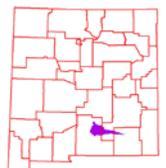
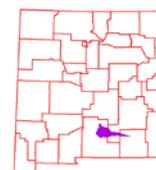


## Rapid Watershed Assessment Rio Penasco Watershed



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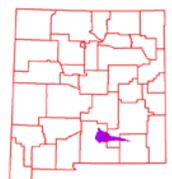


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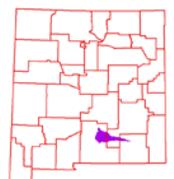
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## Overview

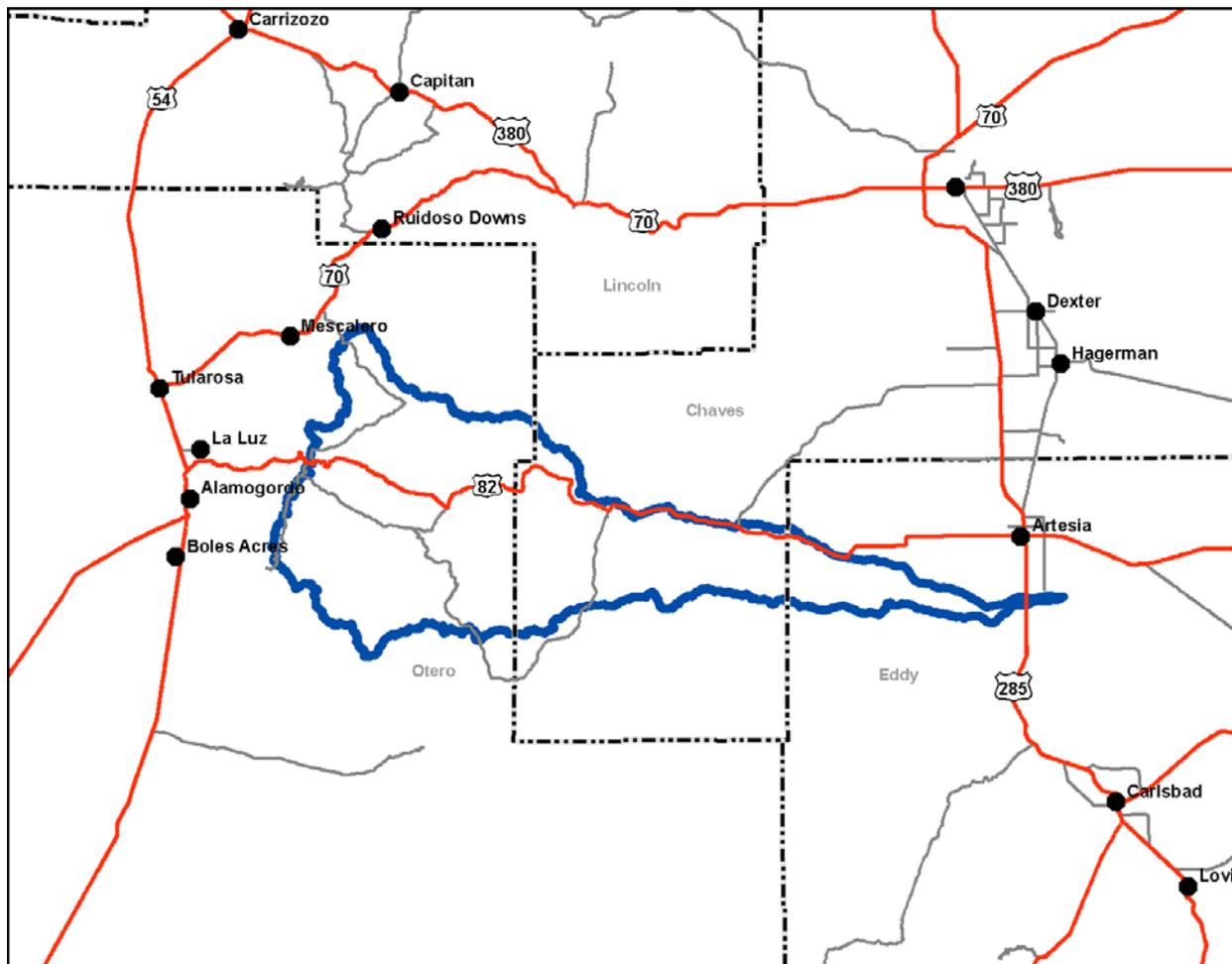
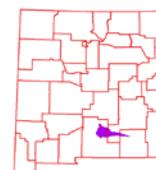


Figure 1. Rio Penasco Watershed Overview

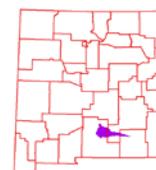


## Overview

The Rio Penasco Watershed is located in southeastern central New Mexico and It covers 685,879 total acres (2,775 sq. km). Portions of the Rio Penasco watershed are in the Chaves, Eddy and Otero counties, Table 1 summarizes the distribution of the Rio Penasco watershed.

	County Acres Total	Acres in HUC	% of HUC in County	% of County in HUC
<b>Chaves</b>	<b>3,885,346</b>	<b>217,234</b>	<b>32</b>	<b>3</b>
<b>Eddy</b>	<b>2,684,613</b>	<b>68,674</b>	<b>10</b>	<b>1</b>
<b>Otero</b>	<b>4,238,818</b>	<b>399,971</b>	<b>58</b>	<b>6</b>
<b>Sum (Σ)</b>	<b>--</b>	<b>685,879</b>	<b>100</b>	<b>--</b>

**Table 1. Rio Penasco watershed acreage distribution**



## **Physical Setting**

### **Geology:**

The Rio Peñasco flows eastward from the Sacramento Mountains near Cloudcroft to Rogers Ruins and joins the Pecos River near the town of Dayton, NM. The Sacramento Mountains are Pennsylvanian Period limestone at the crest, which changes to Permian Period limestones, sandstones, siltstones, anhydrite, gypsum, halite and dolomite until the valley floor is encountered. The limestone is porous. The valley floor is comprised of Quaternary Period piedmont alluvial deposits of sands, silts, clays and gravels.

Resource concerns are high sediment erosion by water. The Rio Peñasco has gullied the floodplain deposits up to 30-feet deep. 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.

Groundwater quality and quantity is a concern. 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 quality ranges from good to poor for livestock or crops. Chloride and sulfate concentrations in sections of the watershed are also a concern.

### **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 Rio Grande-Albuquerque Watershed are assigned to four groups (A, B, C, and D).



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.

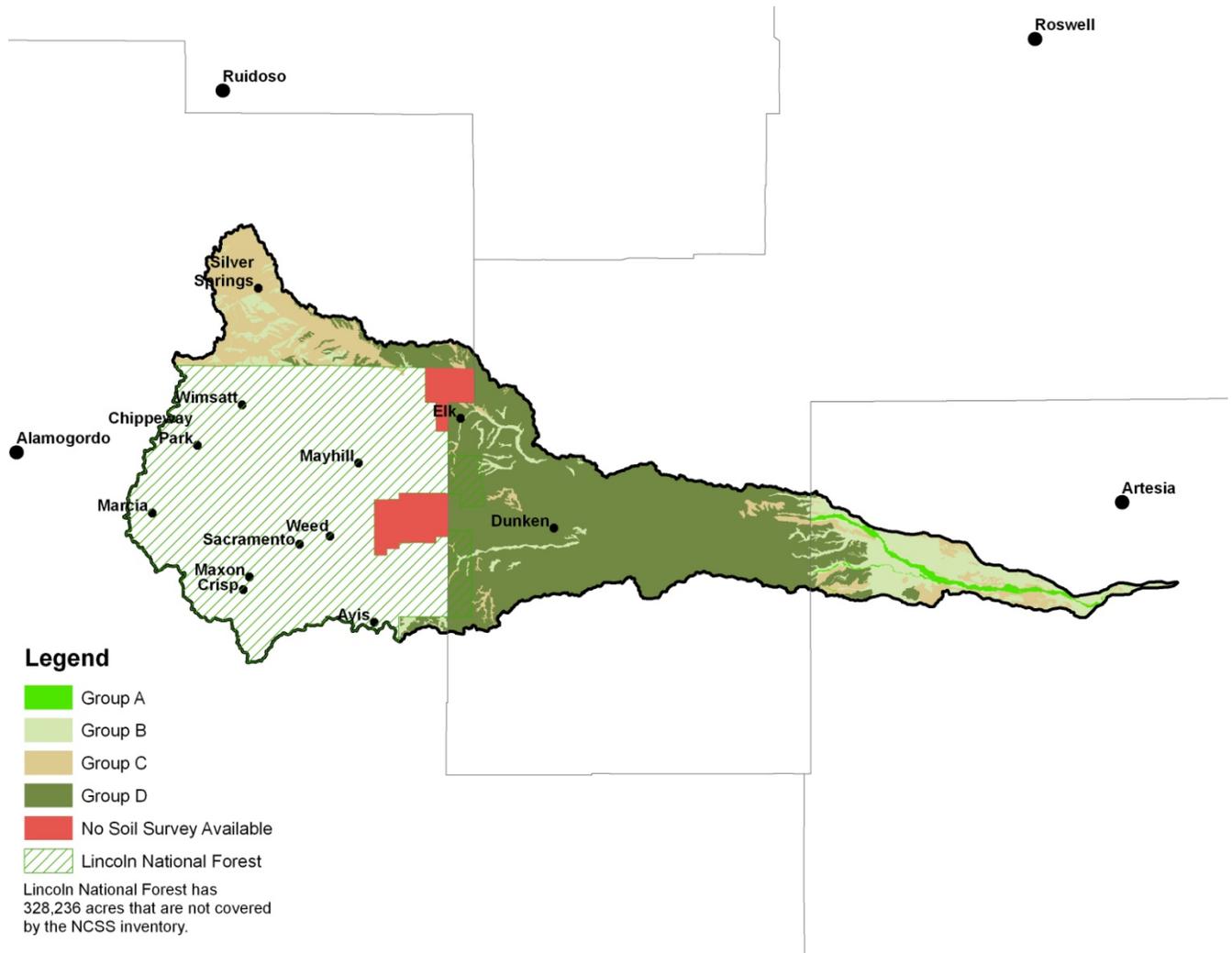




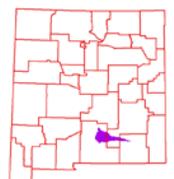
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.



