



United States Department
of Agriculture

Big Thompson Watershed



Hydrologic Unit Code 10190006

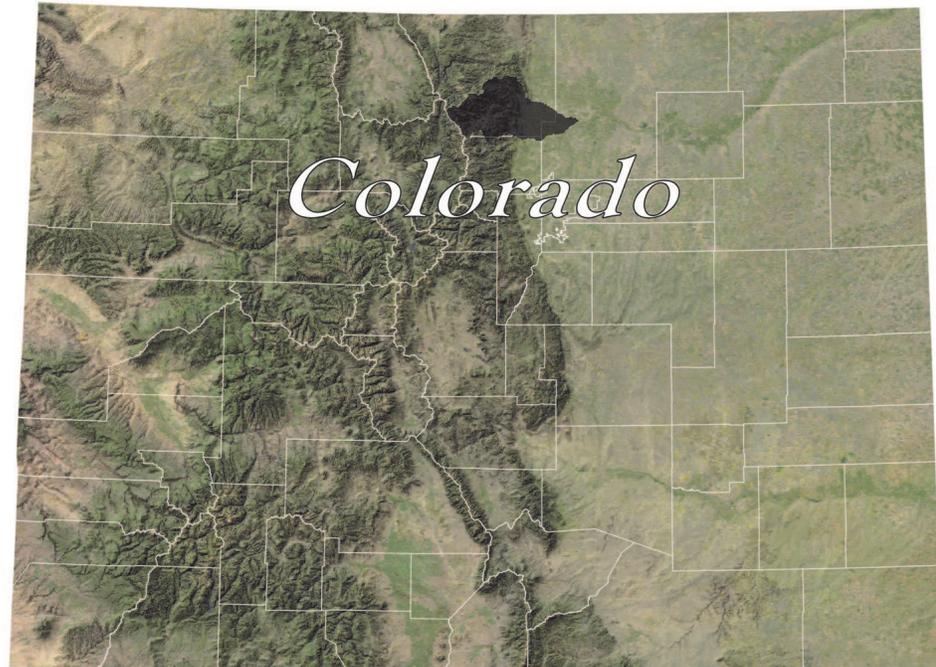
Natural Resources
Conservation Service

Lakewood, Colorado

Rapid Assessment

RWA 10190006

February 2010



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.

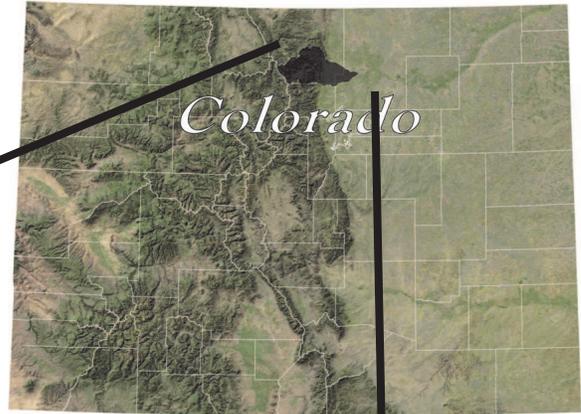
Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best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

Benefits of these Activities

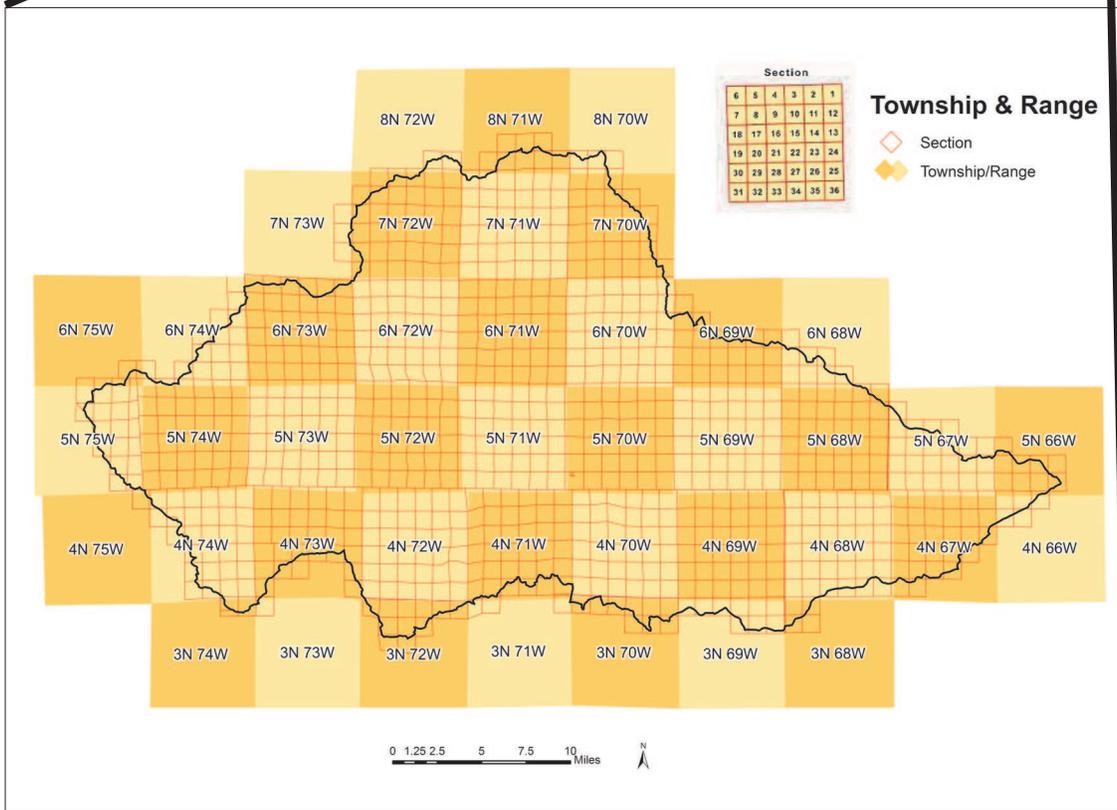
While rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide the benefits of NRCS locally-led planning in less time and at a reduced cost. The benefits include:

- 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.

