



United States Department
of Agriculture

Kiowa Watershed



Hydrologic Unit Code 10190010

Natural Resources
Conservation Service

Rapid Assessment

Lakewood, Colorado

RWA 10190010

November 2009



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.

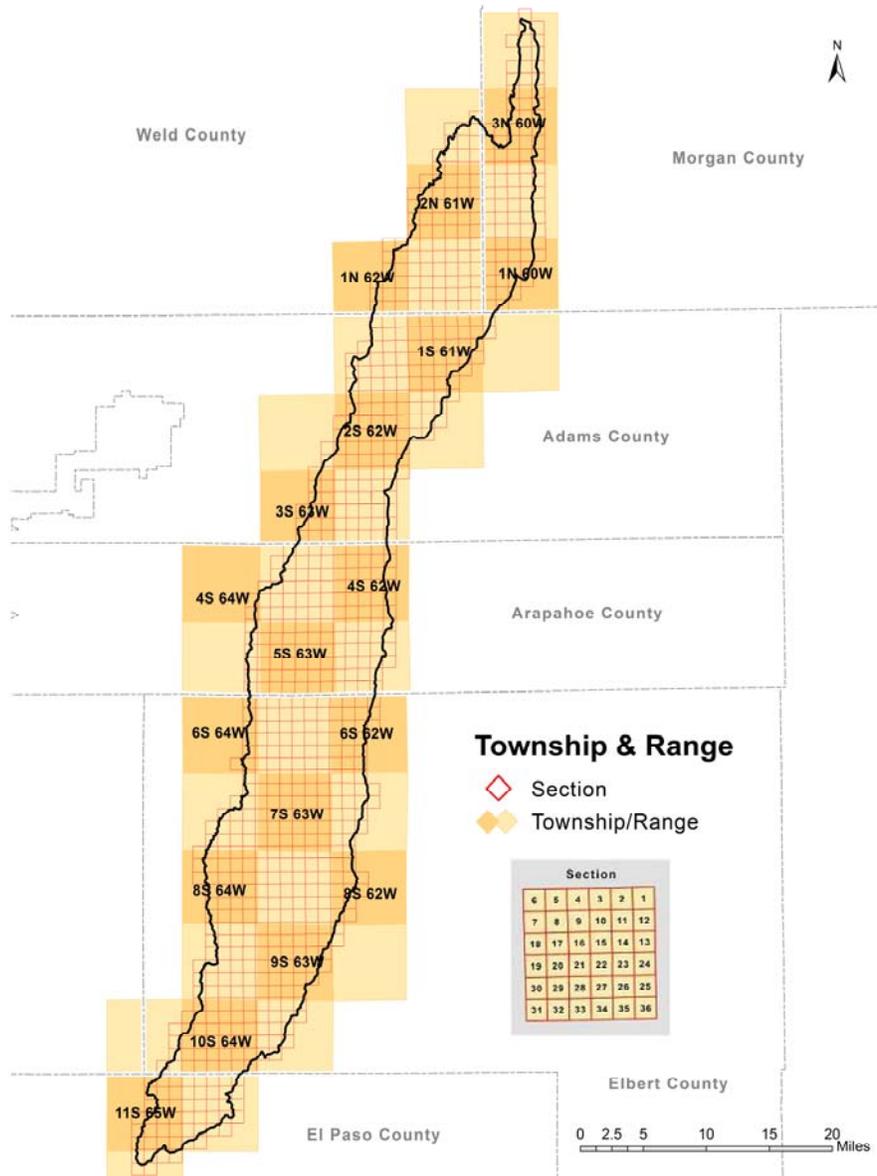
Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best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

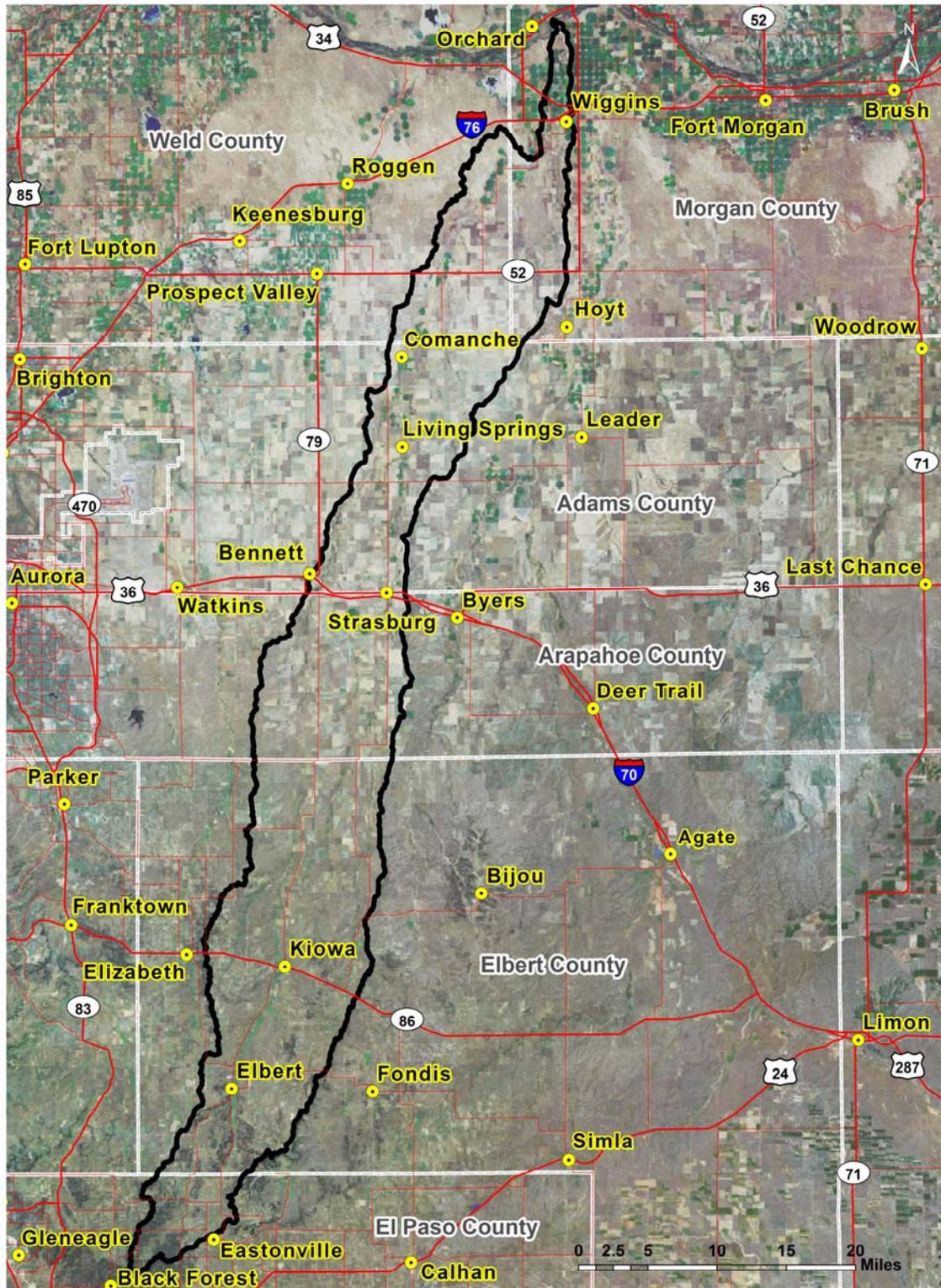
Rapid Watershed Assessments provide information that helps land-owners and local leaders set conservation priorities.



