



United States Department
of Agriculture

Sand Arroyo Watershed



Hydrologic Unit Code 11040004

Natural Resources
Conservation Service

Lakewood, Colorado

Rapid Assessment

RWA 11040004

August 2010



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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.

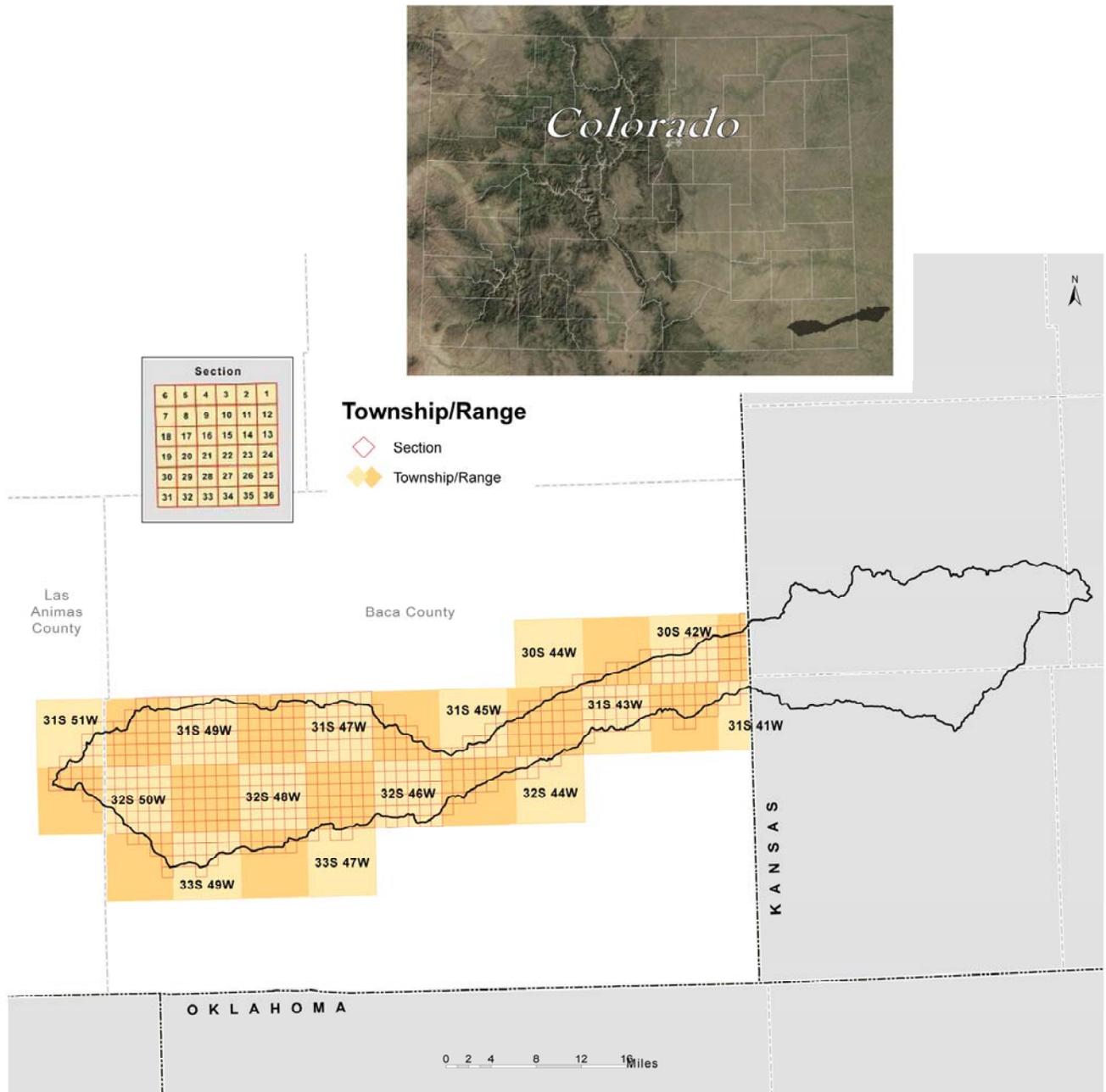
Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best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



