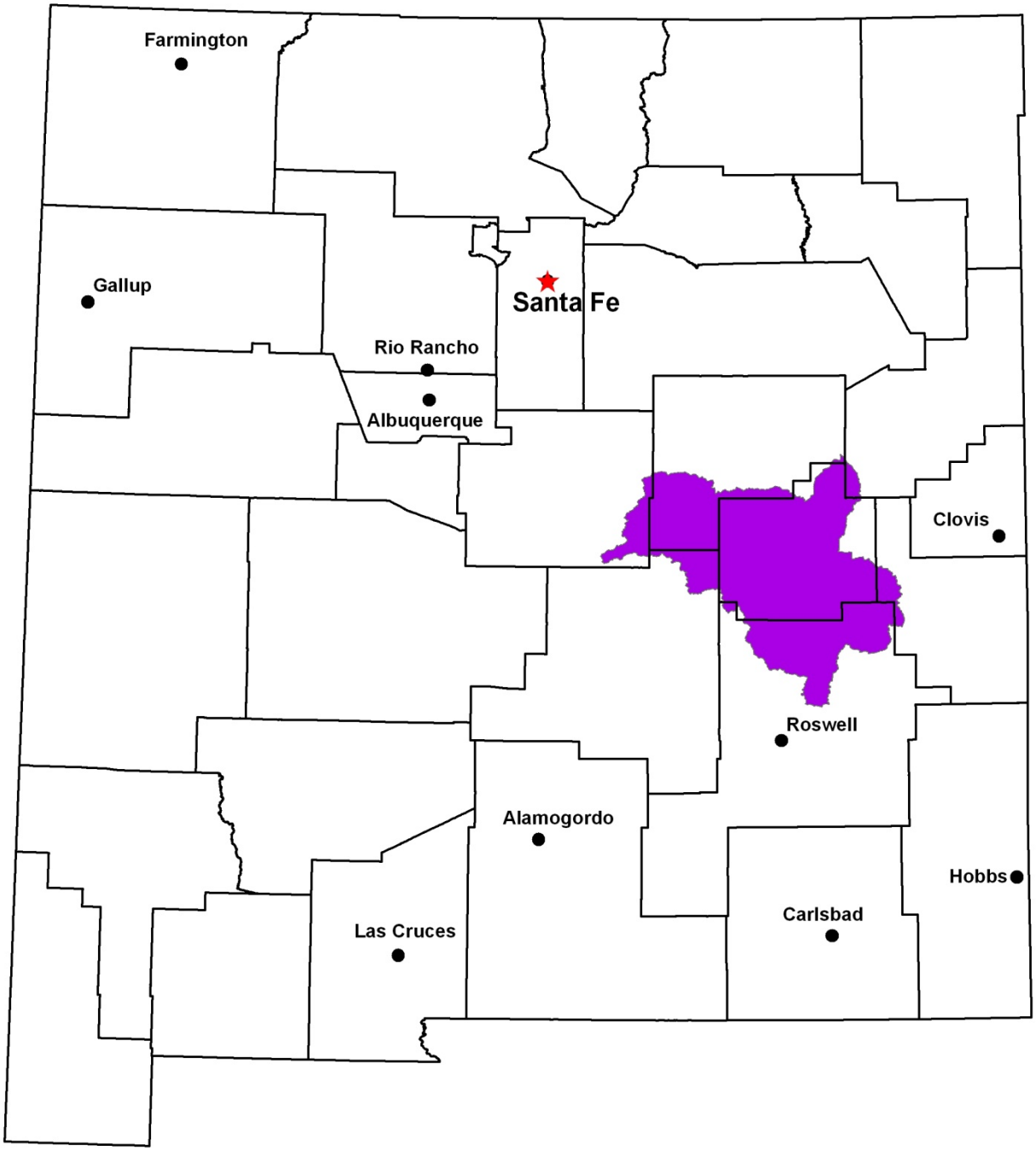
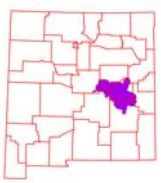
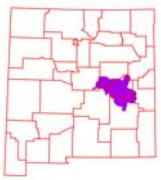


Rapid **W**atershed **A**ssessment
Upper Pecos Watershed





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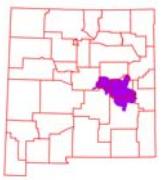

