



Colorado Department of
Agriculture



State Conservation Board

Lakewood, Colorado

Pawnee Watershed

Hydrologic Unit Code 10190014

Rapid Assessment

with the assistance of

United States Department of
Agriculture



Natural Resources
Conservation Service

RWA 10190014

March 2008



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.

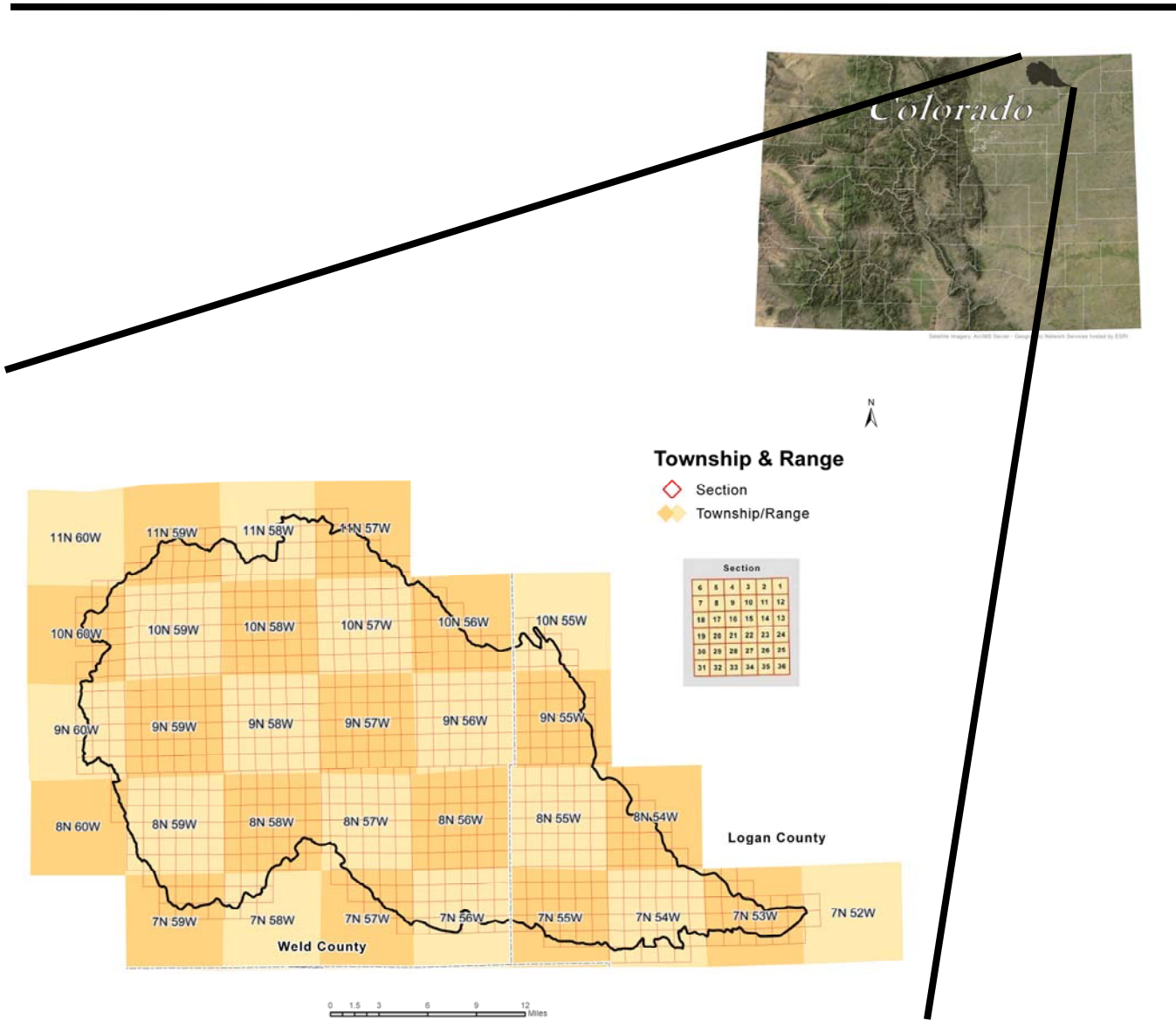
Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals.