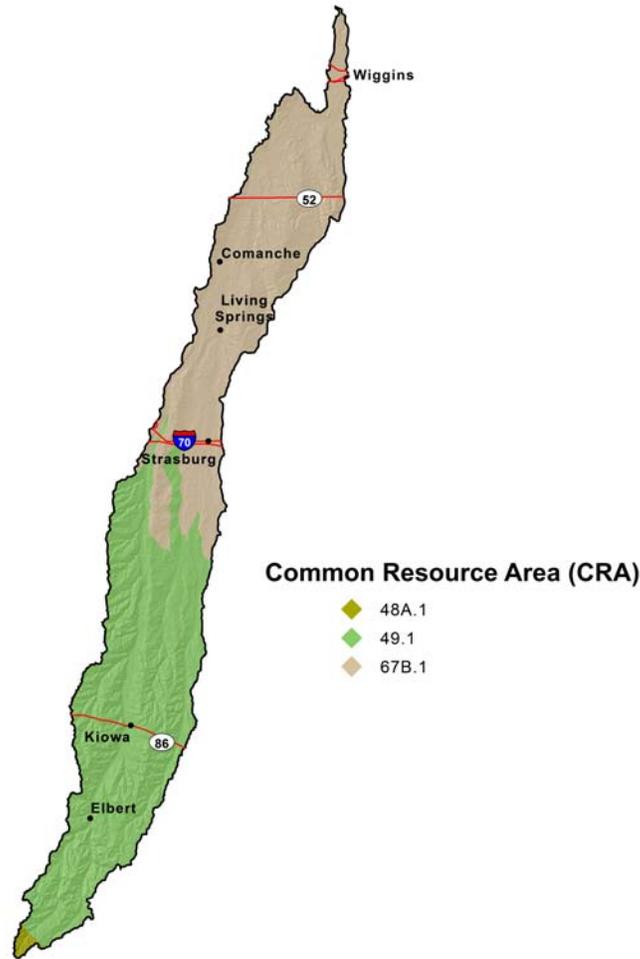
County	County Acres	County Acres in Kiowa Watershed	% of County in the Watershed	% of Watershed in the County
Adams	756,499	82,802	10.9%	18.1%
Arapahoe	515,064	74,657	14.5%	16.3%
El Paso	1,362,117	22,825	1.7%	5.0%
Elbert	1,183,750	182,452	15.4%	39.9%
Morgan	827,504	41,585	5.0%	9.1%
Weld	2,568,823	52,608	2.0%	11.5%