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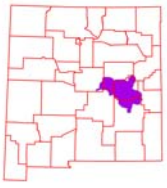


Overview

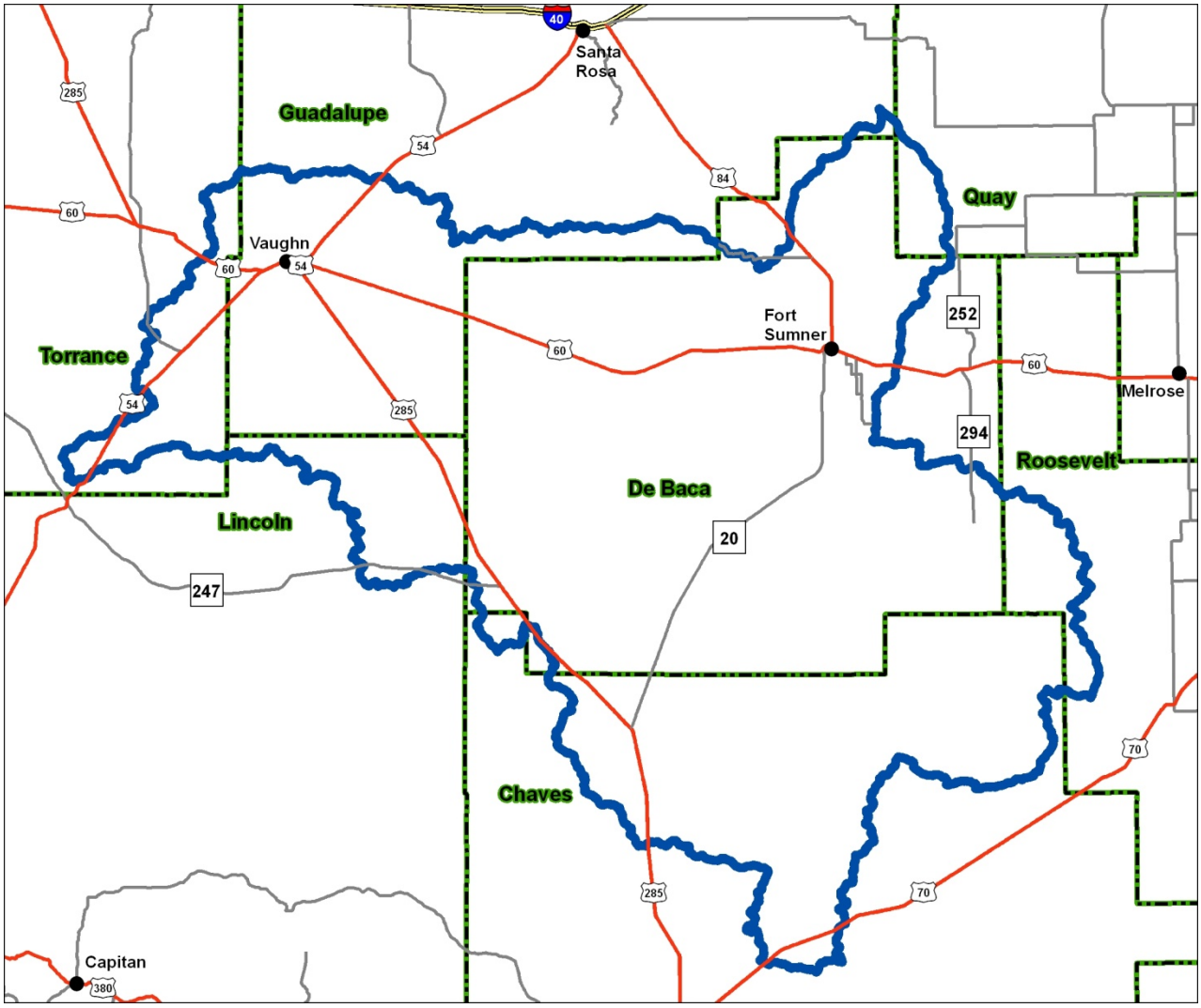
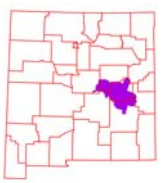


Figure 1. Upper Pecos Watershed Overview

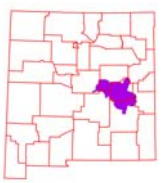


Overview

The Upper Pecos Watershed is located east-central New Mexico. It covers 2,690,883 total acres (10,890 sq. km). Portions of the Upper Pecos watershed extend into Chavez, DeBaca, Guadalupe, Lincoln, Quay, Roosevelt, and Torrance counties. Table 1 summarizes the distribution of the Upper Pecos watershed.

