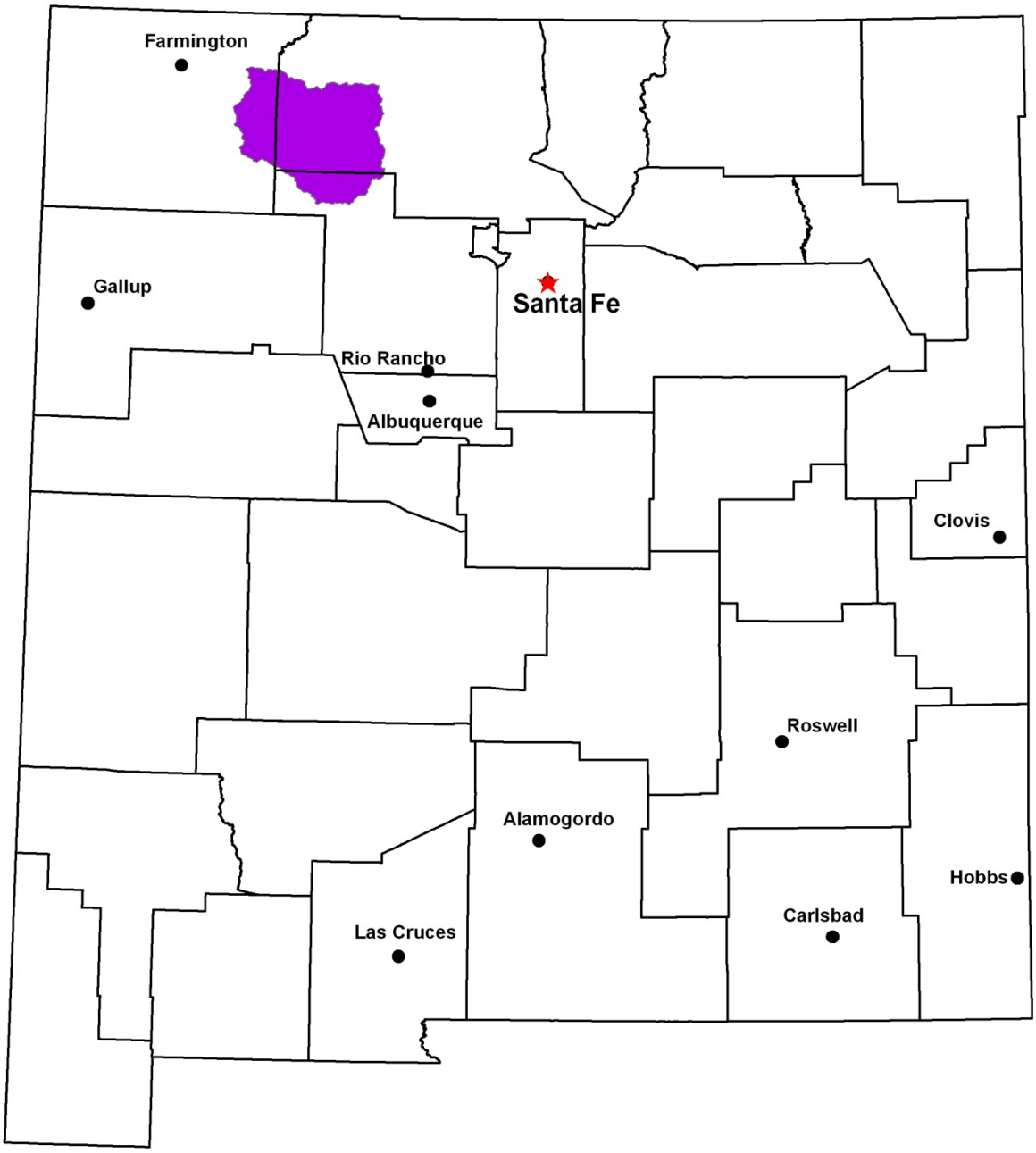
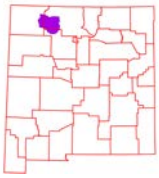
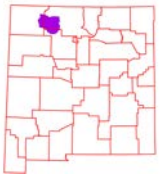


Rapid **W**atershed **A**ssessment
Blanco Canyon Watershed





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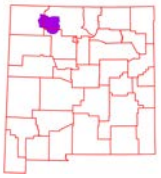

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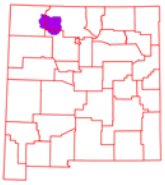

Overview

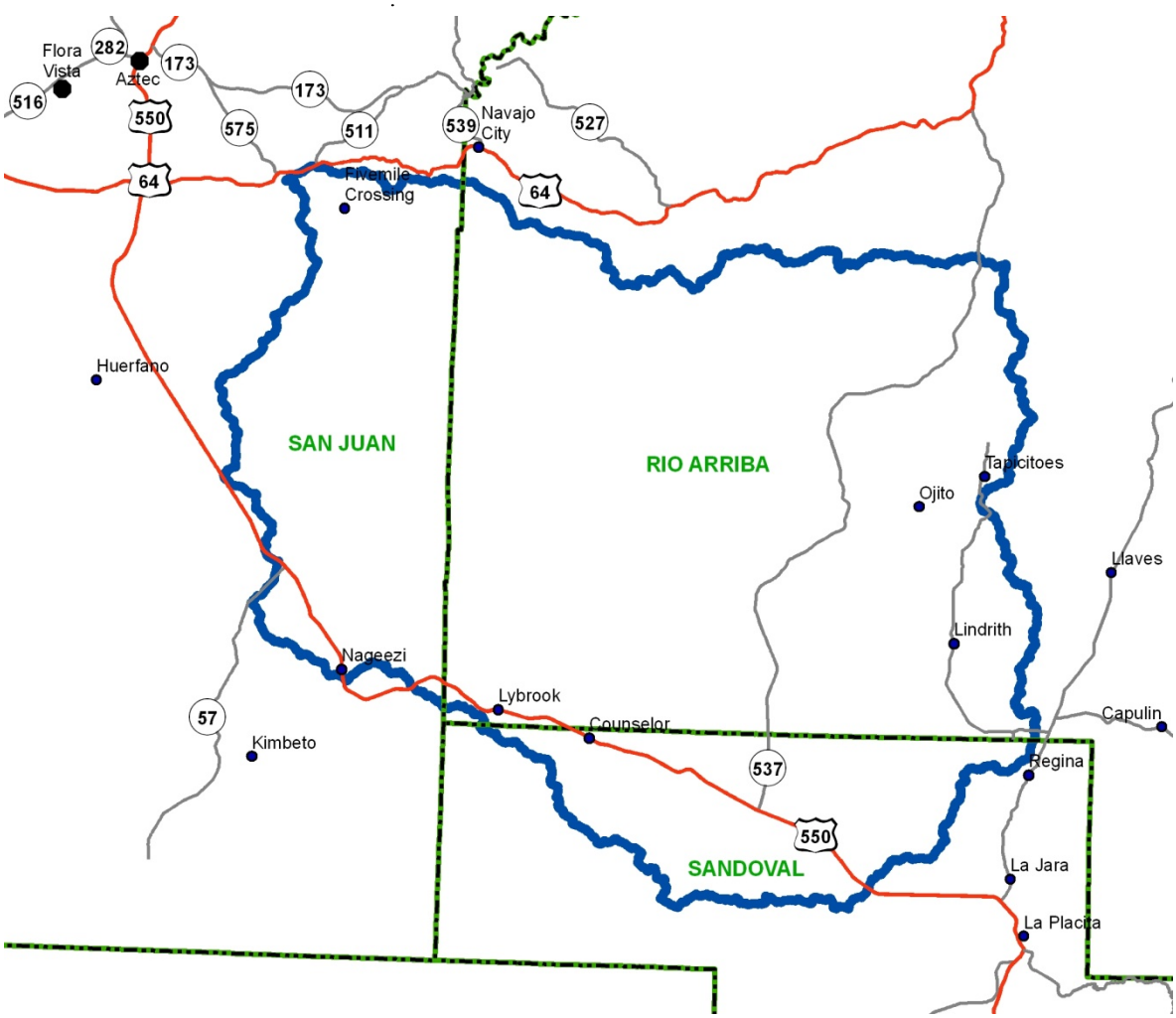

Figure 1. Blanco Canyon Watershed Overview

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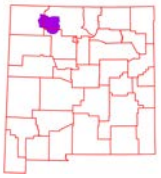
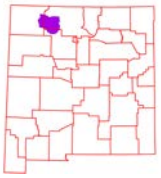


Overview

The Blanco Canyon Watershed is located in northwestern New Mexico, and northeastern Arizona, just south of the Four Corners area. It covers 2,931,265 total acres (11,862 sq. km). The counties it covers are Apache county in Arizona, and San Juan, McKinley, Sandoval, and Rio Arriba counties in New Mexico. Table 1 summarizes the distribution of the Blanco Canyon watershed.