456,930

Kiowa Watershed - 10190010

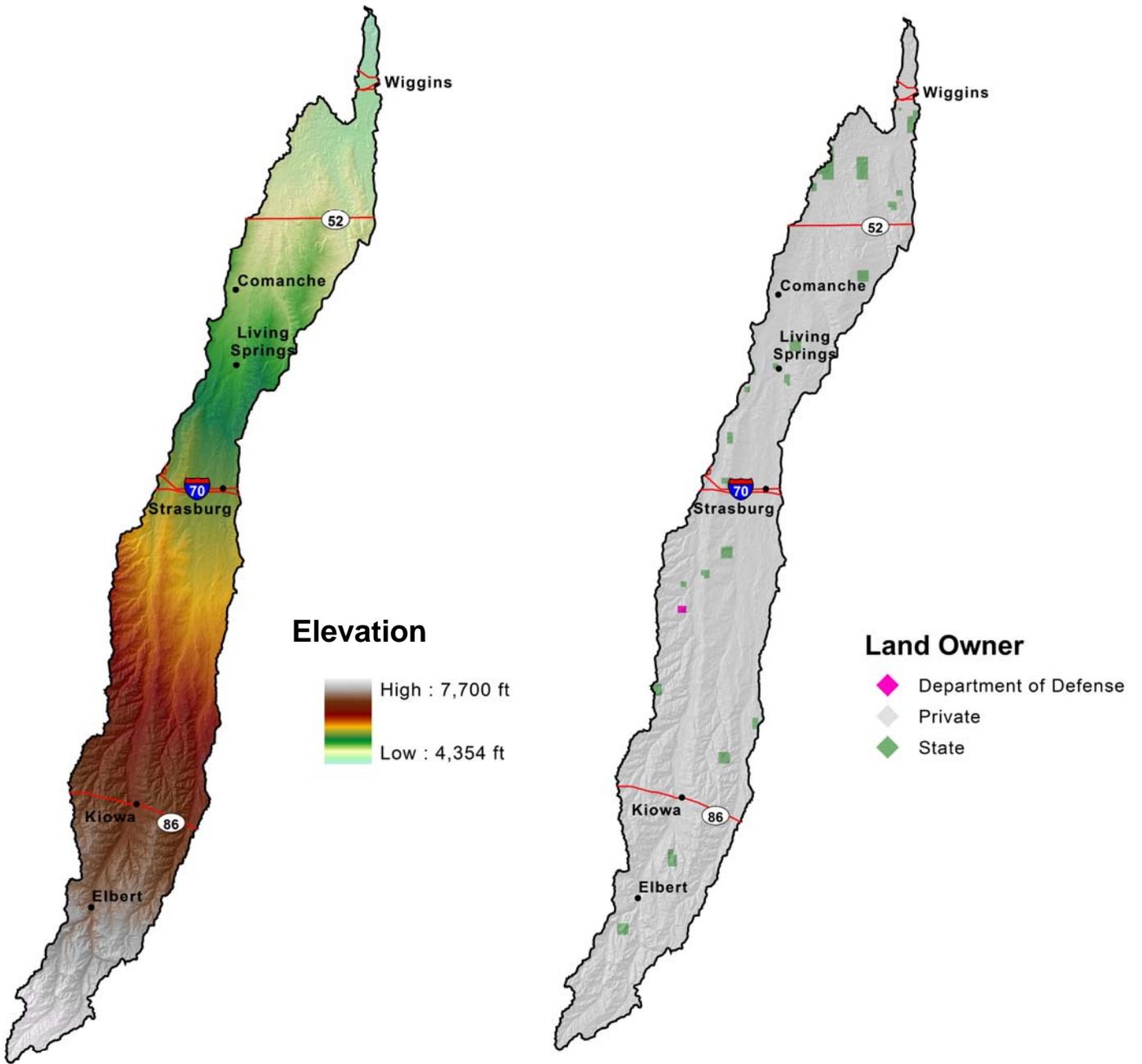


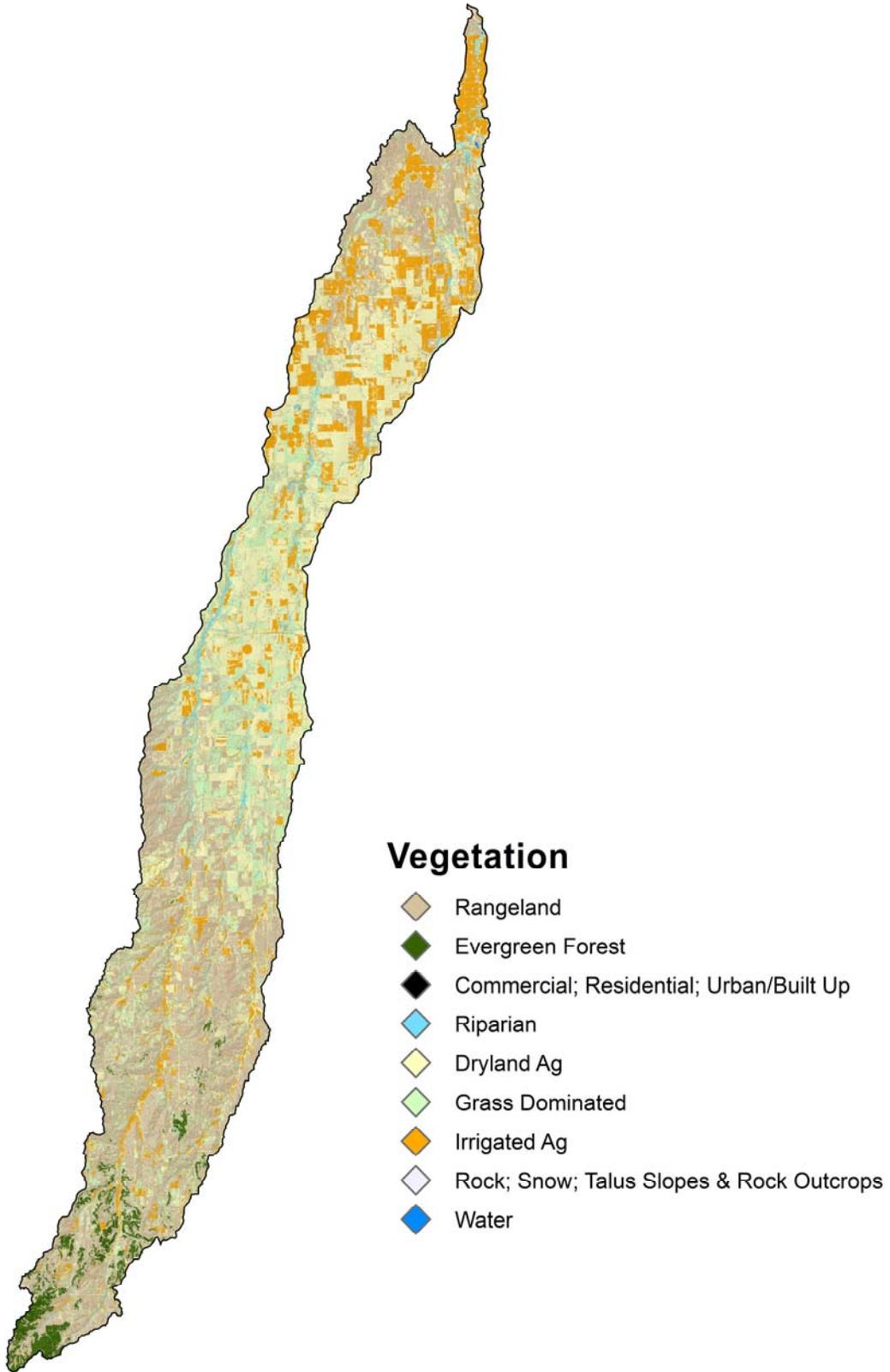
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CRA: A geographical area where resource concerns, problems, and treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographical boundaries of the common resource area.

MLRA	CRA	CRA NAME	CRA DESCRIPTION
48A	48A.1	Southern Rocky Mountains - High Mountains and Valleys	This area is best characterized by steep, high mountain ranges and associated mountain valleys. The temperature regimes are mostly frigid and cryic; moisture regimes are mainly ustic and udic. Vegetation is sagebrush-grass at low elevations, and with increasing elevation ranges from coniferous forest to alpine tundra. Elevations range from 6,500 to 14,400 feet.
49	49.1	Southern Rocky Mountain Foothills	This area is generally a transition between the Great Plains and the Southern Rocky Mountains. The temperature regime is mesic or frigid, and moisture regime is ustic. Characteristic native vegetation ranges from grasslands and shrubs to ponderosa pine and Rocky Mountain Douglas fir forest.
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.