Benefits of these Activities

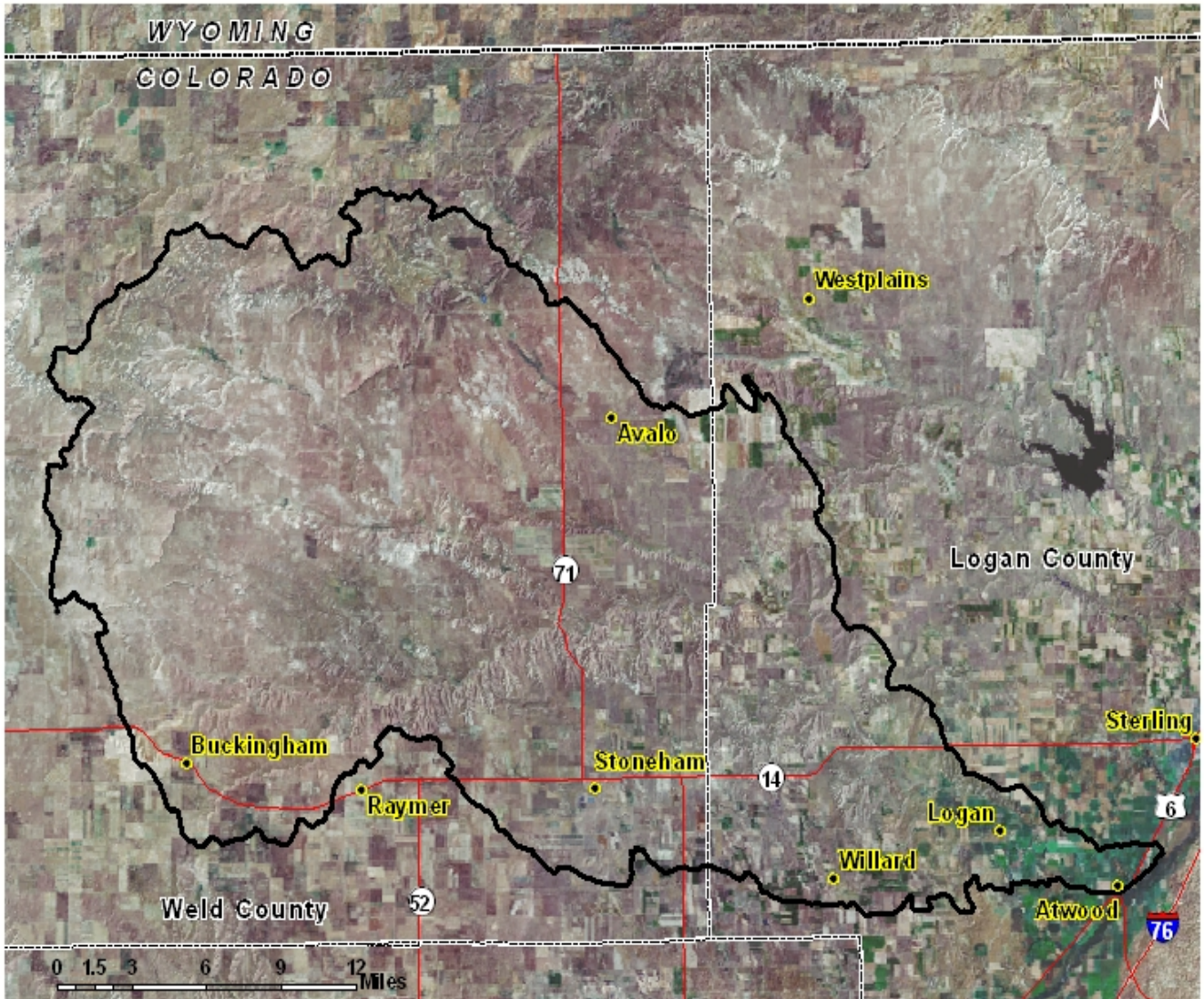
While rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide the benefits of NRCS locally-led planning in less time and at a reduced cost. The benefits include:

- 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 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.

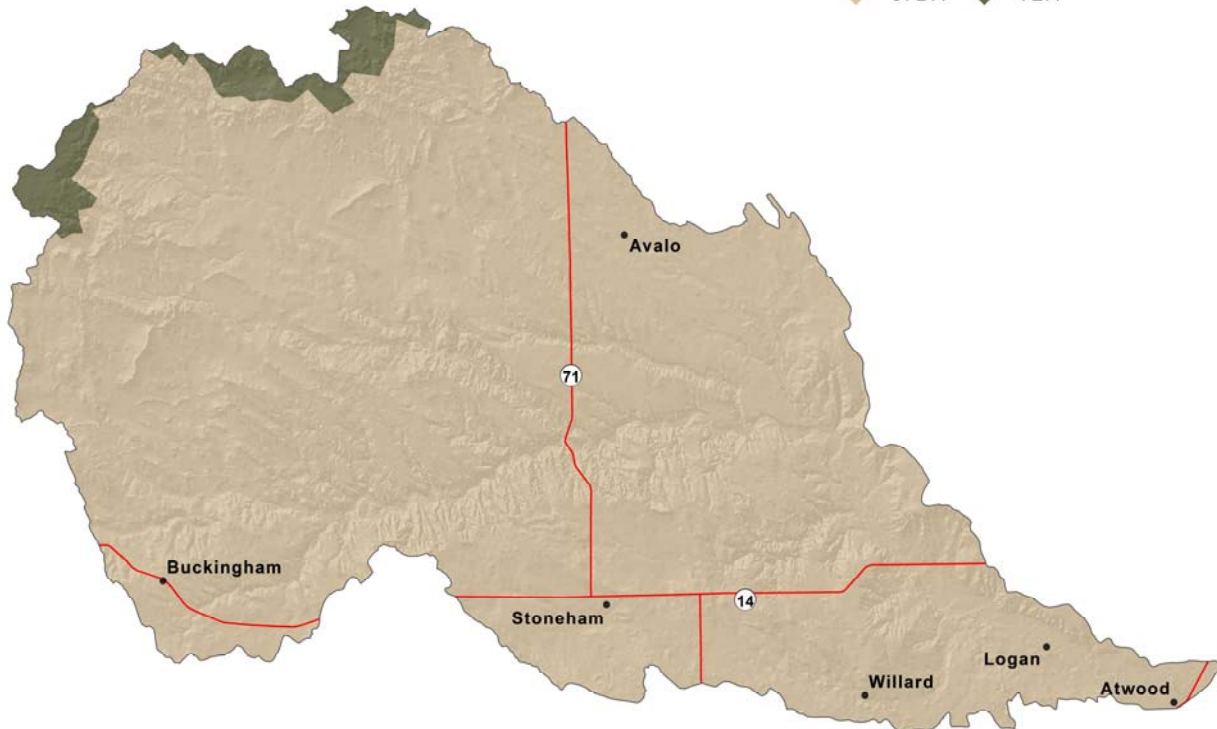


County	County Acres	County Acres in PAWNEE Watershed	% of County in the Watershed	% of Watershed in the County
Weld	2,568,765	322,924	12.6%	77.3%
Logan	1,179,964	94,703	8.0%	22.7%
		417,627		



Common Resource Area (CRA)

◆ 67B.1 ◆ 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
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. Presettlement vegetation was short grass prairies. Nearly all of this area in fallow cropland rotations or rangeland. Some cropland areas are irrigated.
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.