Table 1. Blanco Canyon watershed acreage distribution.

	County Acres Total	Acres in HUC	% of HUC in County	% of County in HUC
Rio Arriba	**3,772,816**	**704,989**	**64**	**19**
Sandoval	**2,377,011**	**156,583**	**14**	**7**
San Juan	**3,549,586**	**235,668**	**21**	**7**
Sum (∑)	**--**	**1,097,240**	**100**	



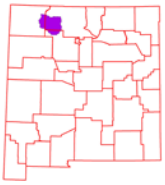
Physical Setting

Geology[1]:

The watershed starts in the San Juan Mountains of southwestern Colorado and proceeds southward toward New Mexico. The San Juan Basin lies on the Colorado Plateau. Several formations of Tertiary and Cretaceous age compose the consolidated geology of the San Juan River basin. The predominant geologic formation in New Mexico is the Nacimiento Formation of Tertiary age which underlies the soils and crops out along nearly all of the reach of the San Juan River valley east of Farmington. The Cretaceous Kirtland and Fruitland Formation and the Mancos Shale layers underlie the soils and crop out west of the Hogback. These two formations underlie tile soils and compose the outcrop in most of the upland area south of the San Juan River. Near Farmington, Cretaceous rocks rise sharply in some areas, forming hogback ridges. All of the shales of Cretaceous age consist at least in part of gray arid black shale. The San Juan River valley is composed in part of Quaternary unconsolidated sand, gravel, silt, clay, and terrace gravel and boulder deposits. Valley soils typically are derived from sandstone, shale, siltstone, and mudstone and range in permeability from moderately rapid to moderately slow.

Resource concerns are high sediment erosion and water runoff. In addition the lowering of valleys by river incision is a continuing process. Many valleys are flanked by terraces. Rivers respond by aggrading during climates that promote large sediment yield and large, stable discharges; and incise during climates that produce flashy flows and reduce the sediment supply. This can be exasperated by the mining of sand and gravel from the river channels.

Groundwater quality and quantity is a concern. Groundwater occurs to a greater or lesser extent in all of these geologic units. Depth to groundwater is a concern if the shallow unconfined aquifer does not produce enough water for the resource or increased population demands are ‘mining’ the water. Groundwater in the igneous rocks and volcanics is usually along fracture zones which are hard to intercept with water wells. Groundwater quality ranges from good to poor for livestock or crops.



Soils:

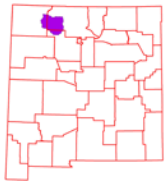
Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.
The soils in the Blanco Canyon are assigned to four groups (A, B, C, and D). Soils on National Forest lands are not mapped at this time.


Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.


Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.



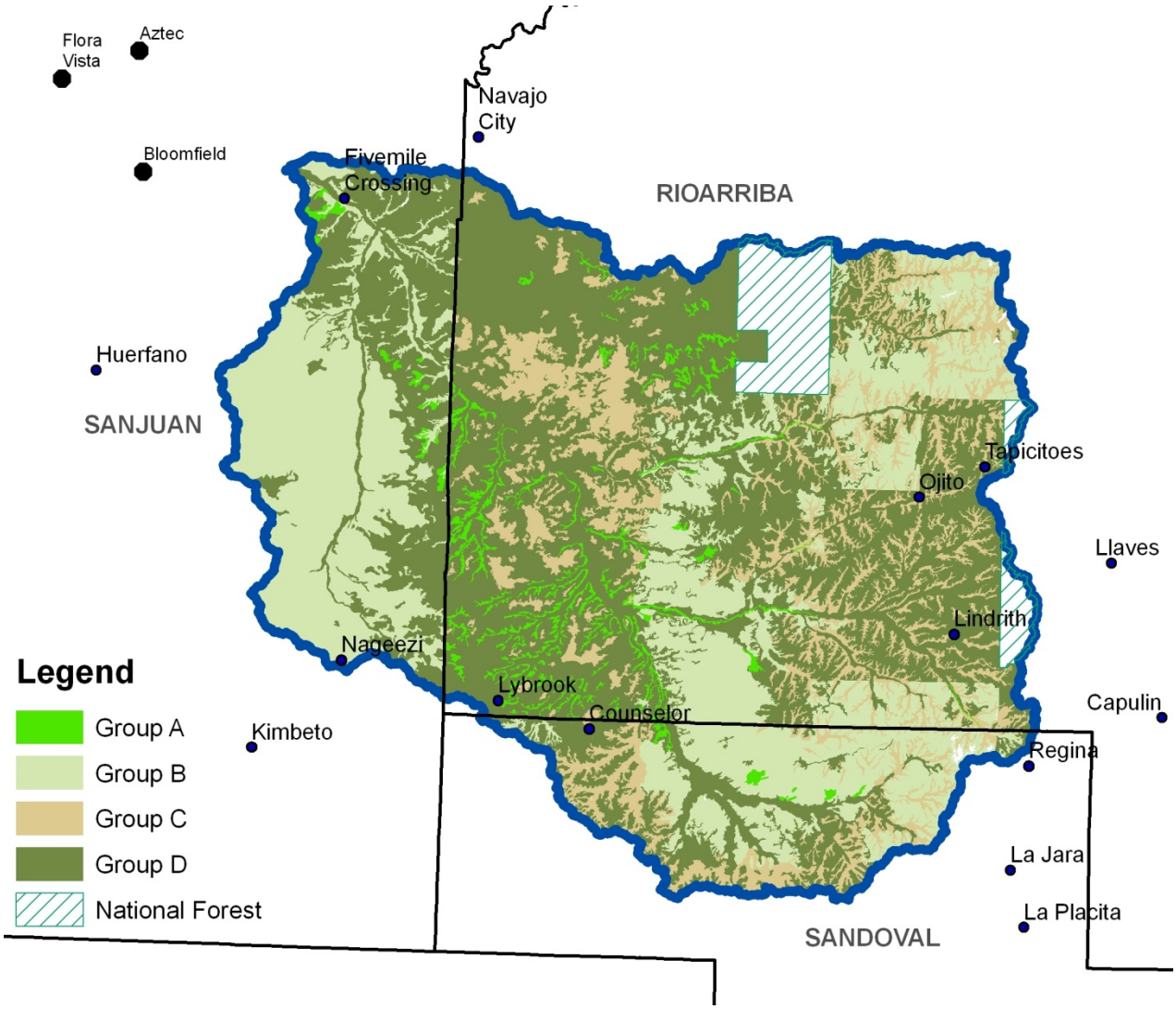


Figure 2. Hydrologic Soil Groups

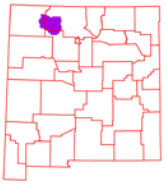
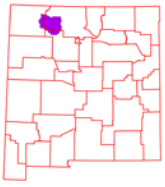


Figure 3. Blanco Canyon Watershed Shaded Relief



Precipitation [2]