Table 1. Upper Pecos watershed acreage distribution.

	County Acres Total	Acres in HUC	% of HUC in County	% of County in HUC
Chavez	3,885,365	591,565	22	15
DeBaca	1,492,600	1,308,183	49	88
Guadalupe	1,938,748	437,893	16	23
Lincoln	3,089,795	128,856	5	4
Quay	1,843,723	32,664	1	2
Roosevelt	3,772,816	65,845	2	2
Torrance	2,139,990	125,877	5	6
Sum (∑)		2,690,883	100	



Physical Setting

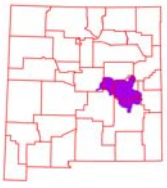
Geology:

The HUC has a northwestern boundary north of Carnero along Berlier Ranch Road. The southern boundary passes just east of Carnero; through Duran Mesa; North Peak; Cameleon Hill; southeast corner of Torrence County; crosses State Highway 247 near the intersection with County Road B041; just north of State Highway 247 and the Lincoln County line; roughly parallels State Highway 285 to the De Baca County line just north of Mesa; crosses State Highway 285 between Stargrass Road and Red Bluff Road; turns southward near Red Bluff Ranch and then to the confluence of Salt Creek and the Pecos River. The northern boundary passes through Mesa Leon; near Twin Wells; intersection of Yucca Road and State Highway 203; Sumner Lake Dam; proceeds northward to east of the intersection of Alamo Road and the De Baca County line; turns southeastward and crosses the Quay County line near County Road 34.5; turns southward to Lone Mesa; charlotte Point; Candy Mesa; through La Lande; the confluence of Taiban Creek and the Pecos River; eastward to Sanders Well; just north of the intersection of Colt Raod and State Highway 294; turns northward to just north of the intersection of James Spring Road and State Highway 294; turns northeastward to cross U.S. Highway 60 & 84 between Tolar and Krider; intersection of North County Road AQ and County Road 17 in Roosevelt County; southwestward to the intersection of North County Road AS and U.S. Highway 60 & 84 in Roosevelt County; southward parallel to North County Road AV in Roosevelt County; just east of the intersection of South County Road 10 and South County Road AT in Roosevelt County; near Jones Well; crosses U.S. Highway 70 between Kenna and Tornero; cuts the corner of Chaves County to South County Road 35 in Roosevelt County; near South Well; proceeds westward to Railroad Mountain Road which it parallels before turning southwestward to Palma Mesa; crosses Ponderosa Road just south of Campbell; then to the confluence of Salt Creek and the Pecos River.

The bedrock is predominantly Permian Period limestones, dolomite and sandstone. The limestone is porous and has many sinkholes. Caliche also forms on the ground surface. These slope eastward down into the Pecos River Valley. Tertiary Ogallala formation occurs in the northwestern part of the watershed. Triassic Period Santa Rosa sandstone occurs near Sumner Lake. The valleys contain Quaternary Period alluvium deposits and older alluvial deposits of the piedmont and upland plains. East of the Pecos River the watershed contains Quaternary eolian deposits.

Resource concerns are high sediment erosion. In addition the lowering of valleys by river incision is a continuing process. 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 in the limestone 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:

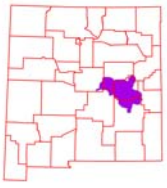
Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.
The soils in the Upper Pecos 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.



