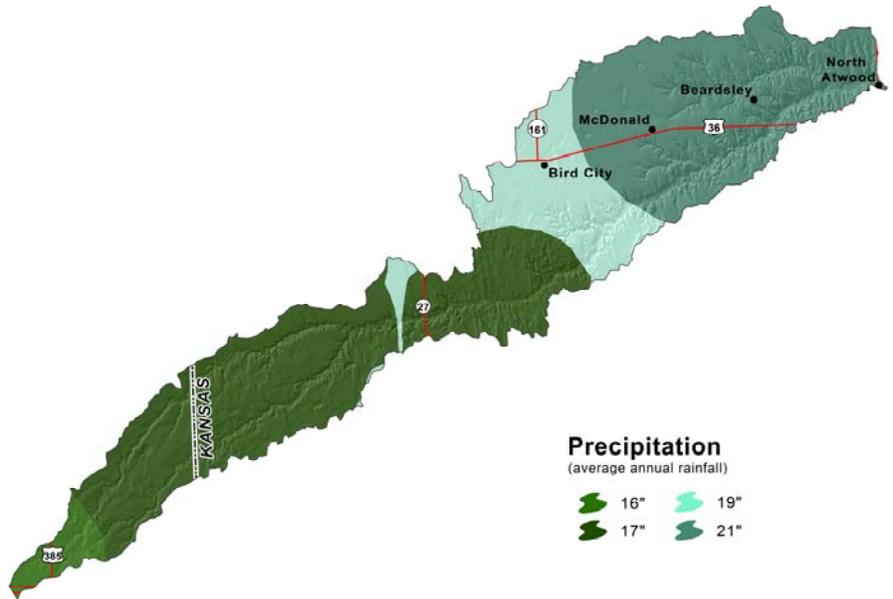


LITTLE BEAVER Colorado Land Use	Total Acreage	Vegetation	Acreage
Cropland	39,749	Irrigated Ag	9,256.90
		Dryland Ag	30,492.20
Rangeland	11,376	Grass Dominated	9,108.06
		Grass/Forb Mix	2,120.51
		Sagebrush Community	5.03
		Sagebrush/Grass Mix	142.81
Grassland	6,249	Short-grass Prairie	6,249.01
Forest	25	Cottonwood	24.69
Riparian	722	Herbaceous Riparian	653.36
		Riparian	68.22
Water	1	Water	0.31
Other	333	Urban/Built Up	333.26
Total Colorado Watershed Acres			58,454

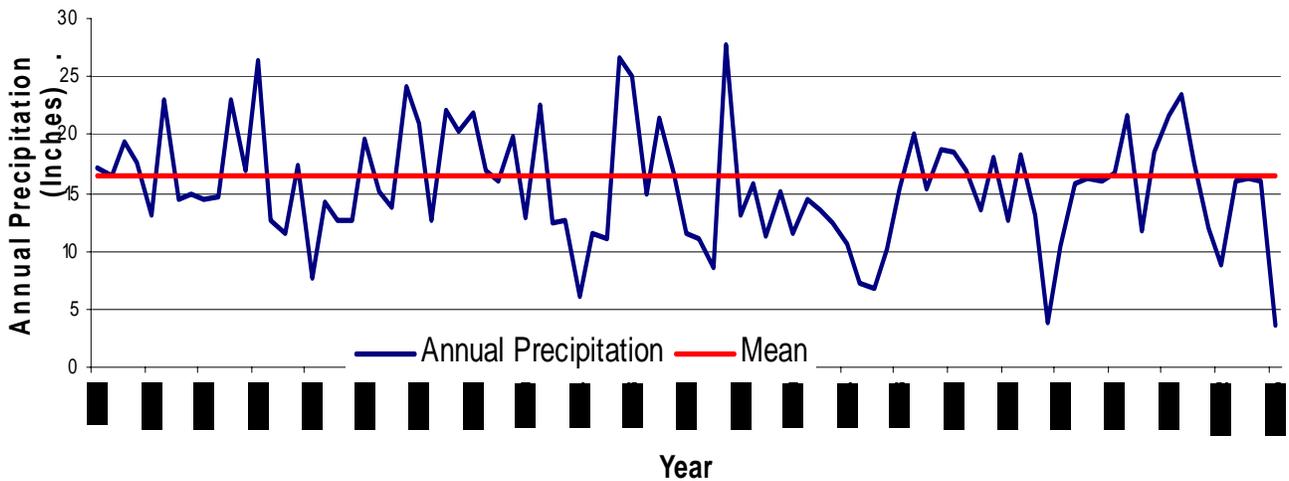
## Precipitation

Precipitation in the Little Beaver watershed averages between 15 and 17 inches per year. Droughts are common in the watershed, as with the rest of Colorado. Statewide, in the 1900's alone, four prolonged dry spells occurred. The first took place in the 1910s, and another, in the '30s, caused the dust-bowl period.