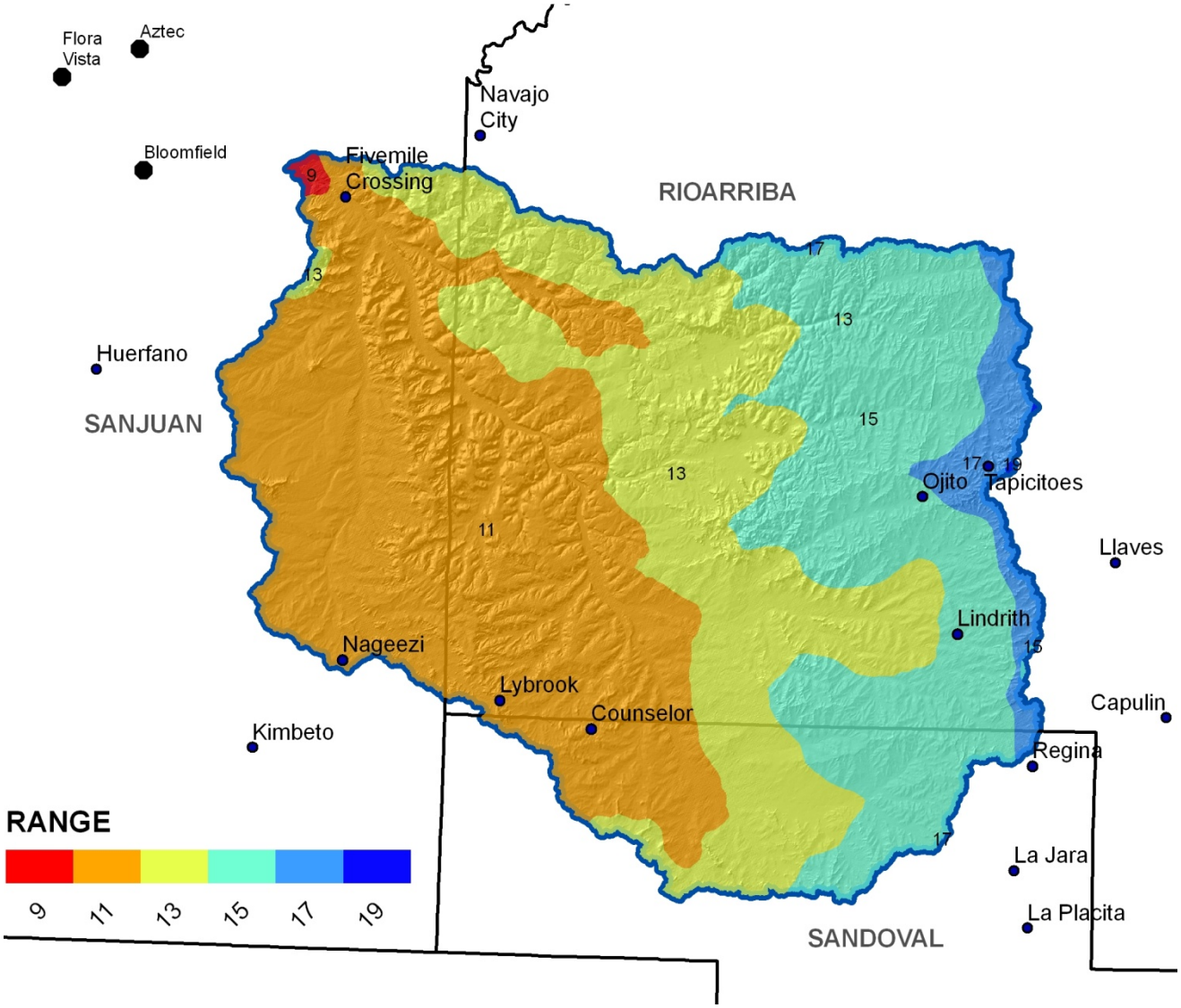
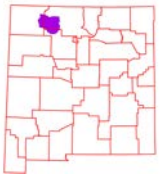


Figure 4. Blanco Canyon Watershed Annual Precipitation.



Land Ownership [3]

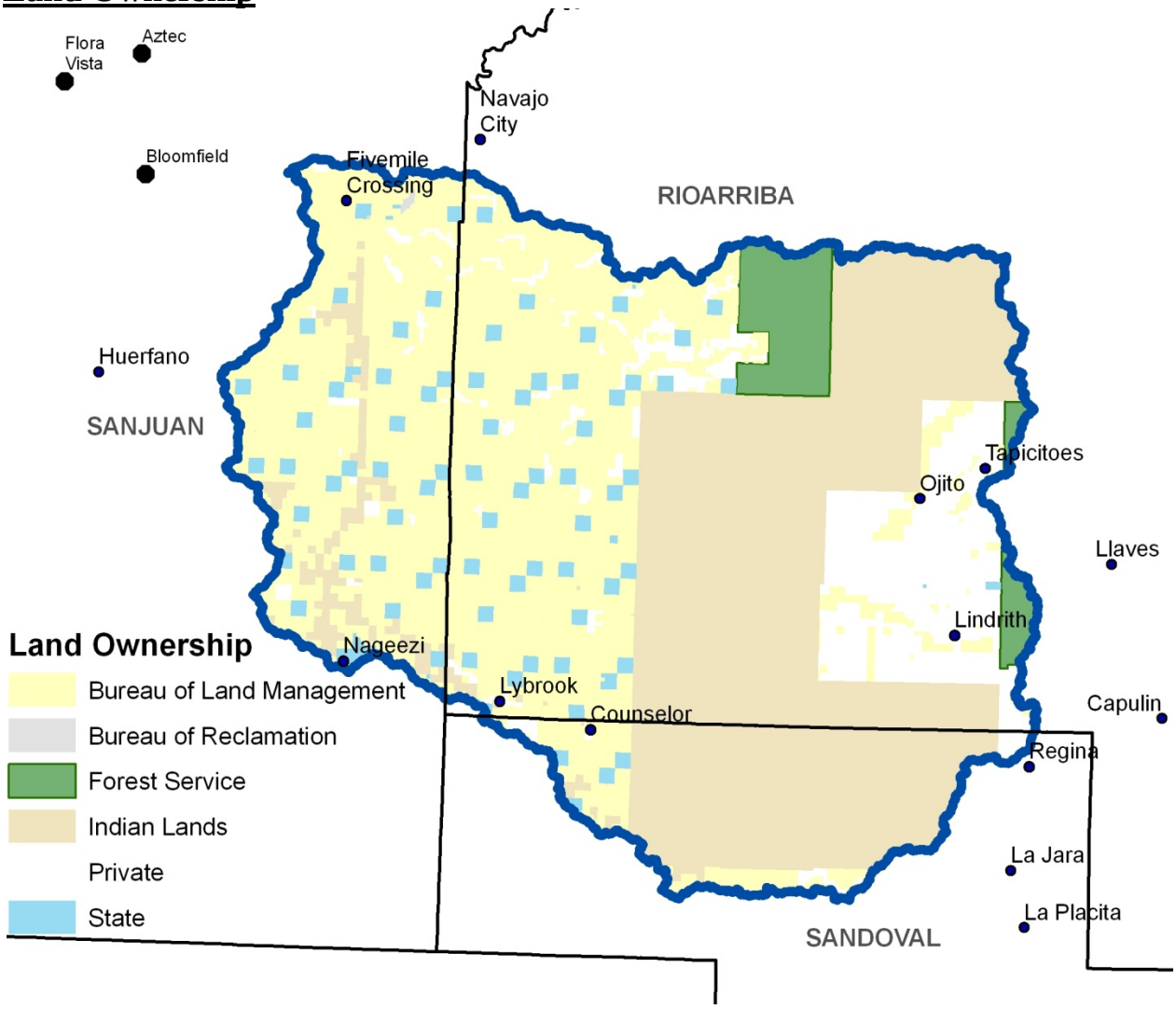
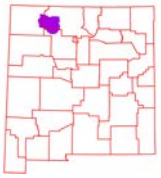


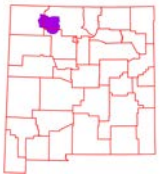
Figure 5. Blanco Canyon Watershed Land Ownership



Land Ownership

COUNTY	BLM	BOR	Forest Service	Indian Lands	Private	State
Rio Arriba	240,576		43,848	277,612	116,334	26,618
San Juan	181,693	499		24,439	6,427	22,610
Sandoval	27,389			121,494	5,250	2,450
Watershed (∑)	449,658	499	43,848	423,545	128,011	51,678
% Watershed	41	<1	4	39	12	5

Table 2. Land ownership in the Blanco Canyon watershed.



