



United States Department
of Agriculture



Natural Resources
Conservation Service

Lakewood, Colorado

RWA 10250003

September 2008

South Fork Republican Watershed

Hydrologic Unit Code 10250003

Rapid Assessment



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.

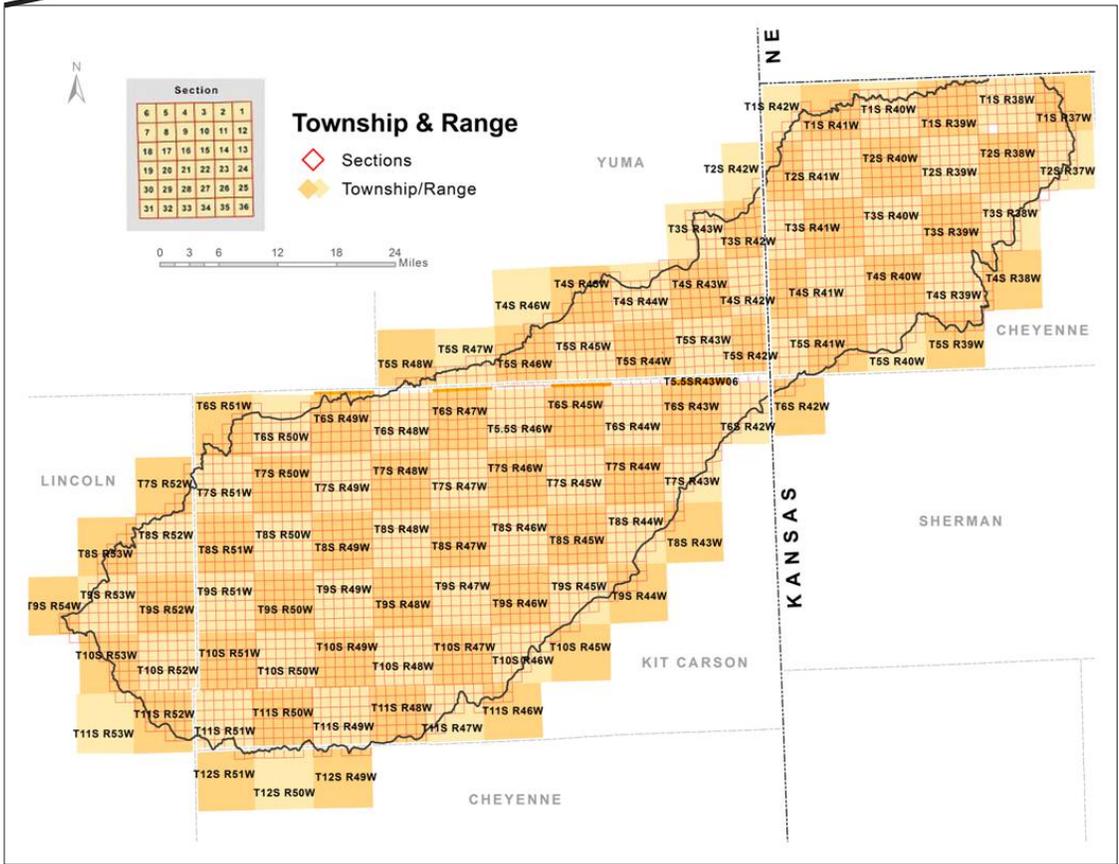
Benefits of these Activities

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)

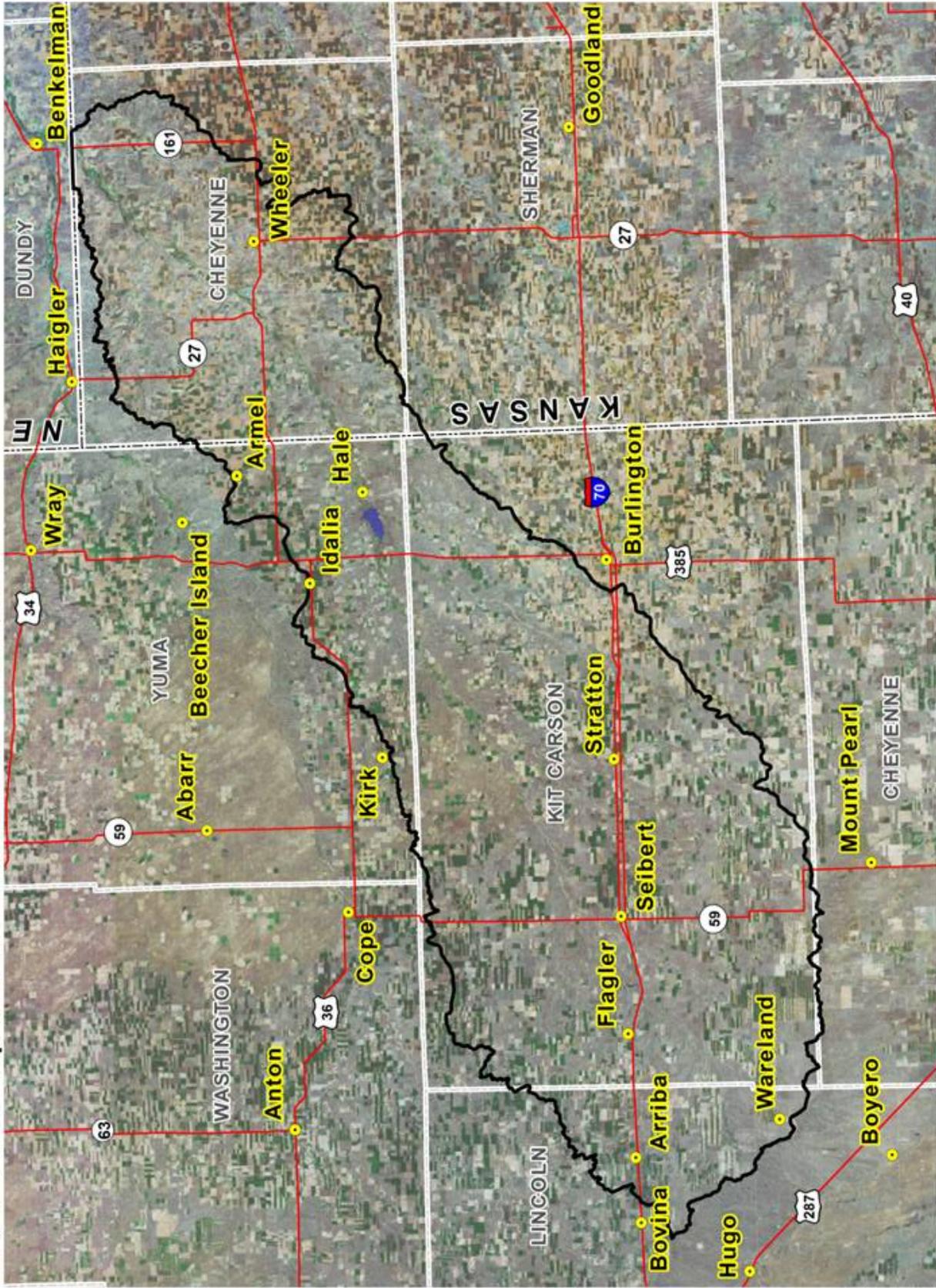
Rapid Watershed Assessments provide information that helps landowners and local leaders set conservation priorities.