The second worst drought on record in the state occurred in the mid-50s, when a series of hot, dry summers following a period of scant mountain snowpack created water shortages. The fourth serious 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 found evidence of droughts, even more severe than those during the record period, with some lasting many years. Rainfall in the watershed typically occurs as frontal storms in the spring and early summer, and as high intensity, convective thunderstorms in late summer. Maximum precipitation is from mid spring through late autumn, and precipitation in winter is snow. The average annual temperature is from 37 to 66 degrees F. The frost free period averages 153 days but ranges from 106 to 184 days.



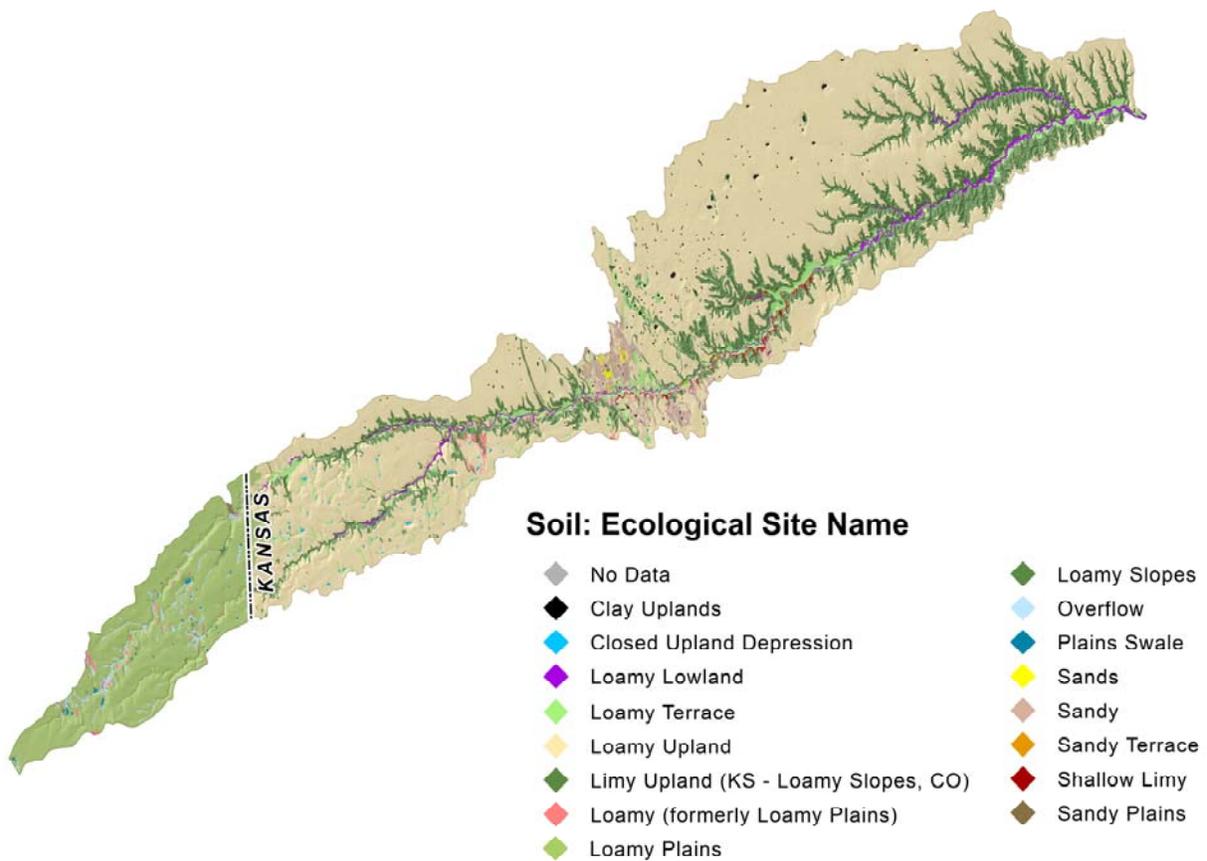
Little Beaver Annual Precipitation, 1918-2006