Land Use / Land Cover [4,5]

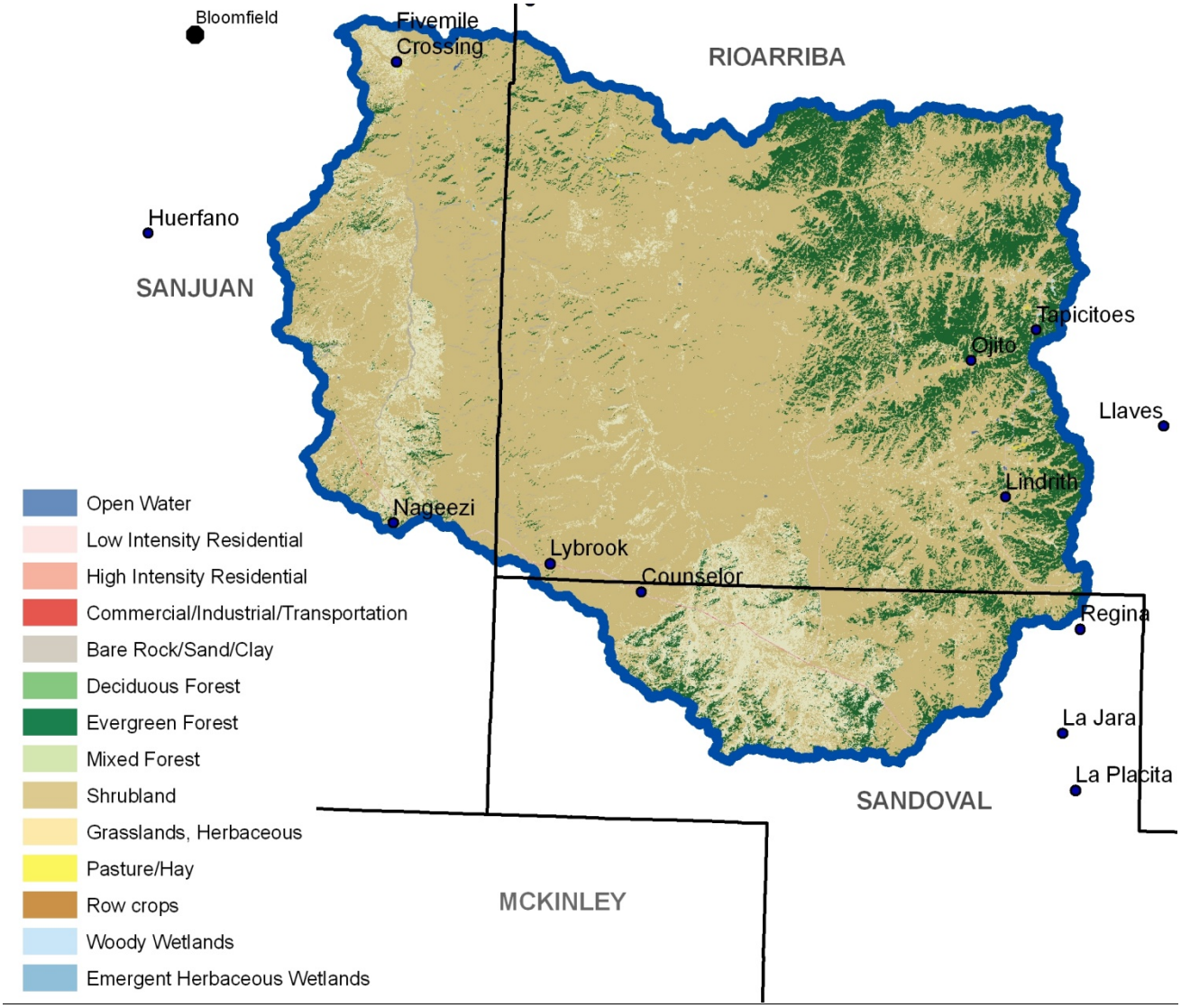
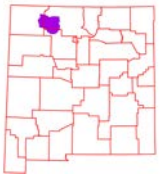


Figure 6. Subset of the National Land Cover Dataset in the Blanco Canyon Watershed.

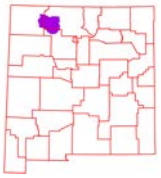


Land Use / Land Cover

The U.S. Geological Survey (USGS) produced the National Land Cover Dataset (NLCD) as part of a cooperative project between the USGS and the U.S. Environmental Protection Agency (USEPA). The goal of this project was to produce a consistent land cover data layer for the conterminous United States. The Multiresolution Land Characterization (MRLC) Consortium collected the data used to compile the NLCD. The MRLC Consortium is a partnership of Federal agencies that produce or use land cover data; partners include the UNITED STATES GEOLOGICAL SURVEY (National Mapping, Biological Resources, and Water Resources Divisions), USEPA, the U.S. Forest Service, and the National Oceanic and Atmospheric Administration.

Land use / Land cover	Acres	% of Watershed
Shrubland	808,678	74
Evergreen Forest	166,825	15
Grasslands, Herbaceous	109,496	10
Bare Rock/Sand/Clay	5,769	1
Low Intensity Residential	2,920	< 1%
Woody Wetlands	1,477	< 1%
High Intensity Residential	903	< 1%
Pasture/Hay	601	< 1%
Open Water	311	< 1%
Emergent Herbaceous Wetlands	140	< 1%

Table 3. Extent of NLCD classes in the Blanco Canyon watershed.



Land Use / Land Cover

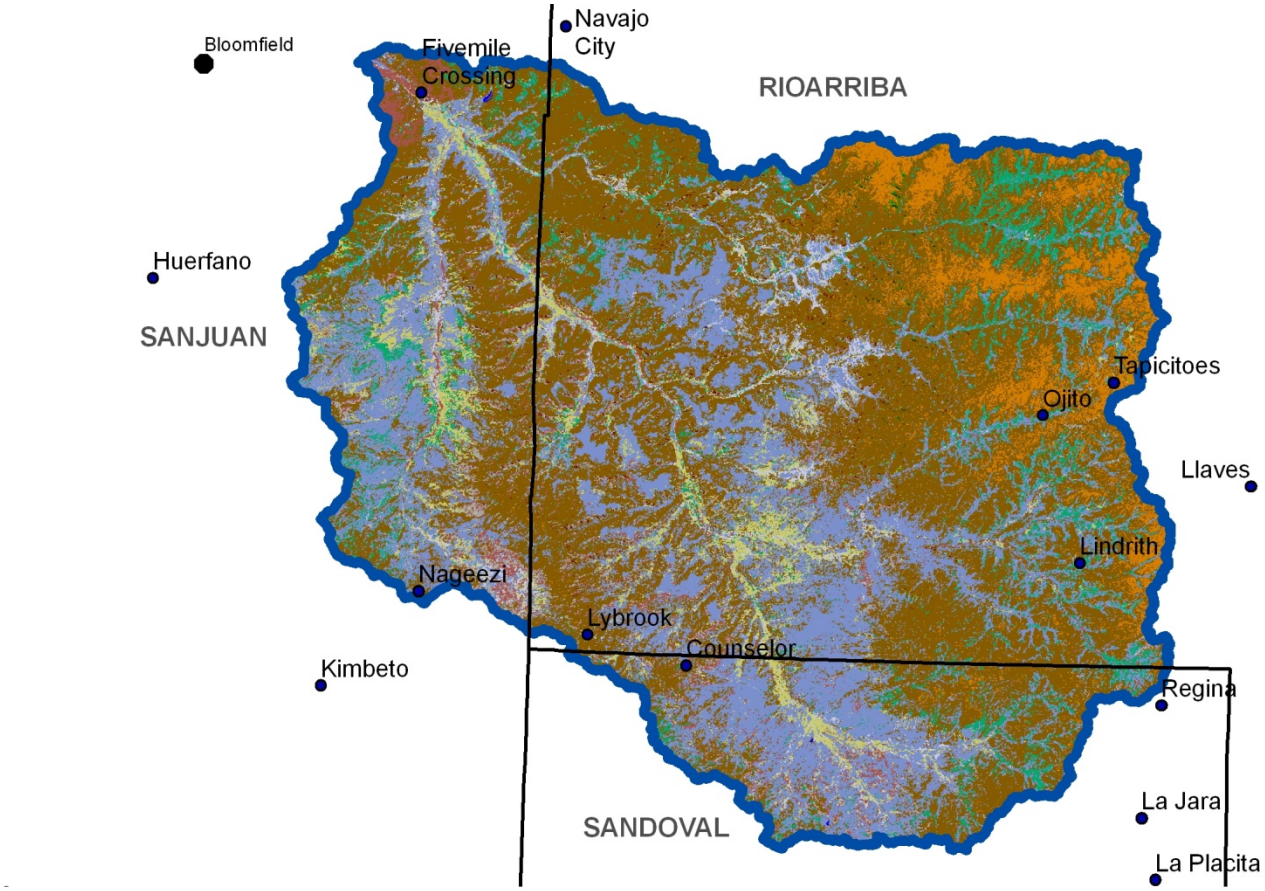
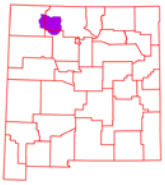