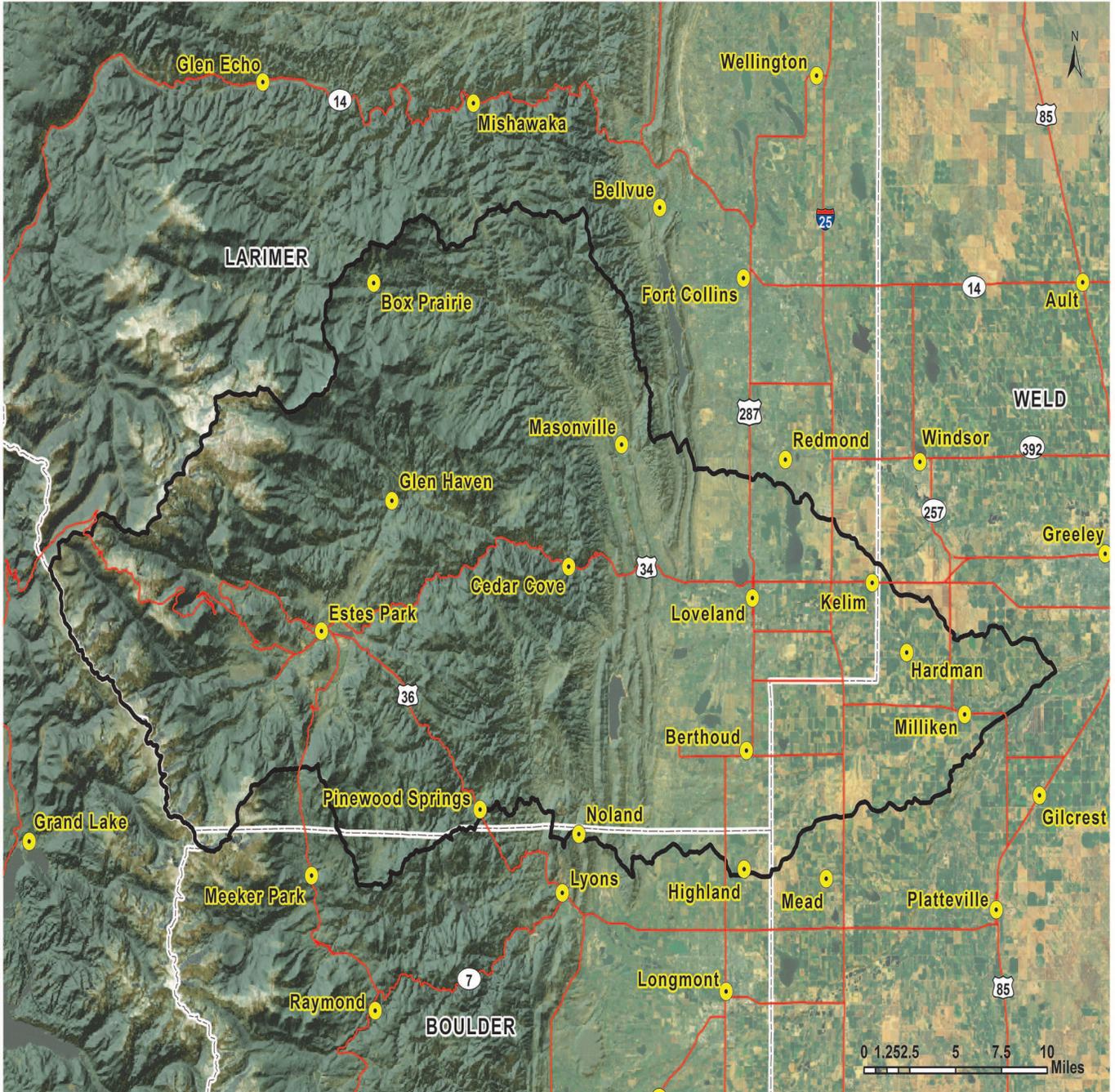


Baseline Imagery: AerialGIS.com | Geographic Network Services hosted by ESRI



County	County Acres	County Acres in BIG THOMPSON Watershed	% of County in the Watershed	% of Watershed in the County
Boulder	473,815	12,888	2.7%	2.7%
Grand	1,195,555	60	0.005%	0.012%
Larimer	1,684,151	463,967	27.5%	96.2%
Weld	2,568,823	5,515	0.2%	1.1%
		482,430		

Big Thompson Watershed - 10190006



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



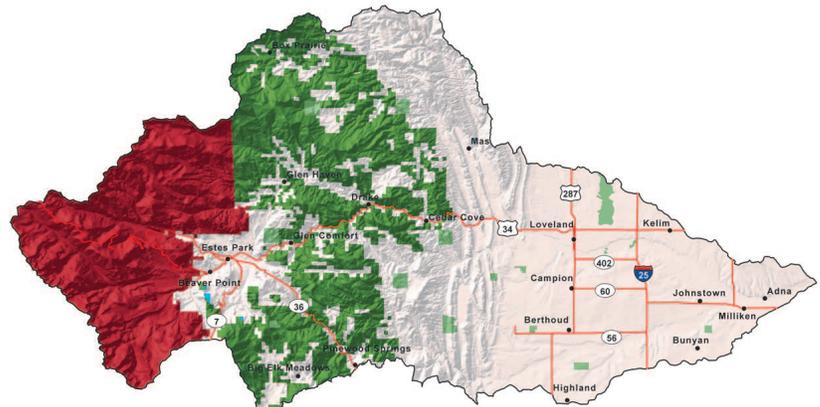
Common Resource Areas (CRA)

- ◆ 48A.1
- ◆ 49.1
- ◆ 67B.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.