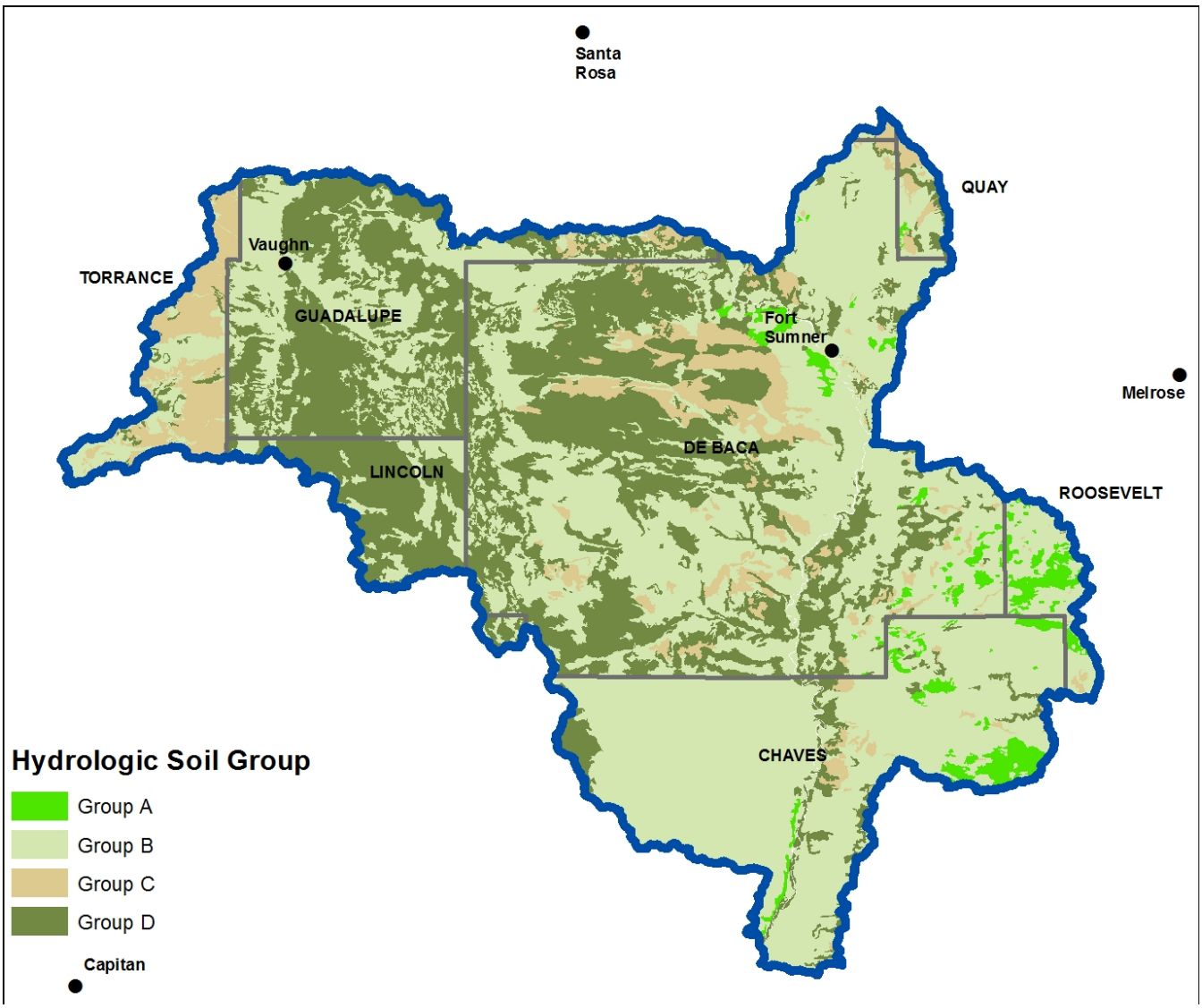
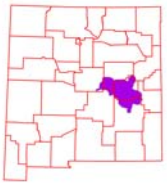