Figure 7. Subset of the SWREGAP over the Blanco Canyon Watershed.

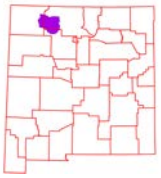


Land Use / Land Cover

The landcover mapping effort for the Southwest Region Gap Analysis Project was a coordinated multi-institution endeavor. This dataset was created for regional terrestrial biodiversity assessment. Additional objectives were to establish a coordinated mapping approach to create detailed, seamless maps of land cover, all native terrestrial vertebrate species, land stewardship, and management status, and to analyze this information to identify those biotic elements that are underrepresented on lands managed for their long term conservation.

Ecosystem	Acres	% of Watershed
Colorado Plateau Pinyon-Juniper Woodland	533,316	49
Inter-Mountain Basins Semi-Desert Shrub Steppe	295,367	27
Inter-Mountain Basins Big Sagebrush Shrubland	64,829	6
Rocky Mountain Ponderosa Pine Woodland	57,958	5
Inter-Mountain Basins Semi-Desert Grassland	51,978	5
Inter-Mountain Basins Shale Badland	32,567	3
Inter-Mountain Basins Active and Stabilized Dune	28,043	3
Inter-Mountain Basins Greasewood Flat	19,210	2
Southern Rocky Mountain Pinyon-Juniper Woodland	4,403	<1
Inter-Mountain Basins Mixed Salt Desert Scrub	4,282	<1
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	1,603	<1
Inter-Mountain Basins Juniper Savanna	744	<1
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	740	<1
Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland	593	<1
Colorado Plateau Mixed Low Sagebrush Shrubland	388	<1

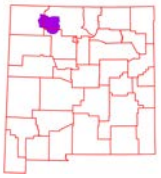
Table 4. SW Region Gap analysis ecosystem acreages.



Hydrology [6, 7, 8, 9, 10]

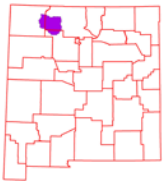
The National Hydrography Dataset (NHD) is a comprehensive set of data that encodes information about naturally occurring and constructed bodies of water, paths through which water flows, and related entities. The NHD identifies 5,138 miles (8,269 km) of water courses in the Blanco Canyon River Watershed. The majority of these courses typically flow intermittently in summer months during periods associated with high intensity convective thunderstorms.

Figure 8. National Hydrologic Dataset (NHD) of the Blanco Canyon.



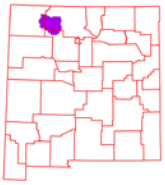
Water Course Type	Miles
Artificial path	257
Canal / Ditch	3
Pipeline	4
Intermittent Stream / River	4,874
Sum (∑)	5,138

Table 5. NHD Water Course Type and Extents



There is 1 dam and 1 water gauging station in the watershed. USGS Site 09356565 is near the northwest end of the watershed on Canon Largo near Blanco, NM. During the period 1978–1981, this site has had mean annual discharge of 17.015 cubic feet per second ranging from 4.78 (1978) to 49.1(1979) cubic feet per second.

Figure 9. Gauging Stations in the Blanco Canyon Watershed

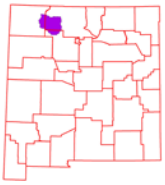


Hydrology

The New Mexico Water Quality Control Commission (NMWQCC) is the issuing agency of water quality standards for interstate and intrastate waters in New Mexico. The NMWQCC has defined the Blanco Canyon watershed as part of the San Juan River Basin.

Under section 303(d) of the Clean Water Act, states, territories, and authorized tribes, are required to develop lists of impaired waters. These are waters for which technology-based regulations and other required controls are not stringent enough to meet the water quality standards set by states. The law requires that states establish priority rankings for waters on the lists and develop Total Maximum Daily Loads (TMDLs), for these waters. A TMDL is a calculation of the maximum amount of a pollutant a water body can receive and still safely meet water quality standards.

The Blanco Canyon watershed has no reaches listed as 303 (d) Impaired Surface Waters.



Hydrology

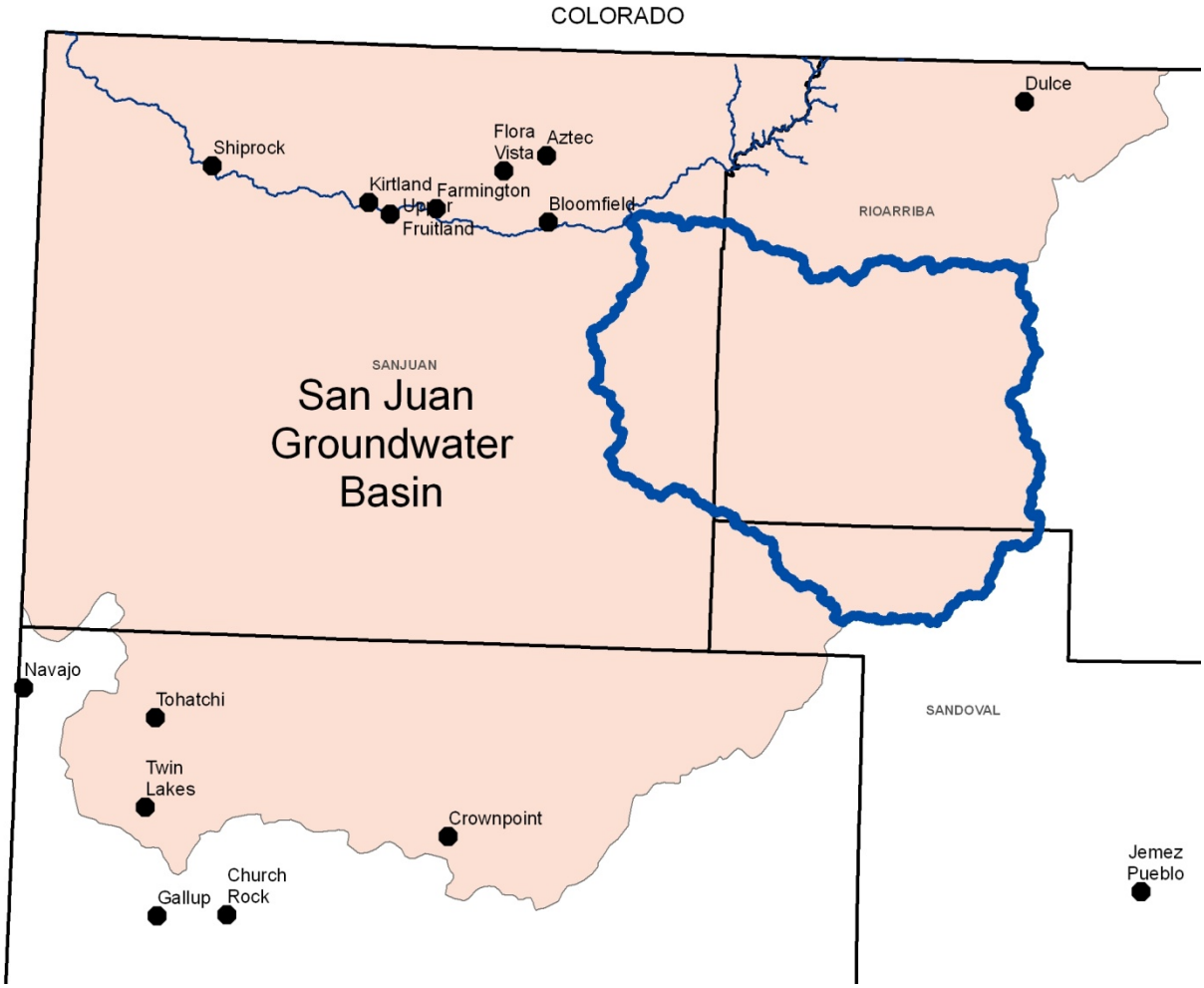
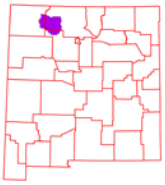