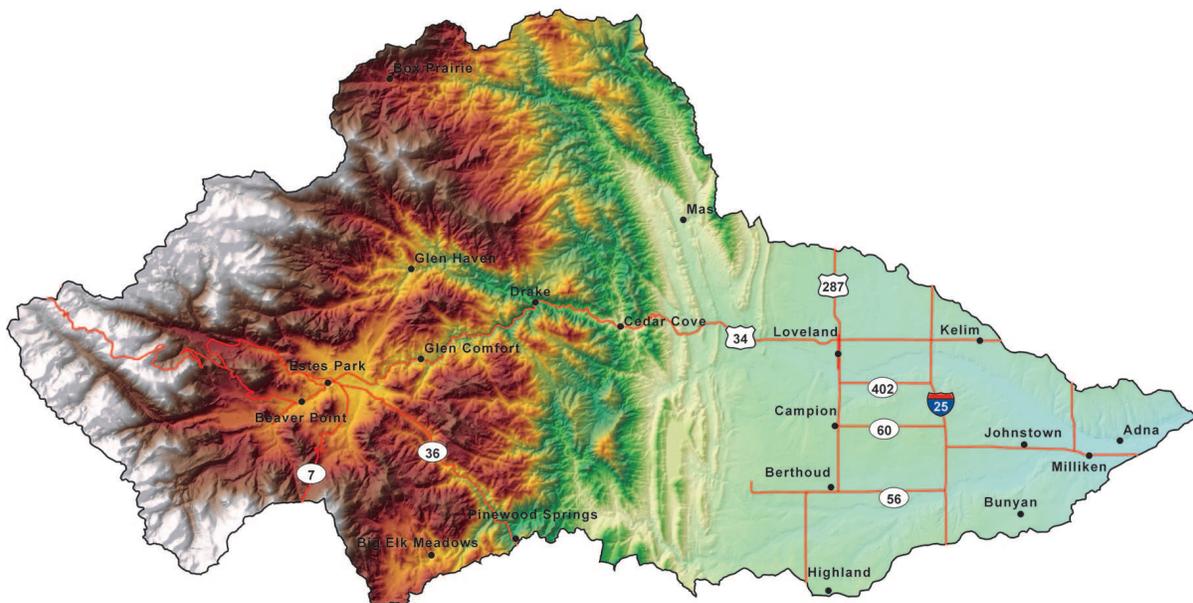
MLRA	CRA	CRA NAME	CRA DESCRIPTION
48A	48A.1	Southern Rocky Mountains - High Mountains and Valleys	This area is best characterized by steep, high mountain ranges and associated mountain valleys. The temperature regimes are mostly frigid and cryic; moisture regimes are mainly ustic and udic. Vegetation 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.

Big Thompson Watershed Land Ownership	
Bureau of Land Management	219
National Park Service	101,578
Private	301,081
State	4,615
State, County, City; Wildlife, Parks & Rec	2,054
U.S. Forest Service	122,483



Land Owner

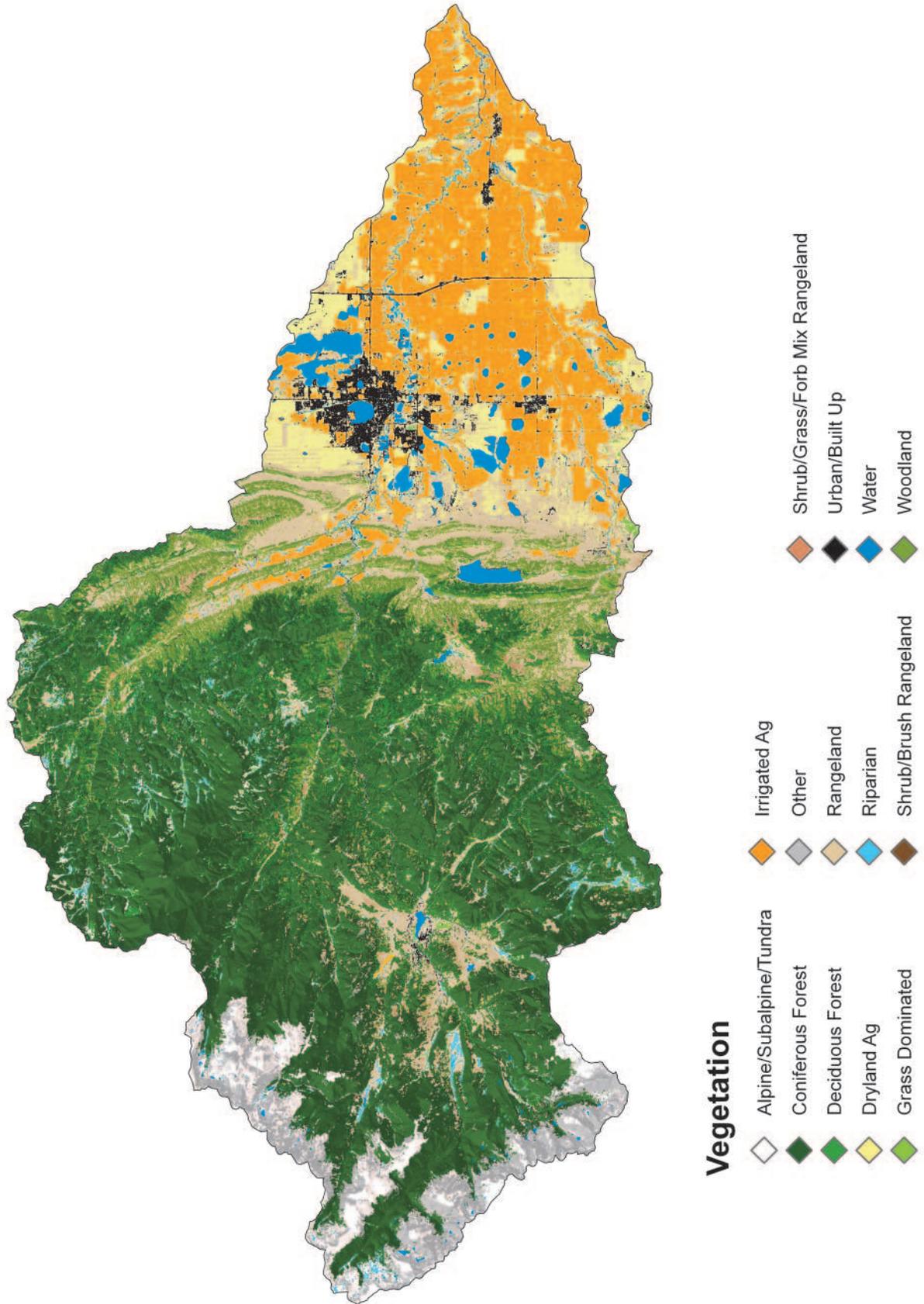
- ◆ Bureau of Land Management
- ◆ National Park Service
- Private Owner
- ◆ State Owned Land
- ◆ U.S. Forest Service