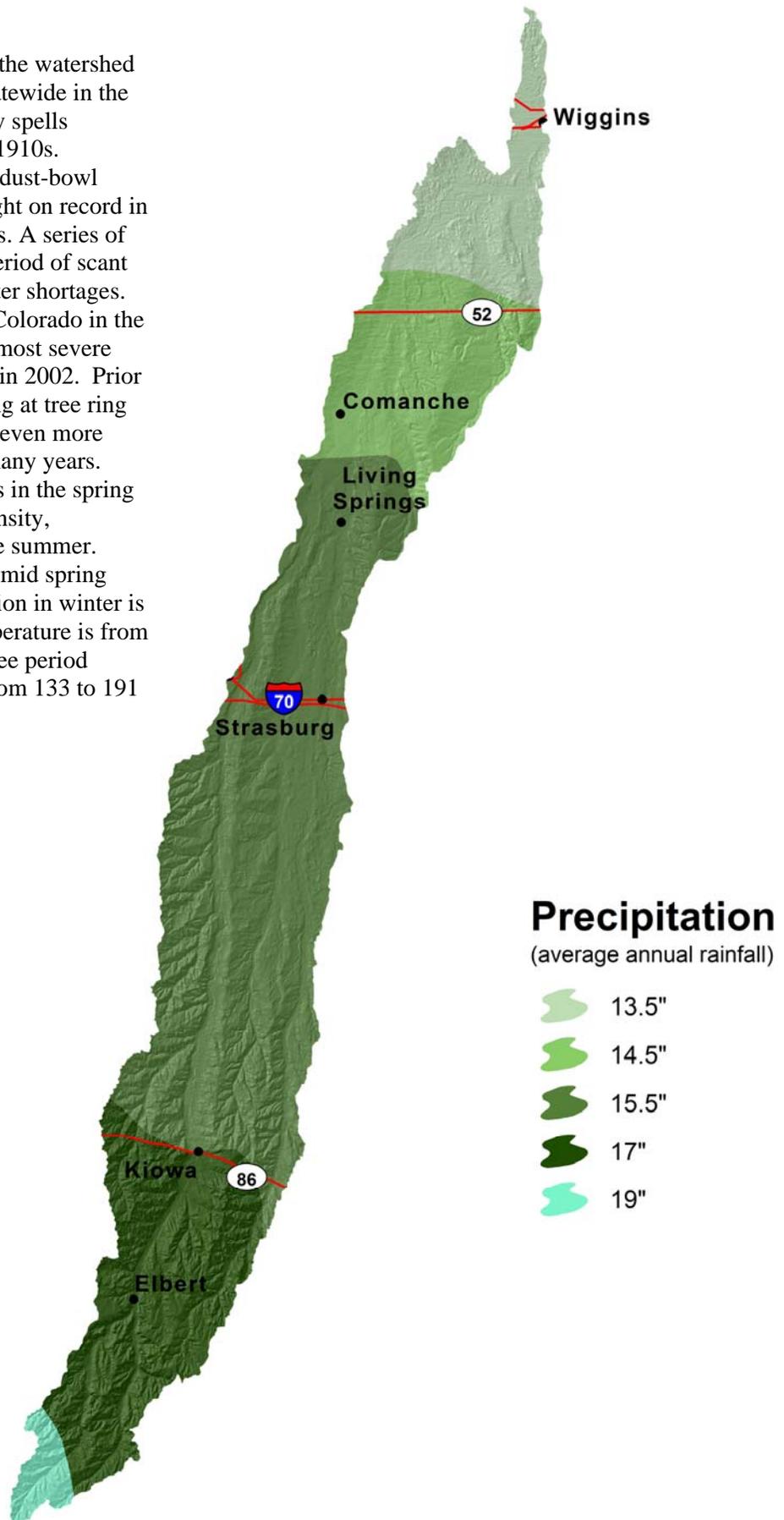


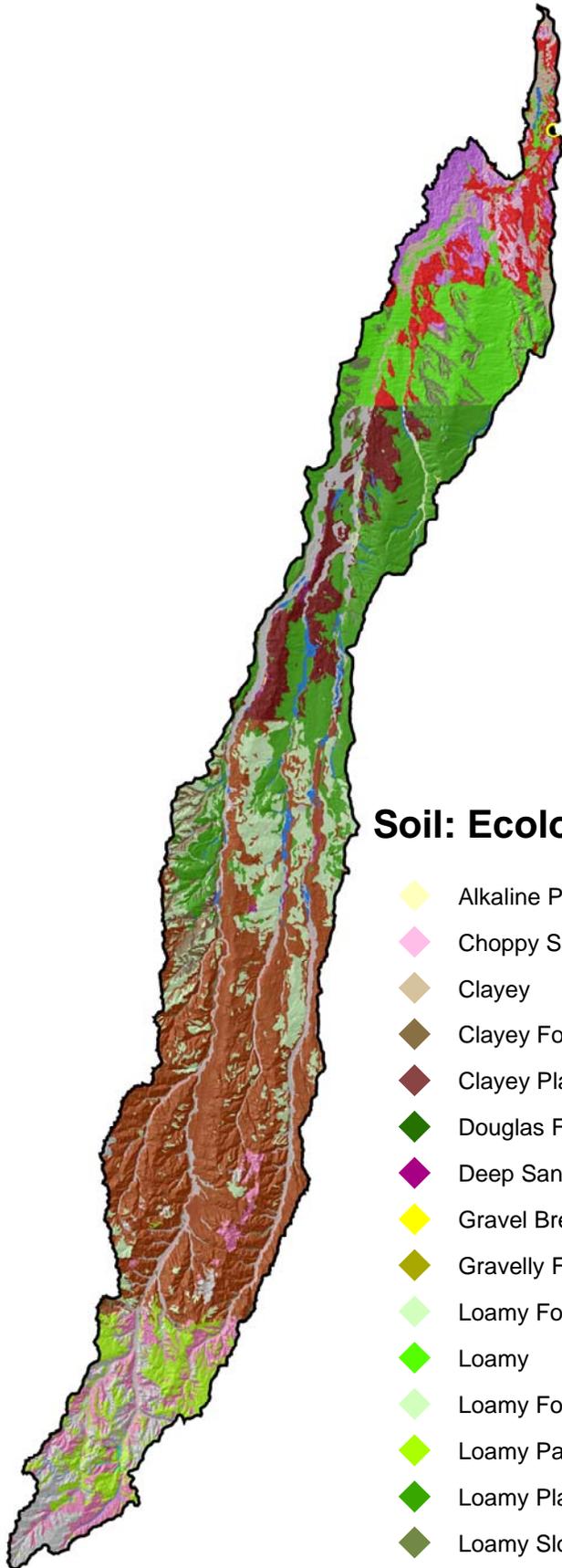


KIOWA Land Use	Total Acreage	Vegetation	Acreage
Cropland	177,001	Dryland Ag	111,147.01
		Irrigated Ag	65,853.80
Rangeland/Grassland	249,178	Gambel Oak	9,896.65
		Grass Dominated	74,025.31
		Grass/Forb Mix	100,287.68
		Grass/Yucca Mix	19.56
		Mesic Mountain Shrub	49.10
		Sagebrush Community	253.64
		Sagebrush/Grass Mix	28,454.62
		Shrub/Grass/Forb Mix	36,189.53
		Sparse Grass	0.22
Xeric Mountain Shrub	2.16		
Forest	21,522	P. Pine/Gambel Oak	7,841.06
		Ponderosa Pine	13,357.04
		Ponderosa Pine/	323.45
Riparian	9,081	Cottonwood	7,433.85
		Herbaceous Riparian	1,633.43
		Riparian	13.64
Water	92	Water	92.05
Other	24	Commercial	14.42
		Rock	1.76
		Soil	3.79
		No Data	4.13
Total Watershed Acres			456,898

Precipitation

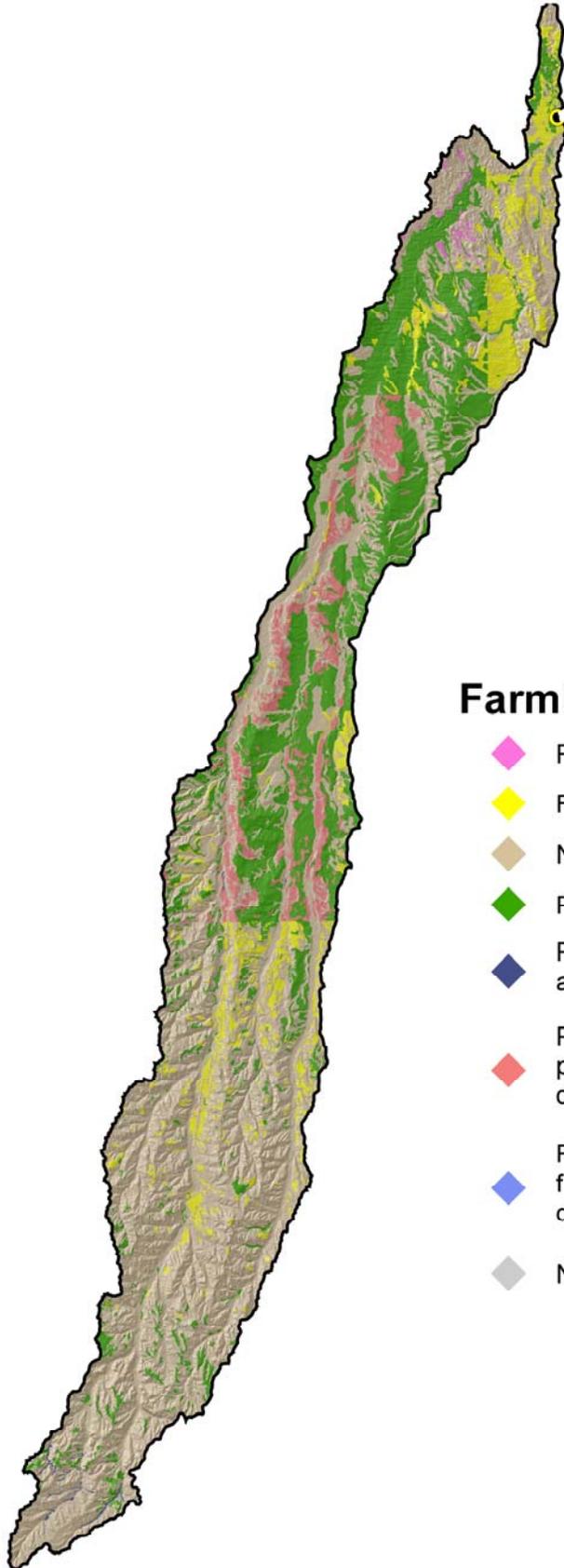
Droughts are regular visitors to the watershed as with the rest of Colorado. Statewide in the 1900's alone, four prolonged dry spells occurred. There was one in the 1910s. Another, in the '30s, caused the dust-bowl period. The second worst drought on record in the state occurred in the mid-50s. A series of hot, dry summers following a period of scant mountain snowpack created water shortages. The fourth drought hit parts of Colorado in the late 1970s. In this century, the most severe drought since 1723 hit the state in 