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**



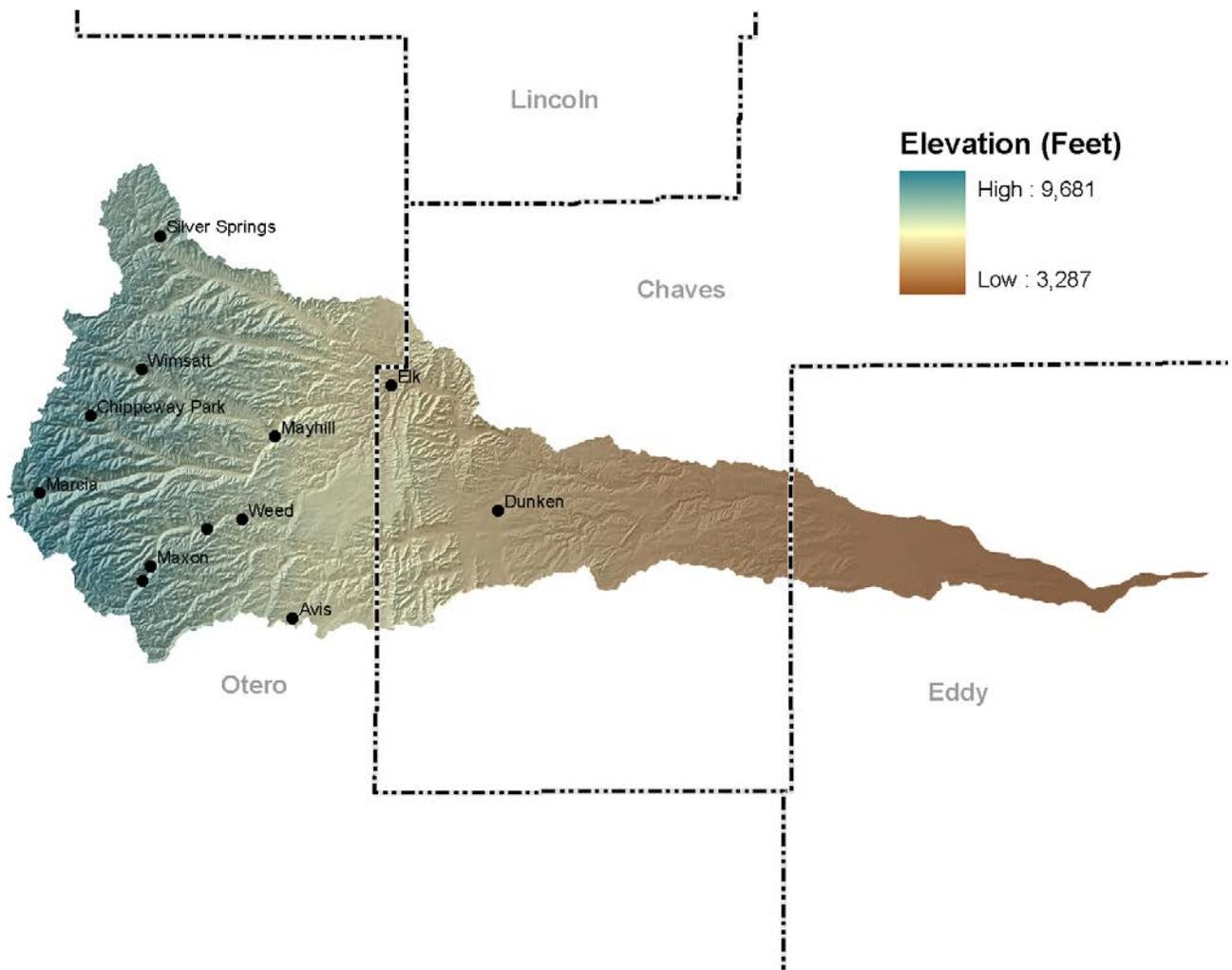
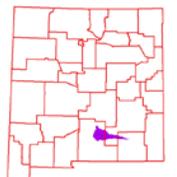


Figure 3. Rio Penasco Watershed Shaded Relief



## Precipitation <sup>1</sup>

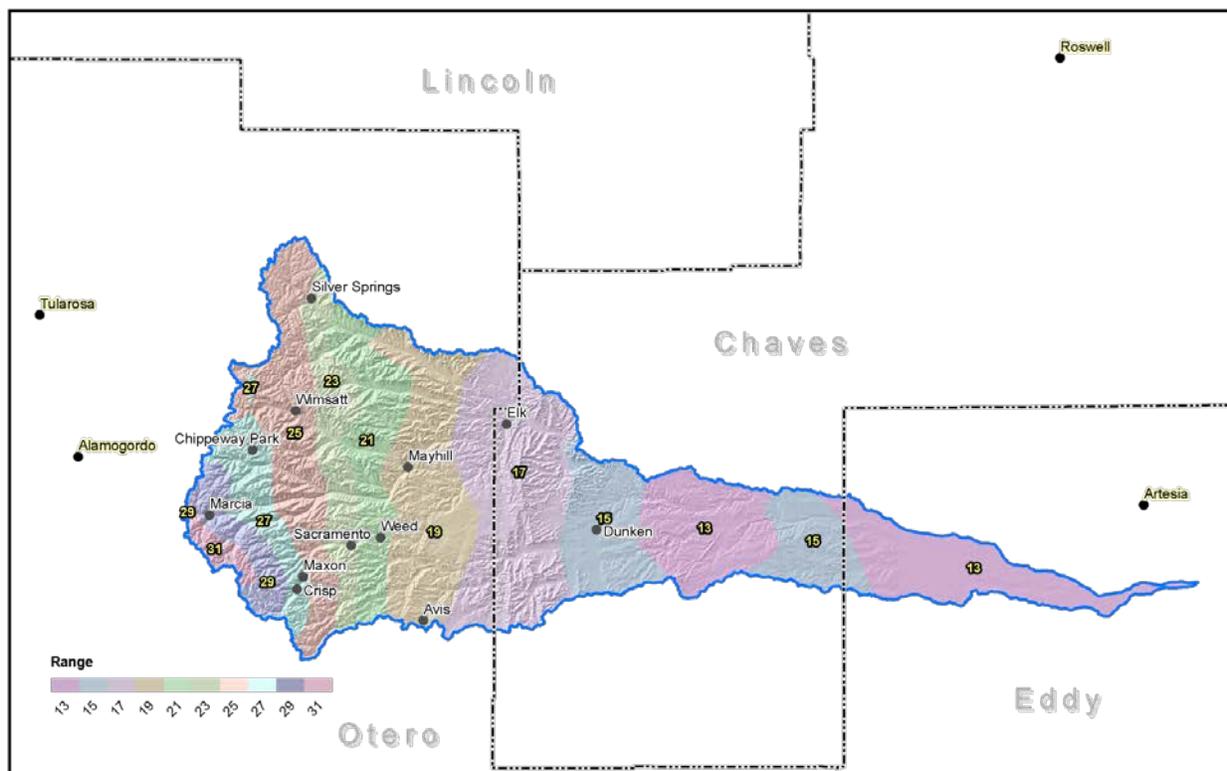
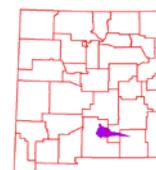


Figure 4. Rio Penasco watershed Annual Precipitation.