Watershed Overview

The Pawnee Watershed is located in the South Platte River Basin on the northeastern plains of Colorado. This highly agricultural watershed is 468,943 acres in size. There are approximately 529 farms and ranches covering 353,666 acres in the watershed. As of April 2005 there are 26,548 acres of land in the Conservation Reserve Program and 0 acres of CREP.

Physical Description

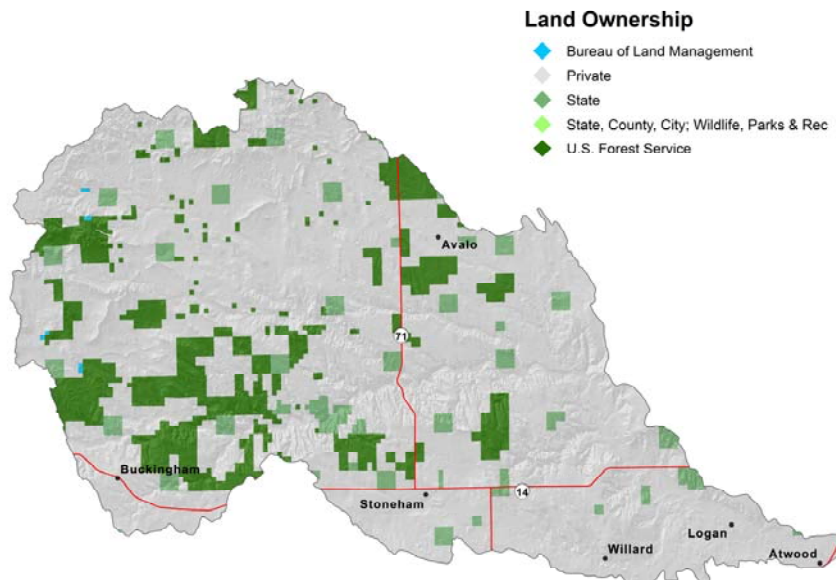
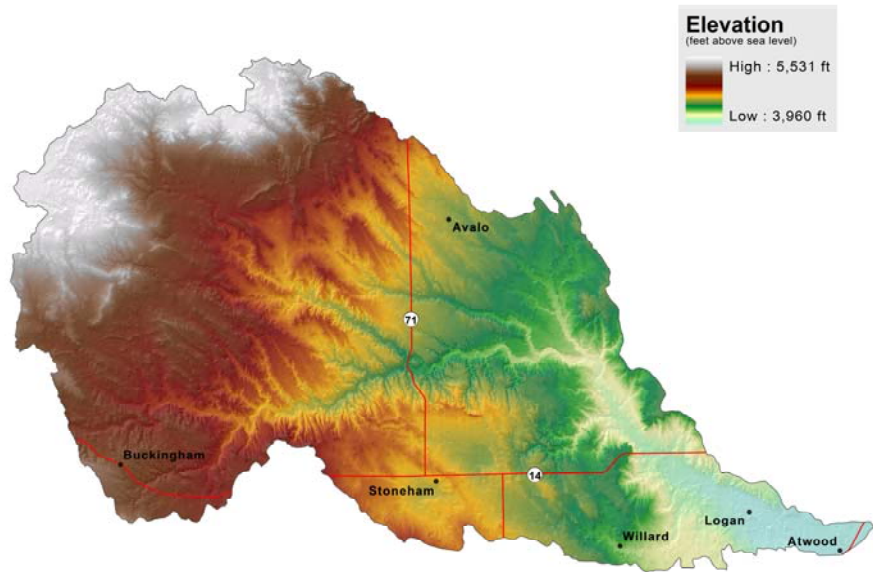
This area is characterized by broad, undulating to rolling plains dissected by streams and rivers.