Figure 10. Declared Groundwater Basins of the Blanco Canyon.

A declared groundwater basin is an area of the state proclaimed by the State Engineer to be underlain by a groundwater source having reasonably ascertainable boundaries. By such proclamation the State Engineer assumes jurisdiction over the appropriation and use of groundwater from the source. The New Mexico portion of the Blanco Canyon watershed is completely within the San Juan Underground Water Basin.



Threatened and Endangered Species [11]

Endangered species are those that are at risk of extinction throughout all or a significant portion of its native range. A threatened species is one that is likely to become endangered in the foreseeable future. The New Mexico Natural Heritage program tracks the status of threatened and endangered species which are listed on both federal and state lists. Table 6 lists those species which are currently listed and tracked in the Blanco Canyon River Watershed.

Common Name	Scientific Name	Tax.Class	Family	Fed Status	State Status
Roundtail Chub	*Gila robusta*	Actinopterygii	Cyprinidae		E
Mexican Spotted Owl	*Strix occidentalis lucida*	Aves	Strigidae	LT	

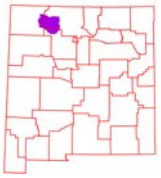
Table 6. Threatened and Endangered Plant and Animal Species.

Invasive Species [12]

Invasive species are those which have been introduced into a region or ecosystem and have the ability to out-compete native species for resources (i.e. water, nutrients, sunlight, etc.) The Southwest Exotic Plant Mapping Program (SWEMP) is a collaborative effort between the United States Geological Survey and federal, tribal, state, county and non-government organization partners in the southwest which maintains ongoing efforts to compile and distribute regional data on the occurrence of non-native invasive plants in the southwestern United States. Within the Blanco Canyon watershed, the SWEMP has identified 10 species of invasive plants (Table 7). Each of these species is defined as non-native by the USDA PLANTS database.

Scientific Name	Common Name
Zygophyllaceae (Caltrop Family)	African Rue
Scrophulariaceae (Figwort Family)	Dalmation Toadflax
Brassicaceae (Mustard Family)	Hoary Cress (Whitetop)
Brassicaceae (Mustard Family)	Perennial Pepperweed (Tall Whitetop)
Euphorbiaceae (Spurge Family)	Leafy Spurge
Asteraceae (Sunflower Family)	Musk Thistle
Asteraceae (Sunflower Family)	Russian Knapweed
Asteraceae (Sunflower Family)	Spotted Knapweed
Asteraceae (Sunflower Family)	Yellow Starthistle
Scrophulariaceae (Figwort Family)	Yellow Toadflax

Table 7. Invasive Species Recognized by the SWEMP.



Common Resource Areas[13]

A Common Resource Area (CRA) is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) designation. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area.

Each Common Resource Area will have multiple Conservation System Guides associated with it. A Conservation System Guide associates, for a given CRA and land use, different components of Resource Management Systems and their individual effect on conserving soil and water resources.

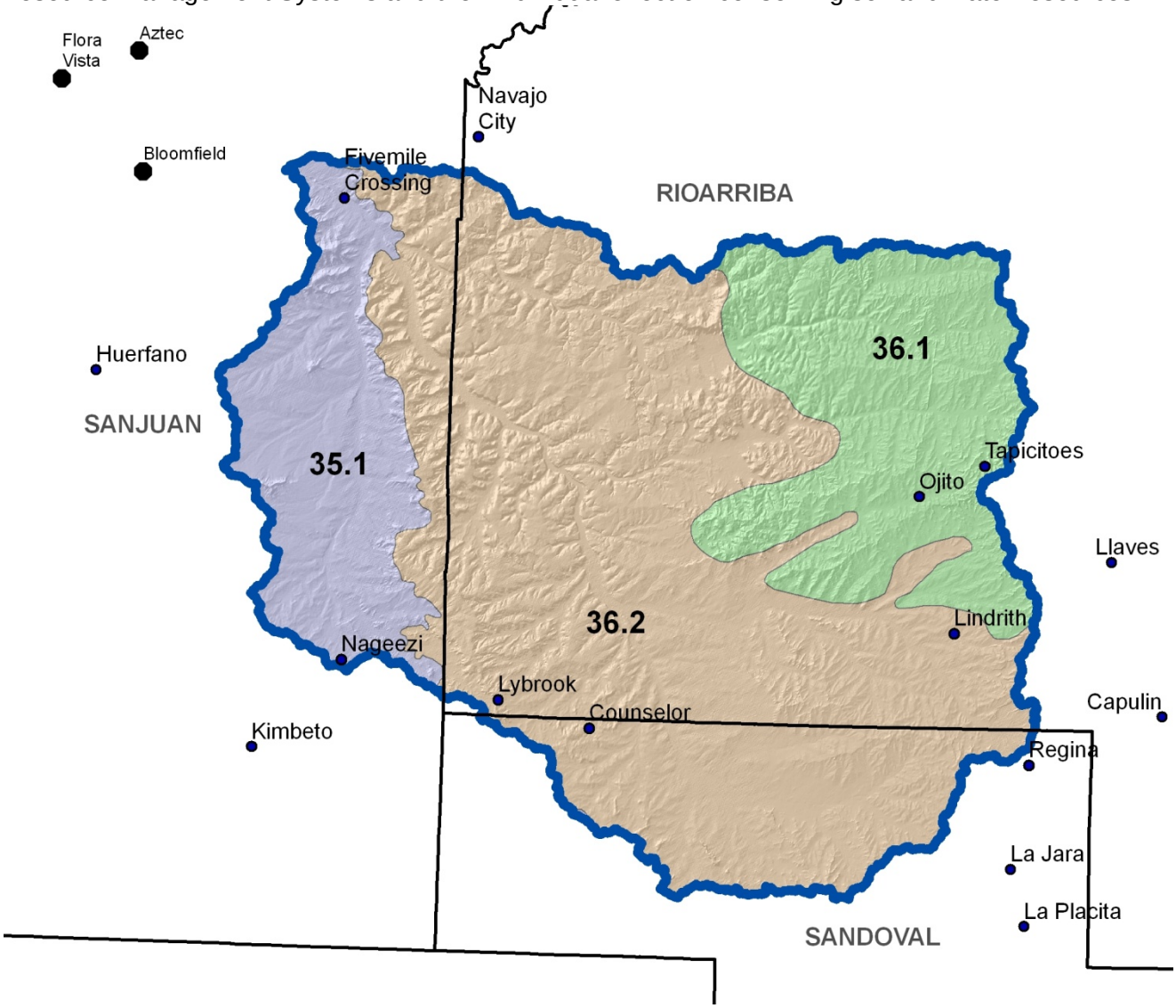
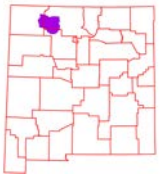


Figure 11. Common Resource Areas of Blanco Canyon.