## Land Ownership <sup>2</sup>

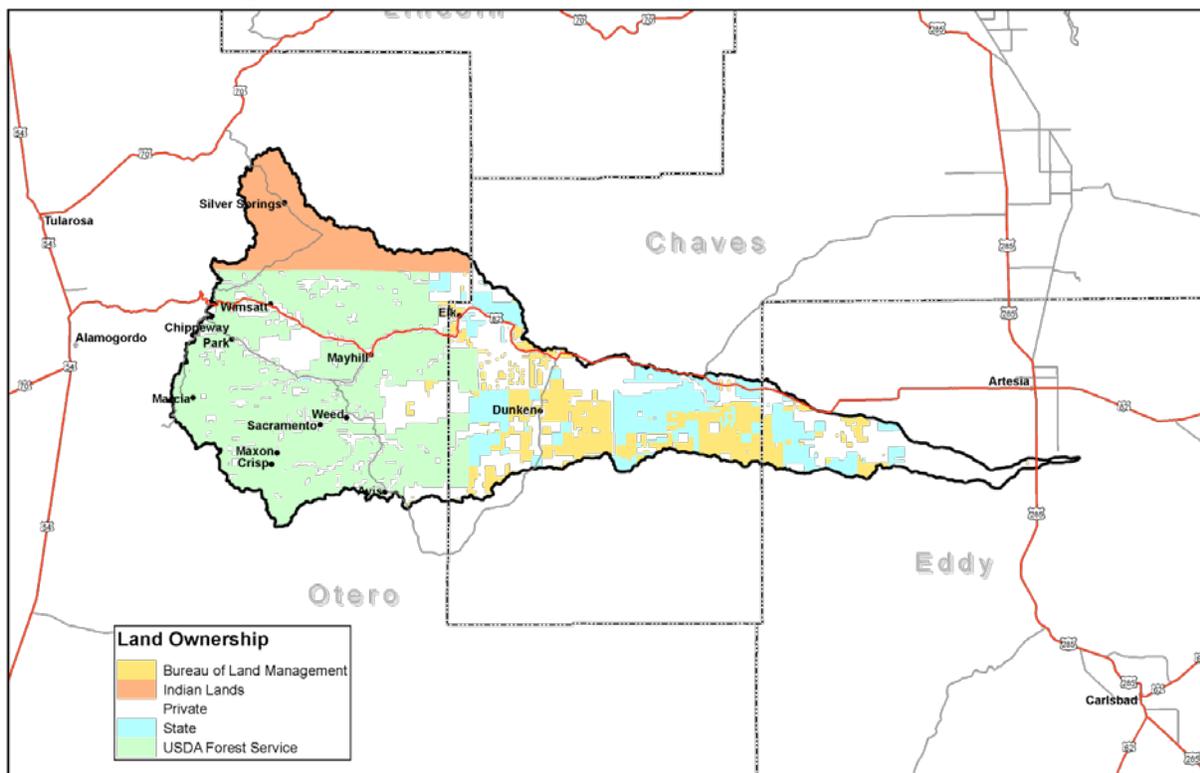
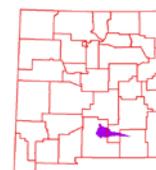


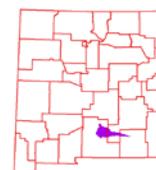
Figure 5. Rio Penasco Watershed Land Ownership.



## Land Ownership

<u>COUNTY</u>	<u>BLM</u>	<u>FS</u>	<u>Indian Lands</u>	<u>Private</u>	<u>State</u>
<b>Chaves</b>	<b>66,176</b>	<b>14,548</b>		<b>78,604</b>	<b>57,899</b>
<b>Eddy</b>	<b>10,582</b>			<b>41,498</b>	<b>16,590</b>
<b>Otero</b>	<b>1,530</b>	<b>248,867</b>	<b>68,474</b>	<b>78,883</b>	<b>2,224</b>
<b>Watershed (<math>\Sigma</math>)</b>	<b>78,288</b>	<b>263,415</b>	<b>68,474</b>	<b>198,986</b>	<b>76,714</b>
<b>% Watershed</b>	<b>11</b>	<b>39</b>	<b>10</b>	<b>29</b>	<b>11</b>

Table 2. Land ownership in the Rio Penasco watershed.



**Land Use / Land Cover** <sup>3, 4</sup>

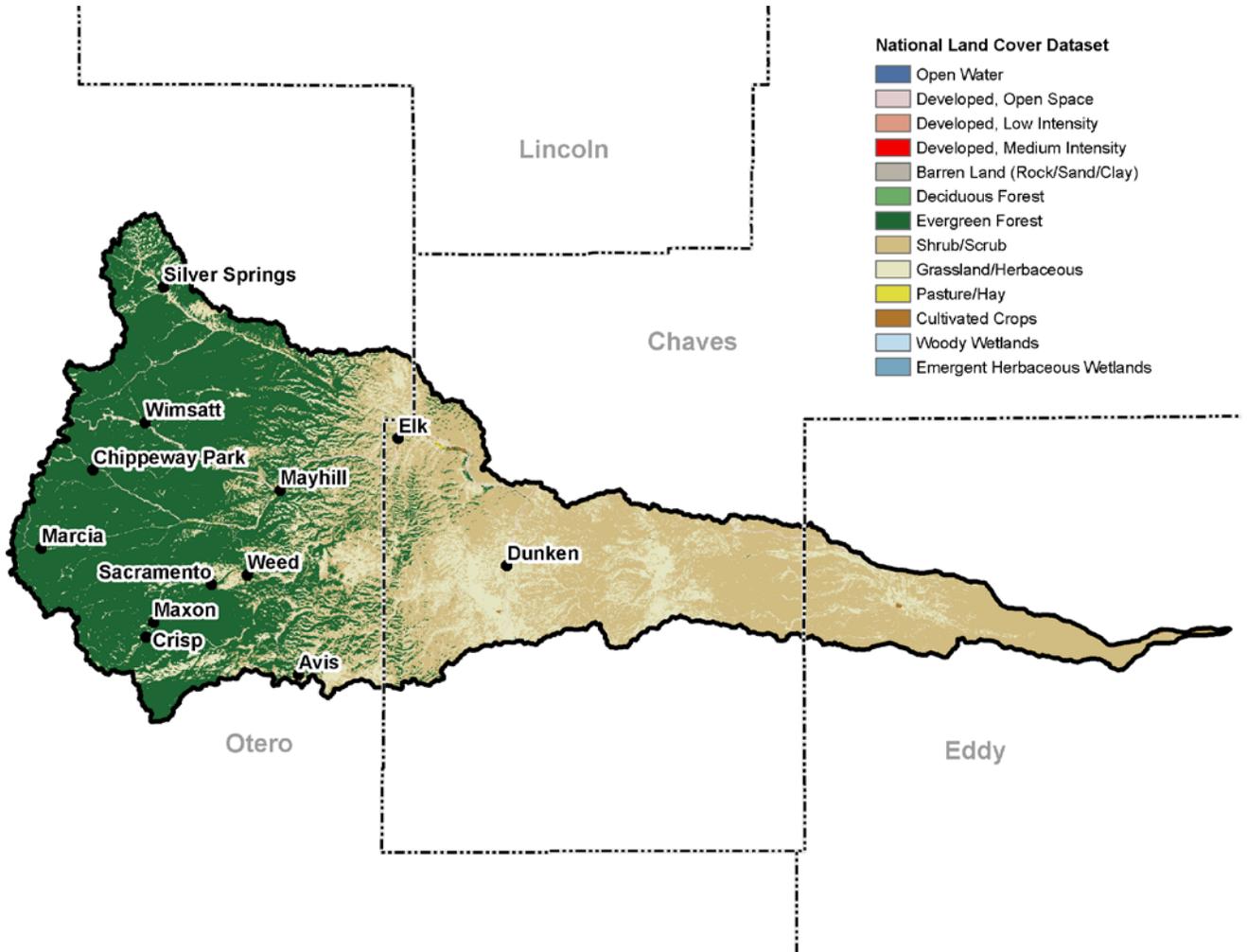
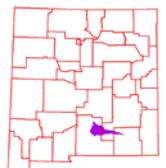


Figure 6. Subset of the National Land Cover Dataset in the Rio Penasco Watershed.

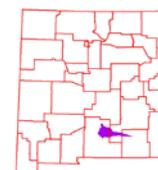


## Land Use / Land Cover

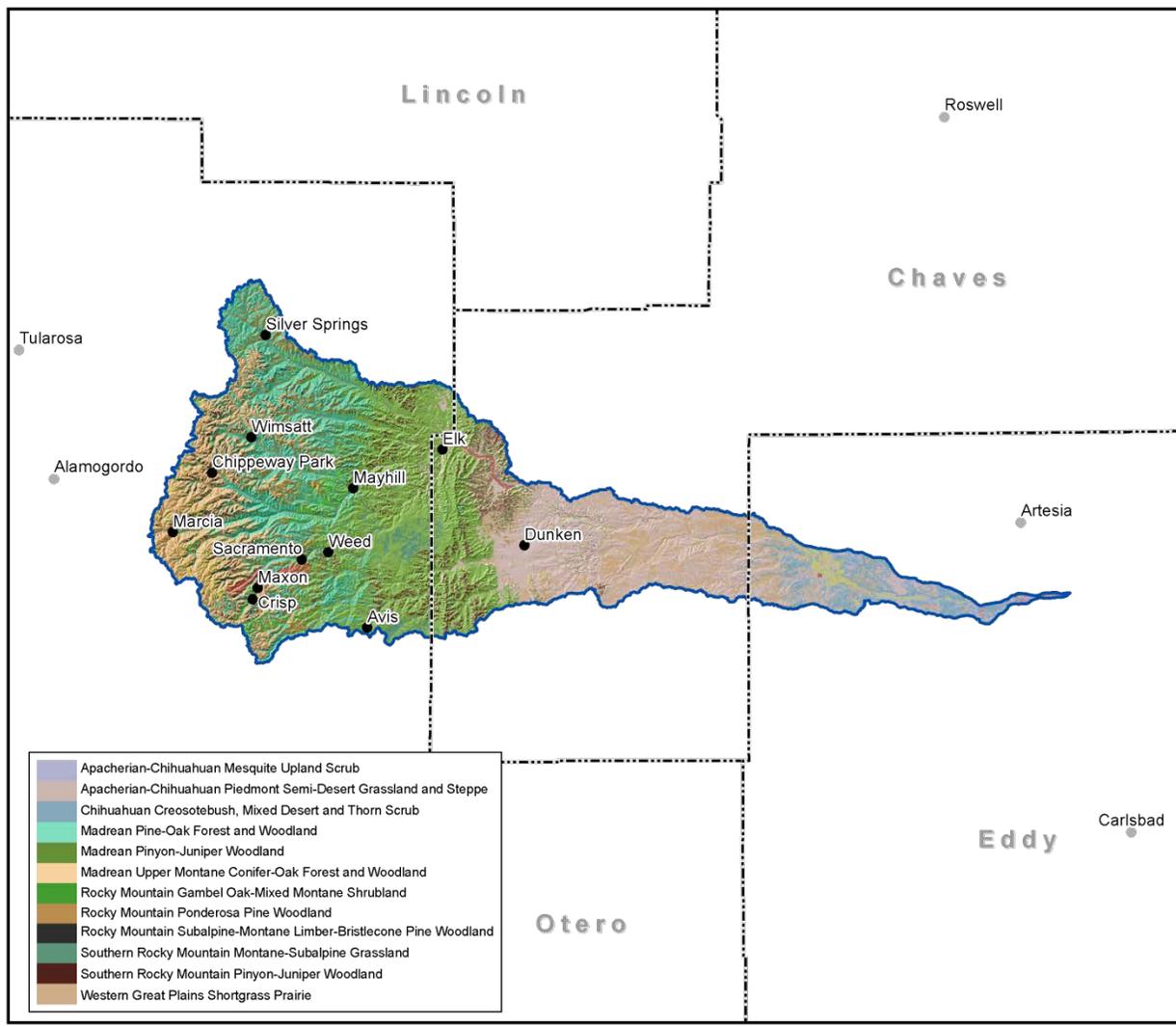
The U.S. Geological Survey (USGS) produced the National Land Cover Dataset (NLCD) as part of a cooperative project between the USGS and the U.S. Environmental Protection Agency (USEPA). The goal of this project was to produce a consistent land cover data layer for the conterminous United States. The 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.