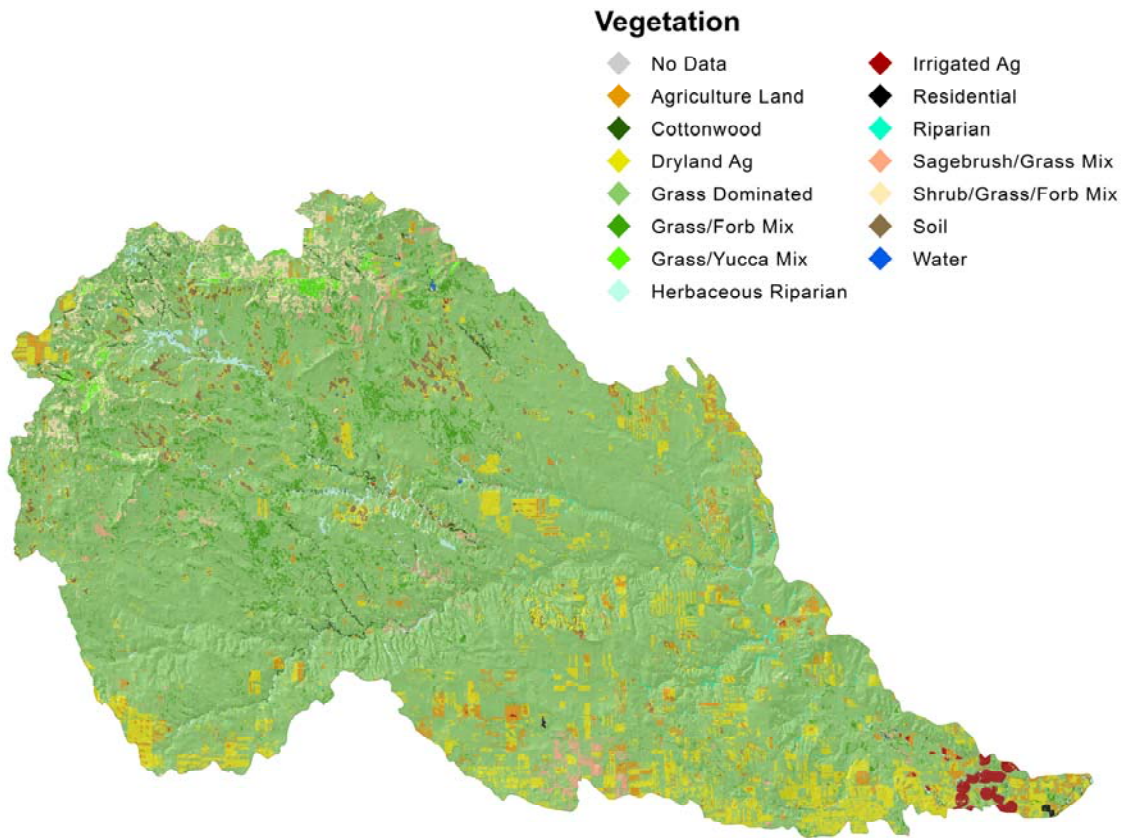
The highest elevations are on the western side of the watershed and gently slopes down to the lowest elevation to the east. Nearly all of this watershed is farmed in fallow, dry cropland rotations or is in rangeland. Some cropland areas along the flood plains and terraces are irrigated. The majority 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 372,482 acres in the Pawnee Watershed are privately owned. There are 68,775 acres of federally controlled lands and 27,426 acres of state controlled lands.

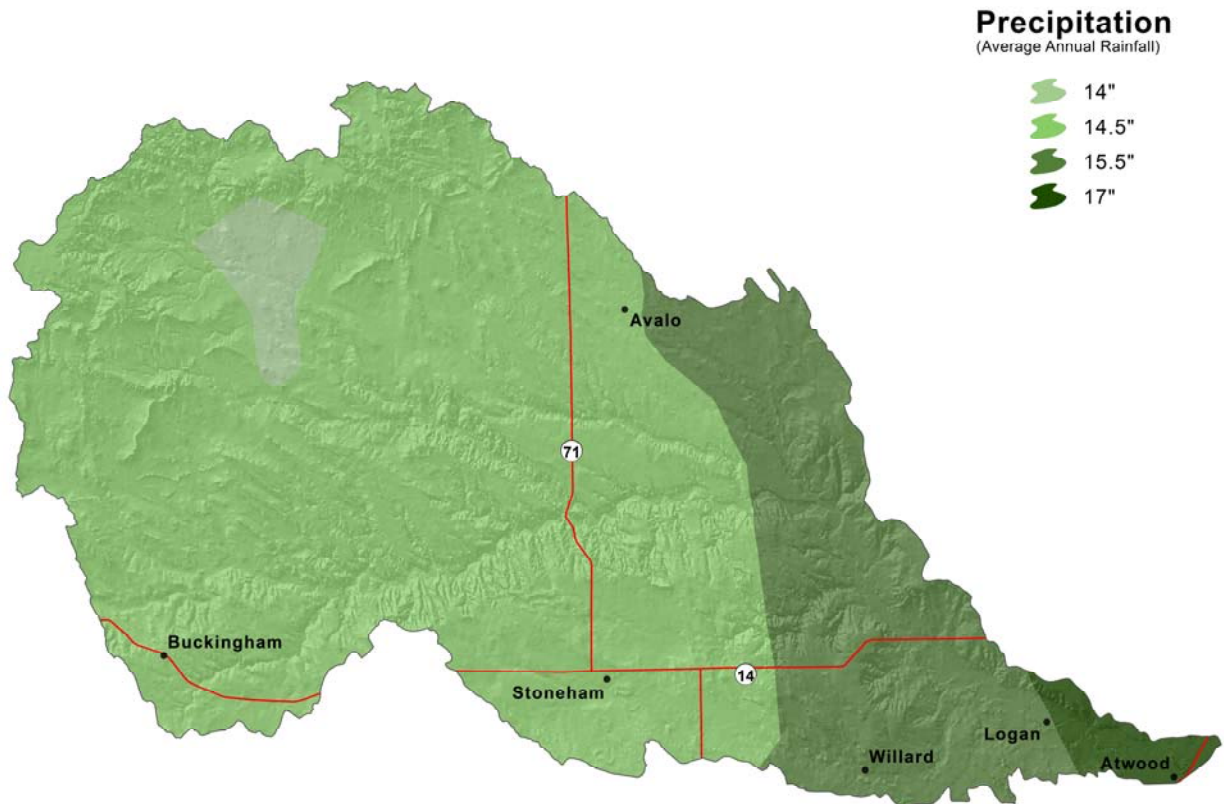




PAWNEE Land Use	Total Acreage	Vegetation	Acreage
Cropland	50,091	Agriculture Land	12,075.8
		Dryland Ag	36,247.3
		Irrigated Ag	1,767.6
Rangeland/Grassland	358,514	Grass Dominated	319,412.0
		Grass/Forb Mix	16,947.0
		Grass/Yucca Mix	2,691.2
		Sagebrush/Grass Mix	4,584.0
		Shrub/Grass/Forb Mix	9,048.4
		Soil	5,831.4
Riparian	8,763	Cottonwood	3,077.9
		Herbaceous Riparian	4,692.3
		Riparian	992.4
Water	108.8	Water	108.8
Other	118	No Data	0.9
		Residential	117.6