## 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** shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

## Land Capability Classes

**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.

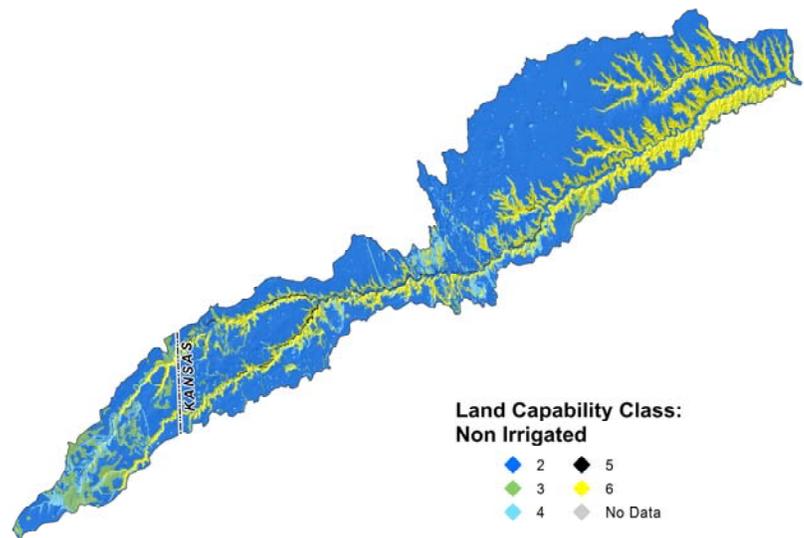
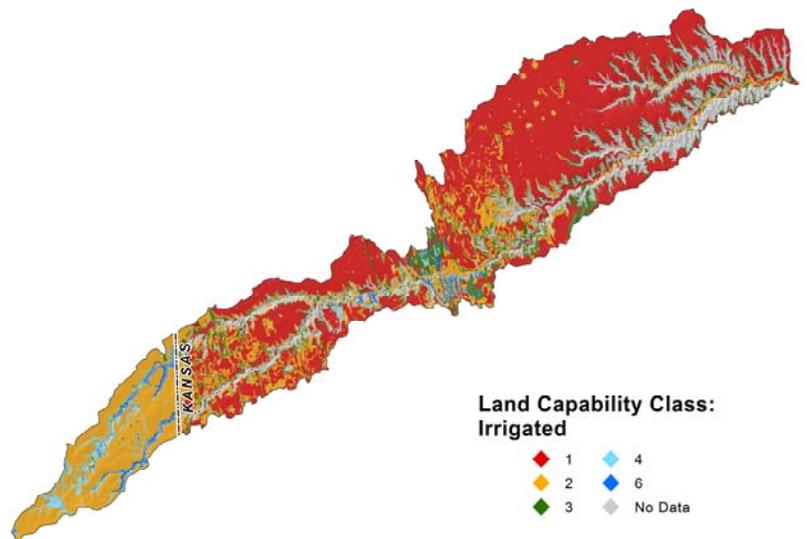
**Class 4** - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

**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.

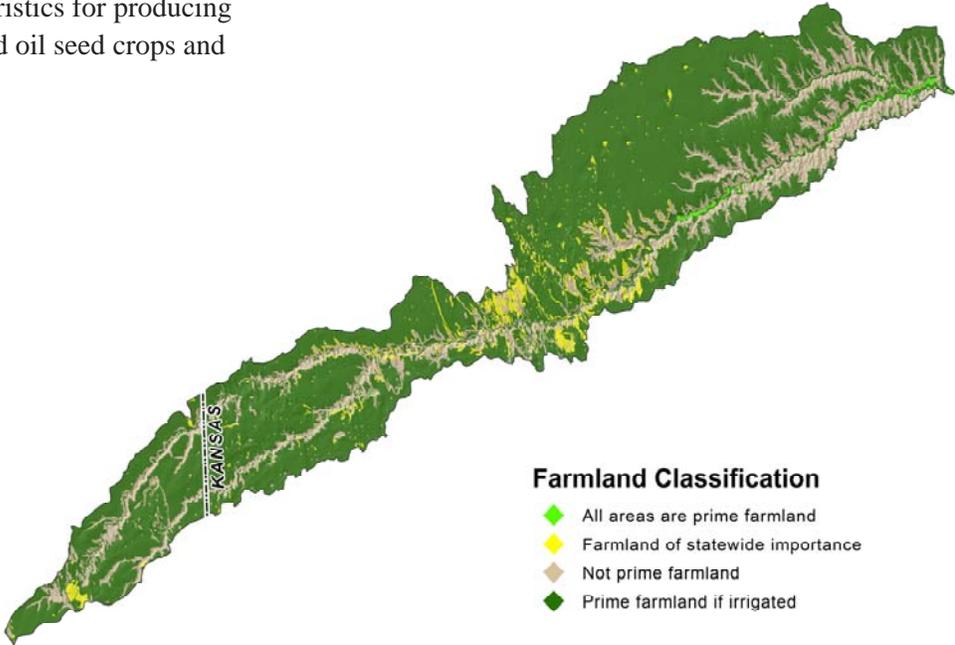
**Class 7** - soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