<u>Land use / Land cover</u>	<u>Acres</u>	<u>% of Watershed</u>
Evergreen Forest	301,518	44%
Shrubland	260,796	38%
Grassland/Herbaceous	117,389	17%
Developed, Open Space	4,984	1%
Cultivated Crops	795	3%
Pasture/Hay	285	< 1%
Barren Land (Rock/Sand/Clay)	35	< 1%
Woody Wetlands	23	< 1%
Deciduous Forest	12	< 1%
Developed, Low Intensity	11	< 1%
Open Water	9	< 1%
Developed, Medium Intensity	2	< 1%
Emergent Herbaceous Wetlands	2	< 1%

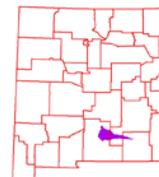
Table 3. Extent of NLCD classes in the Rio Penasco watershed.



## Land Use / Land Cover



**Figure 7. Subset of the SWREGAP over the Rio Penasco Watershed. The 12 dominant ecosystems are displayed in the legend.**

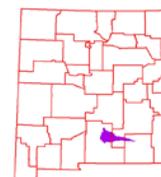


## Land Use / Land Cover

The land cover 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.

<b>ECOSYSTEM</b>	<b>Acres</b>	<b>% of Watershed</b>
<b>Madrean Pinyon-Juniper Woodland</b>	<b>160,464</b>	<b>23</b>
<b>Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe</b>	<b>110,649</b>	<b>16</b>
<b>Madrean Pine-Oak Forest and Woodland</b>	<b>99,868</b>	<b>15</b>
<b>Madrean Upper Montane Conifer-Oak Forest and Woodland</b>	<b>79,482</b>	<b>12</b>
<b>Western Great Plains Shortgrass Prairie</b>	<b>57,385</b>	<b>8</b>
<b>Rocky Mountain Ponderosa Pine Woodland</b>	<b>28,958</b>	<b>4</b>
<b>Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub</b>	<b>24,863</b>	<b>4</b>
<b>Southern Rocky Mountain Montane-Subalpine Grassland</b>	<b>22,792</b>	<b>3</b>
<b>Southern Rocky Mountain Pinyon-Juniper Woodland</b>	<b>21,249</b>	<b>3</b>
<b>Rocky Mountain Gambel Oak-Mixed Montane Shrubland</b>	<b>16,646</b>	<b>2</b>
<b>Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland</b>	<b>12,864</b>	<b>2</b>
<b>Apacherian-Chihuahuan Mesquite Upland Scrub</b>	<b>9,986</b>	<b>1</b>

Table 4. SW Region Gap analysis ecosystem acreages.



**Hydrology** 5, 6, 7, 8, 9

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 2,462 miles (3,962 km) of water courses in the Rio Penasco River Watershed. The majority of these courses typically flow intermittently in summer months during periods associated with high intensity convective thunderstorms.

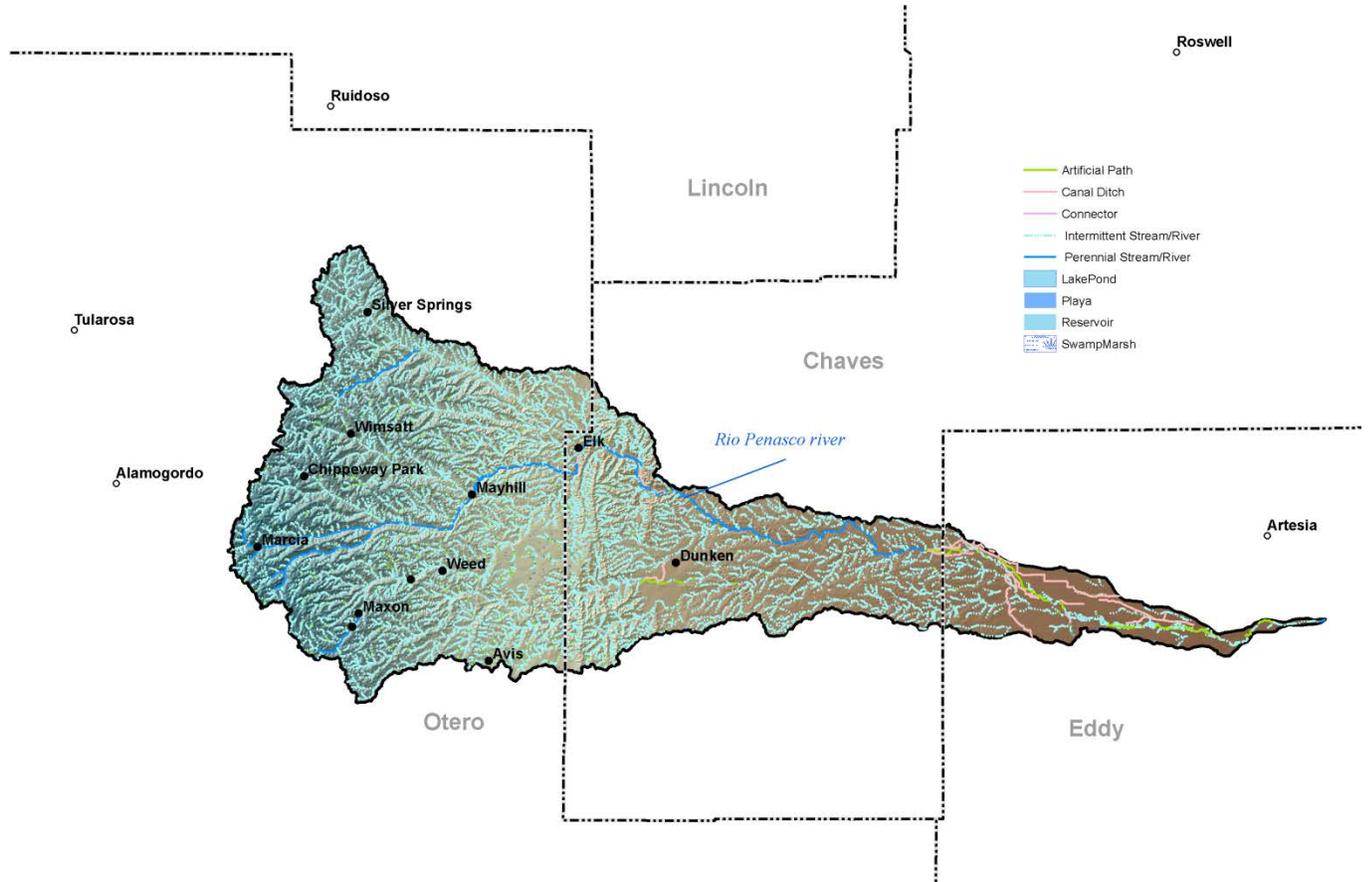
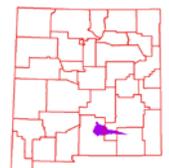


Figure 8. National Hydrologic Dataset (NHD) of the Rio Penasco.