The South Fork Republican Watershed is located in the Republican River Basin, on the eastern plains of Colorado. The watershed is 1,291,268 acres in size, with approximately 945 farms and ranches covering 1,229,163 acres in the watershed. As of April 2005, there are 152,836 acres land in the Conservation Reserve Program.

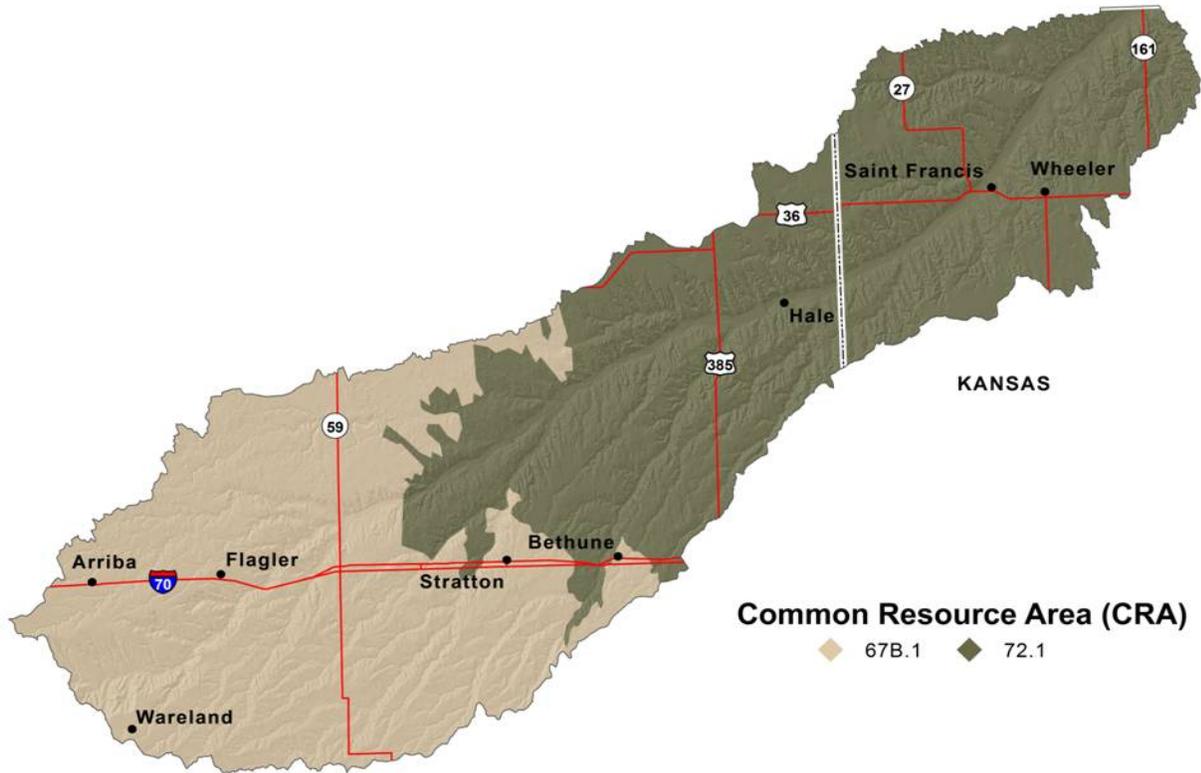


<i>COLORADO County</i>	County Acres	County Acres in SOUTH FORK REPUBLICAN Watershed	% of County in the Watershed	% of Watershed in the County
Cheyenne	1,140,382	1,581	0.1%	0.1%
Kit Carson	1,383,914	975,352	70.5%	56.7%
Lincoln	1,654,463	121,491	7.3%	7.1%
Yuma	1,516,523	193,043	12.7%	11.2%

South Fork Republican Watershed - 10250003



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

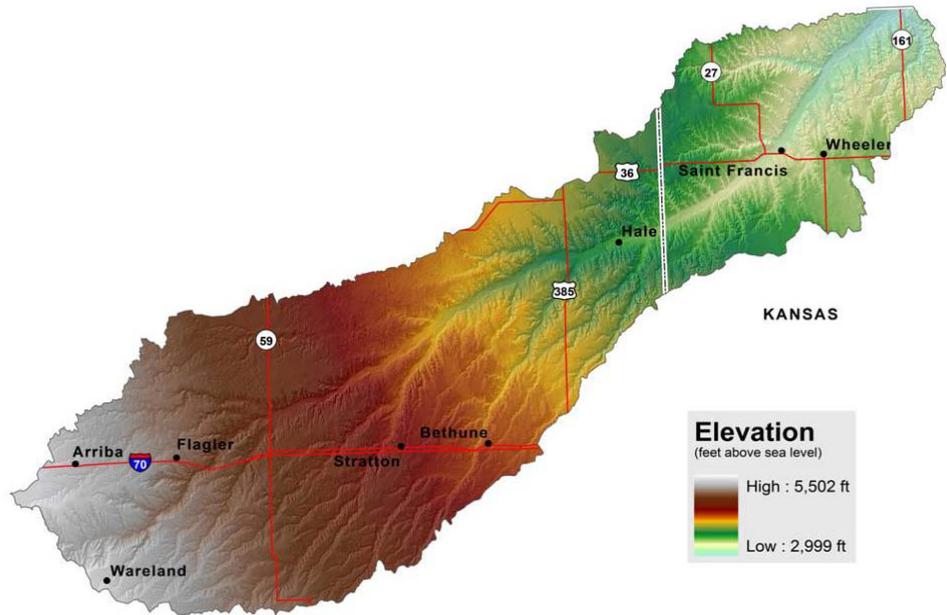


Common Resource Areas (CRA): Geographical areas where resource concerns, problems, and treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographical boundaries of the common resource area.

MLRA	CRA	CRA NAME	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. Most soils are deep and formed in aeolian and alluvial materials. Pre-settlement vegetation was mainly mixed mid and short grass on the heavy soils, and tall grass on the sandy soils. 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. Most soils are deep. Pre-settlement vegetation was mainly mixed mid and short grass on the heavy soils, and tall grass on the sandy soils. About half of this area is in rangeland and half is in cropland, including dry land small grain crops and irrigated corn and grain sorghum.