**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.



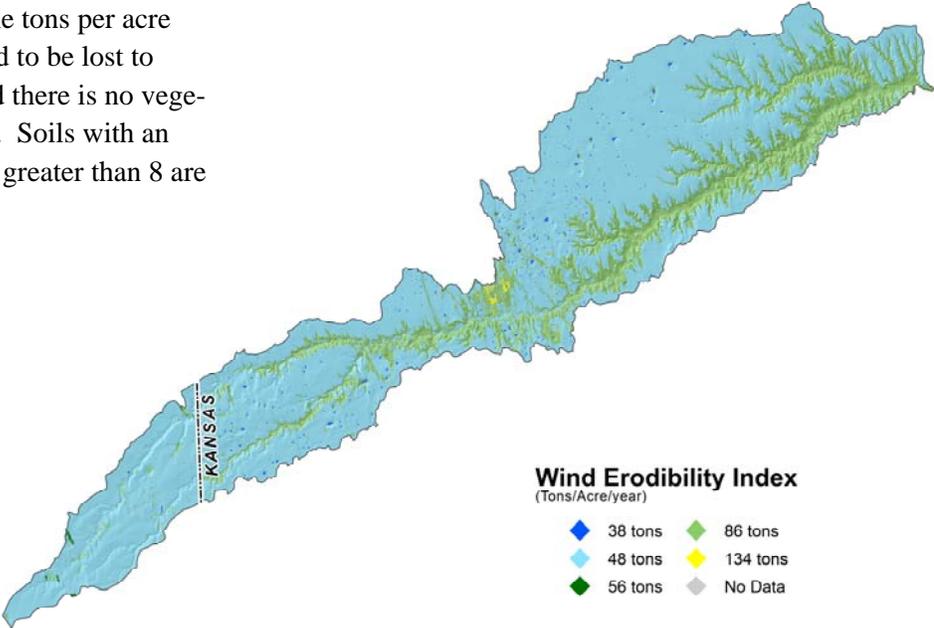
### Farmland Classification

Prime farmland is land that has the best combination of physical characteristics for producing food, feed, forage, fiber and oil seed crops and is also available for these.



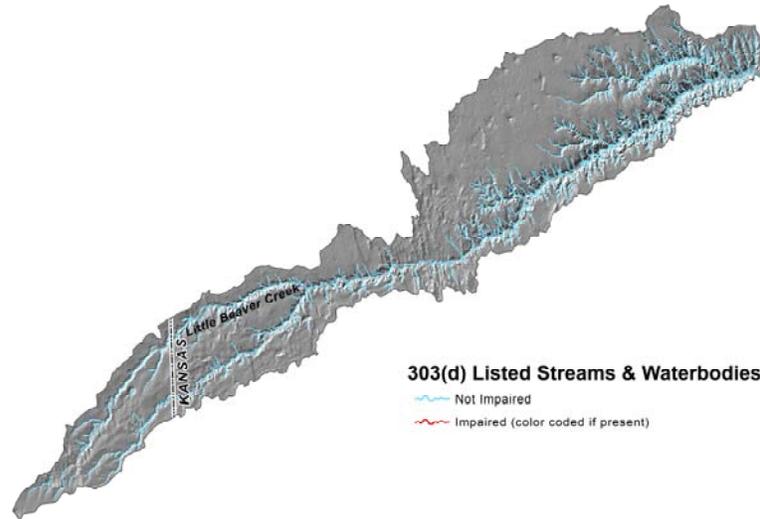
### The Wind Erodibility Index (WEI)

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.