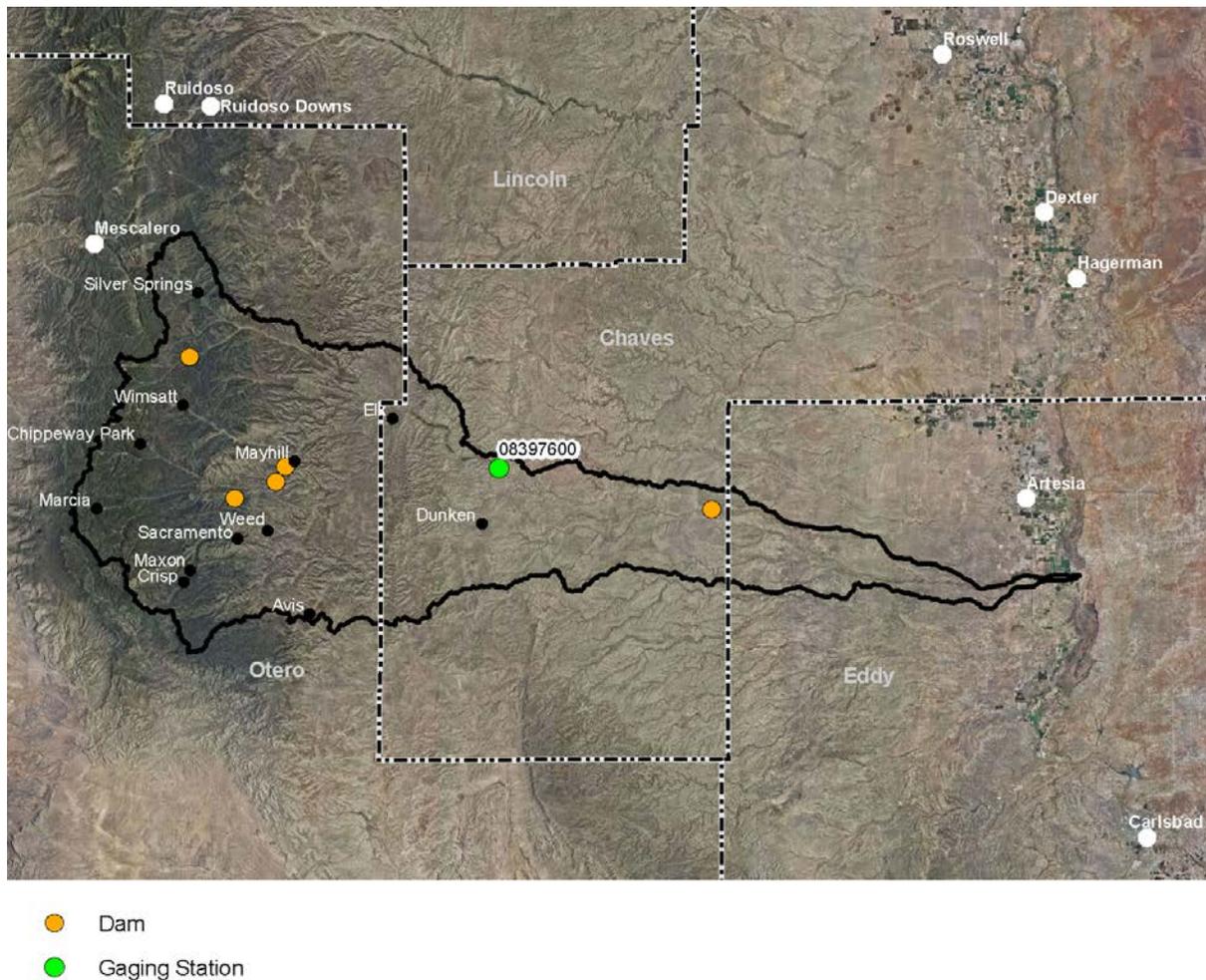


<b>Water Course Type</b>	<b>Miles</b>
<b>Artificial path</b>	<b>41</b>
<b>Canal / Ditch</b>	<b>62</b>
<b>Intermittent Stream / River</b>	<b>2,256</b>
<b>Perennial Stream / River</b>	<b>104</b>
<b>Sum (<math>\Sigma</math>)</b>	<b>2,463</b>

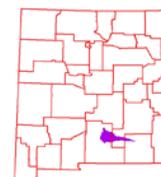
Table 5. NHD Water Course Type and Extents



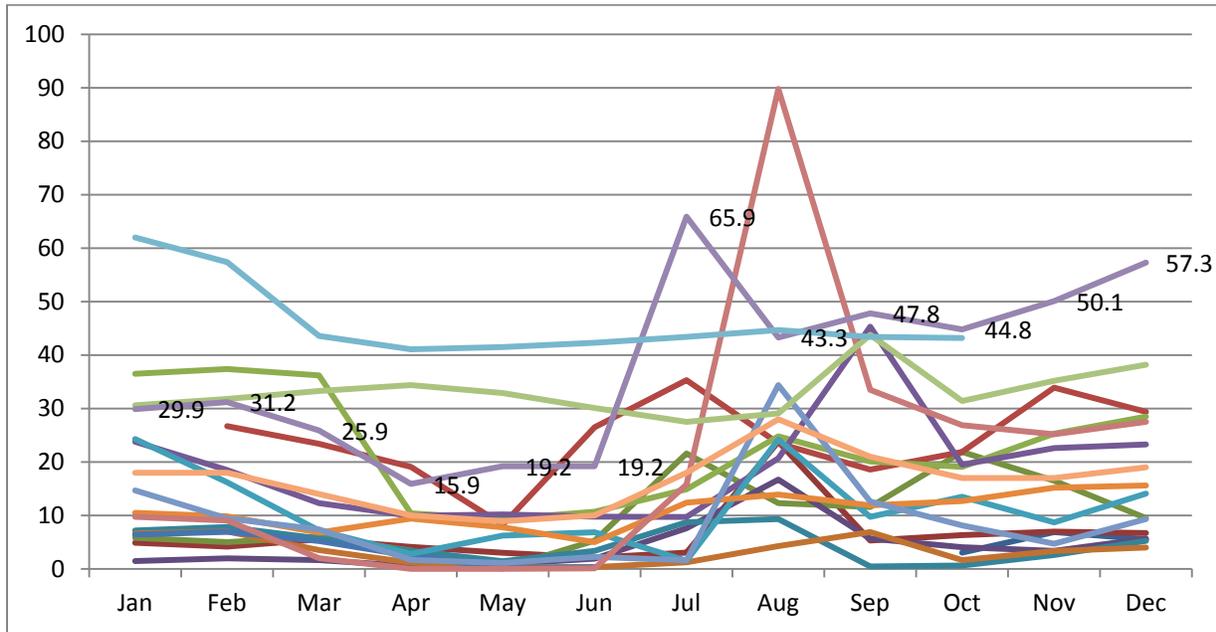
There are 6 water gauging stations in the watershed. USGS Site 08397600 is near the northwest corner of the watershed on the Rio Penasco at Dunken, NM. During the period of 1956 – 2009, this site has had mean annual discharge of 16.51 cubic feet per second ranging from 0 (May, 2006) to 89.8 (2006) cubic feet per second.



**Figure 9. Gauging Stations in the Rio Penasco Watershed**



## Hydrology



**Figure 10. Monthly Average of Mean Daily Flow on the Rio Penasco near Dunken, NM. Period of observation: 1956 – 1962 and 2000 - 2009.**



The New Mexico Water Quality Control Commission (NMWQCC) is the issuing agency of water quality standards for interstate and intrastate waters in New Mexico.

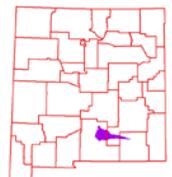
The Rio Penasco watershed has the following reaches listed as 303 (d) Impaired Surface Waters:

1.	Agua Chiquita (perennial portions Rio Peñasco to headwaters)
2.	Rio Peñasco (HWY 24 to headwaters)
3.	Rio Peñasco (Pecos River to HWY 24)

The designated uses for these reaches have been listed in Table 6.

Use	Agua Chiquita (perennial portions Rio Peñasco to headwaters)	Rio Peñasco (HWY 24 to headwaters)	Rio Peñasco (Pecos River to HWY 24)
Coldwater Aquatic	NS	NS	
Fish Culture	X	X	
Irrigation	X	X	X
Livestock Watering	X	X	X
Secondary Contact	NA	X	X
Wildlife Habitat	X	X	X
Marginal Coldwater Aquatic Life			
Primary Contact			
Warmwater Aquatic Life			NS

Table 6. Listed Uses. NS = Not Supporting, NA = not assessed, x = Fully Supporting



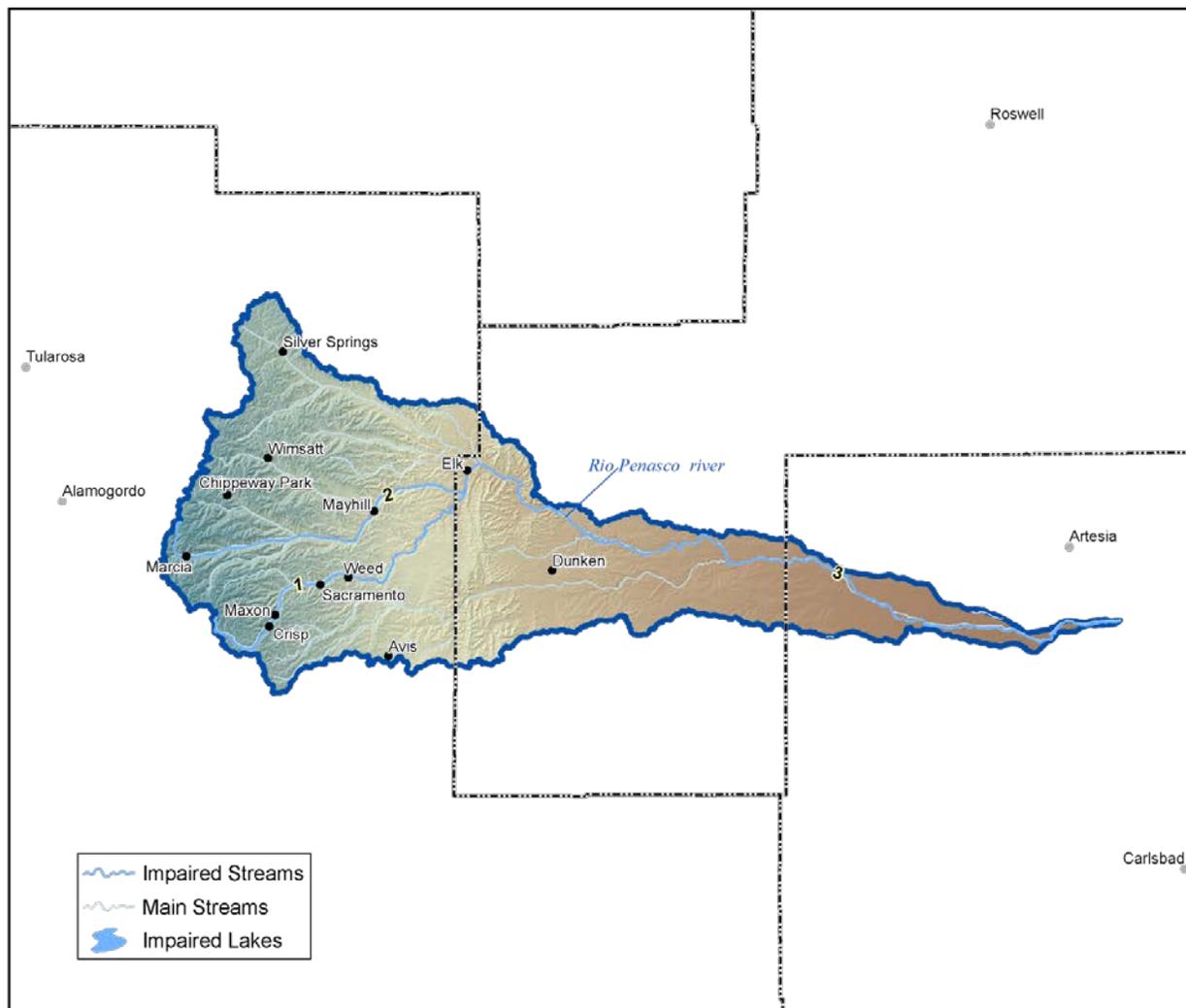
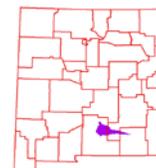