2002. Prior to the 1700's, researchers looking at tree ring records have found evidence of even more severe droughts, some lasting many years. Rainfall occurs as frontal storms in the spring and early summer and high intensity, convective thunderstorms in late summer. Maximum precipitation is from mid spring through late autumn. Precipitation in winter is snow. The average annual temperature is from 45 to 55 degrees F. The frost free period averages 162 days but ranges from 133 to 191 days.





Soil: Ecological Site Name

- | | |
|-------------------|------------------|
| Alkaline Plains | Mountain Meadow |
| Choppy Sands | Overflow |
| Clayey | Saline Overflow |
| Clayey Foothill | Salt Flat |
| Clayey Plains | Sands |
| Douglas Fir | Sandstone Breaks |
| Deep Sand | Sandy |
| Gravel Breaks | Sandy Bottomland |
| Gravelly Foothill | Sandy Divide |
| Loamy Foothill | Sandy Foothill |
| Loamy | Sandy Plains |
| Loamy Foothill | Shaly Plains |
| Loamy Park | Wet Meadow |
| Loamy Plains | No Data |
| Loamy Slopes | |



Farmland Classification

- ◆ Farmland of local importance
- ◆ Farmland of statewide importance
- ◆ Not prime farmland
- ◆ Prime farmland if irrigated
- ◆ Prime farmland if irrigated and reclaimed of excess salts and sodium
- ◆ Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- ◆ 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.