Physical Description

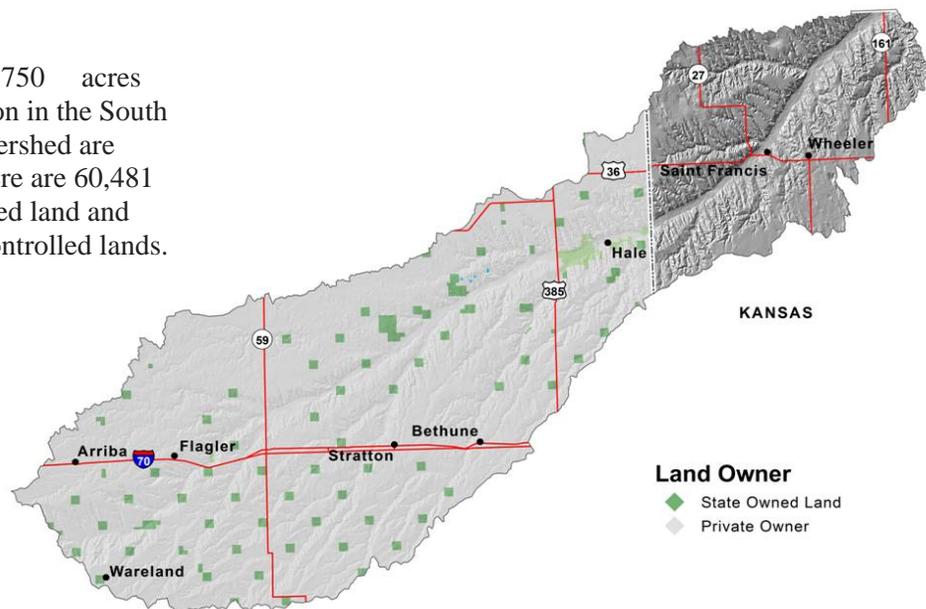
The South Fork Republican Watershed consists of gently rolling plains with little topographic relief. Deep, well-drained soils overlay the Ogallala Formation, and historically support short grass prairie. The gently sloping topography slows runoff, and most precipitation in the watershed is lost to evapotranspiration.



The predominant land use is agriculture, consisting of grain farming and livestock production. Cropland is dominated by dryland winter wheat rotations, and corn and grain sorghum production in areas where irrigation is available. Steeper slopes are generally in native grasses and are used for livestock grazing.

Land Ownership

Approximately 1,292,750 acres of the Colorado portion in the South Fork Republican Watershed are privately owned. There are 60,481 acres of state controlled land and 241 acres federally controlled lands.

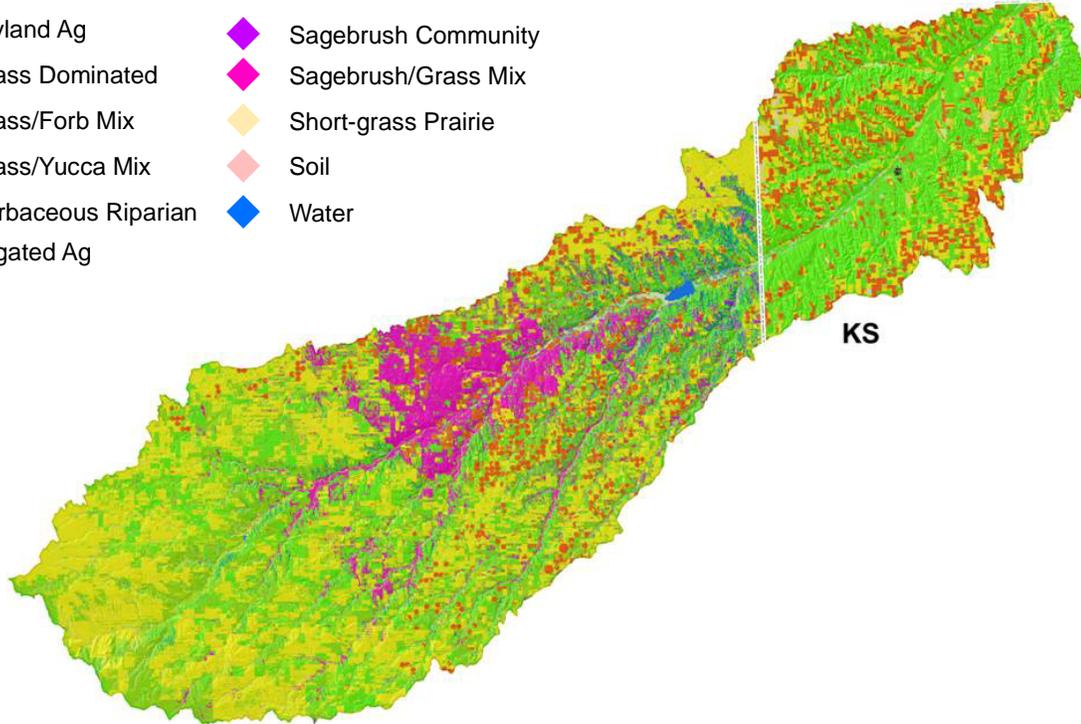


Vegetation

co_cvcp

Vegetation (Colorado)

- ◆ Cottonwood
- ◆ Dryland Ag
- ◆ Grass Dominated
- ◆ Grass/Forb Mix
- ◆ Grass/Yucca Mix
- ◆ Herbaceous Riparian
- ◆ Irrigated Ag
- ◆ Riparian
- ◆ Sagebrush Community
- ◆ Sagebrush/Grass Mix
- ◆ Short-grass Prairie
- ◆ Soil
- ◆ Water



SOUTH FORK REPUBLICAN Colorado Land Use	Total Acreage	Vegetation	Acreage
Cropland	543,468	Irrigated Ag	71,460.1
		Dryland Ag	472,008.0
		Grass Dominated	336,489.7
		Grass/Forb Mix	188,165.7
Rangeland/Grassland	721,982	Grass/Yucca Mix	41,122.5
		Short-grass Prairie	111.2
		Sagebrush Community	7,156.5
		Sagebrush/Grass Mix	148,936.1
Forest	5,578	Cottonwood	5,578.3
Riparian	16,096	Herbaceous Riparian	12,649.1
		Riparian	3,446.9
Water	2,120	Water	2,119.5
Other	3,510	Rock	153.8
		Soil	3,356.2
Total Colorado Watershed Acres			1,292,754