Total Watershed Acres

417,595



Precipitation

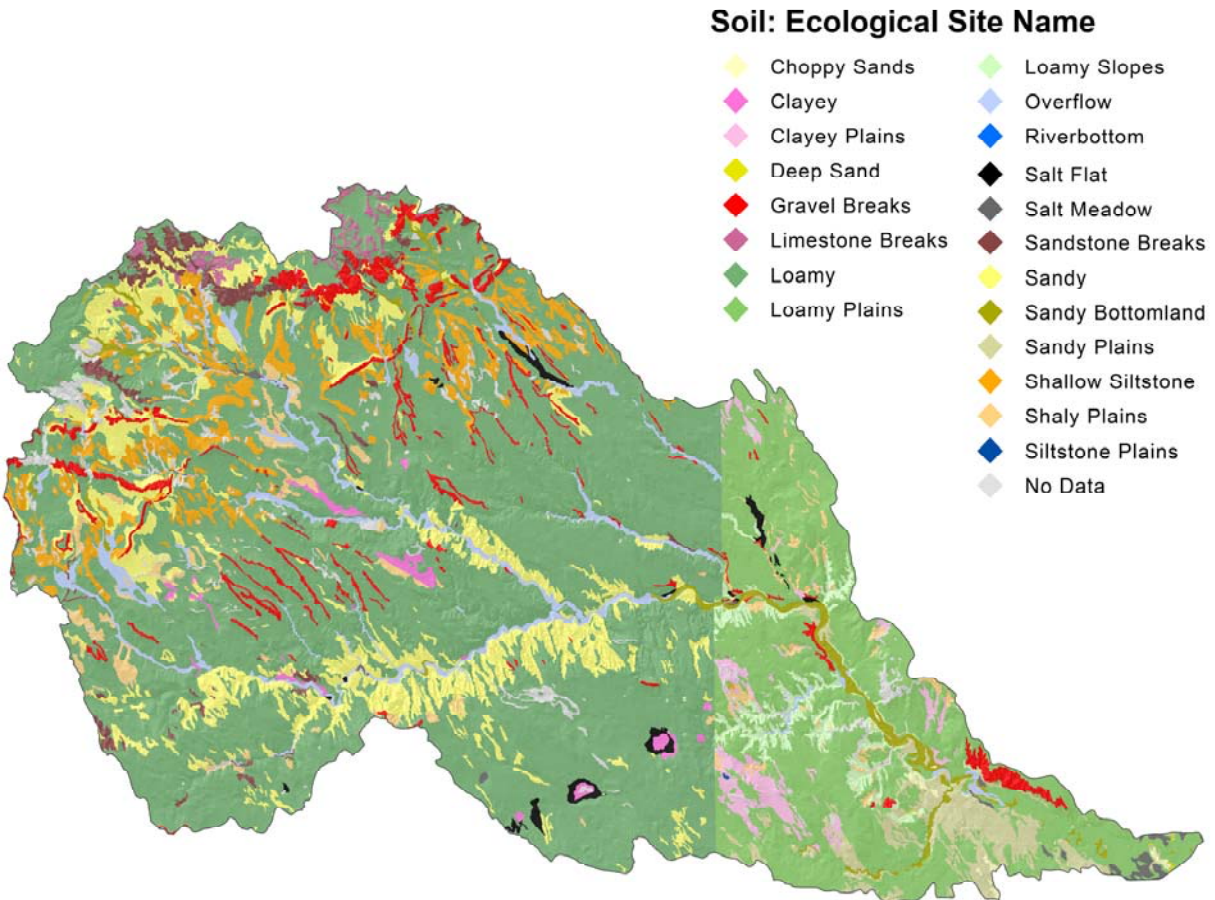
Droughts are regular visitors to the watershed as with the rest of Colorado. Statewide, in the 1900's alone, four prolonged dry spells occurred. There was one in the 1910s. Another, in the '30s, caused the dust-bowl period. The second worst drought on record in the state occurred in the mid-50s. A series 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.

The average annual temperature is 48°F degrees and ranges between 44°F and 56°F. July is warmest month and December is the coolest month. It is not uncommon for the temperatures to reach 100°F during the summer. Summer humidity is low and evaporation is high. The winters are characterized with frequent northerly winds that produce extreme cold temperatures dropping to -35°F or lower. Winds average about 9 miles per hour annually with daytime winds that are generally stronger than nighttime and occasional strong storms bring periods of high winds with gusts greater than 90 miles per hour. Rainfall occurs as frontal storms in the spring and early summer and high intensity, convective thunderstorms in late summer. Approximately seventy-five percent of annual precipitation occurs from mid-April through late September. The mean average annual precipitation ranges from 12 to 16 inches per year and ranges less 7 inches to over 24 inches. Precipitation in winter is snow. The average snowfall ranges from 31 inches to 35 inches but ranges between 8.50 and 68.80 inches. The frost free period averages 142 days but ranges from 129 to 154 days. The average date of first frost is in the fall is September 28 and the last frost in the spring is about May 9.