Figure 11. 303(d) Impaired Waters



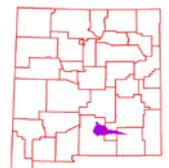
## Hydrology

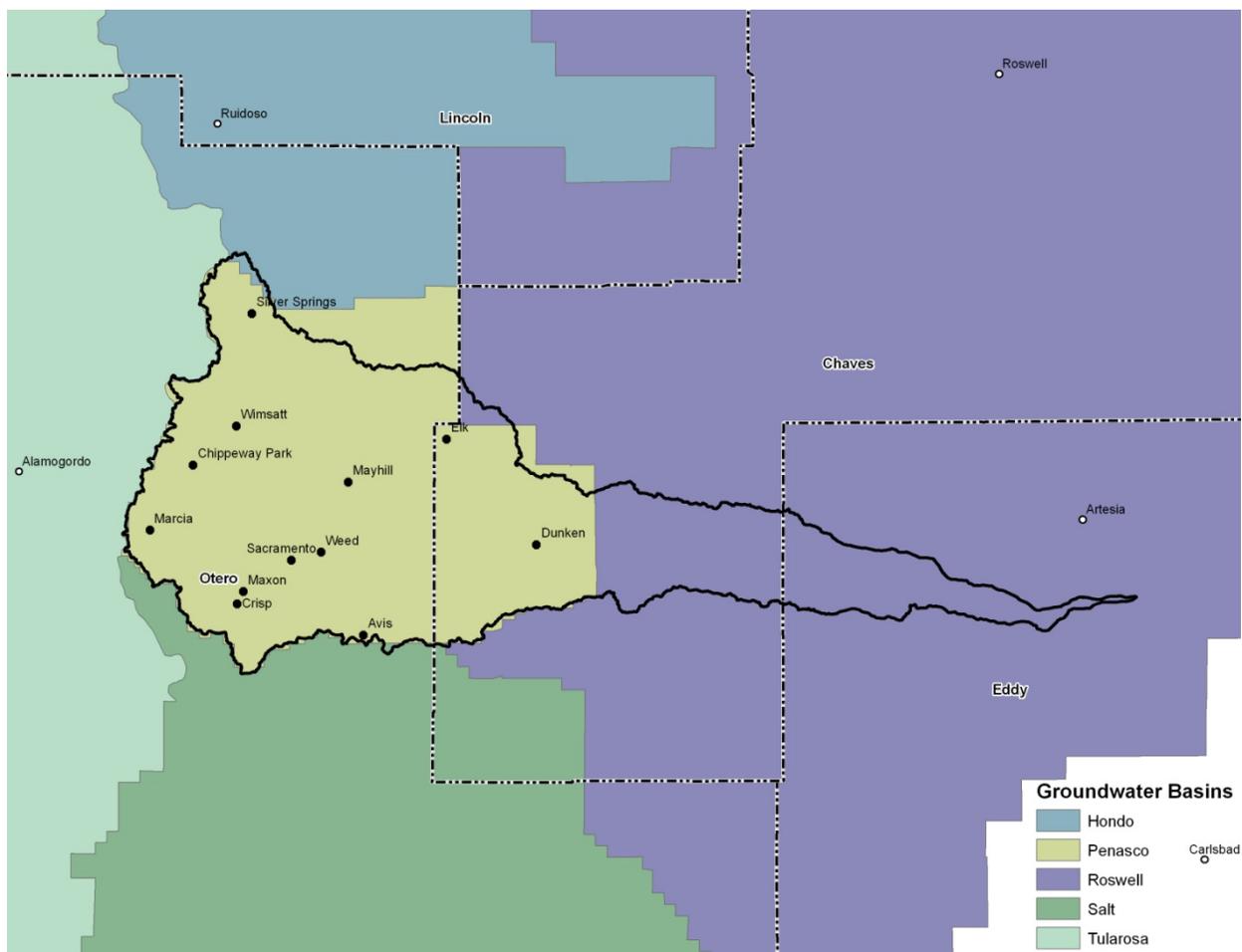
Under section 303(d) of the Clean Water Act, states, territories, and authorized tribes, are required to develop lists of impaired waters. These are waters for which technology-based regulations and other required controls are not stringent enough to meet the water quality standards set by states. The 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. Within the Rio Penasco Watershed, there are no bodies of water listed as impaired as of the 2010-12 listing cycle.

The river and stream reaches total 148.78 miles (239.43 km)

<b><u>Probable Causes of Impairment</u></b>	<b>Agua Chiquita (perennial portions Rio Peñasco to headwaters)</b>	<b>Rio Peñasco (HWY 24 to headwaters)</b>	<b>Rio Peñasco (Pecos River to HWY 24))</b>
	<b>1</b>	<b>2</b>	<b>3</b>
<b>Benthic-Macroinvertebrate Bioassessments (Streams)</b>	x		
<b>Sedimentation/Siltation</b>		x	x

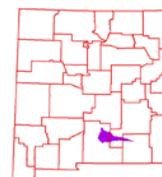
**Table 7. Possible Causes of Impairment**





**Figure 12. Declared Groundwater Basins of the Rio Penasco**

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 Rio Penasco watershed is completely within the Hondo, Penasco, Roswell Artesian, Salt Basin and Tularosa Underground Water Basins. The surface watershed in NM covers 685,880 of the approximately 13,586,527 thousand acres of the underground water basins in NM.

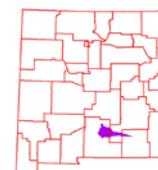


## Threatened and Endangered Species <sup>10</sup>

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 8 lists those species which are currently listed and tracked in the Rio Penasco Watershed.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Tax.Class</u>	<u>Family</u>	<u>Fed Status</u>	<u>State Status</u>
Chihuahua Chub	<i>Gila nigrescens</i>	Actinopterygii	Cyprinidae	LT	E
Greenthroat Darter	<i>Etheostoma lepidum</i>	Actinopterygii	Percidae		T
Sacramento Mountain Salamander	<i>Aneides hardii</i>	Amphibia	Plethodontidae		T
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Aves	Tyrannidae	LE	E
Gray Vireo	<i>Vireo vicinior</i>	Aves	Vireonidae		T
Sacramento Mountains Thistle	<i>Cirsium vinaceum</i>	Dicotyledoneae	Asteraceae	LT	E
Kuenzler's Hedgehog Cactus	<i>Echinocereus fendleri var. kuenzleri</i>	Dicotyledoneae	Cactaceae	LE	E
New Mexican Jumping Mouse	<i>Zapus hudsonius luteus</i>	Mammalia	Dipodidae		E
Penasco Chipmunk	<i>Neotamias minimus atristriatus</i>	Mammalia	Sciuridae		E
Wood Lily	<i>Lilium philadelphicum</i>	Monocotyledoneae	Liliaceae		E
Crested Coralroot	<i>Hexalectris spicata</i>	Monocotyledoneae	Orchidaceae		E

Table 8. Threatened and Endangered Plant and Animal Species.

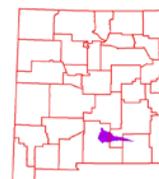


## Invasive Species <sup>11</sup>

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 Rio Penasco watershed, the SWEMP has identified 8 species of invasive plants (Table 9). Each of these species is defined as non-native by the USDA PLANTS database.

<b><u>Scientific Name</u></b>	<b><u>Common Name</u></b>
<b><i>Zygophyllaceae</i> (Caltrop Family)</b>	<b>African Rue</b>
<b><i>Scrophylariaceae</i> (Figwort Family)</b>	<b>Dalmatian Toadflax</b>
<b><i>Brassicaceae</i> (Mustard Family)</b>	<b>Hoary Cress (Whitetop)</b>
<b><i>Euphorbiaceae</i> (Spurge Family)</b>	<b>Leafy Spurge</b>
<b><i>Asteraceae</i> (Sunflower Family)</b>	<b>Musk Thistle</b>
<b><i>Asteraceae</i> (Sunflower Family)</b>	<b>Russian Knapweed</b>
<b><i>Asteraceae</i> (Sunflower Family)</b>	<b>Spotted Knapweed</b>
<b><i>Asteraceae</i> (Sunflower Family)</b>	<b>Yellow Starthistle</b>

Table 9. Invasive Species Recognized by the SWEMP.