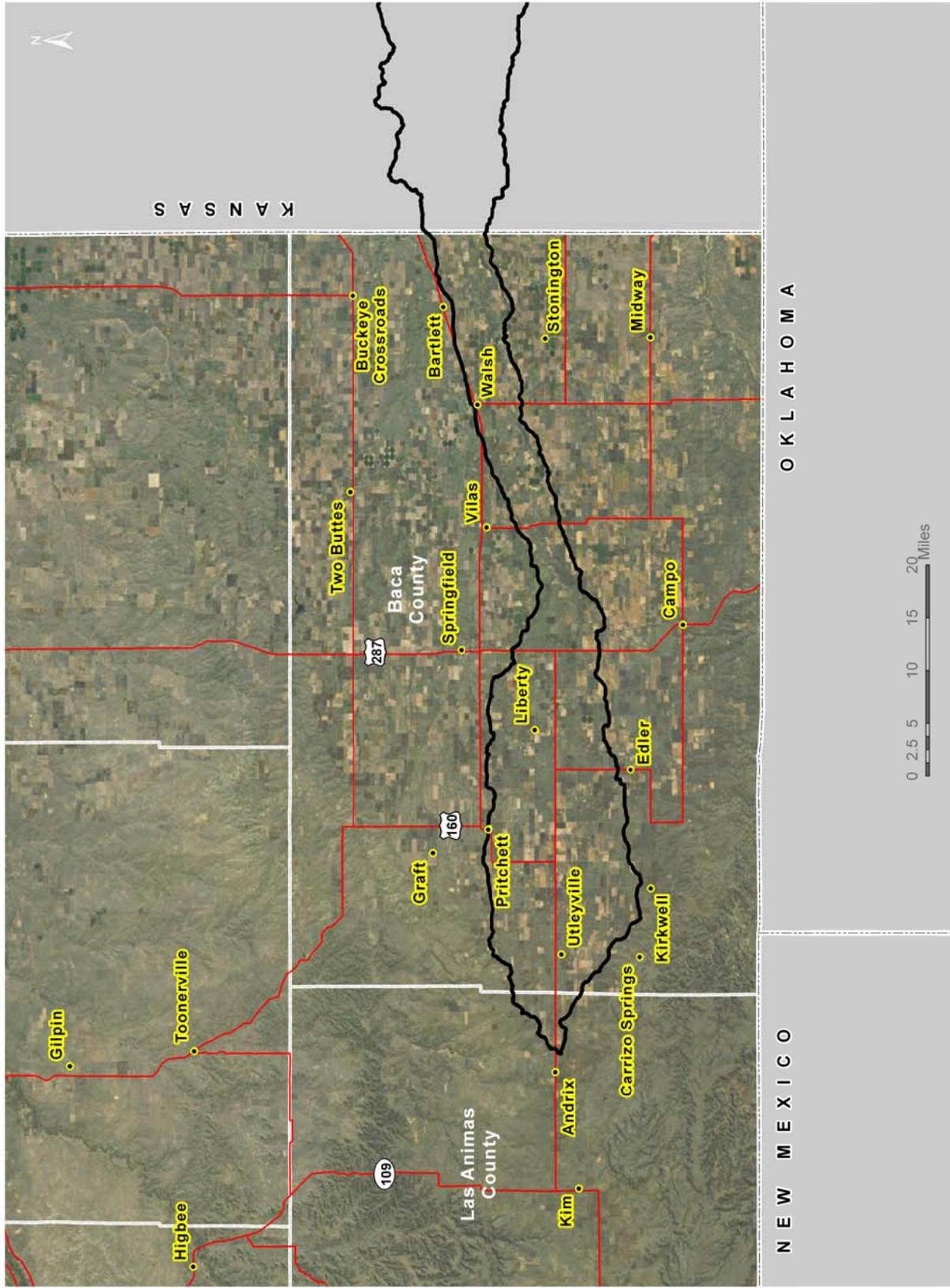
COLORADO County	County Acres	County Acres in SAND ARROYO Watershed	% of County in the Watershed	% of Watershed in the County
Baca	1,637,109	295,518	18.1%	60.6%
Las Animas	3,054,517	9,475	0.3%	1.9%

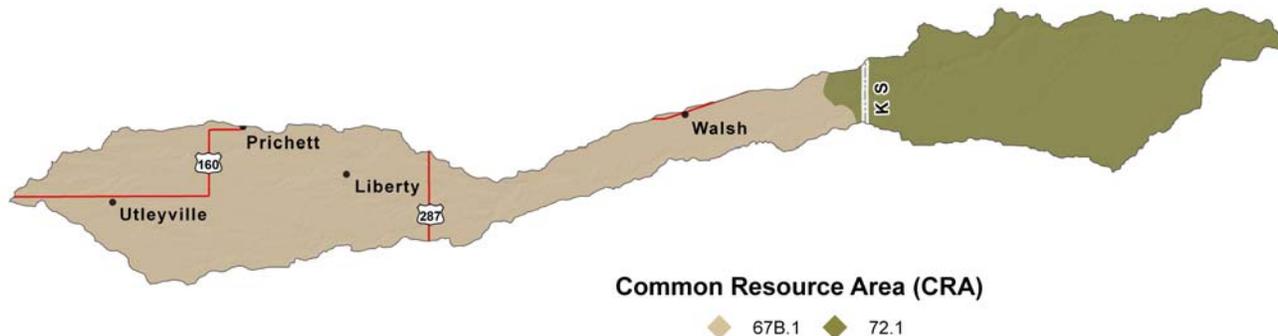
KANSAS

Grant	368,690	2,688	0.7%	0.6%
Morton	467,713	43,832	9.4%	9.0%
Stanton	435,748	136,224	31.3%	27.9%