Elevation
(feet above sea level)

High : 14245 ft

Low : 4672 ft

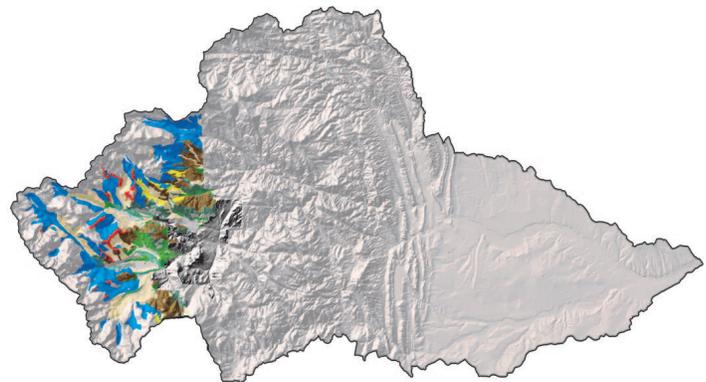
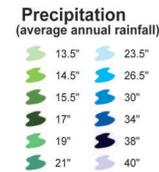


BIG THOMPSON Land Use	Total Acreage	Vegetation	Acreage
Cropland	83,271	Dryland Ag Irrigated Ag*	20,141.80 63,129.00
Rangeland/Grassland	145,376	Alpine Grass Dominated Alpine Grass/Forb Mix Grass Dominated Grass/Forb Mix Mesic Mountain Shrub Mix Sagebrush Community Sagebrush/Grass Mix Shrub/Grass/Forb Mix Sparse Grass (Blowouts) Sparse PJ/Shrub/Rock Mix SubAlpine Shrub Community Subalpine Grass/Forb Mix Xeric Mountain Shrub Mix	12.09 14,153.31 3,020.41 86,777.15 50.33 14.25 29.10 2,036.88 54.25 2.09 2.50 2,200.80 37,022.44
Forest	253,076	Aspen Aspen/Mesic Mountain Shrub Mix Douglas Fir Douglas Fir/Aspen Mix Englemann Spruce/Fir Mix Limber Pine Lodgepole Pine Lodgepole Pine/Aspen Mix Lodgepole/Spruce/Fir Mix Ponderosa Pine Ponderosa Pine/Aspen Mix Ponderosa Pine/Douglas Fir Mix Ponderosa Pine/Mesic Mtn. Shrub Spruce/Fir/Aspen Mix Spruce/Fir/Lodgepole/Aspen Mix Upland Willow/Shrub Mix Willow	4,668.83 0.52 2,651.44 21.47 11,507.20 1,361.95 73,993.84 3,905.48 20,825.28 85,493.52 3,497.33 14,512.88 26,942.76 190.69 287.49 40.84 3,174.82
Riparian	8,433	Cottonwood Herbaceous Riparian Riparian Shrub Riparian	1,765.76 3,319.75 3,343.45 3.55
Water	9,210	Water	9,209.96
Other	32,628	Commercial Disturbed Soil Residential Rock Snow Soil Talus Slopes & Rock Outcrops Urban/Built Up No Data	111.55 17.45 5,062.90 4,763.26 638.05 92.25 16,700.49 5,235.25 6.84
~Total Watershed Acres			531,993

*Colorado Decision Support Systems Data

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.