## Surface Water Quality

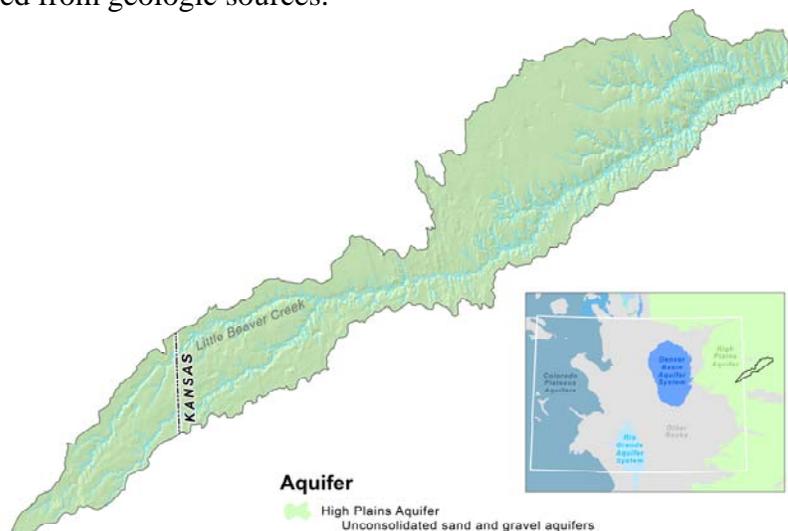
Surface water quality in the Little Beaver Watershed is generally good. Section 303(d) of the Clean Water Act requires states to identify and list all water bodies where state water quality standards are not being met for designated uses. As indicated in the map, there are no 303(d) listed streams in the watershed. The river is designated as Primary Contact Recreation, Aquatic Life Warm I, and Agriculture. Updates to the 303(d)/TMDL list can be found at: [http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303\(d\)/303dtmdlpro.html](http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303(d)/303dtmdlpro.html)



## Ground Water

The High Plains Aquifer underlies the Little Beaver watershed, and is the primary source of irrigation and domestic water for the area. The High Plains aquifer is an extensive regional aquifer that underlies the Great Plains states extending from South Dakota on the north to Texas and New Mexico on the south.

Ground water quality is generally good, although moderately to very hard. Total dissolved solids in the aquifer have risen significantly since the early 1900s, and in some areas, the water may exceed drinking water standards for sulfate, chloride, fluoride, iron and arsenic. These concentrations may be naturally derived from geologic sources.