Precipitation

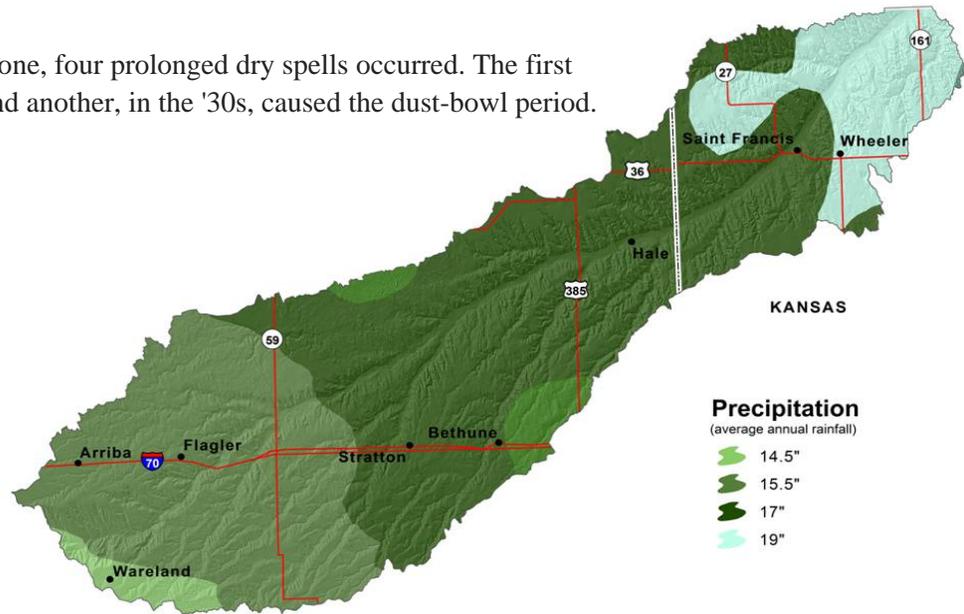
Precipitation in the South Fork Republican watershed averages between 15 and 17 inches per year. Droughts are common in the watershed, as with the rest of Colorado.

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.

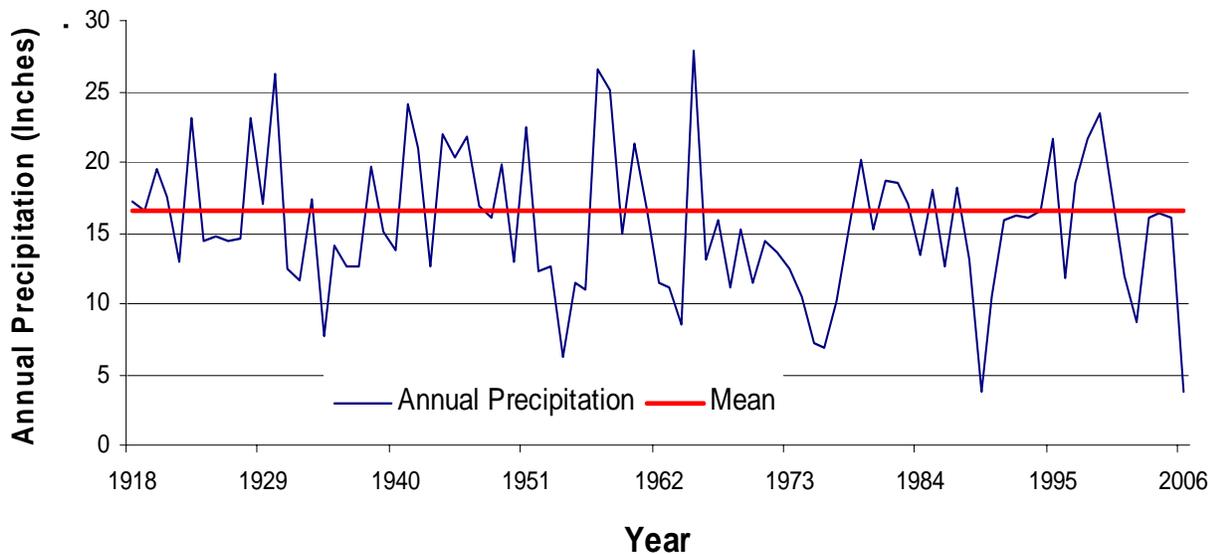
The fourth serious drought hit parts of Colorado in the late 1970s. In this century, the most severe drought since 1723 hit

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, with little precipitation as snow in winter. The average annual temperature is from 37 to 66 degrees F. The frost free period averages 154 days but ranges from 111 to 180 days.

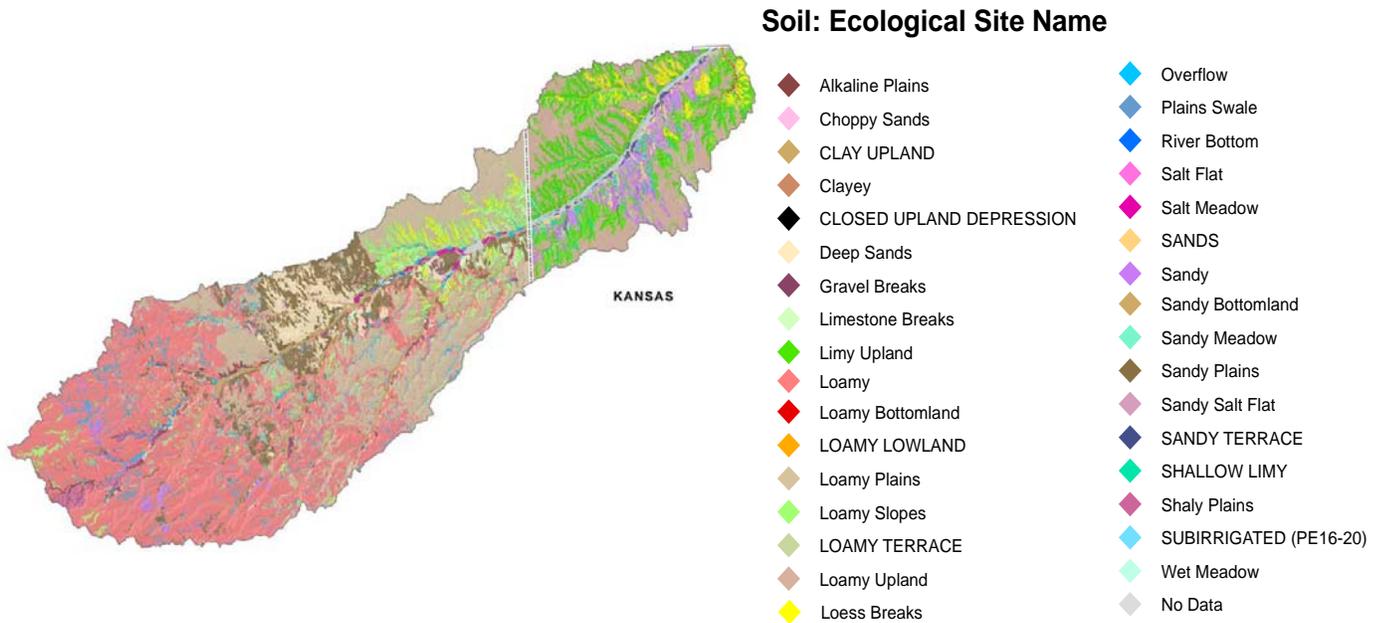
South Fork Republican Annual Precipitation, 1918-2006