Ecological Sites

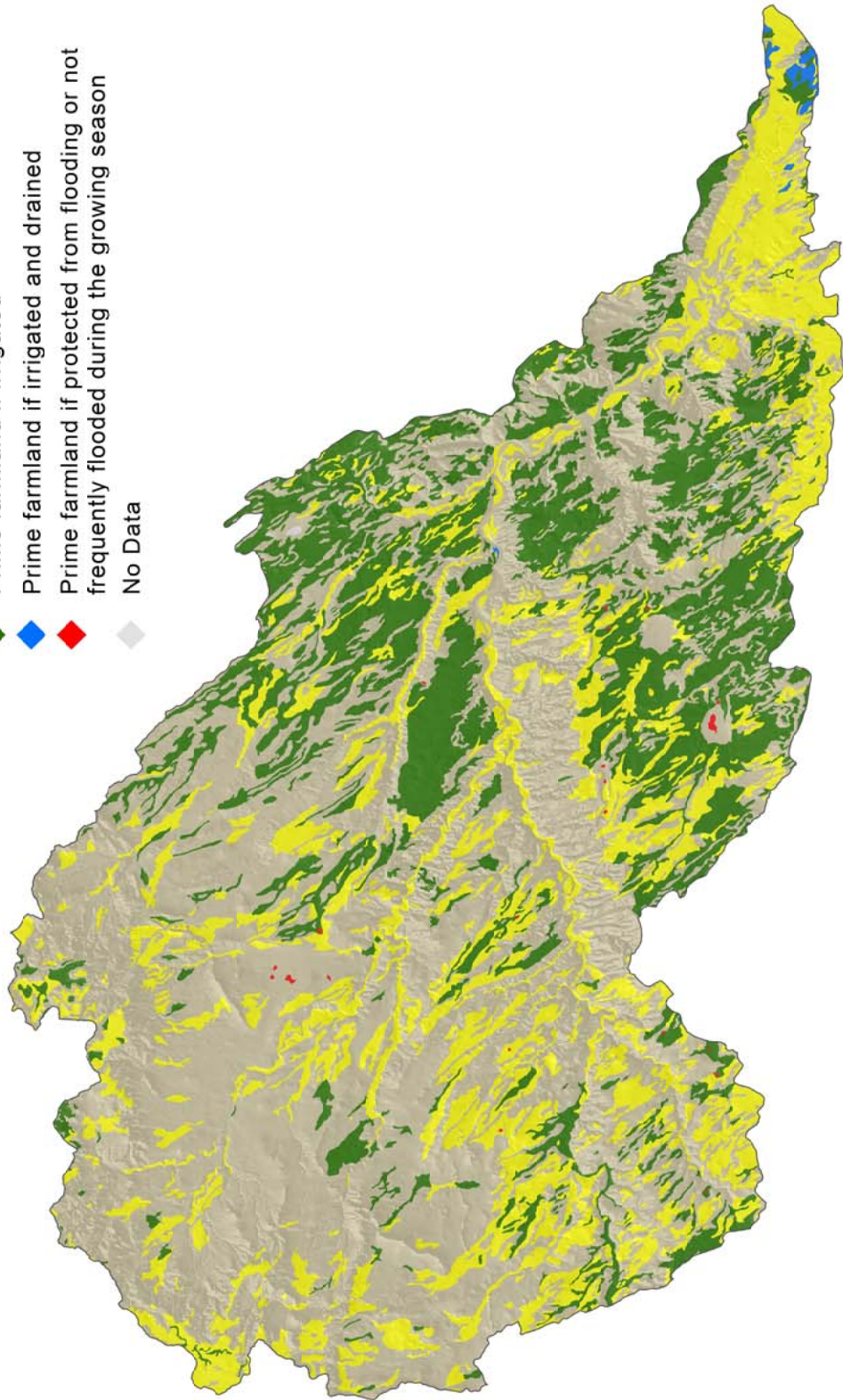
The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

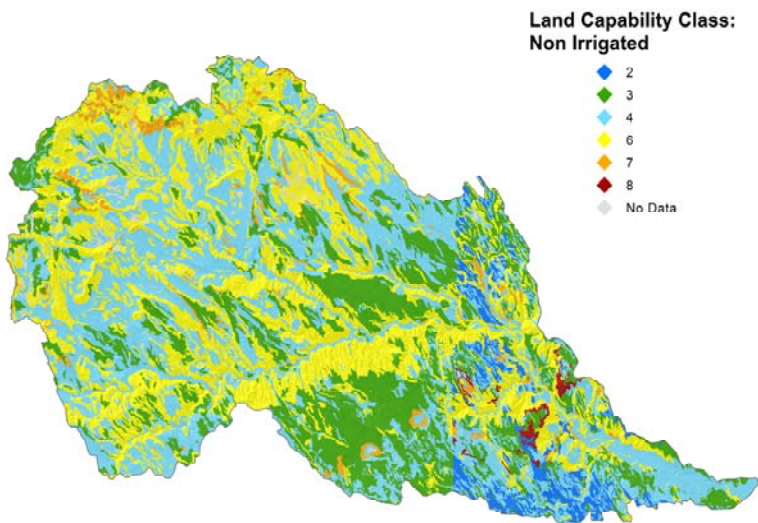
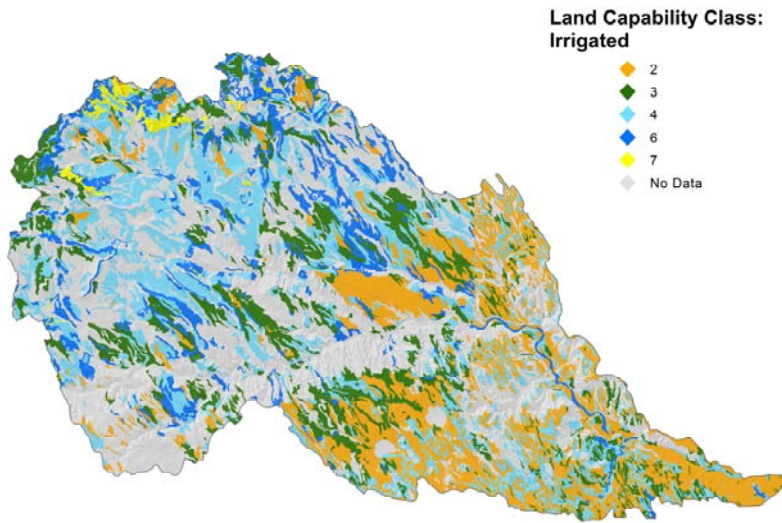
Ecological Site maps give an overall indication of the soils plant relationship in the area. More detailed descriptions of ecological sites are provided in the Field Office Technical Guide (FOTG). The FOTG is available in local offices of the Natural Resources Conservation Service (NRCS) and online at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