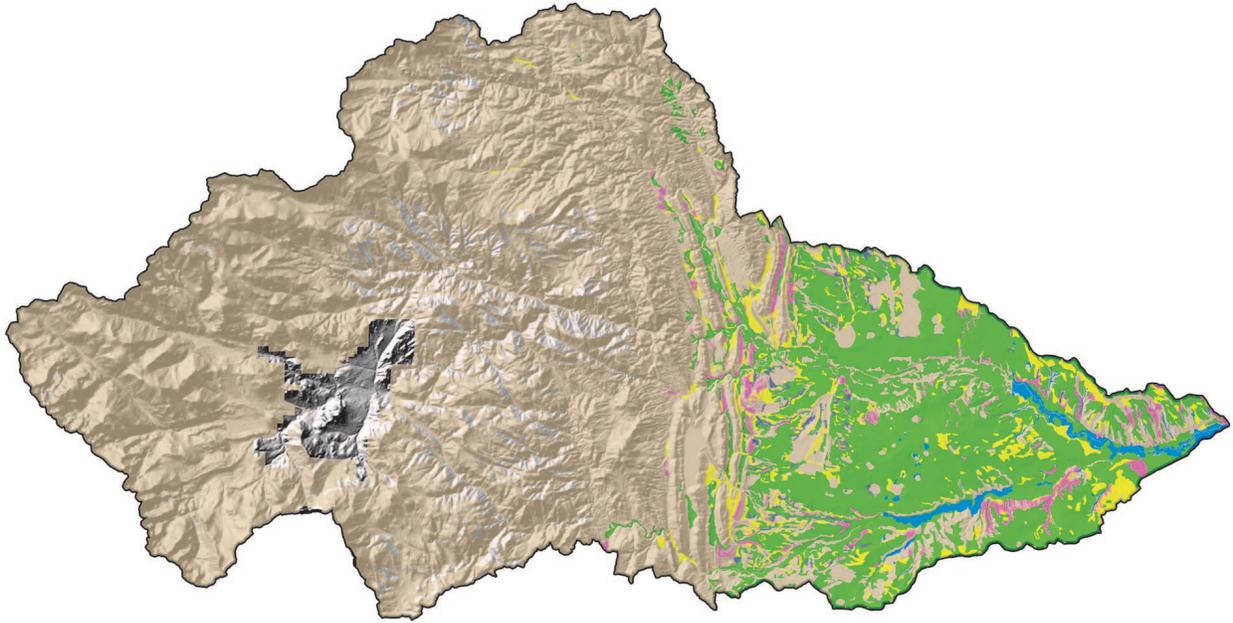
Ecological Sites

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/>.

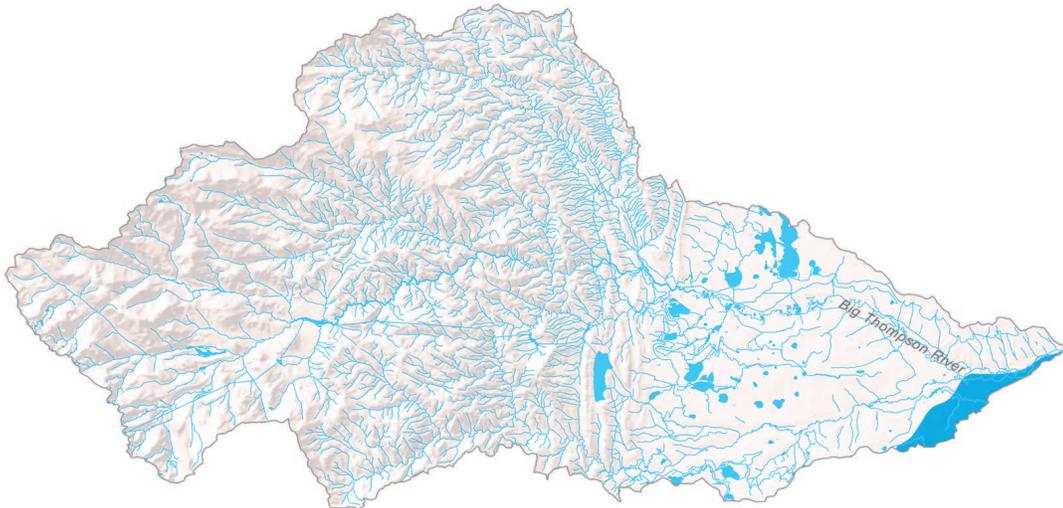
Soil: Ecological Site Name

- ◆ No Data
- ◆ Limber pine/common juniper
- ◆ Lodgepole pine-common juniper
- ◆ Lodgepole pine/elk sedge
- ◆ Lodgepole pine/grouse whortleberry
- ◆ Lodgepole pine/kinnikinnick
- ◆ Ponderosa pine-Rocky Mountain Douglas fir/mountain muhly
- ◆ Ponderosa pine/antelope bitterbrush
- ◆ Ponderosa pine/mountain muhly
- ◆ Subalpine fir-Engelmann's spruce/grouse whortleberry