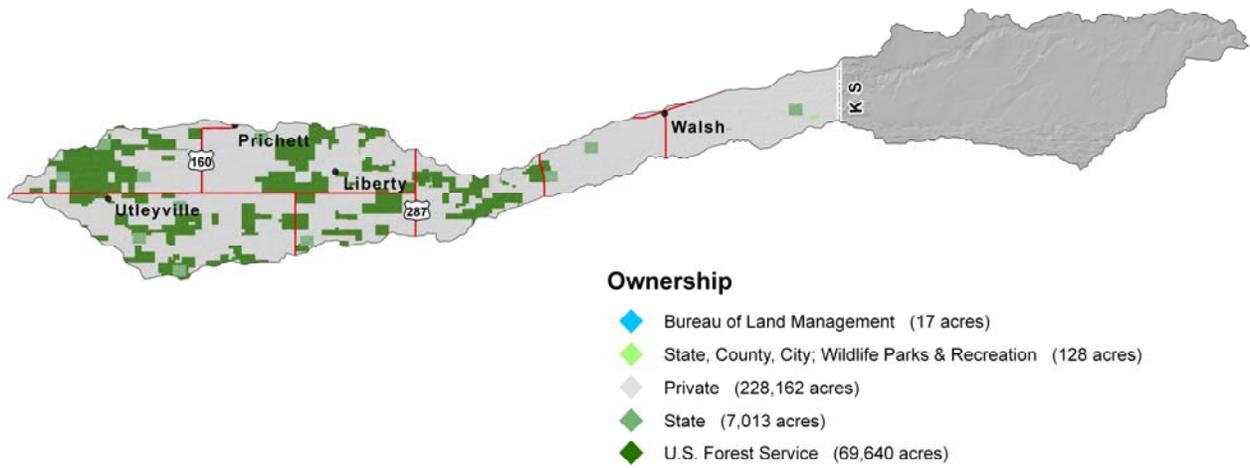
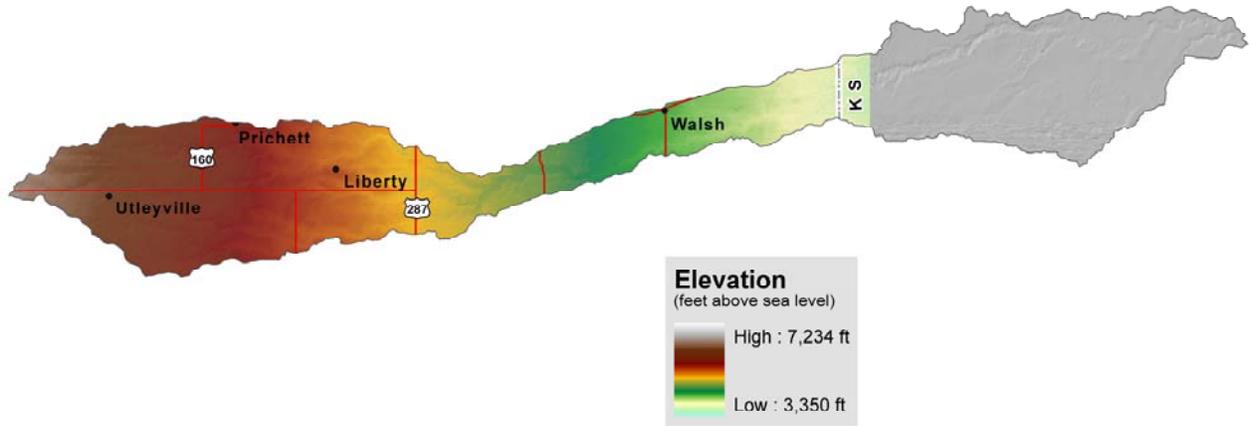
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Sand Arroyo Watershed - 11040004