## Common Resource Areas<sup>12</sup>

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.

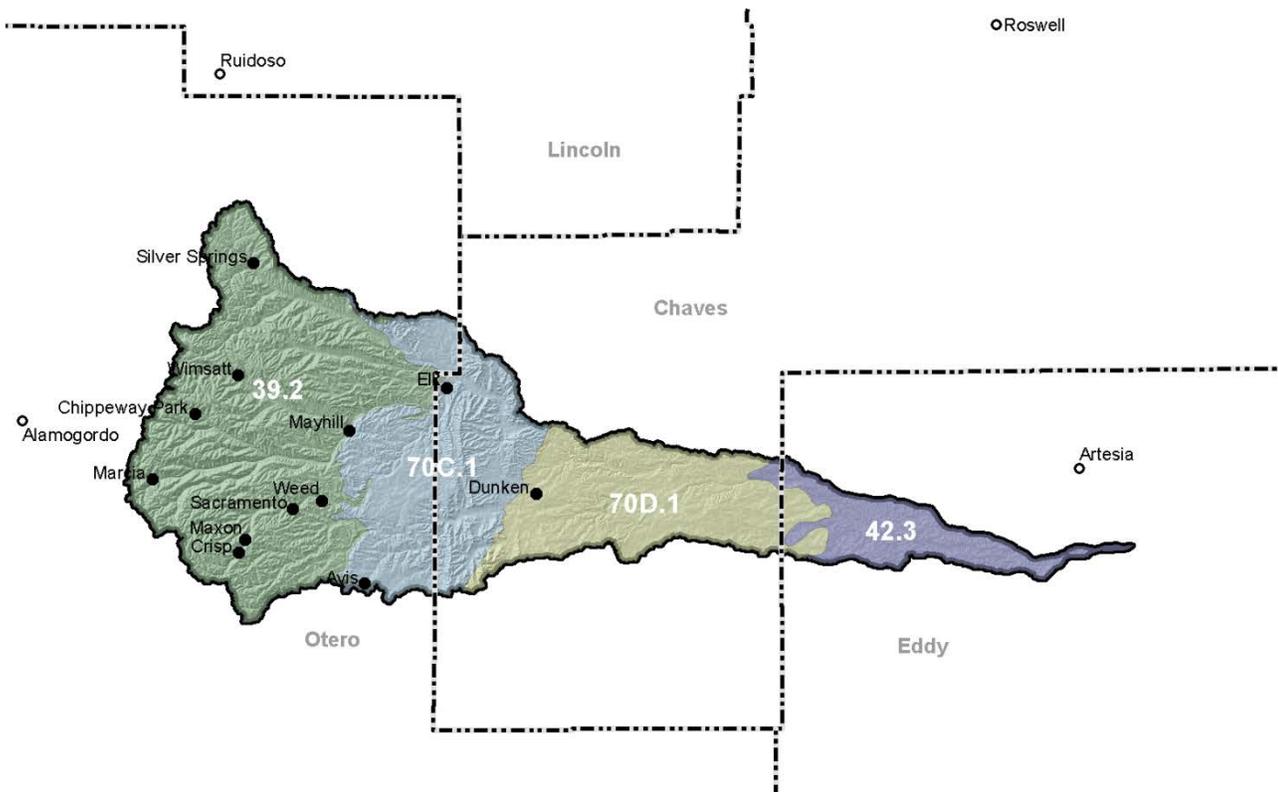
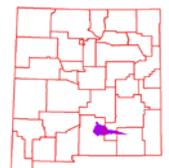


Figure 13. Common Resource Areas of the Rio Penasco watershed.



## **Common Resource Areas**

### **39.2 - Central New Mexico Mountains**

This unit occurs within the Colorado Plateau Physiographic Province and is characterized by volcanic fields and gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Elevations range from 7000 to 12000 feet. Precipitation ranges 17 to 25 inches per year. The soil temperature regime ranges from mesic to frigid. Vegetation includes corkbark, Douglas and white fir, Englemann spruce, pinyon and southwestern white pine, and aspen. Grasslands include tufted hairgrass, sedges, and Arizona and Thurber fescue.

### **42.3 - Chihuahuan Desert Grassland**

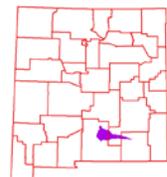
This unit occurs within the Basin and Range Physiographic Province and is characterized by valley plains and alluvial fans broken by the Pecos River. Drainage divides are low and inconspicuous forming one great plain. Elevations range from 2800 to 5000 feet. Precipitation ranges from 8 to 13 inches per year. The soil temperature regime is thermic. The soil moisture regime is aridic. Vegetation includes tobosa, alkali sacaton, black grama, burrograss, creosote bush, tarbush, soaptree yucca, catclaw, fourwing saltbush, winterfat, mesquite and desert willow.

### **70C.1 - Central New Mexico Highlands**

Tablelands and mesas separated by broad plains and small terraces characterize this area. Elevation is 5,000 to 7,200 feet and precipitation is 12 to 17 inches. The soil moisture regime is aridic to ustic and the soil temperature regime is mesic. Pinyon-juniper savannah and pinyon juniper woodlands at higher elevations, and broad mid- to short-grass prairies and basins at lower elevations dominate the area. Current land use is livestock grazing. The soils formed in Quaternary alluvium, eolian sands, and sedimentary rocks of Permian age. (Old CP-3)

### **70D.1 - Southern New Mexico Foothills**

This unit is characterized by nearly level to steep limestone hills with steep, narrow drainageways. Elevation ranges from 4,000 to 7,000 feet and average annual precipitation is 13 to 18 inches. Native vegetation is sparse and consists of pinyon, juniper, algerita, agave, yucca and cacti. Grasses include blue and black grama, little bluestem, and muhly species. Shrubs include catclaw, ocotillo, sotol and fourwing saltbush. Much of the area is federally owned. Federal and private lands are used for grazing, wildlife habitat, and military training.

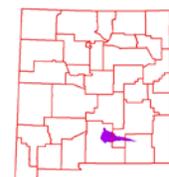


## Conservation <sup>13</sup>

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.

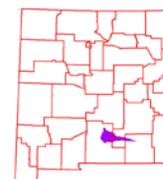
Conservation Practice	2006		2007		2008		2009		2010		TOTAL	
	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres
Brush Management	2	2,946	4	3,508	3	882	3	10,128	2	10,571	14	28,035
Conservation Crop Rotation			1	241							1	241
Forest Stand Improvement	1	231	2	1,493	1	86,686	2	15,201	1	15,360	8	118,971
Integrated Pest Management			1	241					1	125	2	366
Irrigation Water Management			1	241					1	125	2	366
Prescribed Grazing	4	12,654	4	9,756	4	17,551	5	8,622	5	20,552	22	69,136
Residue Management, Seasonal			1	241							1	241
Upland Wildlife Habitat Management	2	17,119	3	3,576	4	18,715	3	10,242	4	21,174	16	70,825
Wetland Enhancement					1	2,655					1	2,655
<b>SUM (Σ)</b>	<b>9</b>	<b>32,950</b>	<b>17</b>	<b>19,297</b>	<b>13</b>	<b>126,489</b>	<b>13</b>	<b>44,193</b>	<b>14</b>	<b>67,907</b>	<b>67</b>	<b>290,836</b>

Table 10. 5 year Trends in Applied Conservation Practices. Reported in Acres.



Conservation Practice	2006		2007		2008		2009		2010		TOTAL	
	#	Feet	#	Feet	#	Feet	#	Feet	#	Feet	#	Feet
Conservation Completion Incentive First Year					2	356					2	356
Fence	2	232			2	42,615	1	1,554	1	477	6	44,878
Grade Stabilization Structure					1	53						53
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic					1	57			1	125	2	182
Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic			1	23							1	23
Pipeline	2	3,957	2	11,031	3	41,969	2	57,322	1	10	10	114,289
Pond			2	22,184			1	23767			3	45,951
Pond Sealing or Lining, Bentonite Sealant					1	39					1	39
Pumping Plant	1	205	2	530	1	51			1	10	5	796
Structure for Water Control			1	28	1	57			1	374	3	459
Water Well	2	789	3	970	1	51	1	11,306	1	10	8	13,075
Water Facility	2	15,718	3	3,864	4	40,704	2	43,080	2	10,997	13	114,363
Wildlife Watering Facility					1	53					1	53
<b>SUM (Σ)</b>	<b>9</b>	<b>20,901</b>	<b>14</b>	<b>38,630</b>	<b>18</b>	<b>126,005</b>	<b>7</b>	<b>137,029</b>	<b>8</b>	<b>12,003</b>	<b>55</b>	<b>334,517</b>

Table 11. 5 Year Trends in Location Specific Applied Conservation Practices. Reported in Feet if Linear (i.e. Fence)



## Soil Resource Inventory <sup>14</sup>

The Rio Penasco watershed has a number of certified National Cooperative Soil Survey (NCSS) inventories. The National Forest in New Mexico is not covered, but has 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.