Ecological Sites

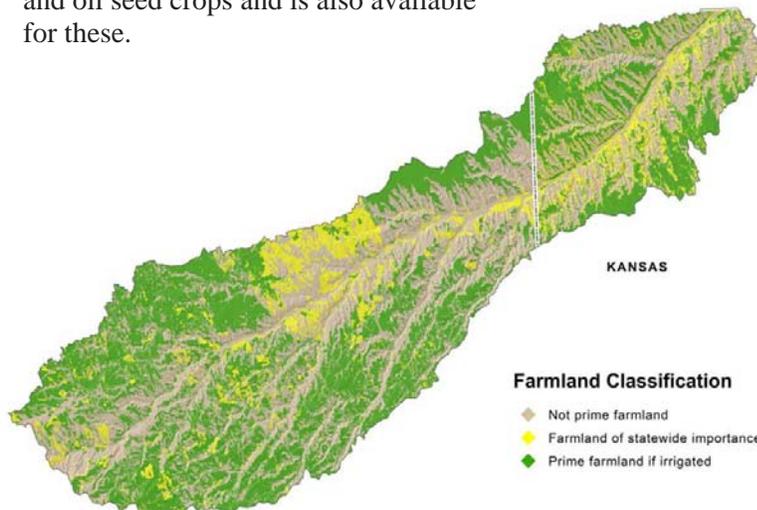
The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

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/>.

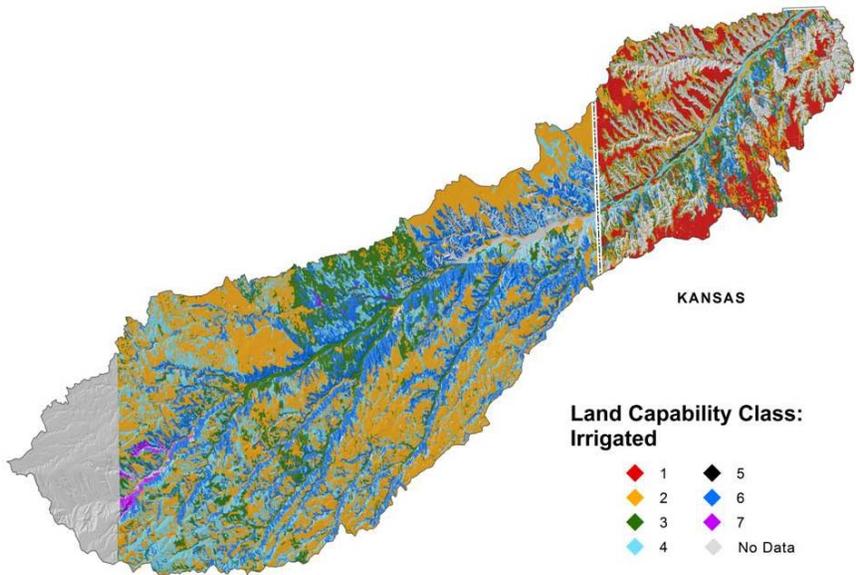


Farmland Classification

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.



Colorado had approximately 1,696,800 acres of nonfederal prime farmland recorded in 1997. This represents over 2 percent of the states total land area or 4 percent of the non-federal land in Colorado. Nationally, 64 percent of soils classified as prime farmland are being used for cropland. In Colorado, 93 percent of the soils classified as prime farmland are being utilized as cropland.



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 wood land, and for engineering purposes.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use.

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.

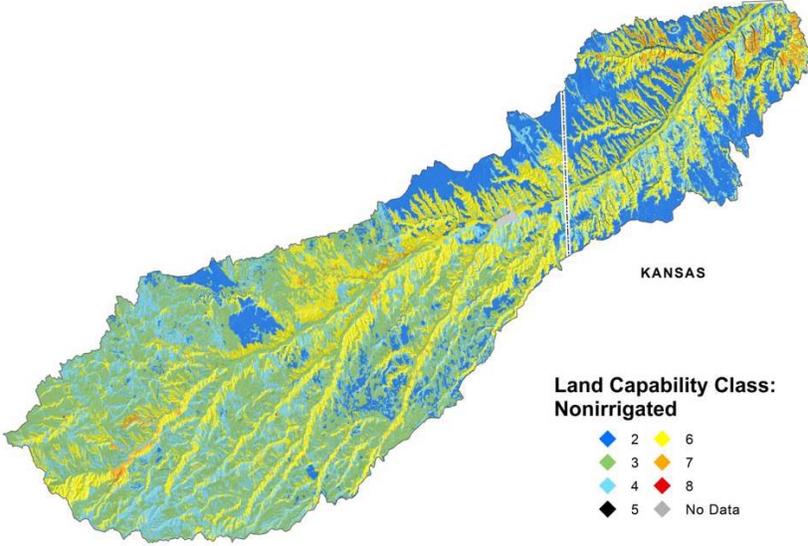
Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

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.