Figure 2. Hydrologic Soil Groups



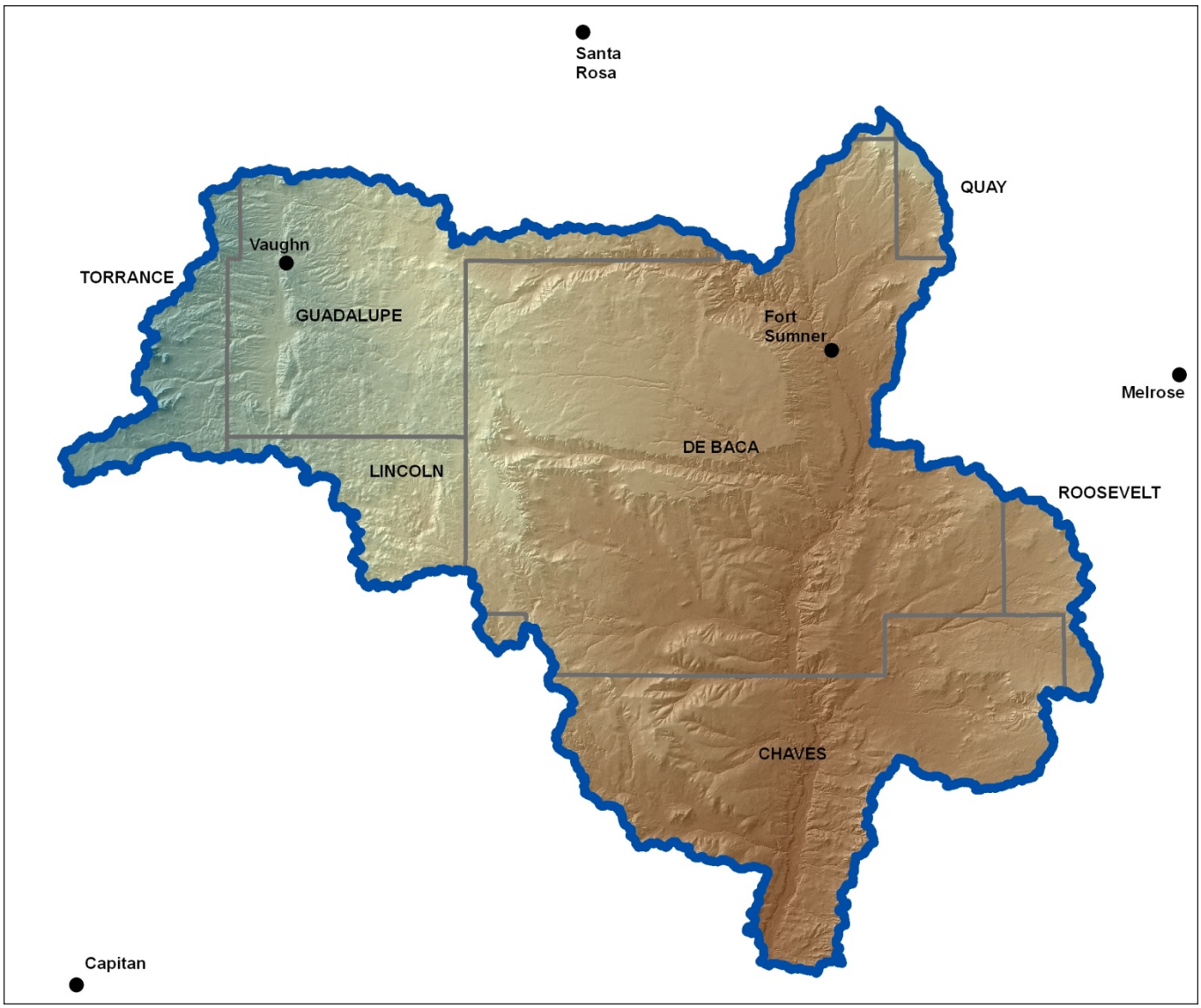
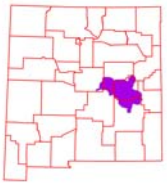


Figure 3. Upper Pecos Watershed Shaded Relief



Precipitation [1]