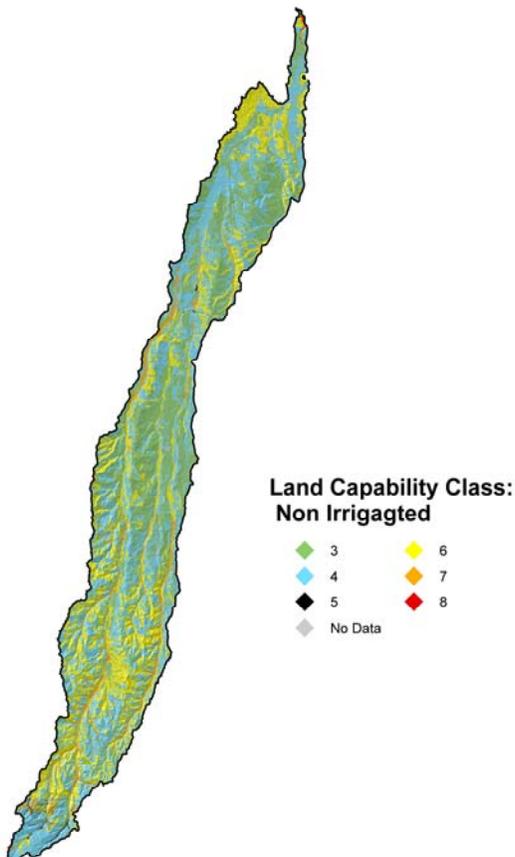
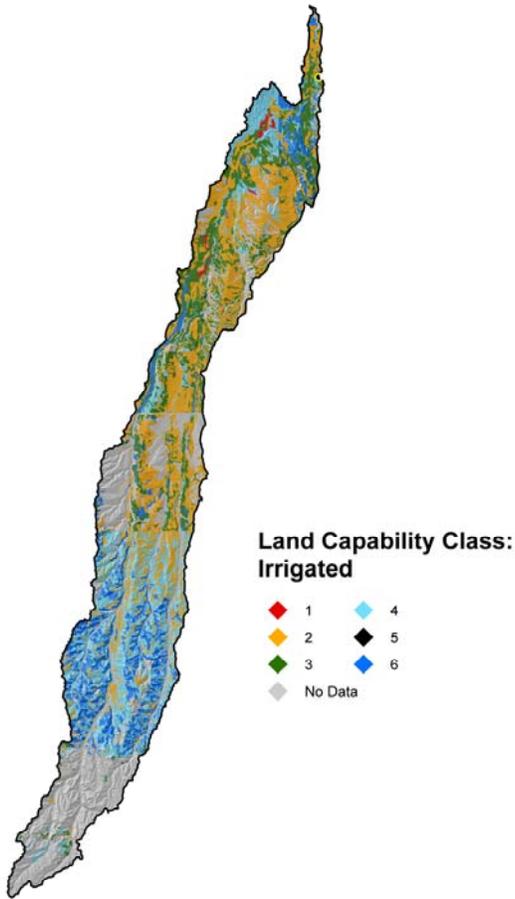
Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

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.

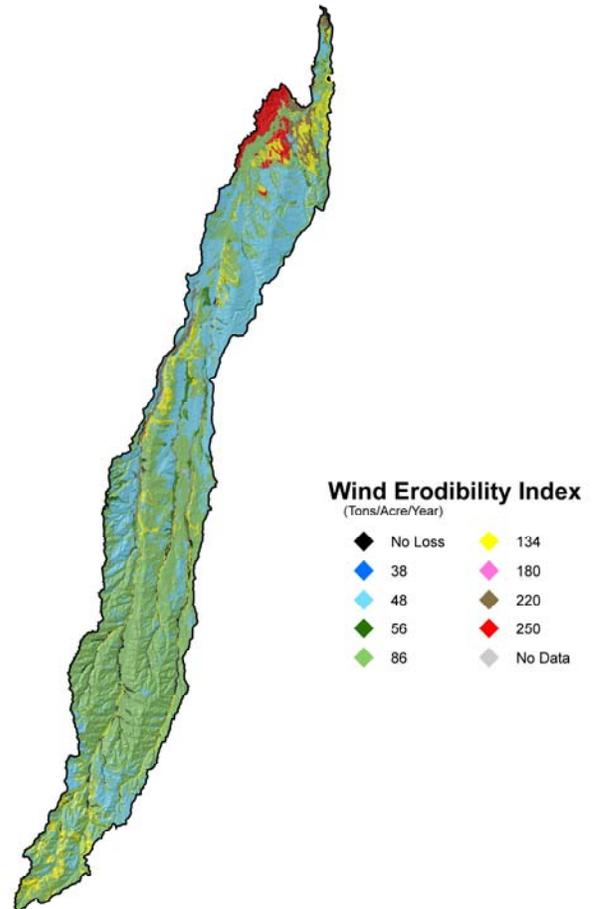
Class 8 - soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.



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.

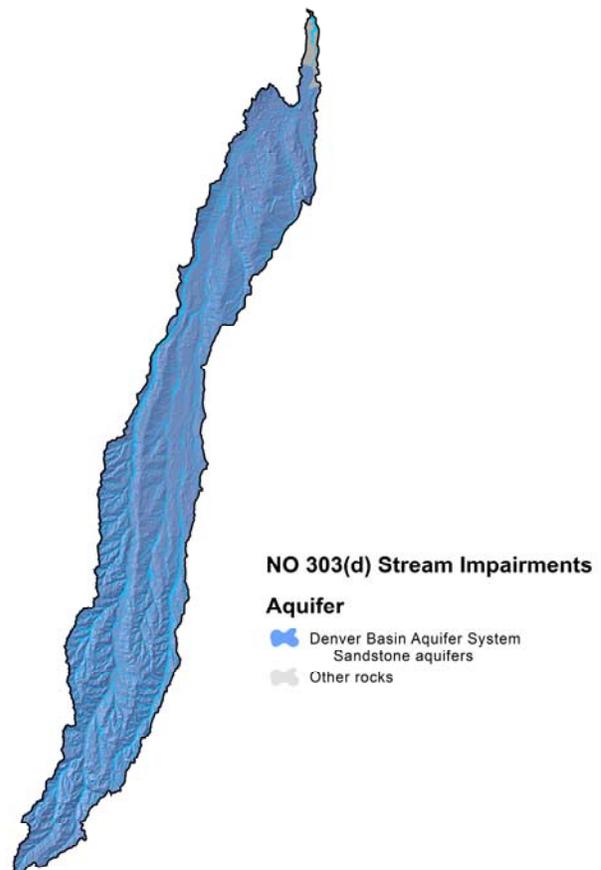
Soils with an erodibility index equal to or greater than 8 are considered highly erodible.