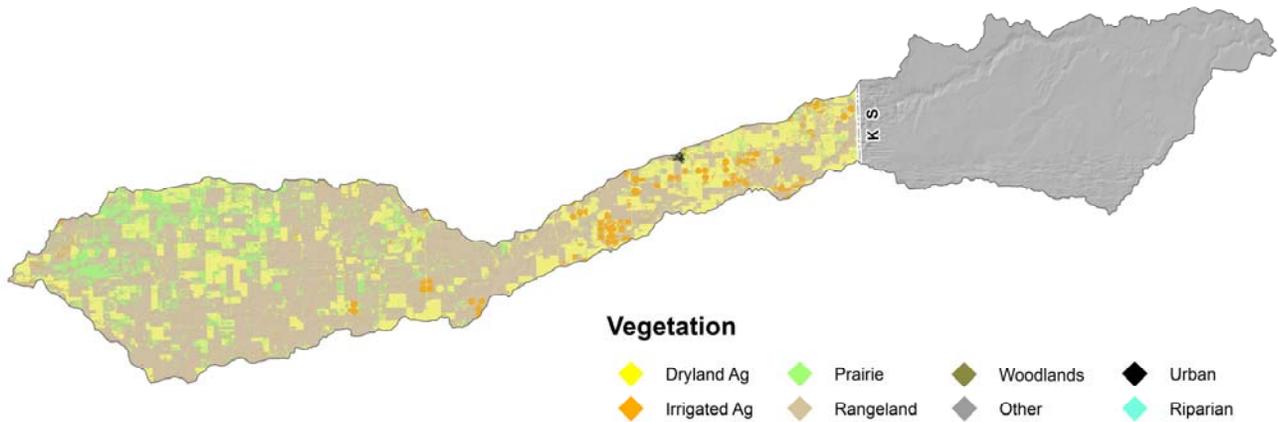




MLRA	CRA	CRA NAME	CRA DESCRIPTION
67B	67B.1	Central Great Plains, Southern Part	The Central High Plains, Southern Part CRA is broad, undulating to rolling plains dissected by streams and rivers. Local relief is measured in tens of feet on the plains. Soils are deep and formed in aeolian and alluvial materials. Pre-settlement vegetation was short grass prairies. Nearly all of this area in fallow cropland rotations or rangeland. Some cropland areas are irrigated.
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. Pre-settlement vegetation was short grass prairies. Nearly all of this area in cropland, both dry land small grain crops and irrigated corn and grain sorghum.

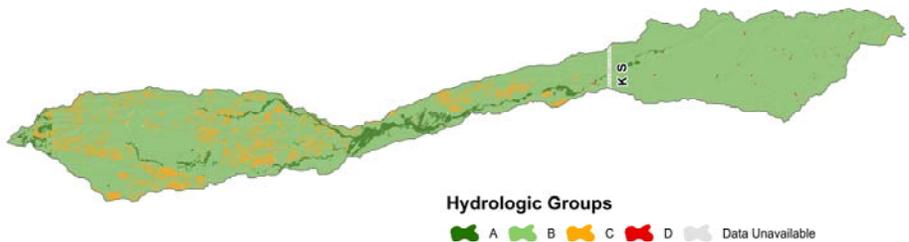
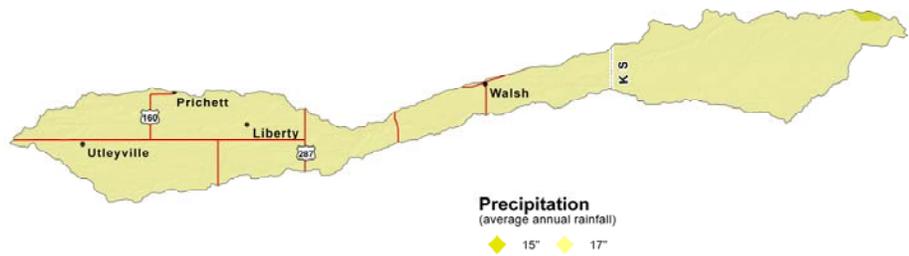