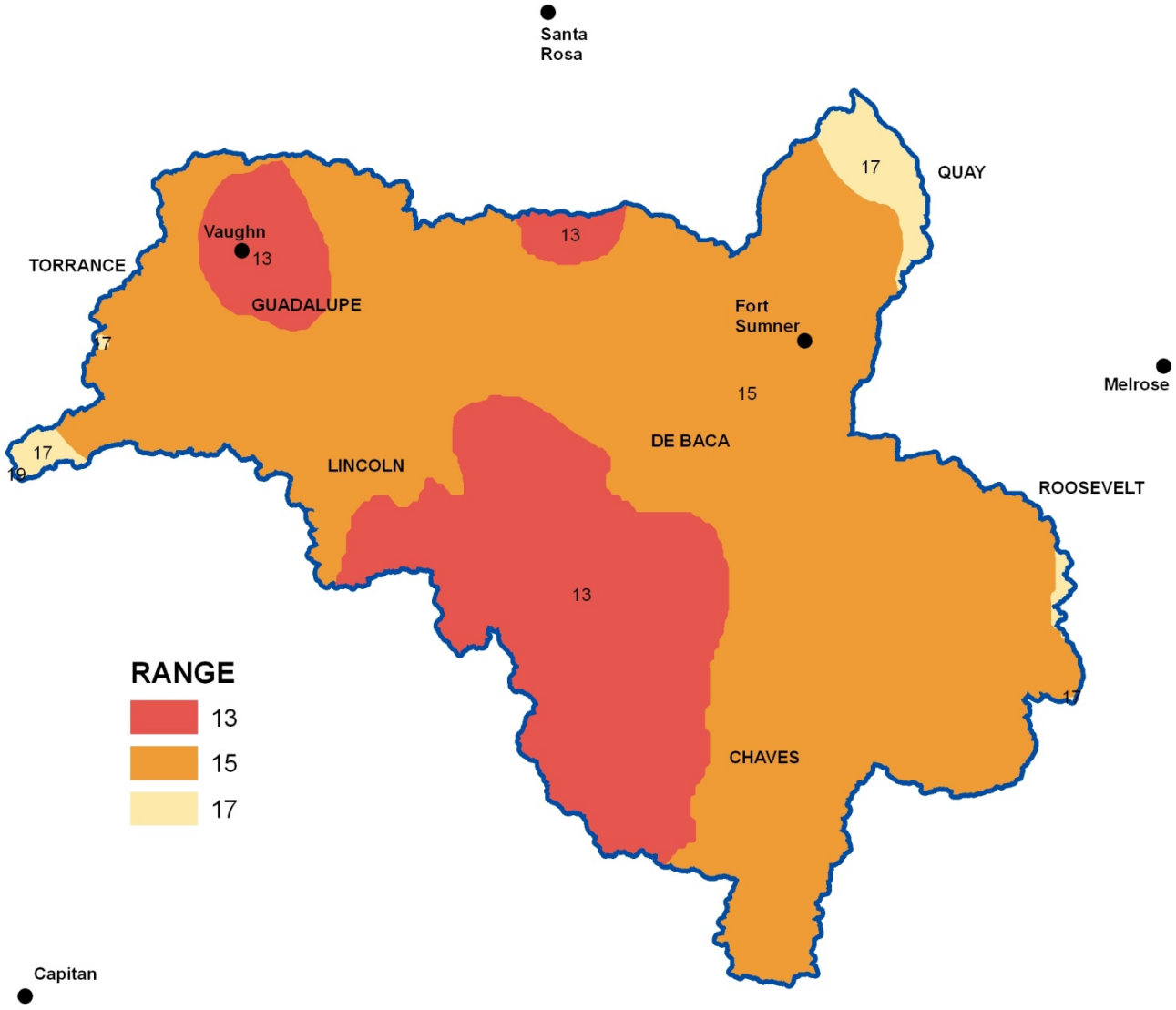
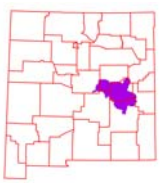


Figure 4. Upper Pecos Watershed Annual Precipitation.



Land Ownership [2]