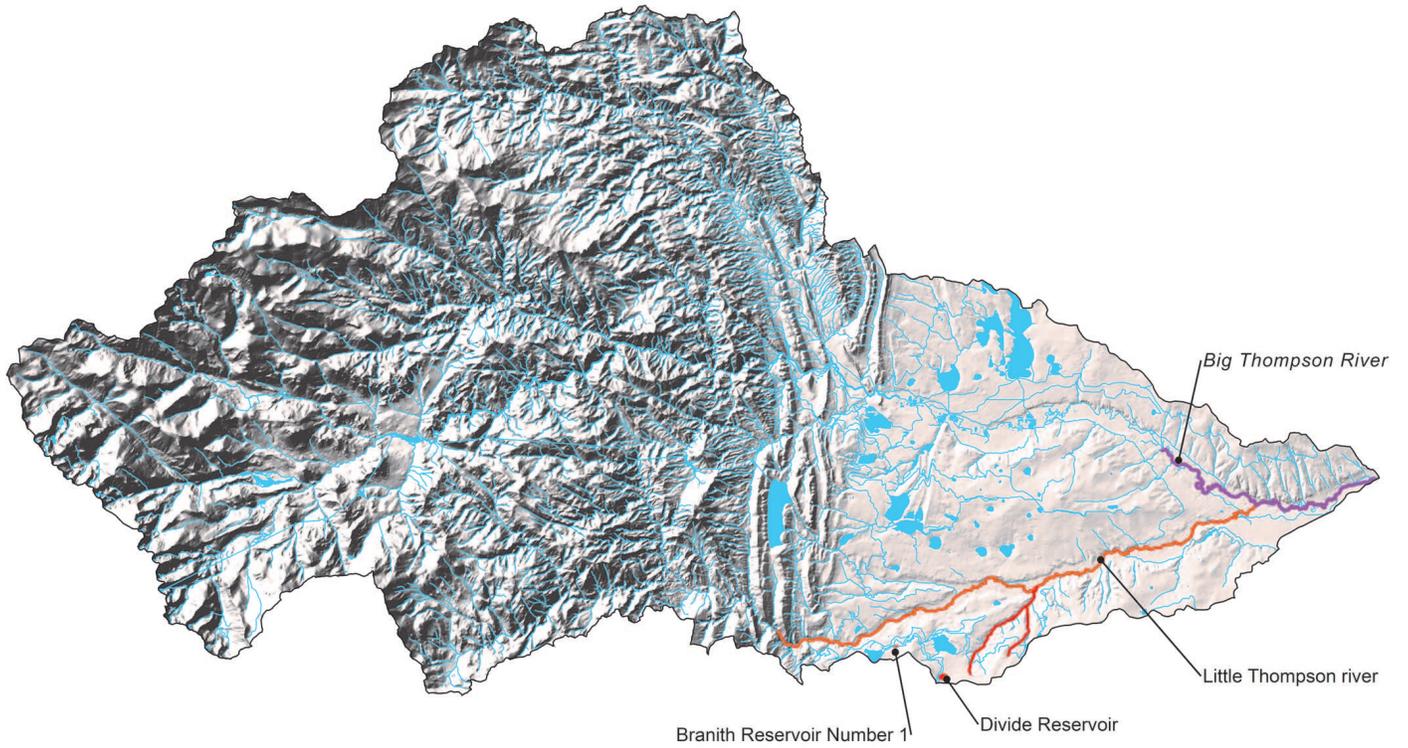
Farmland Classification

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



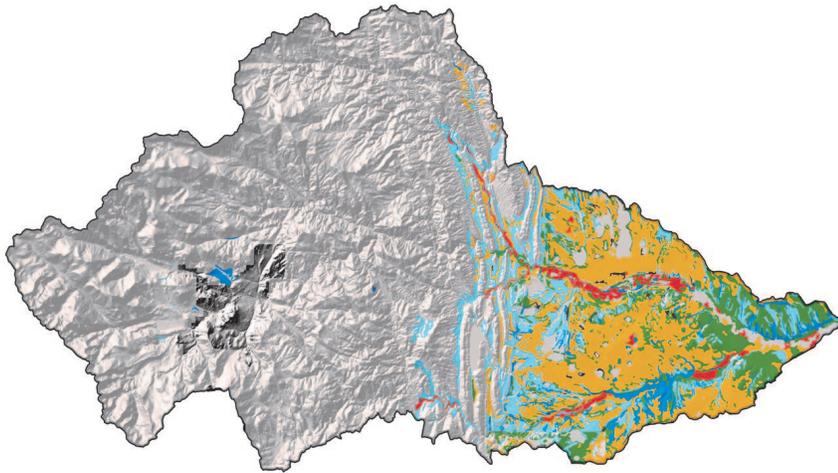
Aquifer

- ◆ Denver Basin aquifer system
- ◆ Rocks that are generally poorly permeable, but locally may contain productive aquifers



303(d) Listed Streams & Waterbodies

- | | | |
|--|---------------|---------------|
| Not Impaired | Ammonia (NH3) | Not Impaired |
| Escherichia Coliform Bacteria (E.Coli) | Selenium (Se) | Selenium (Se) |



Land Capability Class:
Irrigated



Land Capability Classification

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.

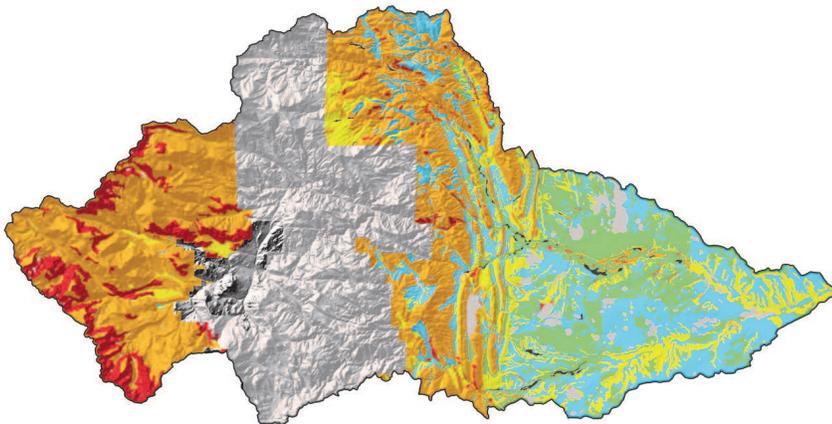
Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

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.