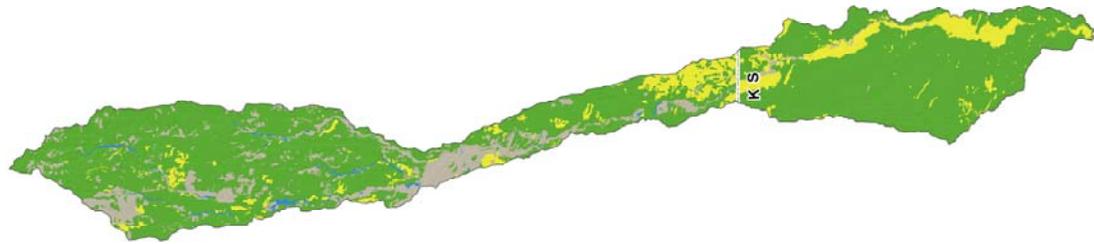
<u>SAND ARROYO WATER-SHED Land Use</u>	Total Acreage	Vegetation	Acreage
Cropland	84,640	Dryland Ag	74,273.7
		Irrigated Ag	10,365.9
Rangeland/Grassland	219,279	Grass Dominated	63,211.7
		Grass/Forb Mix	35,335.6
		Grass/Misc. Cactus Mix	99.5
		Juniper	8.3
		Mid-grass Prairie	15,632.0
		Pinon-Juniper	4.6
		PJ-Oak Mix	1.4
		Sagebrush Community	18,559.0
		Sagebrush/Grass Mix	11,941.4
		Short-grass Prairie	19,224.5
		Shrub/Grass/Forb Mix	55,256.8
		Sparse PJ/Shrub/Rock Mix	3.7
Riparian	412	Herbaceous Riparian	57.9
		Exotic Riparian Shrubs	129.0
		Riparian	225.2
Other	251	Barren Land	26.7
		Residential	223.8
~Total Watershed Acres			304,581



Precipitation

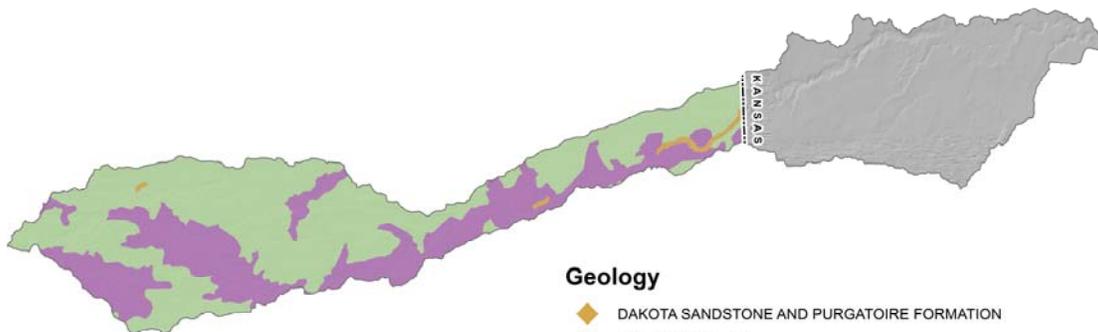
Droughts are regular visitors to the watershed as with the rest of Colorado. Statewide, in the 1900's alone, four prolonged dry spells occurred. There was one in the 1910s. Another, in the '30s, caused the dust-bowl period. The second worst drought on record in the state occurred in the mid-50s. A series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





Farmland Classification

- ◆ Farmland of statewide importance
- ◆ Not prime farmland
- ◆ Prime farmland if irrigated
- ◆ Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- ◆ Prime farmland if protected from flooding or not frequently flooded during the growing season



Geology

- ◆ DAKOTA SANDSTONE AND PURGATOIRE FORMATION
- ◆ EOLIAN DEPOSITS
- ◆ OGALLALA FORMATION

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.

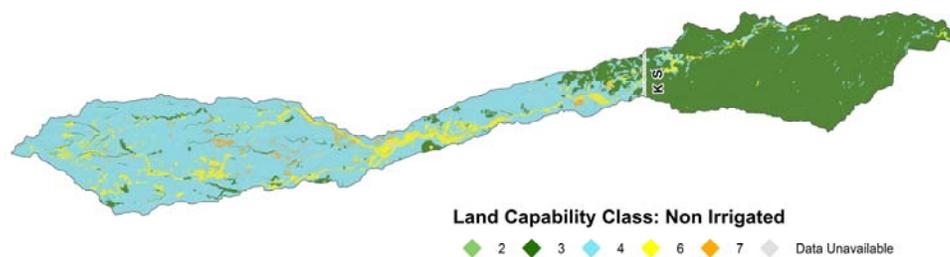
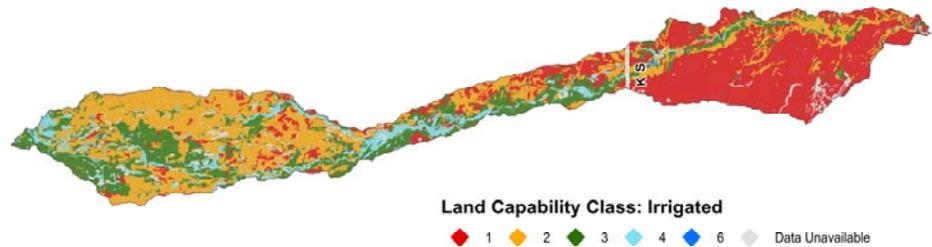
Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

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.