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



Stream Impairments

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



State and Federal Threatened, Endangered, and Candidate Species and Species of Special Concern

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
Brassy Minnow	<i>Hybognathus hankinsoni</i>	Fish	Threatened/None	May occur near watershed outlet
Burrowing Owl	<i>Athene cunicularia</i>	Birds	Threatened/None	Occurs in the watershed
Common Garter Snake	<i>Thamnophis sirtalis</i>	Reptiles	Concern/None	Occurs in the watershed
Cylindrical Papershell	<i>Anodontooides 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	Water depletions in the watershed may affect downstream habitats
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	Water depletions in the watershed may affect downstream habitats
Piping Plover	<i>Charadrius melodus</i>	Birds	Threatened/Threatened	Water depletions in the watershed may affect downstream habitats
Preble's Meadow Jumping Mouse	<i>Zapus hudsonius preblei</i>	Mammals	Threatened/Threatened	Occurs in the watershed
Suckermouth Minnow	<i>Phenacobius mirabilis</i>	Fish	Endangered/None	May occur near watershed outlet
Swift fox	<i>Vulpes velox</i>	Mammals	Concern/None	Occurs in the watershed
Whooping Crane	<i>Grus Americana</i>	Birds	Endangered/Endangered	Water depletions in the watershed may affect downstream habitats

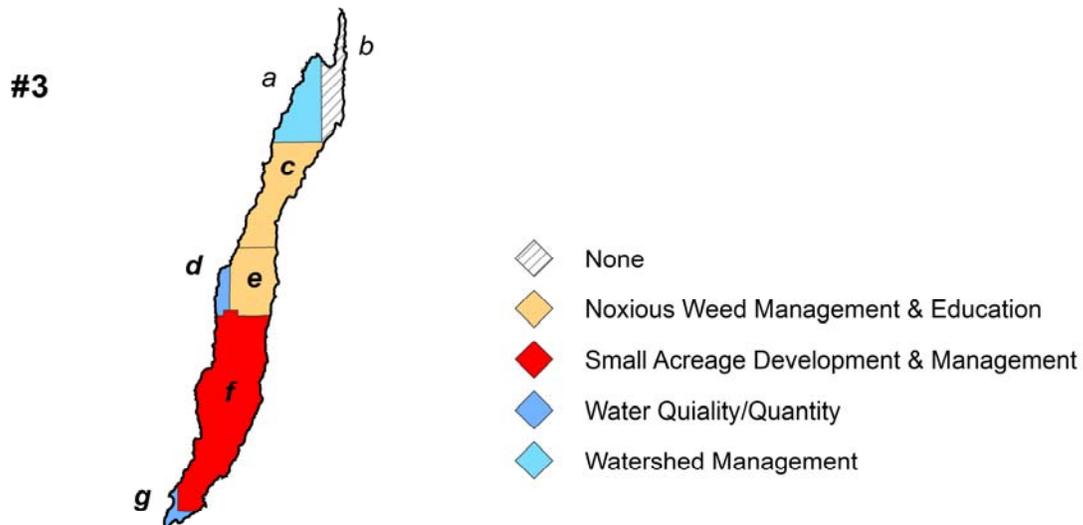
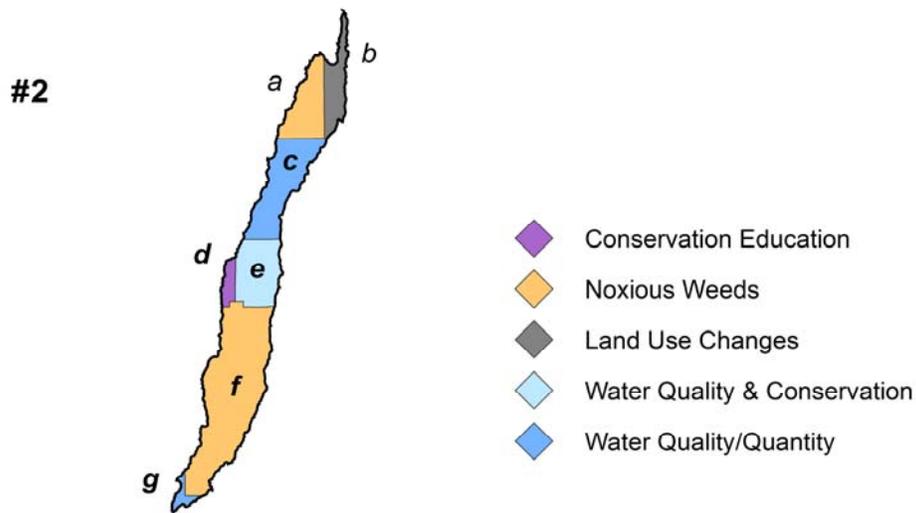
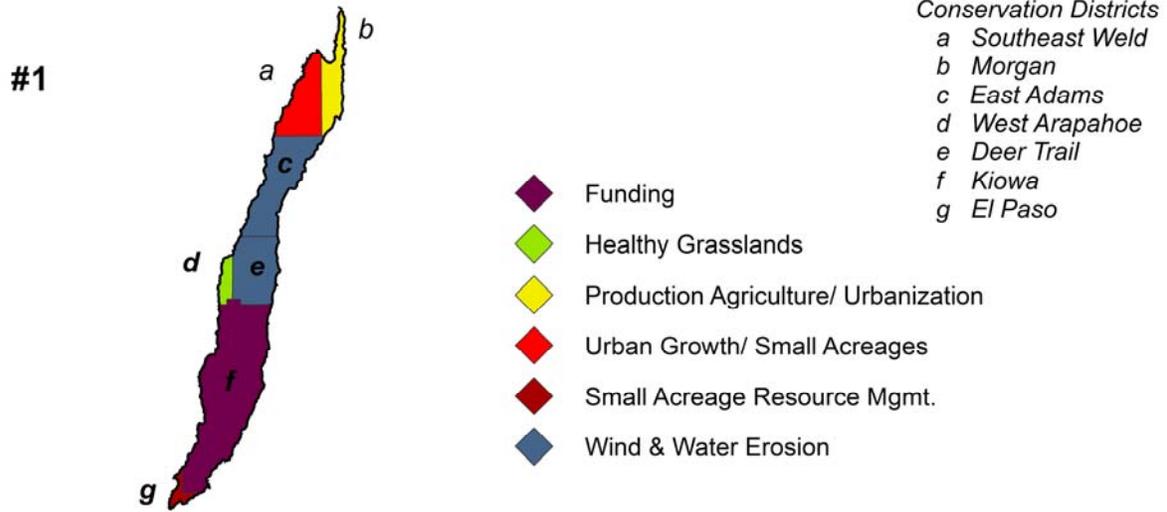
Terrestrial habitats in this watershed are varied. Ponderosa pine; short, mid, and tall grass prairie; sand dunes; and both irrigated and dryland cropland comprise the major terrestrial habitats. In dry years, water is scarce. Because of this, the native species in this watershed are those that can survive without abundant water supplies. Riparian areas, playa lakes, and stock ponds provide seasonal to intermittent aquatic habitats. Swift fox, black-tailed prairie dog, and burrowing owl occur in the short and mid-grass areas. Economically important wildlife species that occur in much of the watershed include pronghorn, mule and/or white-tailed deer, and mourning dove. Snow goose, and bobwhite occur in the lower part of the watershed near the South Platte River. Black bear, mountain lion, and elk occur in the forested areas in the upper parts of the watershed. A few wild turkey occur in riparian areas.