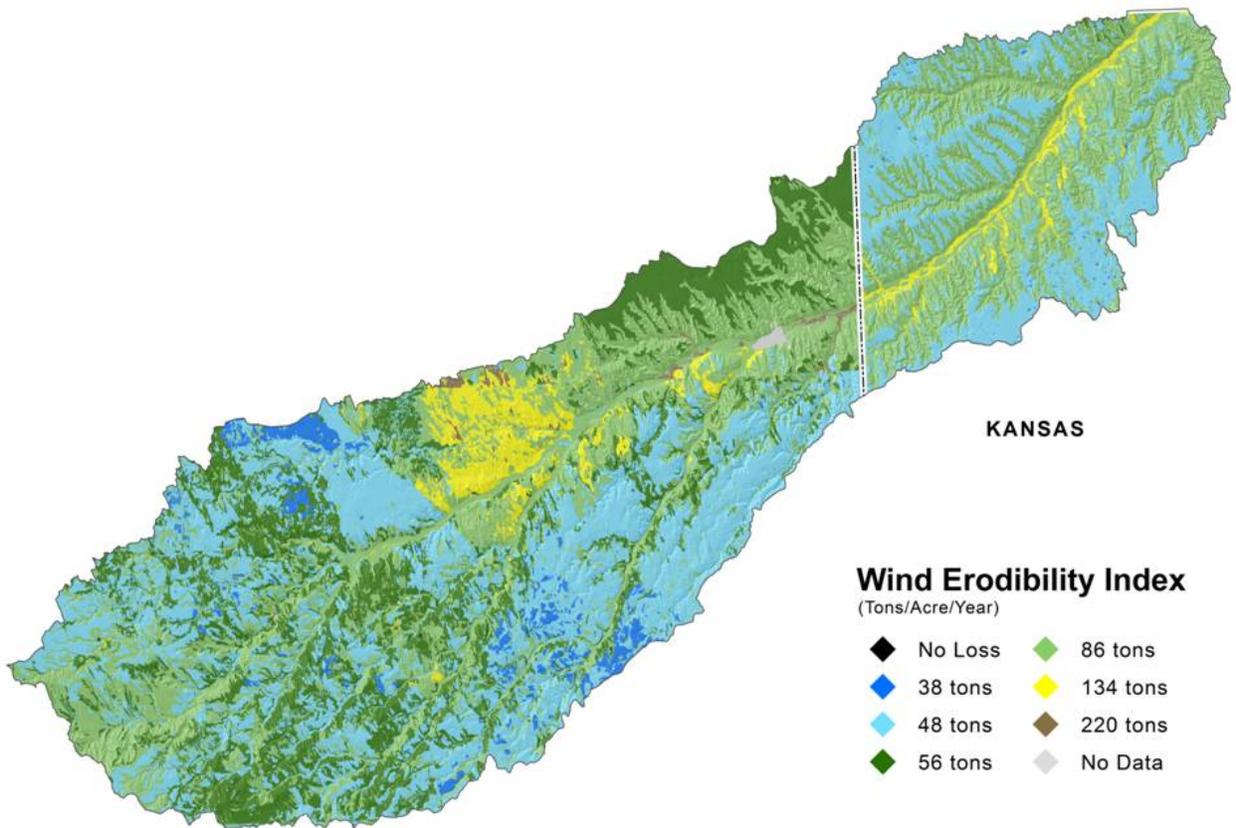
Class 8 - soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.



Wind Erodibility Index

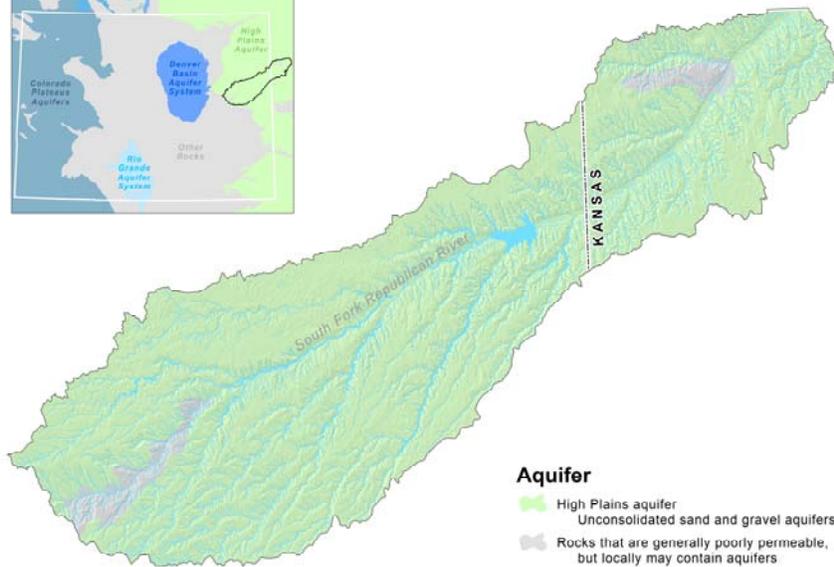
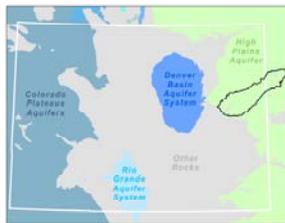
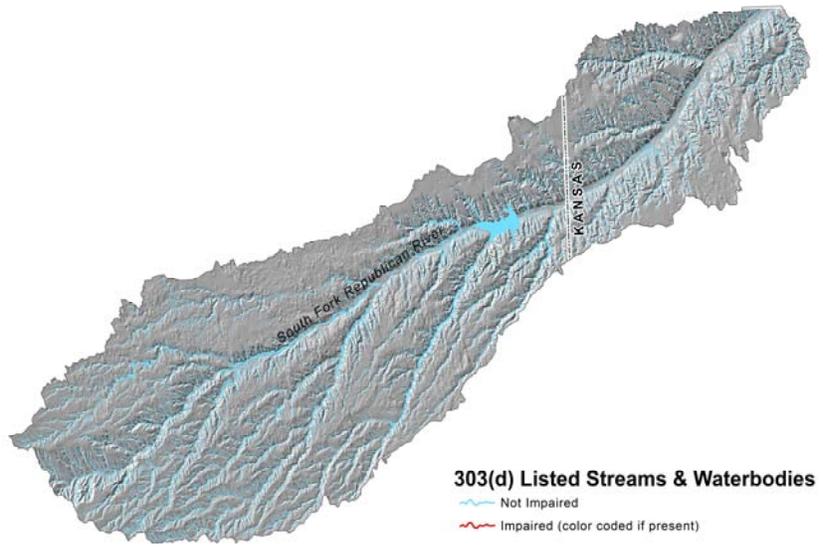
The Wind Erodibility Index (WEI), is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion if it is assumed there is no vegetative cover or management.

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 South Fork Republican Watershed are highly erodible.



Surface Water Quality

Surface water quality in the South Fork Republican 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 South Fork of the Republican River is designated as fully supporting Water Supply, Primary Contact Recreation, Aquatic Life Warm I, and Agriculture use designations. 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 South Fork Republican 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.