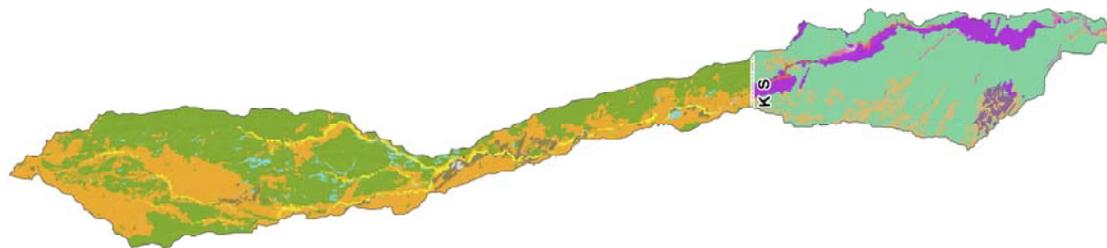
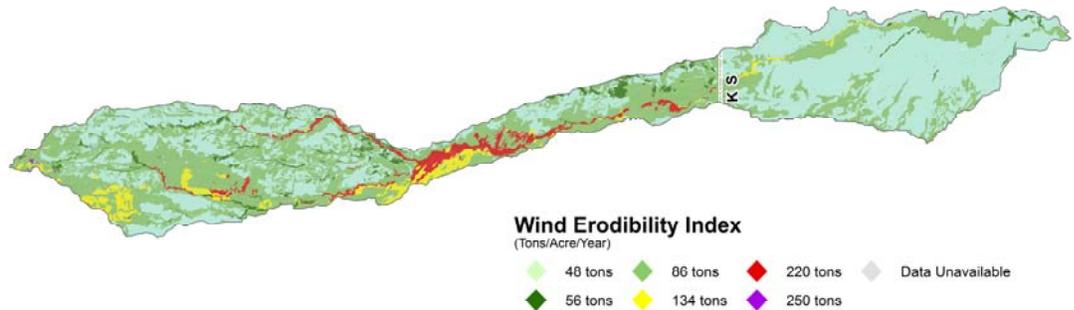
Class 8 - soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.



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.



Soil: Ecological Site Name

- | | | |
|--|------------------------------------|------------------------------------|
| ◆ Data Unavailable | ◆ Loamy Terrace (South) (PE 16-20) | ◆ Sandy (South) (PE 16-20) |
| ◆ Clay Upland (South) (PE16-20) | ◆ Loamy Upland (PE 17-20) | ◆ Sandy Bottomland |
| ◆ Closed Upland Depression (South) (PE16-20) | ◆ Loamy Upland (South) (PE 16-20) | ◆ Sandy Lowland (South) (PE 16-20) |
| ◆ Gravel Breaks | ◆ Sands | ◆ Sandy Terrace (PE 17-20) |
| ◆ Limy Upland (South) (PE16-20) | ◆ Sands (South) (PE 16-20) | ◆ Shallow Limy (South) (PE 16-20) |
| ◆ Loamy | ◆ Sandstone Breaks | |
| ◆ Loamy Lowland (South) (PE 16-20) | ◆ Sandy | |

State and Federal Threatened, Endangered, and Candidate Species and Species of Special Concern in the Sand Arroyo Watershed

Common Name	Scientific Name	Class	State Status/Federal Status	Comments
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Birds	Threatened/None	May occur in the 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	May occur in the watershed
Ferruginous Hawk	<i>Buteo regalis</i>	Birds	Concern/None	May occur in the watershed
Flathead Chub	<i>Platygobio gracilis</i>	Fish	Concern/None	May occur in the watershed
Great Plains narrow-mouth toad	<i>Gastrophryne olivacea</i>	Amphibians	Concern/None	May occur in the watershed
Lesser Prairie Chicken	<i>Tympanuchus palidicinctus</i>	Birds	Threatened/Candidate	Occurs 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
Plains Leopard Frog	<i>Rana blairi</i>	Amphibians	Concern/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
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
Townsend's big-eared bat (pale ssp)	<i>Corynorhinus townsendii pallascens</i>	Mammals	Concern/None	May occur in the watershed
Yellow Mud Turtle	<i>Kinosternon flavescens</i>	Reptiles	Concern/None	May occur in the watershed

The predominant terrestrial habitat types in this watershed are shortgrass prairie, sand dune/shrub complex, and dry cropland. Wildlife species found on the shortgrass prairie include mountain plover, black-tailed prairie dog, and swift fox. Seasonal streams with associated riparian areas and stock ponds provide limited aquatic habitats in the shortgrass. Economically important wildlife species that occur in the watershed include pronghorn, mule and white-tailed deer, pheasant, mourning dove, bob-white, and scaled quail.