Farmland Classification

- ◆ Not prime farmland
- ◆ Farmland of statewide importance
- ◆ Prime farmland if irrigated
- ◆ Prime farmland if irrigated and drained
- ◆ Prime farmland if protected from flooding or not frequently flooded during the growing season
- ◆ No Data





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.

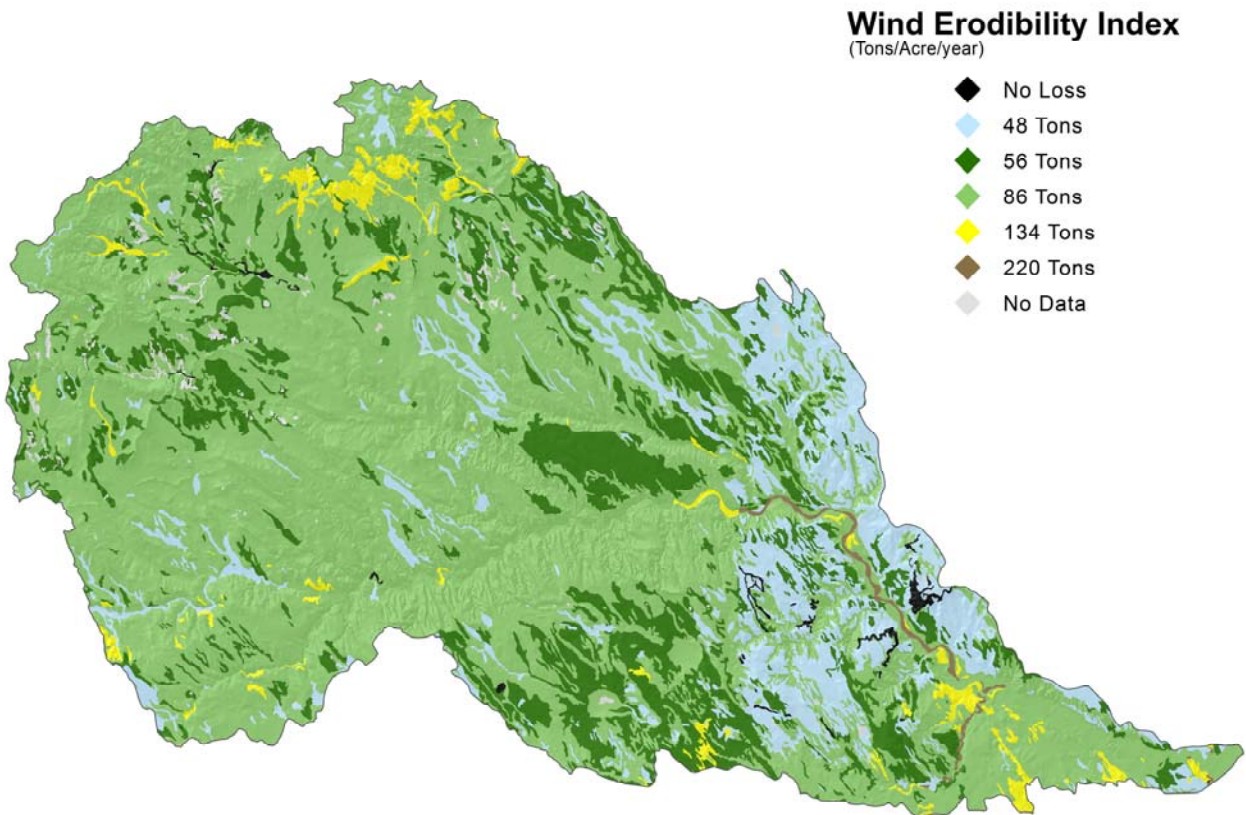
Class 8 - soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.

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.