Social Data

	Adams	Arapahoe	Elbert	El Paso	Morgan	Weld
Demographics (US Census, American Factfinder)						
Total population	396,032	254,207	19,872	550,130	27,171	223,966
Male	200,836	258,572	9,966	272,922	13,613	112,848
Female	195,196	265,635	9,906	277,208	13,558	111,118
Median age (years)	31.2	34.8	37.2	33.5	33.5	31.3
White	297,986	410,747	18,923	444,799	21,642	200,942
Black or African American	12092	48,874	128	33484	91	754
American Indian and Alaska Native	3945	4,180	125	4855	221	1465
Asian	14128	24,931	74	15516	47	2427
Native Hawaiian and Other Pacific Islander	66	719	18	1241	46	117
Some other race	55810	21,919	255	29575	4449	14814
Hispanic or Latino (of any race)	138940	85,131	766	70312	8473	62792
Economic Characteristics (US Census, American Factfinder)						
In labor force (population 16 years and over)	213,189	292,087	11,056	288,867	12,422	120,817
Median household income (dollars)	50,650	54,838	62,480	50,714	34,568	48,763
Median family income (dollars)	56,053	67,456	66,740	61,719	39,102	57,009
Per capita income (dollars)	22,228	30,170	24,960	25,261	15,492	21,981
Families below poverty level	x	x	145	x	592	x
Individuals below poverty level	x	x	791	x	3281	x
X means that value is not applicable or not available						
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)						
Farms (number)	728	448	1153	1175	761	3121
Land in farms/ranches (acres)	701,471	332,585	1,068,359	811,931	757,946	1,812,167
Average size farm/ranch (acres)	964	742	927	691	996	581
Median size farm (acres)	159	82	160	160	385	158
Average age of farmer or rancher	54.6	53.1	52.8	54.1	52.9	53.5
Net cash return from ag sales (\$1,000)	6,721	1,897	108	2,485	18,627	67,959
Cattle and calves (number)	10,000	6,000	36,000	26,000	242,000	505,000

Identified Long Range Resource Concerns

Top Three Concerns within Conservation Districts



Selected Conservation Application Data						
	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Total
Practices						
Prescribed Grazing	1,964	4,038	327	3,442	7,031	16,802
Irrigation Water Management	50	924	0	0	1,382	2,356
Conservation Cropping System	na	2,155	939	1,345	922	5,361
Residue Management, Seasonal	4,217	2,678	939	249	1,308	9,391

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 100,000 acres need to be treated on median sized ranches of 1,000 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.	21,120	0.6	12,672
Pest Management (595)	Ac.	300	4,500	4,500
Pipeline (516)	Ft.	15,000	2.40	36,000
Upland Wildlife Habitat Management (645)	Ac.	300	na	0
Watering Facility (614)	No.	2	410	820
Windbreak/Shelterbelt Establishment (380)	Ft.	1,000	.85	850
Costs to apply prescribed grazing per median sized ranch of 1,000 acres	No.	100	54,842	5,484,200
Subtotal Rangeland costs:				\$5,484,200

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

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	81,800	5	27,770
Nutrient Management (590)	Ac	81,800	5	409,000
Pest Management (595)	Ac	81,800	15	1,227,000
Subtotal Costs Dryland Crops:				\$2,045,000
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 67.1-CR-Sprinkler-R-2
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Irrigation Water Management (449)-includes re-bowl, renozzle, and IWM	Ac	58,000	10.20	591,600
Nutrient Management (590)	Ac	20,000	5	100,000
Pest Management (595)	Ac	20,000	15	300,000
Subtotal Irrigation Costs:				\$991,600

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.	5,484,200
Dryland Crop	Soil	368,100 Total Tons/Year saved	Cropland sustainability	2,045,000
Irrigated Crops	Water		Nutrients and organics are stored, handled, disposed of, and managed so that surface	991,600
Estimated Total Costs to Address Major Resource Concerns:				\$8,520,800

References Not Cited in Document

303(d) listed streams within the Watershed were created using data from Colorado Department of Public Health & Environments' Water Quality & Control Commission. Impaired streams are current as of April 30, 2006. For a list of all Colorado impaired streams, locations and priority ratings, visit <http://www.cdphe.state.co.us/regulations/wqccregs/100293wqlimitedsegtmdls.pdf>. Stream data from National Hydrologic Dataset <http://nhd.usgs.gov>

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>.

This information was compared with an NRCS survey of field office resource inventory and resource concerns developed by ECS during 2008.

Maps were generated using Soil Survey Geographic Database (SSURGO) tabular and spatial data. SSURGO data was downloaded for the following Colorado surveys:

Adams County Area (CO001) Published 1/11/2008	Arapahoe County (CO005) Published 1/25/2000
Lincoln County (CO073) Published 12/19/2005	Morgan County (CO087) Published 11/28/2000
Washington County (CO121) Published 1/10/2007	Elbert County East (CO624) Published 12/16/2005

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>.