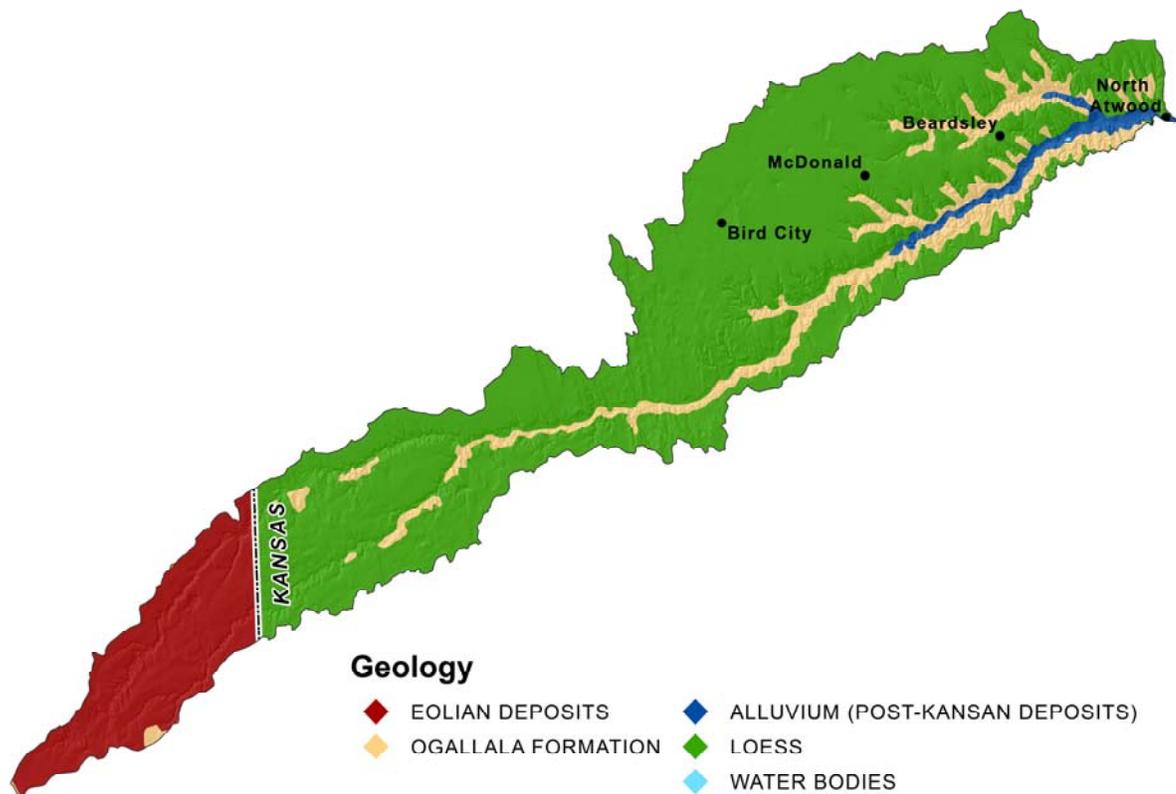


Era	System	Series	Stratigraphic Unit	Unit Thickness (feet)	Physical Characteristics	Hydrogeologic Unit	Hydrologic Characteristics
Cenozoic	Quaternary	Holocene and Pleistocene	Valley-fill deposits	0 to 60	Stream deposits of gravel, sand, silt, clay associated with the most recent cycle of erosion and deposition along present streams	High Plains aquifer	Shallow water-table aquifer(s). Well yields range from 500 to more than 1,000 gpm in several river valleys
			Dune sand	0 to 300	Fine to medium sand with small amounts of clay, silt, and coarse sand formed into hills and ridges by the wind		Typically lies above the water table; has a high infiltration rate and is important for ground-water recharge
		Loess	0 to 250	Silt with lesser amounts of very fine sand and clay deposited as windblown dust	Lies above the water table and does not yield water; serves for minor recharge		
	Pleistocene	Unconsolidated alluvial deposits	0 to 550	Stream deposits of gravel, sand, silt, and clay locally cemented by calcium carbonate into caliche or mortar beds	Primary portion of the High Plains aquifer; mostly unconfined; yields range from 100 to 3,100 gpm; typically less than 300 gpm in Colorado; Ogallala is the most significant High Plains aquifer resource		
	Tertiary	Miocene	Ogallala Formation	0 to 700	Poorly sorted clay, silt, sand, and gravel generally unconsolidated; forms caliche layers or mortar beds when cemented by calcium carbonate; Ogallala makes up large part of High Plains aquifer		Can be confined; moderately permeable. May yield up to 200 gpm in localized areas
			Arikaree Group	0 to 1,000	Predominantly massive, very-fine to fine-grained sandstone with localized beds of volcanic ash, silty sand, siltstone, claystone, sandy clay, limestone, marl, and mortar beds; part of the High Plains aquifer		Typically confined, except at outcrop; yields typically less than 100 gpm
		Oligocene	White River Group	0 to 700	Upper unit, Brule Formation, is considered part of the High Plains aquifer in Colorado, predominantly massive sandstone containing sandstone beds and channel deposits Lower unit, Chadron Formation, mainly consists of varicolored, bentonitic, loosely to moderately cemented clay and silt		Chadron is mostly impermeable

From Gutentag and others, 1984

## Geology

The Little Beaver lies within the Ogallala formation, and dips into Cretaceous Pierre shale on the eastern edge of the watershed. Eolian sands and silt cover much of the uplands surrounding the river.



## Threatened & Endangered Species

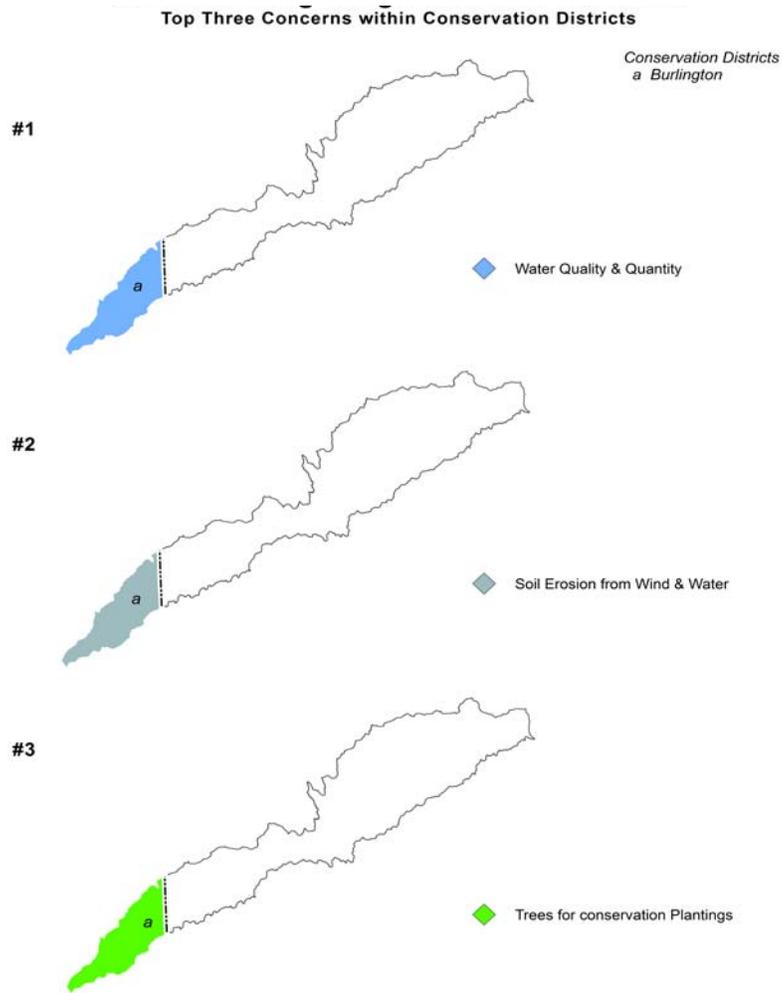
State & Federally Threatened, Endangered & Candidate Species as well as Species of Special Concern in Little Beaver Watershed.