Common Resource Areas

35.1 - Colorado Plateau Mixed Grass Plains

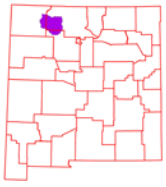
This unit occurs within the Colorado Plateau Physiographic Province and is characterized by flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Volcanic fields occur in places. Elevations range from 5100 to 6000 feet. Precipitation averages 10 to 14 inches per year. The soil temperature regime is mesic. The soil moisture regime is ustic aridic. Vegetation includes Stipa, Indian ricegrass, galleta, blue grama, fourwing saltbush, and scattered juniper.

36.1 – Southwest Plateaus, Mesas, and Foothills – Cool Subhumid Mesas and Foothills

This area encompasses the higher elevation mesas and foothills that represent a transition to the Southern Rocky Mountains. The temperature regime is frigid, and the moisture regime is ustic. The typical vegetation is big sagebrush, Gambel oak, and ponderosa pine. Land use is mainly forest and grazing land.

36.2 – Southwest Plateaus, Mesas, and Foothills – Warm Semiarid Mesas and Plateaus

This area encompasses the lower elevation mesas and plateaus. The temperature regime is mesic and the moisture regime is transitional from ustic to aridic. Vegetation is typically twoneedle pinyon, Utah juniper, and big sagebrush. Cropland is a significant land use in parts of this area, particularly on soils formed in thick deposits of eolian material. Precipitation ranges from 10 to about 16 inches. Elevations range from about 6,000 to 7,000 feet.



Conservation [14]

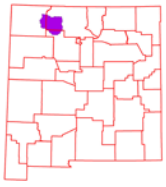
The USDA-Natural Resources Conservation Service (NRCS) focuses on the development and delivery of high quality products and services that enable people to be good stewards of our Nation's soil, water, and related natural related resources on non-Federal lands. The Natural Resources Conservation Service's conservation programs aid agricultural producers in their efforts to reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity and environmental quality while supporting continued economic development, recreation, and scenic beauty.

Conservation Practice	2007		2008		2009		2010		2011		TOTAL	
	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres
Brush Management	2	750	4	10271	6	336	9	1508	9	538	30	13403
Prescribed Grazing	4	6644	4	10835							8	17479
Range Planting	1	110			3	227			1	10	5	347
Upland Wildlife Habitat Management	5	7283									5	7283
SUM (∑)	12	14787	8	21106	9	563	9	1508	10	548	48	38512

Table 8. 5 year Trends in Applied Conservation Practices. Reported in Acres.

Conservation Practice	2007		2008		2009		2010		2011		TOTAL	
	#	Feet	#	Feet	#	Feet	#	Feet	#	Feet	#	Feet
Fence					2	9060			2	12946	4	22006
Pipeline			1	2600	1	1190					2	3790
Pond					1		3				4	
Pumping Plant	4		1				1				6	
Water Well	4		3								7	
Watering Facility	4		5				2				9	
SUM (∑)	12		10		4		6		2		34	

Table 9. 5 Year Trends in Location Specific Applied Conservation Practices. Reported in Feet if Linear (i.e. Fence).



Soil Resource Inventory [15]

The Blanco Canyon Watershed has a number of certified National Cooperative Soil Survey (NCSS) inventories. Soils data is available from the NRCS Soil Data Mart at http://soildatamart.nrcs.usda.gov/ and/or the NRCS Geospatial Data Gateway at http://datagateway.nrcs.usda.gov/. The National Forests in New Mexico are not covered, but have soils information available through their Terrestrial Ecosystem Unit Inventories. These will be integrated with the National Cooperative Soil Survey (NCSS) inventories in the next few years.

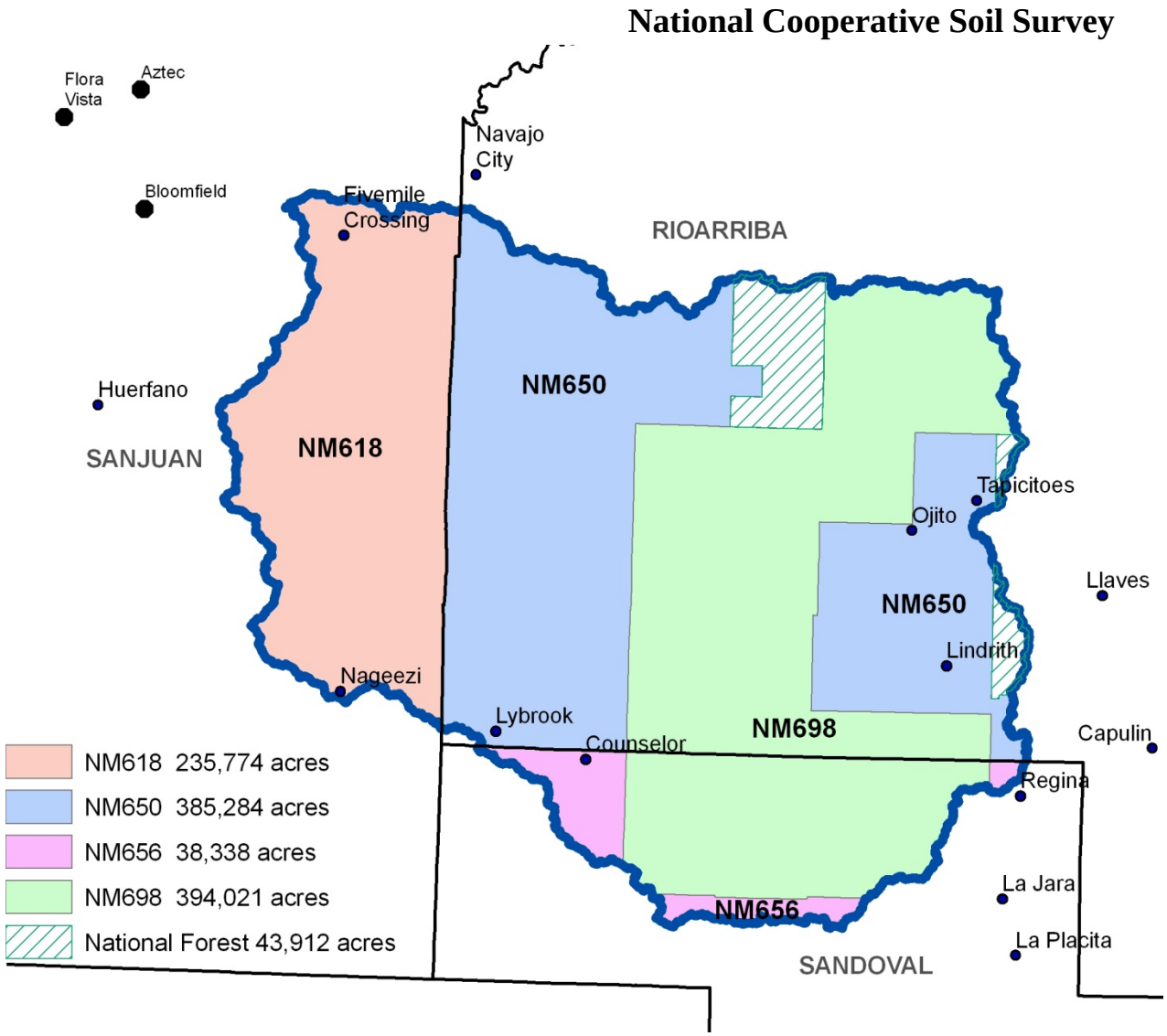
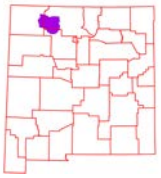


Figure 12. National Cooperative Soil Survey coverage of the Blanco Canyon Watershed.