Social Data

Baca

Demographics (US Census, American Factfinder)

Total population	4517
Male	2247
Female	2270
Median age (years)	42.9
White	4,234
Black or African American	2
American Indian and Alaska Native	54
Asian	7
Native Hawaiian and Other Pacific Islander	4
Some other race	135
Hispanic or Latino (of any race)	317

Economic Characteristics

In labor force-population 16 years & over	2,072
Median household income (dollars)	28,099
Median family income (dollars)	34,018
Per capita income (dollars)	15,068
Families below poverty level	165
Individuals below poverty level	749

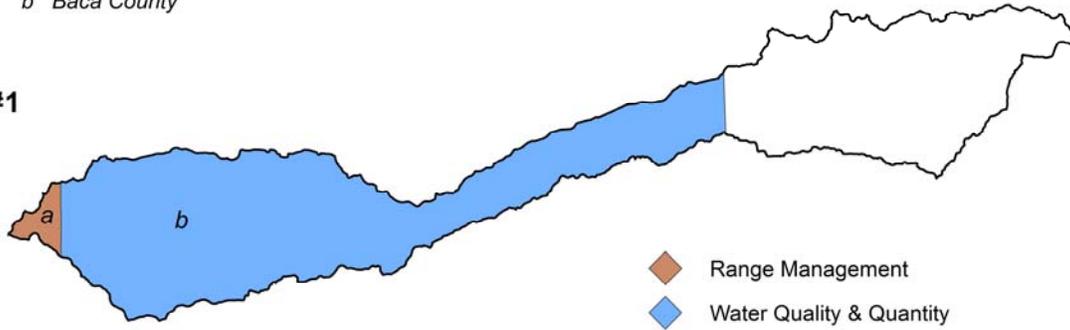
County Agricultural Characteristics

Farms (number)	608
Land in farms/ranches (acres)	1,080,386
Average size farm/ranch (acres)	1,777
Median size farm (acres)	1,120
Average age of farmer or rancher	57.2
Net cash return from ag sales (\$1,000)	5,944
Cattle and calves (number)	56,000

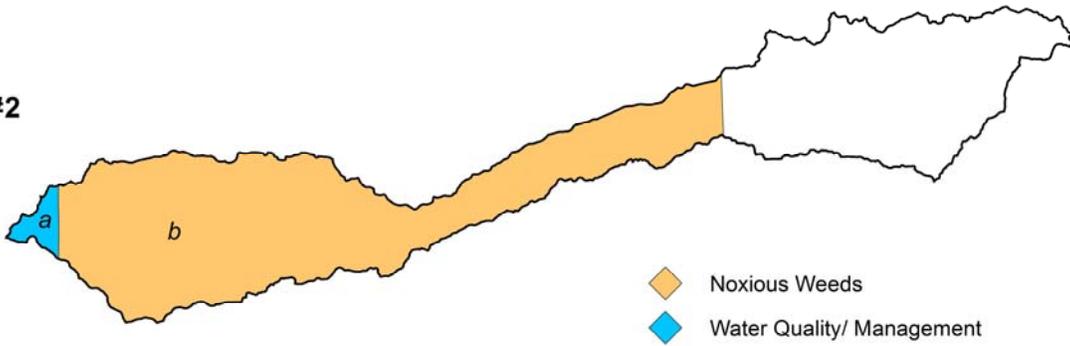
Identified Long Range Resource Concerns Top Three Concerns within Conservation Districts

Conservation Districts
a Branson-Trinchera
b Baca County

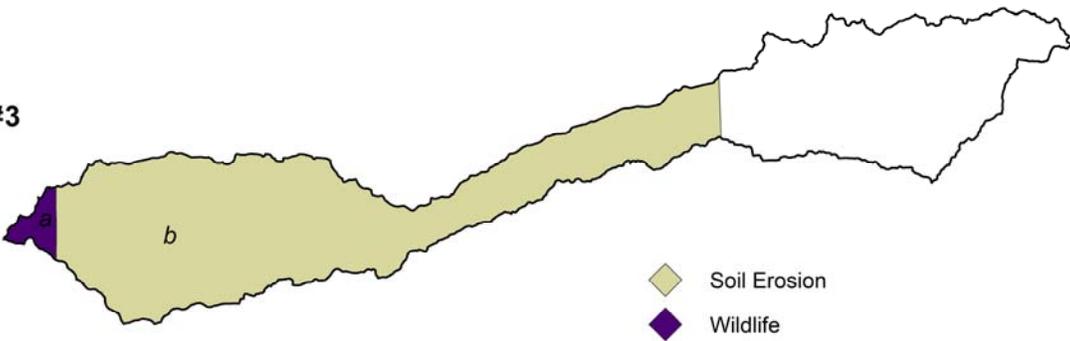
#1



#2



#3



Selected Conservation Practices Applied, FY 2005 through FY 2009

Practice Code	Practice Name	Practice Unit	Applied Amount	Applied Count
528	Prescribed Grazing	ac	43,979	258
329	Residue Management	ac	6,510	62
449	Irrigation Water Management	Ac	3,285	19