	Common Name	Scientific Name	Class	State Status	Federal Status	Comments
	<b>Bald Eagle</b>	<i>Haliaeetus leucocephalus</i>	Birds	<b>Threatened</b>	None	May migrate through watershed
	<b>Black-tailed Prairie Dog</b>	<i>Cynomys ludovicianus</i>	Mammals	<b>Concern</b>	None	Occurs in the watershed
	<b>Brassy Minnow</b>	<i>Hybognathus hankinsoni</i>	Fish	<b>Threatened</b>	None	May occur in the watershed
	<b>Burrowing Owl</b>	<i>Athene cunicularia</i>	Birds	<b>Threatened</b>	None	Occurs in the watershed
	<b>Ferruginous Hawk</b>	<i>Buteo regalis</i>	Birds	<b>Concern</b>	None	Occurs in the watershed
	<b>Long-Billed Curlew</b>	<i>Numenius americanus</i>	Birds	<b>Concern</b>	None	May occur in the watershed
	<b>Massasauga</b>	<i>Sistrurus catenatus</i>	Reptiles	<b>Concern</b>	None	May occur in the watershed
	<b>Mountain Plover</b>	<i>Charadrius montanus</i>	Birds	<b>Concern</b>	None	Occurs in the watershed
	<b>Northern Cricket Frog</b>	<i>Acris crepitans</i>	Amphibians	<b>Concern</b>	None	May occur in the watershed
	<b>Plains Leopard Frog</b>	<i>Rana blairi</i>	Amphibians	<b>Concern</b>	None	May occur in the watershed
	<b>Plains Orangethroat Darter</b>	<i>Etheostoma spectabile</i>	Fish	<b>Concern</b>	None	May occur in the watershed
	<b>Swift fox</b>	<i>Vulpes velox</i>	Mammals	<b>Concern</b>	None	Occurs in the watershed
	<b>Yellow mud turtle</b>	<i>Kinosternon flavescens</i>	Reptiles	<b>Concern</b>	None	May occur in the watershed

Shortgrass prairie is the dominant, non-cropland, terrestrial habitat type in this watershed. The Conservation Reserve Program also provides a significant acreage of grassland habitat in this watershed. Both dry and irrigated cropland provide additional terrestrial food and cover habitats. Burrowing owl, mountain plover, black-tailed prairie dog, and swift fox are representative species for the shortgrass habitat. Water is scarce and the native species in this watershed are those that can survive without abundant water supplies. Riparian areas, playa lakes, and stock ponds provide seasonal to intermittent aquatic habitats. Economically important wildlife species that occur in the watershed include pronghorn (antelope), mule and/or white-tailed deer, mourning dove, and pheasant.

Social Data	Kit Carson
<b>Demographics (US Census, American Factfinder)</b>	
Total population	8,011
Male	4,236
Female	3,775
Median age (years)	37.4
White	6,992
Black or African American	139
American Indian and Alaska Native	41
Asian	26
Native Hawaiian and Other Pacific Islander	3
Some other race	737
Hispanic or Latino (of any race)	1095
<b>Economic Characteristics (US Census, American Factfinder)</b>	
In labor force (population 16 years and over)	3,746
Median household income (dollars)	33,152
Median family income (dollars)	41,867
Per capita income (dollars)	16,964
Families below poverty level	198
Individuals below poverty level	908
X means that value is not applicale or not available	
<b>County Agricultural Characteristics (Colorado Agricultural Census, county data tables)</b>	
Farms (number)	678
Land in farms/ranches (acres)	1,247,181
Average size farm/ranch (acres)	1,840
Median size farm (acres)	11,112
Average age of farmer or rancher	54.3
Net cash return from ag sales (\$1,000)	3,392
Cattle and calves (number)	148,000

## Little Beaver Watershed Natural Resource Concerns



Resource Concern By Priority	Burlington
Water Quality/Quantity	6
Soil Erosion	5
Tree Planting	4
Rangeland/Grazingland Health and Productivity	3
Conservation Education	2
Conservation Policy	1

**Notes:**

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.