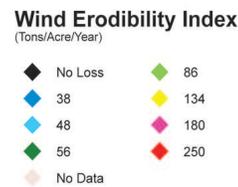
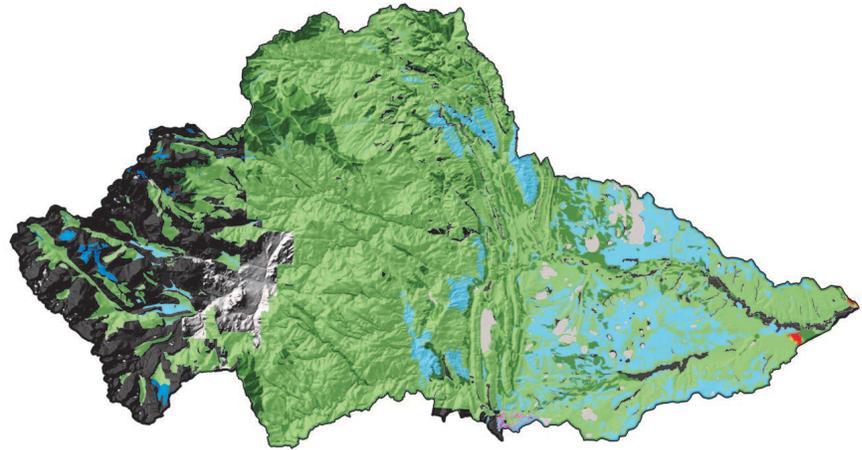
Land Capability Class:
Non Irrigated



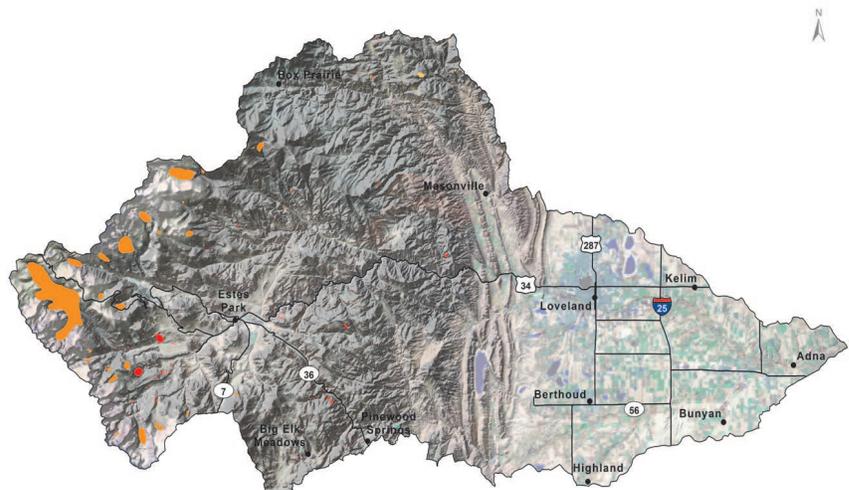
The Wind Erodibility Index (WEI), is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion if it is assumed there is no vegetative cover or management.

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

As shown on the Wind Erodibility Index map, most soils in the Big Thompson Watershed are highly erodible.



This map shows stream locations within the watershed that are listed on the 303d list. 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.



Impairment Definition

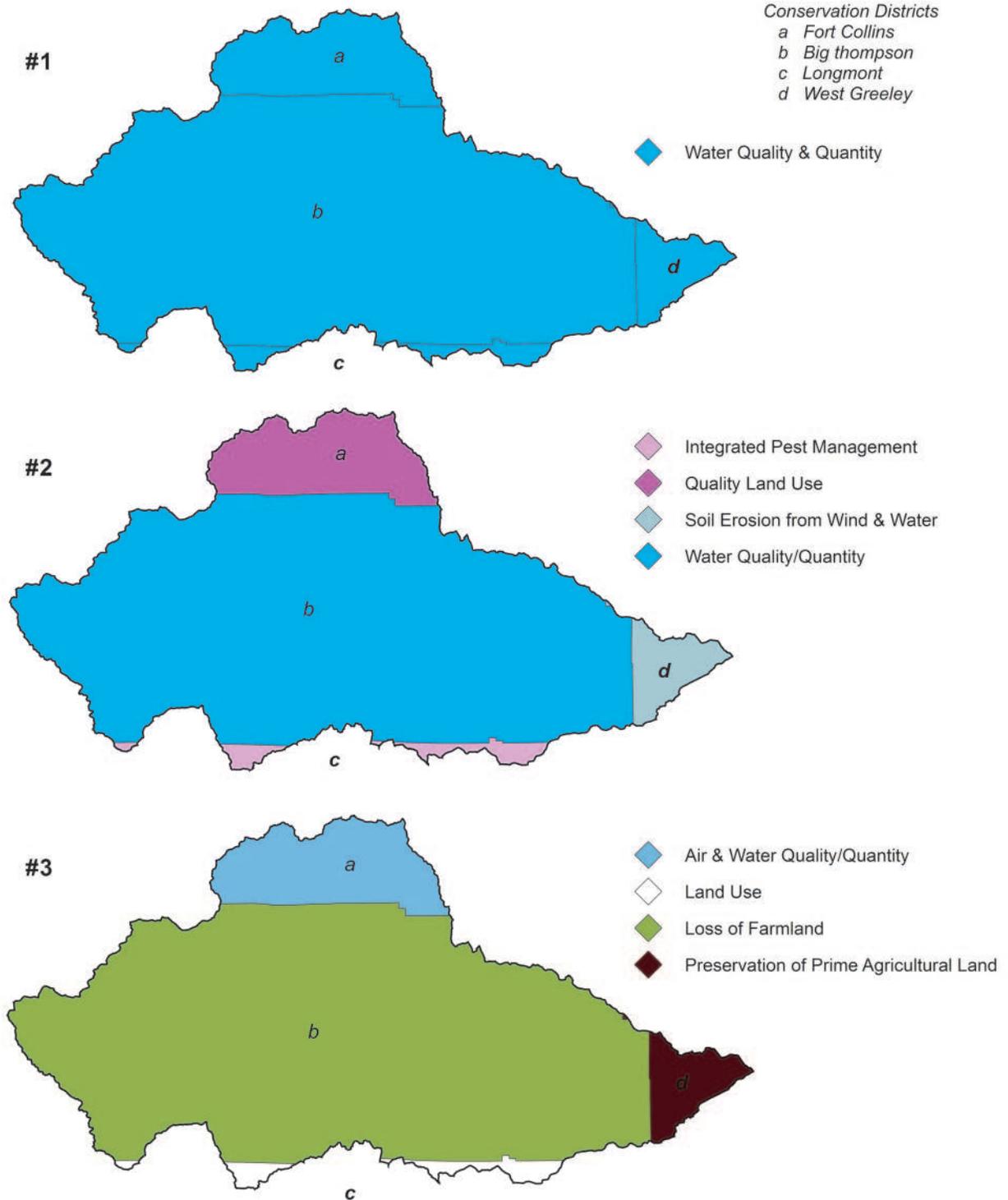
Selenium: A naturally occurring metal in marine shale that serves as a micro-nutrient. Excessive amounts impair aquatic life and bioaccumulation up the food chain occurs causing toxicity to birds, mammals, and humans.