Conservation Systems to Address Major Resource Concerns *from the Field Office Technical Guide*

Grazed Rangeland—Grazing resources need improved plant condition (similarity index), productivity, health and vigor. Grazing animals have inadequate quantities and quality of feed, forage, and shelter. The animals are adapted to the climatic and ecological condition of the resources.

CO 67B.1-GR-01-R-Grazing

Practices

314 Brush Management
382 Fence
516 Pipeline
528 Prescribed Grazing
595 Pest Management
614 Watering Facility
642 Water Well
645 Upland Wildlife Habitat Management
666 Forest Stand Improvement

Description

The Central High Tableland is broad, level to gently rolling, loess mantled tableland. Soils vary from shallow to deep. Vegetation varies from short grasses to tall grasses based on soils and past management. Majority of the precipitation occurs thru spring snows and also thru severe summer high intensity rains.

Resource Concerns Addressed

Domestic Animals - Inadequate Stock Water
Fish and Wildlife - T&E Species: Declining Species, Species of Concern
Plant Condition - Productivity, Health and Vigor
Soil Erosion - Sheet and Rill
Soil Erosion - Wind

Dry Cropland Seasonal —Seasonal residue management with Conservation crop rotation, Nutrient and Pest Mgt.

CO 67B.1-CR-Dryland

Practices

328 Conservation Crop Rotation
344 Residue Management, Seasonal
590 Nutrient Management
595 Pest Management

Description

Crops: wheat, corn, milo, millet, sunflower, forage sorghum. Fallow included in rotation. Soils: silt loams and loams. Annual precipitation ranges from 14 - 18". Moisture usually lacking in the summer during peak ET; rainfall often comes in short intense spring and early summer storms. Wildlife potential for use by pheasant, quail, deer, pronghorn and other wildlife. Long term agricultural production practices have resulted in water and wind erosion, soil compaction and decrease in organic matter.

Resource Concerns Addressed

Soil Erosion - Sheet and Rill
Soil Erosion - Wind
Water Quantity - Inefficient Water Use on Irrigated Land

Irrigation system converted to sprinkler –Sprinkler irrigation system with IWM, Crop rotation, Mulch-till, Nutrient and Pest Mgt.	CO 67B.1-CR-Pivot
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<i>Practices</i>	<i>Description</i>	<i>Resource Concerns Addressed</i>
328 Conservation Crop Rotation 345 Residue Mgmt, Mulch Till 442 Irrigation System, Sprinkler 449 Irrigation Water Management 590 Nutrient Management 595 Pest Management	Crops: corn (silage or grain), field beans, wheat, alfalfa, onions, melons, potatoes, vegetables and sugar beets. Soils: fine sandy loams, loams, silt and clay loams, sands and fine sands. Annual precipitation ranges from 12 - 16". Moisture usually lacking in the summer during peak ET and supplemented with gravity irrigation, the water source may be ground or surface water; rainfall often comes in short intense spring and early summer storms. Wildlife potential for use by pheasant, quail, deer, pronghorn and other wildlife. Long term agricultural production practices have resulted in soil compaction.	Soil Erosion - Sheet and Rill Soil Erosion - Wind Water Quantity - Inefficient Water Use on Irrigated Land

Estimated Costs of Application of Conservation Systems

Landuse	Estimated Acres Need to be Treated	Estimated Average Cost per Acre (\$)	Costs (\$)
Range	60,000	10	600,000
Dryland Crop	5,000	30	150,000
Irrigated Crop	1,500	1,200	1,800,000
Total Costs:			2,550,000

FOOTNOTES/ BIBLIOGRAPHY

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 12/7/2005
- Las Animas County (CO628) Published 8/21/2007
- Grant County (KS067) Published 11/13/2008
- Morton County (KS129) Published 11/13/2008
- Stanton County (KS187) Published 11/13/2008

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 GIS 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>.

All border state (if applicable) vegetation data courtesy of the National Land Cover Dataset (NLCD). For more information visit http://www.mrlc.gov/mrlc2k_nlcd.asp

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,07/22/2006 dataset) data was obtained from the Bureau of Land Management, Colorado State Office. For more information, visit http://www.blm.gov/co/st/en/BLM_Programs/geographical_sciences/gis.html

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>.