Selected Conservation Application Data					
	FY 2005	FY 2006	FY 2007	FY 2008	Total
Total Conservation Systems Planned (Acres)	1,331	1,011	501		2,843
Total Conservation Systems Applied (Acres)	2,493	287	847		3,727
<b>Practices</b>					
Irrigation Water Management	470	113	0	695	1,278
Prescribed Grazing	1,253	164	0	0	1,417
Conservation Cropping System	1,158	55	346	0	1,559
Residue Management	1,174	674	121	121	2,090

### Conservation Systems to Address Major Resource Concerns

Primary Resource Concern: Water Quality				
<b>Conservation System Description:</b>		Sprinkler irrigation system with IWM, Crop rotation, Mulch-till, Nutrient and Pest Mgt..		<b>Conservation System Guide Code Ref:</b> CO 72.1-CR-Pivot-R-1
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Irrigation System, Sprinkler (442)	Ac	5,000	779	3,895,000
Irrigation Water Management (449)	Ac	7,200	5	36,000
Pest Management (595)	Ac	5,000	15	75,000
<b>Subtotal Irrigated Cropland:</b>				<b>\$4,006,000</b>

Primary Resource Concern: Soil Erosion By Wind on Dryland Crops				
<b>Conservation System Description:</b>		Seasonal residue management with Conservation crop rotation, Nutrient and Pest Mgt		<b>Reference Conservation System Guide Code:</b> CO 72.1-CR-Dryland-R-2
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Conservation Crop Rotation (328)	Ac	60,000	5	300,000
Residue Mgmt, Seasonal (344)	Ac	50,000	5	250,000
Nutrient Management (590)	Ac	20,000	5	100,000
Pest Management (595)	Ac	20,000	15	300,000
<b>Subtotal Costs Dryland Crops:</b>				<b>\$950,000</b>

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

Primary Resource Concern:					
Conservation System Description:		Prescribed Grazing—Planned management that provides adequate recovery opportunity between grazing events and proper stocking of animals. Estimate 30,000 acres need to be treated on medium sized ranches of 3,000 acres.			Based on Conservation System Guide Code: CO 72.1-GR-01-R-Grazing
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost per Median Sized Ranch (\$)	
Fencing (382)	Ft.	5,000	.60	3,000	
Pipeline (516)	Ft.	3,000	2.40	7,200	
Pest Management (595)	Ac.	300	15	4,500	
Upland Wildlife Habitat Management (645)	Ac.	300	na	0	
Watering Facility (614)	No.	4	410	1,640	
Costs to apply prescribed grazing per median sized ranch of 3,000 acres	No.	7	16,340		
Subtotal Rangeland costs:				\$114,380	

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

Landuse	Resource Concern	Measurable Effects	Non-measurable Effects	Estimated Cost (\$)
Irrigated Crop	Water		Nutrients and organics are stored, handled, disposed of, and managed so that surface water uses are not adversely affected.	4,006,000
Dryland Crop	Soil	225,000 Total Tons/Year saved	Cropland sustainability	950,000
Rangeland	Plants		Improved plant condition, productivity, health and vigor. Grazing animals have adequate feed, forage, and shelter. Wildlife habitat is sustained or improved.	114,380
Estimated Total Costs to Address Major Resource Concerns:				\$1,064,380

## References Not Cited in Document

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

**Threatened and Endangered Species** information was gathered using data from the Colorado Division of Wildlife (CDOW) Natural Diversity Information Source (NDIS).

**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>.

**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

Prowers County (CO099) Published 12/20/2005

Elbert County E (CO624) Published 12/16/2005

El Paso County Area (CO625) Published 12/19/2005

**Vegetation** data was generated using the Colorado Division of Wildlife's "Colorado Vegetation Classification Project" (CVCP) data. 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. 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 visit <http://www.ncgc.nrcs.usda.gov/products/datasets/climate/docs/fact-sheet.html> or <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). The data was downloaded from the NRCS Geospatial Data Gateway at <http://datagateway.nrcs.usda.gov>.

**Conservation Systems to address major resource concerns** were extracted from the Conservation Systems Guides (CSG) compiled from local conservationists by the NRCS Ecological Sciences Section at the Lakewood State Office.

**Effects and Impacts** of application of conservation systems were extracted from Colorado eFOTG, Section III, Resource Quality Criteria, NRCS, Colorado, March 2005.