### National Cooperative Soil Survey

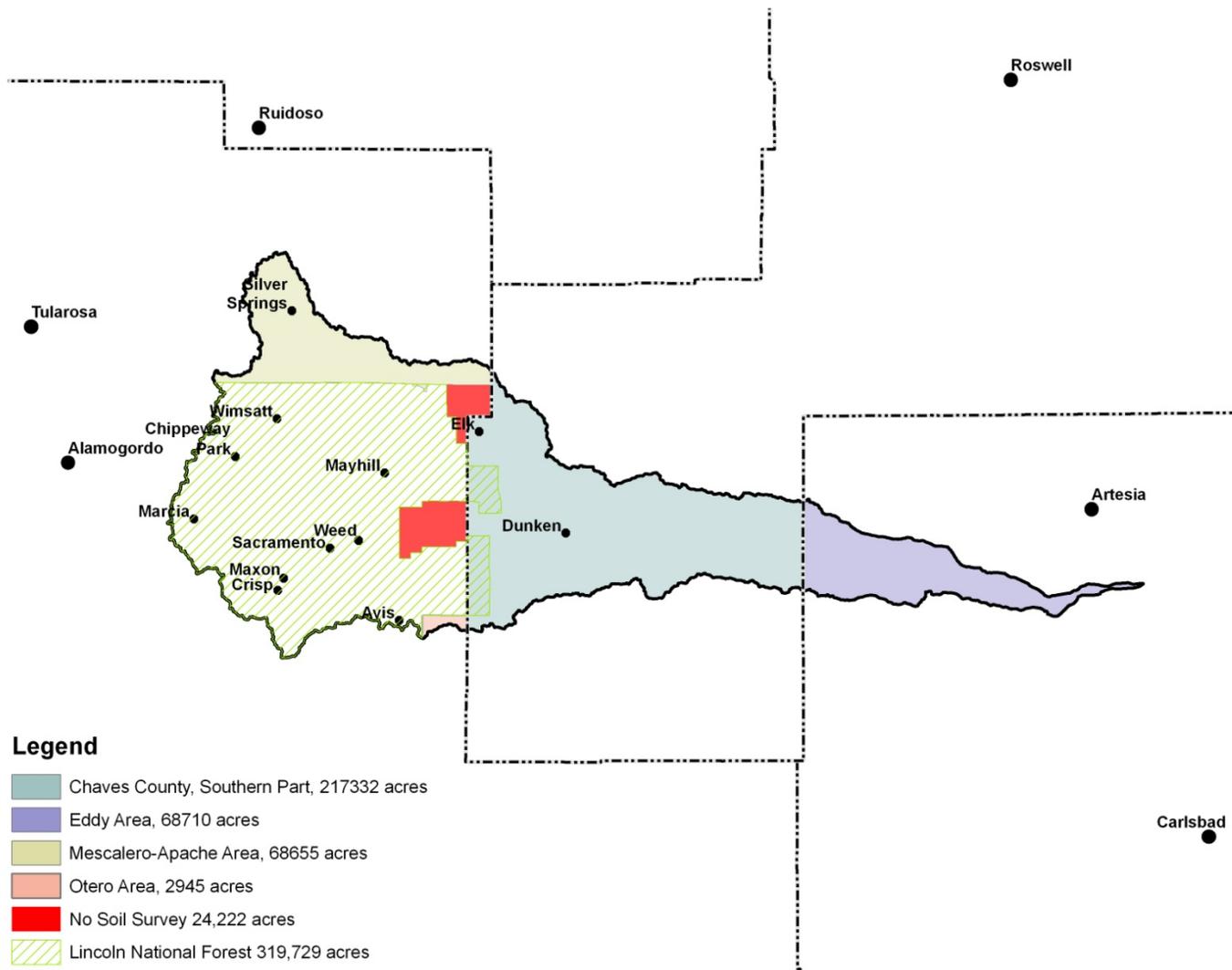
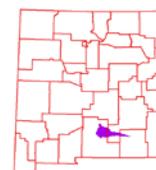


Figure 14. National Cooperative Soil Survey coverage of the Rio Penasco Watershed.

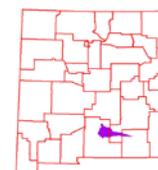


## Soil Resource Inventory

In order to evaluate the susceptibility of erosion within the Rio Penasco 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 map unit 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 -

<u>SSURGO Value</u>	<u>Nominal Description</u>	<u>Model Rank</u>
<b>Saturated Hydraulic Conductivity</b>		
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
<b>Slope %</b>		
0 - 5		0
6 - 10		1
11 - 15		2
16 - 25		3
> 25		4
<b>Soil Loss Tolerance</b>		
5	High Tolerance For loss	0
4	↓	1
3	↓	2
2	↓	3
1	Low Tolerance For Loss	4
<b>Wind Erodibility Group</b>		
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 12. 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. Forest Service Soils are not able to be included in the model at this time.

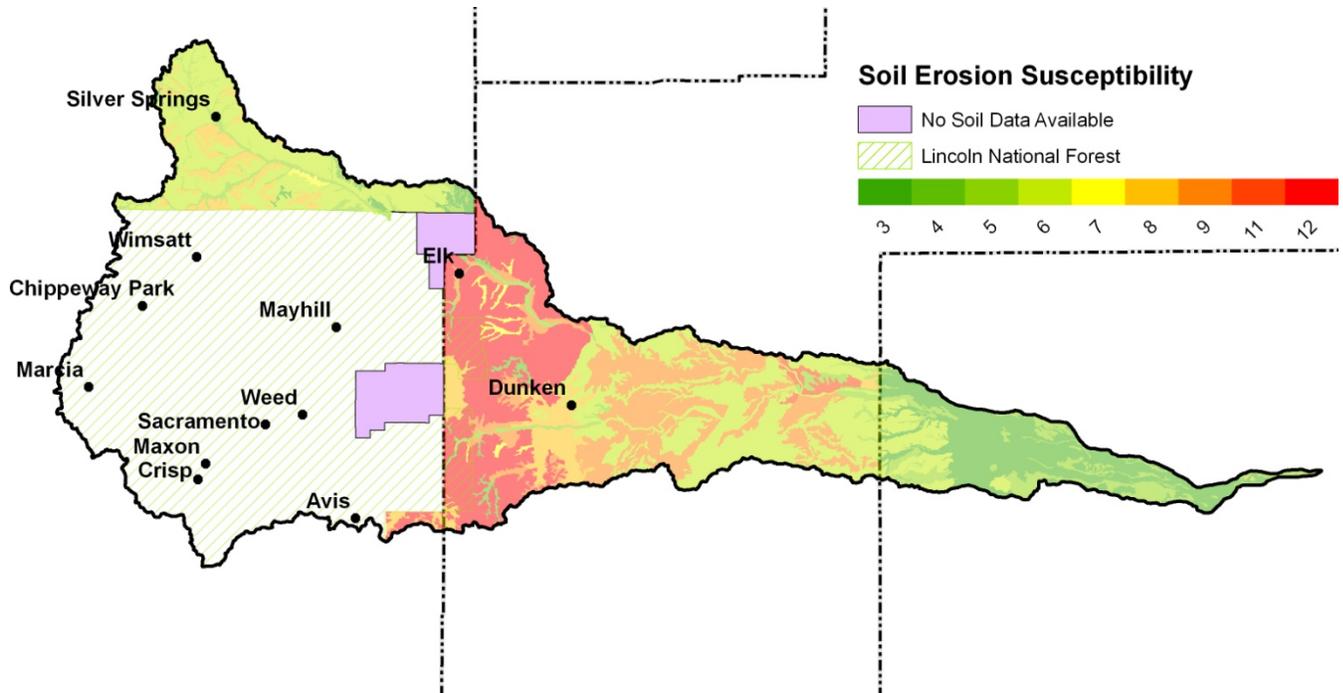
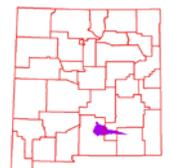


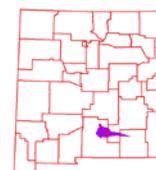
Figure 15. Rio Penasco Watershed Erosion Potential



## Soil Resource Inventory

<b>Rank</b>	<b>Acres</b>
3	44,179
4	4,033
5	30,482
6	119,968
7	3,112
8	27,407
9	54,755
11	2,961
12	70,745
<b>Sum( <math>\Sigma</math> )</b>	<b>357,643</b>

**Table 13. Soil Erosion Potential Model Results. A greater rank indicates greater potential for erosion.**



**Socioeconomic Data** <sup>15</sup>

COUNTY	Total pop: Total	Total pop: Urban	Total pop: Rural	Total Pop.: Rural Farm	Total Pop.: Rural Nonfarm	Total pop: Hispanic or Latino	Total pop: White alone	Total pop: Black or African American alone	Total pop: American Indian and Alaska Native alone	Total pop: Asian alone	Total pop: Native Hawaiian and Other Pacific Islander alone	Total pop: Some other race alone	Total pop: Two or more races	Families: Median family income adj. 2008
Chaves	61,382	47,176	14,206	1,044	47,158	26,904	44,167	1,209	694	323	34	1,019	13,042	28,513
Eddy	51,658	38,836	12,822	675	12,678	20,023	39,438	805	646	231	47	9,129	1,362	36,789
Otero	62,298	44,240	18,058	530	18,595	20,033	45,919	2,440	3,614	728	82	7,273	2,242	34,781

**Table 14. Socioeconomic Data of the Counties in the Watershed (2000).**



## References

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14. Natural Resources Conservation Service – Soil Data Mart <http://soildata mart.nrcs.usda.gov/>
15. United States Census Bureau - <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>