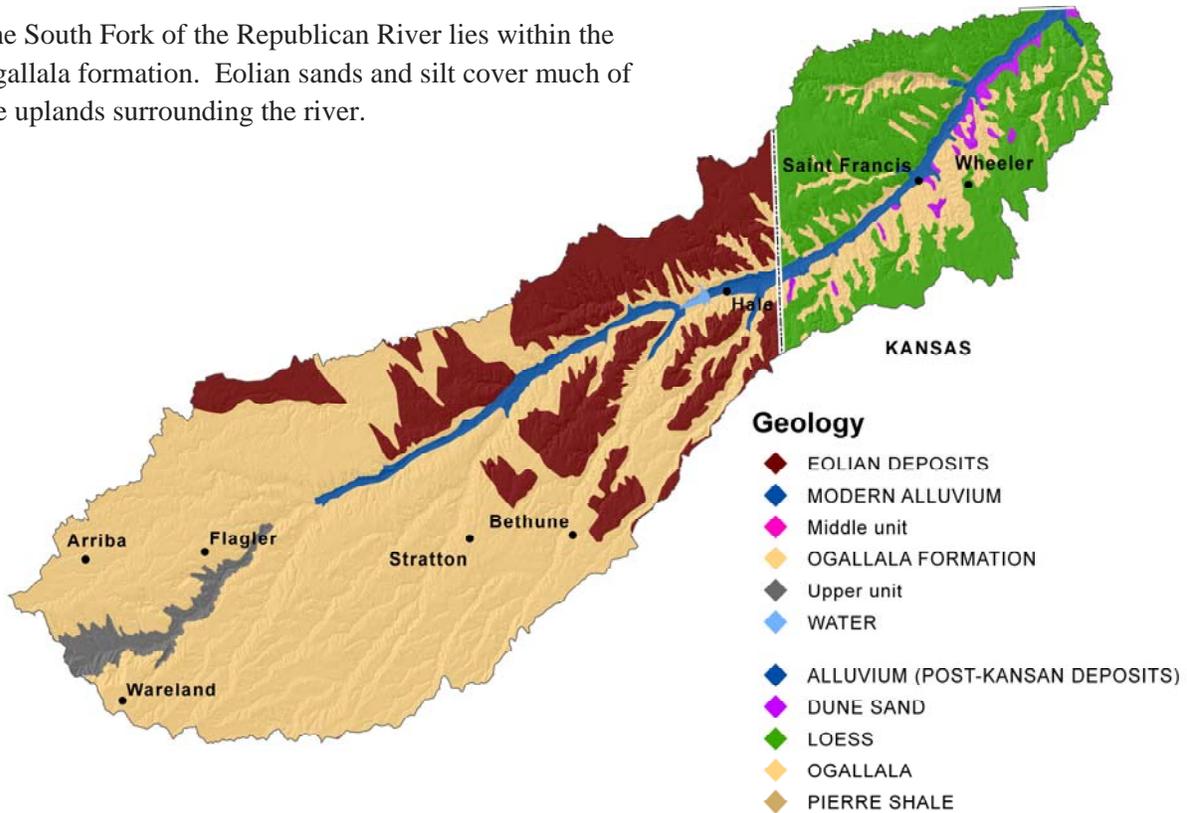
Ground water quality is generally good, although moderately to very hard.

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	
			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	
	Tertiary	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		Typically confined, except at outcrop; yields typically less than 100 gpm	
					Lower unit, Chadron Formation, mainly consists of varicolored, bentonitic, loosely to moderately cemented clay and silt		Chadron is mostly impermeable	

Geology

The South Fork of the Republican River lies within the Ogallala formation. 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 S.Fork Republican Watershed.*

	Common Name	Scientific Name	Class	Federal Status	State Status	Comments
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Birds	None	Threatened	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	None	Concern	Occurs in the watershed
	Brassy Minnow	<i>Hybognathus hankinsoni</i>	Fish	None	Threatened	Occurs in the watershed
	Burrowing Owl	<i>Athene cunicularia</i>	Birds	None	Threatened	Occurs in the watershed
	Common garter snake	<i>Thamnophis sirtalis</i>	Reptiles	None	Concern	May occur in the watershed
	Cylindrical paper-shell	<i>Anodontoides ferussacianus</i>	Gastropods	None	Concern	May occur in the watershed
	Ferruginous Hawk	<i>Buteo regalis</i>	Birds	None	Concern	Occurs in the watershed
	Long-Billed Curlew	<i>Numenius americanus</i>	Birds	None	Concern	Occurs in the watershed
	Mountain Plover	<i>Charadrius montanus</i>	Birds	None	Concern	Occurs in the watershed
	Northern Cricket Frog	<i>Acris crepitans</i>	Amphibians	None	Concern	Occurs in the watershed
	Northern leopard frog	<i>Rana pipiens</i>	Amphibians	None	Concern	Occurs in the watershed
	Plains Leopard Frog	<i>Rana blairi</i>	Amphibians	None	Concern	Occurs in the watershed
PHOTO NOT AVAILABLE	Plains Minnow	<i>Hybognathus placitus</i>	Fish	None	Endangered	May occur in the watershed
	Plains Orangethroat Darter	<i>Etheostoma spectabile</i>	Fish	None	Concern	Occurs in the watershed
	Stonecat	<i>Noturus flavus</i>	Fish	None	Concern	May occur in the watershed

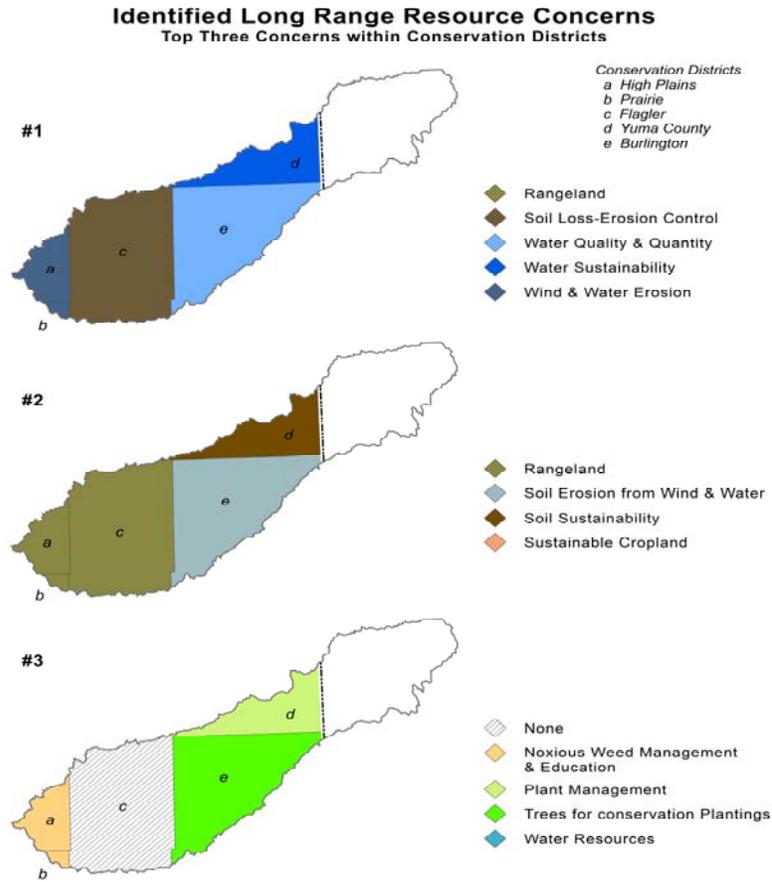
Threatened & Endangered Species (cont.)