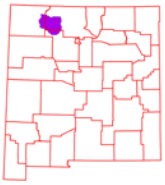


Soil Resource Inventory

In order to evaluate the susceptibility of erosion within the Blanco Canyon watershed, a model was developed using Soil Survey Geographic Database (SSURGO) information. The soil properties saturated hydraulic conductivity, soil loss tolerance, and wind erodibility group were used in conjunction with slope to assess soil mapunit potential for erosion. Saturated hydraulic conductivity and slope are reported in SSURGO databases as interval/ratio data whereas wind erodibility and soil loss tolerance are ordinal data. Data transformations for the model are listed -

SSURGO Value	Nominal Description	Model Rank
Saturated Hydraulic Conductivity		
µm / s		
705.0 - 100.0	Very High	0
100.0 - 10.0	High	1
10.0 - 1.0	Moderately High	2
1.0 - 0.1	Moderately Low	3
0.1 - 0.01	Low	4
Slope %		
0 - 5		0
6 - 10		1
11 - 15		2
16 - 25		3
> 25		4
Soil Loss Tolerance		
5	High Tolerance For loss	0
4	↓	1
3	↓	2
2	↓	3
1	Low Tolerance For Loss	4
Wind Erodibility Group		
1	Very High	4
2	Very High	4
3	High	3
4	High	3
4L	High	3
5	Moderate	2
6	Moderate	2
7	Moderate	1
8	Slight	0

Table 10. Criteria Used for Soil Erosion Susceptibility Model.



Soil Resource Inventory

For each soil map unit (discrete delineation), the soil properties (named above) of the dominant soil type was used as the condition to be evaluated in the susceptibility to erosion model. Miscellaneous areas such as gravel pits, water, riverwash, etc. were excluded from evaluation. Possible range of values for each map unit are 0 – 16. Increasing values represent a higher susceptibility to soil erosion. National Forest Soils are not able to be included at this time.

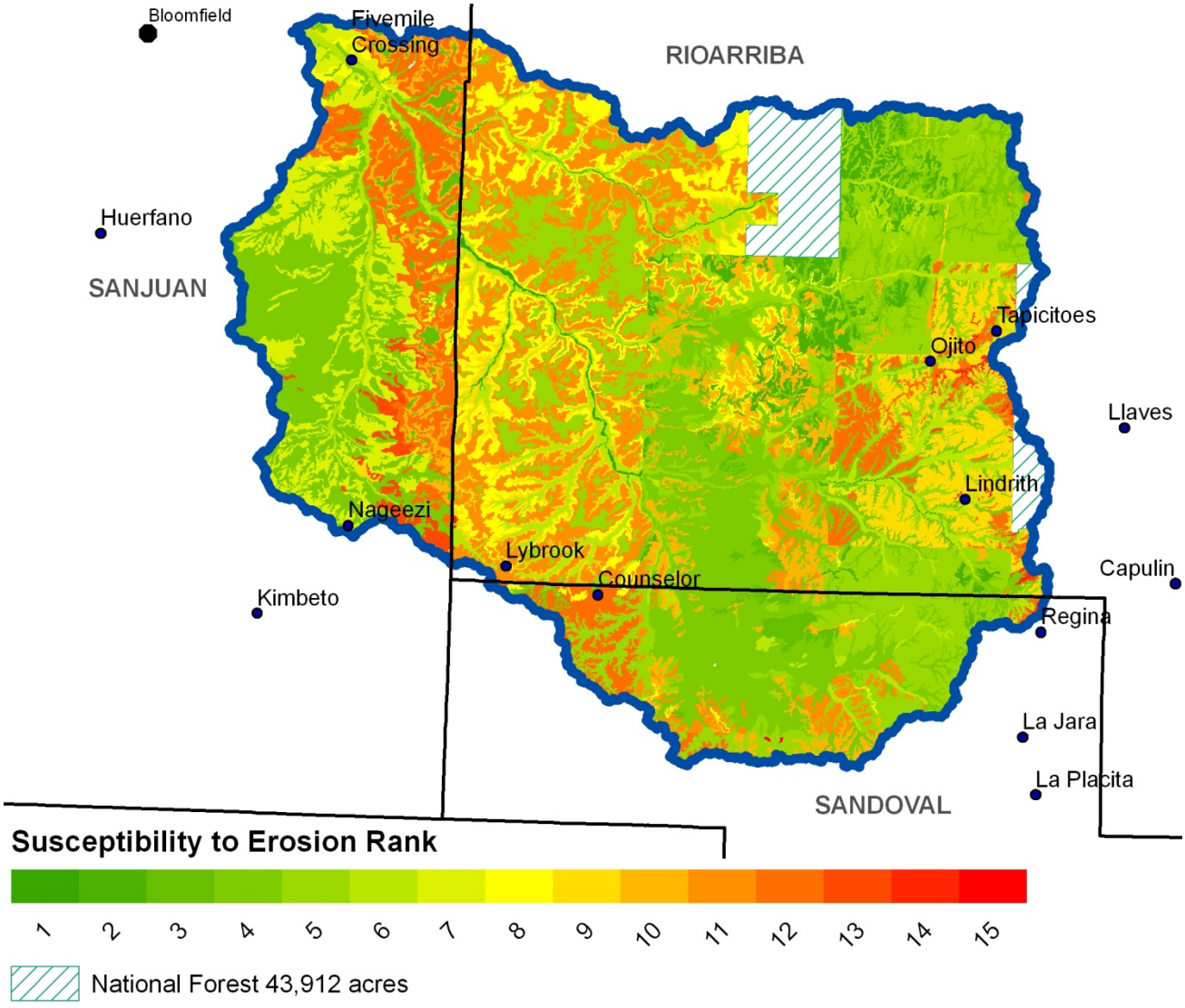
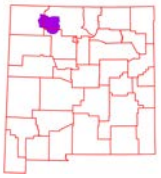


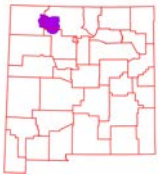
Figure 13. Blanco Canyon Watershed Erosion Potential.



Soil Resource Inventory

Rank	Acres
1	4,126
2	28,004
3	15,456
4	246,498
5	212,200
6	66,891
7	53,499
8	77,192
9	64,551
10	58,977
11	127,351
12	87,296
13	8,354
14	2,820
15	107
Sum(∑)	1,053,321

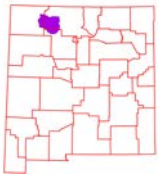
Table 11. Soil Erosion Potential Model Results. A greater rank indicates greater potential for erosion.



Socioeconomic Data [16]

COUNTY	Total population: Total	Total population: Hispanic or Latino	Total population: White alone	Total population: Black or African American alone	Total population: American Indian and Alaska Native alone	Total population: Asian alone	Total population: Native Hawaiian and Other Pacific Islander alone	Total population: Some other race alone	Total population: Two or more races	Families: Median family income 2010
Rio Arriba (NM)	40,246	28,703	38,900	204	6,447	170	13	11,288	1,346	N/A
Sandoval (NM)	131,561	46,129	89,482	2,800	16,945	1,922	169	15,139	5,104	$51,959
San Juan (NM)	130,044	24,776	67,048	756	47,640	484	74	9,501	4,541	$52,039

Table 12. Socioeconomic Data of the Counties in the Watershed (2010).



References

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6. UNITED STATES GEOLOGICAL SURVEY – National Hydrography Dataset. http://nhd.United States Geological Survey.gov/

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8. State of New Mexico Clean Water Act 303(d)/305(b) Integrated Report ftp://ftp.nmenv.state.nm.us/www/swqb/303d-305b/2010/USEPA-Approved303dList.pdf

9. United States Environmental Protection Agency - http://cfpub.epa.gov/surf/huc.cfm?huc_code=14080103

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11. New Mexico Natural Heritage Program - http://nhnm.unm.edu/

12. Southwest Exotic Plant Mapping Program - http://www.invasiveweeds.com/mapping/welcome.html

13. Natural Resources Conservation Service – Common Resource Area (CRA) Geographic Database http://soils.usda.gov/survey/geography/cra.html

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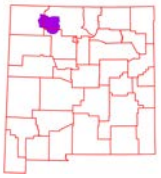
15. Natural Resources Conservation Service – Soil Data Mart http://soildatamart.nrcs.usda.gov/



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