2006 Forest Insect & Disease



Social Data	Boulder	Grand	Larimer	Weld	Yuma
Total population	271,934	12,442	264,807	223,966	9,841
Male	137,790	6,593	133,444	112,848	4,840
Female	134,144	5,849	131,363	111,118	5,001
Median age (years)	35.1	36.9	33.9	31.3	37.3
White	236,466	11,839	243,945	200,942	9,267
Black or African American	1717	60	1636	754	11
American Indian and Alaska Native	1878	54	1077	1465	28
Asian	9791	85	4451	2427	7
Native Hawaiian and Other Pacific Islander	90	12	201	117	2
Some other race	15266	249	5934	14814	407
Hispanic or Latino (of any race)	34940	543	25319	62792	1268
In labor force (population 16 years and over)	156,309	7,768	154,222	120,817	4,919
Median household income (dollars)	57,502	47,759	48,686	48,763	33,169
Median family income (dollars)	77,766	55,217	64,088	57,009	39,814
Per capita income (dollars)	34,156	25,198	26,963	21,981	16,005
Families below poverty level	x	172	x	x	235
Individuals below poverty level	x	901	x	x	1244
X means that value is not applicable or not available					
Farms (number)	736	173	1564	3121	864
Land in farms/ranches (acres)	107,629	219,598	521,599	1,812,167	1,351,010
Average size farm/ranch (acres)	146	1,269	334	581	1,567
Median size farm (acres)	38	350	40	158	1,000
Average age of farmer or rancher	56.2	54.8	52.9	53.5	52.7
Net cash return from ag sales (\$1,000)	4,717	-1,467	124	67,959	58,023
Cattle and calves (number)	11,000	18,000	40,000	505,000	250,000

Identified Long Range Resource Concerns Top Three Concerns within Conservation Districts



Selected Conservation Application Data		Big Thompson Watershed – 10190006			
	FY 2004	FY 2005	FY 2006	FY 2007	Total
Total Conservation Systems Planned (Acres)	NA	12,851	7,089	1,375	34,647
Total Conservation Systems Applied (Acres)	NA	10,664	4,541	3,383	31,640
Practices Applied					
Prescribed Grazing	6,537	9,218	1,422	43	26,399
Irrigation Water Management	1,322	640	646	1,795	4,403
Conservation Crop Rotation	1,078	481	1,864	547	3,970
Residue Management	2,637	835	208	32	4,743

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..			Based on Conservation System Guide Code: CO 48A.1-GR-01-R-Grazing
	Practices	Unit	Quantity	Cost/Unit (\$)
Prescribed Grazing				
Fence (382)	Ft.	20,000	0.6	12,000
Pest Management (595)	Ac.	400	6,000	6,000
Pipeline (516)	Ft.	8,000	2.40	19,200
Upland Wildlife Habitat Management (645)	Ac.	na	na	
Watering Facility (614)	No.	3	600	1,800
Subtotal: Rangeland costs	Median Size Ranch— 2,500 acres	24	39,000	\$936,000

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

Primary Resource Concern: Water Quality				
Conservation System Description:		Upgrading Sprinkler irrigation system with IWM, Crop rotation, Nutrient and Pest Mgt.		Reference Conservation System Guide Code: CO 67B.1-CR-Pivot-R-1.1
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Irrigation Water Management (449)* * includes re-bowl, renozzle, and IWM	Ac	15,000	34.20	513,000
Nutrient Management (590)	Ac	20,000	15	300,000
Pest Management (595)	Ac	20,000	15	300,000
Conservation System Description:		Irrigation converted to sprinkler system. Sprinkler/micro irrigation system with IWM, Crop rotation, Nutrient and Pest Mgt.		Reference Conservation System Guide Code: CO 67B.1-CR-Pivot
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Irrigation System, Sprinkler (442)	Ac	25,000	600	15,000,000
Irrigation Water Management (449)	Ac	30,000	5	150,000
Nutrient Management (590)	Ac	15,000	11.5	175,500
Pest Management (595)	Ac	25,000	15	375,000
Subtotal Irrigated Crops:				\$16,813,500

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

Landuse	Resource	Measurable Effects	Non-measurable Effects	Cost (\$)
Rangeland	Plants		Improved plant condition, productivity, health and vigor. Grazing animals have adequate feed, forage, and shelter.	936,000
Irrigated Crop	Soil		Cropland sustainability	16,813,500
Total Costs				\$17,749,500

FOOTNOTES/ BIBLIOGRAPHY

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/100293wqlimitedsegmdls.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>.

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

Weld County S (CO618) Published 12/14/2005	Boulder County Area (CO643) Published 12/21/2006
Larimer County Area (CO644) Published 01/15/2008	RooseveltArapahoeRoutt (CO645) Published 02/04/2008
RockyMtnNatPark (CO651) Published 01/08/2007	

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>.