	Common Name	Scientific Name	Class	Federal Status	State Status	Comments
	Swift fox	<i>Vulpes velox</i>	Mammals	None	Concern	Occurs in the watershed
	Yellow mud turtle	<i>Kinosternon flavescens</i>	Reptiles	None	Concern	Occurs in the watershed

Shortgrass prairie and sandsage-mixed grass rangeland are the dominant, non-cropland, terrestrial habitat type in this watershed. The Conservation Reserve Program also provide a significant acreage of grassland habitat in this watershed. Burrowing owl, mountain plover, black-tailed prairie dog, and swift fox are representative species for the shortgrass habitat. Greater prairie chickens use the sand sage-mixed grass rangeland habitats. 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. Flagler Reservoir, in the upper part of the watershed, and Bonny Lake, near the lower end of the watershed, provide permanent, warm water fisheries. Economically important wildlife species that occur in much of the watershed include black bullhead, green sunfish, pronghorn (antelope), mule and/or white-tailed deer, and mourning dove. Pheasant and greater prairie chicken occur in parts of the watershed. Snow geese, bobwhite quail and wild turkey (Rio Grande) occur in the lower South Fork of the Republican River riparian area.

Social Data	Cheyenne	Kit Carson	Lincoln	Yuma
Demographics (US Census, American Factfinder)				
Total population	2,231	8,011	20,504	9,841
Male	1,119	4,236	10,834	4,840
Female	1,112	3,775	9,670	5,001
Median age (years)	37.9	37.4	36.5	37.3
White	2,072	6,992	18,792	9,267
Black or African American	11	139	420	11
American Indian and Alaska Native	17	41	131	28
Asian	3	26	82	7
Native Hawaiian and Other Pacific Islander	0	3	14	2
Some other race	114	737	772	407
Hispanic or Latino (of any race)	181	1095	2439	1268
Economic Characteristics (US Census, American Factfinder)				
In labor force (population 16 years and over)	1,066	3,746	9,771	4,919
Median household income (dollars)	37,054	33,152	32,724	33,169
Median family income (dollars)	44,394	41,867	42,241	39,814
Per capita income (dollars)	17,850	16,964	16,721	16,005
Families below poverty level	53	198	454	235
Individuals below poverty level	244	908	2253	1244
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)				
Farms (number)	283	678	455	864
Land in farms/ranches (acres)	740,486	1,247,181	1,428,404	1,351,010
Average size farm/ranch (acres)	2,617	1,840	3,139	1,567
Median size farm (acres)	1,528	11,112	1,497	1,000
Average age of farmer or rancher	57.2	54.3	55.6	52.7
Net cash return from ag sales (\$1,000)	1,829	3,392	4,829	58,023
Cattle and calves (number)	20,000	148,000	40,000	250,000

South Fork Republican Watershed Natural Resource Concerns



Arikaree Conservation District Priorities:

The Colorado Conservation Districts identified and prioritized these resource concerns during facilitated public meetings and they are included in their Long Range Plans. Higher scores indicate higher priority.

Resource Concern By Priority	<u>Burlington</u>	<u>Flagler</u>	<u>Yuma County</u>	<u>Totals</u>
1. Soil Erosion & Sustainability	5	6	5	16
2. Water Quantity & Quality	6		6	12
3. Rangeland Management	3	5	3	11
4. Plant Management & Invasive Species	4		4	8
5. Conservation Education	2			2
6. Conservation Policy	1			1
7. Animal Management			2	2

Selected Conservation Application Data					
	FY 2004	FY 2005	FY 2006	FY 2007	Total
Total Conservation Systems Planned (Acres)	88,080	99,257	53,326	105,530	346,193
Total Conservation Systems Applied (Acres)	45,735	84,778	56,777	74,706	261,996
Practices					
Conservation Crop Rotation (328)	21,947	21,917	3,875	24,561	72,300
Prescribed Grazing (528)	19,720	32,227	12,028	10,046	94,220
Upland Wildlife Habitat (645)	7,917	5,345	4,635	14,266	32,163
Irrigation Water Management (449)	3,792	7,210	851	5,929	17,782

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 700,000 acres need to be treated on median sized ranches of 4,500 acres.			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.	22,000	0.6	13,200
Pest Management (595)	Ac.	500	5.0	2,500
Pipeline (516)	Ft.	10,000	2.40	24,000
Upland Wildlife Habitat Management (645)	Ac.	500	na	0
Watering Facility (614)	No.	4	410	1,640
Windbreak/Shelterbelt Establishment (380)	Ft.	3,000	.85	2,550
Costs to apply prescribed grazing per median sized ranch of 4,500 acres	No.	200	43,890	
Subtotal: Rangeland costs				8,778,000

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

Resource Concern:		Soil Erosion By Wind		
Conservation System Description:	Seasonal residue management with Conservation crop rotation, Nutrient and Pest Mgt. Estimate 150,000 acres need to be treated.			Reference Conservation System Guide Code:
				CO 67B.1-CR-Dryland-R-1
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Conservation Crop Rotation (328)	Ac	150,000	5	750,000
Residue Mgmt, Mulch Till (345)	Ac	150,000	5	750,000
Nutrient Management (590)	Ac	80,000	5	400,000
Pest Management (595)	Ac	80,000	15	1,200,000
Subtotal Cropland Costs:				\$3,100,000
Primary Resource Concern:		Water Quality/Quantity		
Conservation System Description:	Upgrading Sprinkler irrigation system with IWM, Crop rotation, Nutrient and Pest Management			Reference Conservation System Guide Code:
				CO 72.1-CR-Sprinkler-R-2
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Irrigation Water Management (449)-includes re-bowl, renozzle, and IWM	Ac	18,000	10.20	183,600
Nutrient Management (590)	Ac	20,000	5	100,000
Pest Management (595)	Ac	20,000	15	300,000
Subtotal Irrigation Costs:				\$583,600

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.	8,778,000
Dryland Crop	Soil	840,000 total tons/yr soil saved	Cropland sustainability	3,100,000
Irrigated Crops	Water		Nutrients and organics are stored, handled, disposed of, and managed so that surface water	583,600
Estimated Total Costs to Address Major Resource Concerns:				\$12,461,600

FOOTNOTES/ BIBLIOGRAPHY

303(d) listed streams within South Fork Republican 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). 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 and Kansas surveys:

Kit Carson County Area (CO063) Published 12/20/2006

Lincoln County Area (CO073) Published 12/19/2005

Yuma County Area (CO125) Published 08/07/2007

Cheyenne County Area (KS023) Published 12/05/2006

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, 12/31/2006 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.