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



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

Common Name	Scientific Name	Class	State Status/Federal Status	Comments
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
Brassy Minnow	<i>Hybognathus hankinsoni</i>	Fish	Threatened/None	Occurs in the watershed
Burrowing Owl	<i>Athene cunicularia</i>	Birds	Threatened/None	Occurs in the watershed
Colorado Butterfly Plant	<i>Gaura neomexicana</i> <i>spp. coloradensis</i>	Plants	None/Threatened	May occur in the watershed
Common Garter Snake	<i>Thamnophis sirtalis</i>	Reptiles	Concern/None	May occur in the watershed
Common Shiner	<i>Luxilus cornutus</i>	Fish	Threatened/None	May occur in the watershed
Cylindrical Papershell	<i>Anodontoides ferussacianus</i>	Gastropods	Concern/None	May occur in the watershed
Ferruginous Hawk	<i>Buteo regalis</i>	Birds	Concern/None	Occurs in the watershed
Iowa Darter	<i>Etheostoma exile</i>	Fish	Concern/None	May occur in the watershed
Least Tern	<i>Sterna antillarum</i>	Birds	Endangered/Endangered	May occur in the watershed
Long-Billed Curlew	<i>Numenius americanus</i>	Birds	Concern/None	May occur in the watershed
Mountain Plover	<i>Charadrius montanus</i>	Birds	Concern/None	Occurs in the watershed
Northern Cricket Frog	<i>Acris crepitans</i>	Amphibians	Concern/None	May occur in the watershed
Northern Leopard Frog	<i>Rana pipiens</i>	Amphibians	Concern/None	Occurs in the watershed
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	Fish	None/Endangered	Occurs downstream of watershed; Depletions are a concern here.
Piping Plover	<i>Charadrius melodus</i>	Birds	Threatened/Threatened	May occur in the watershed
Plains Minnow	<i>Hybognathus placitus</i>	Fish	Endangered/None	May occur in the watershed
Plains Sharp-tailed Grouse	<i>Tympanuchus phasianellus jamesii</i>	Birds	Endangered/None	Occurs in the watershed
Suckermouth Minnow	<i>Phenacobius mirabilis</i>	Fish	Endangered/None	May occur in the watershed
Swift Fox	<i>Vulpes velox</i>	Mammals	Concern/None	Occurs in the watershed
Whooping Crane	<i>Grus Americana</i>	Birds	Endangered/Endangered	Occurs downstream of watershed; Depletions are a concern here.

Short and mid-grass prairie with a limited amount of shrub cover are the dominant, non-cropland, terrestrial habitat types in this watershed. Burrowing owl, mountain plover, black-tailed prairie dog, and swift fox are representative species for the prairie habitats. Plains sharp-tailed grouse use mid-grass areas with shrubs and also some of the cropped areas. 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 much of the watershed include black bull-head, green sunfish, pronghorn (antelope), mule and/or white-tailed deer, and mourning dove. Pheasant, snow goose, and Rio Grande wild turkey occur in the southeastern part of the watershed near the South Platte River.

Social Data

County	Logan	Weld
Demographics (US Census, American Factfinder)		
Total population		223,966
Male		112,848
Female		111,118
Median age (years)		31.3
White		200,942
Black or African American		754
American Indian and Alaska Native		1465
Asian		2427
Native Hawaiian and Other Pacific Islander		117
Some other race		14814
Hispanic or Latino (of any race)		62792
Economic Characteristics (US Census, American Factfinder)		
In labor force (population 16 years and over)		120,817
Median household income (dollars)		48,763
Median family income (dollars)		57,009
Per capita income (dollars)		21,981
Families below poverty level		x
Individuals below poverty level		x
X means that value is not applicale or not avaiiable		
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)		
Farms (number)	930	3121
Land in farms/ranches (acres)	1,111,135	1,812,167
Average size farm/ranch (acres)	1,195	581
Median size farm (acres)	608	158
Average age of farmer or rancher	52.8	53.5
Net cash return from ag sales (\$1,000)	5,092	67,959
Cattle and calves (number)	185,000	505,000

Resource Concerns Identified by Conservation Districts

Resource Concern	West Greeley	Centennial
1	Water Quality	Soil Erosion
2	Soil Erosion	Water Quality
3	Preservation of Prime Agricultural Land	Rangeland
4	Rangeland	Tree Planting

Note:

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 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Total
Total Conservation Systems Planned (Acres)	14,056	6,615	Not Avail.	54,986	21,195	32,984	129,836
Total Conservation Systems Applied (Acres)	12,927	17,743	Not Avail.	26,154	25,376	30,493	112,693
Practices							
Prescribed Grazing	5,830	10,488	23,459	11,205	15,664	15,667	82,313
Upland Wildlife Habitat Management	8,292	569	2,984	583	456	3,159	16,043
Conservation Cropping Rotation	Not Avail.	Not Avail.	37	1,591	0	5,012	6,640
Residue Management	223	3,208	37	3,082	371	320	7,241

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. Estimate 253,870 acres need to be treated on median sized ranches of 1,350 acres.		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.	6,400	0.7	4,480
Pest Management (595)	300 Ac.	1	4,500	4,500
Pipeline (516)	Ft.	5,000	1.45	7,250
Upland Wildlife Habitat Management (645)	Ac.	300	na	0
Watering Facility (614)	No.	2	800	1,600
Windbreak/Shelterbelt Establishment (380)	Ft.	1000	.45	450
Costs to apply prescribed grazing per median sized ranch of 1,350 acres	No.	188		18,280

Subtotal Rangeland costs: \$3,436,640

Primary 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 67B.1-CR-Dryland-R-2
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Residue Mgmt, Seasonal (344)	Ac	9,700	5	48,500
Nutrient Management (590)	Ac	9,700	5	48,500
Pest Management (595)	Ac	9,700	15	145,500
Subtotal Costs Dryland Crops:				\$242,500

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. Wildlife habitat is sustained or improved.	3,436,640
Dryland Crop	Soil	38,800 Total Tons/Year saved	Cropland sustainability	242,500
Estimated Total Costs to Address Major Resource Concerns:				\$3,679,140

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/wqccregs/100293wqlimitedsegtmdls.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:

Logan County (CO075) Published 01/30/2008

Weld County North (CO617) Published 12/14/2005

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.