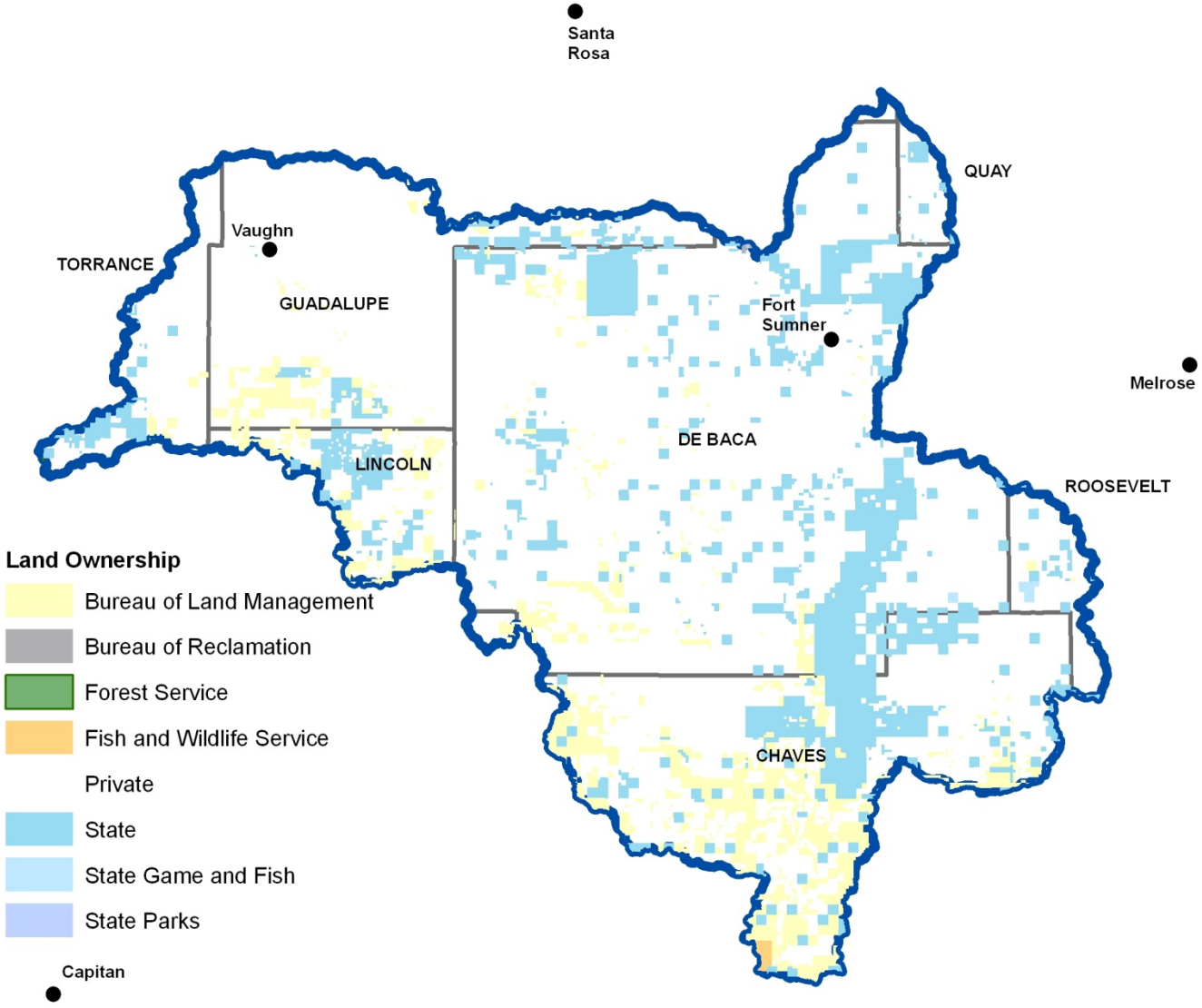
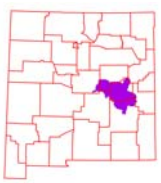


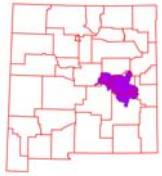
Figure 5. Upper Pecos Watershed Land Ownership.



Land Ownership

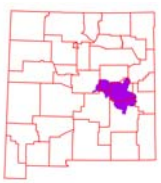
COUNTY	BLM	BoR	FS	FWS	Private	State	State Game & Fish	State Parks
Chavez	127,826			2,343	350,437	110,959		
DeBaca	35,062	295			1,057,552	214,577	630	67
Guadalupe	26,383				391,424	20,086		
Lincoln	23,616				77,943	27,297		
Quay					28,502	4,162		
Roosevelt	722				57,907	5,448	1,768	
Torrance	3,184		10		109,469	13,214		
Watershed (∑)	216,793	295	10	2,343	2,073,234	395,743	2,398	67
% Watershed	8	<1	<1	<1	77	15	<1	<1

Table 2. Land ownership in the Upper Pecos watershed.



Land Use / Land Cover [3, 4]

Figure 6. Subset of the National Land Cover Dataset over the Upper Pecos Watershed.

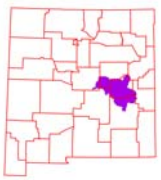


Land Use / Land Cover

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
Grasslands, Herbaceous	1,859,248	69%
Shrubland	795,055	30%
Low Intensity Residential	11,382	< 1%
Row crops	10,941	< 1%
Evergreen Forest	3,035	< 1%
Emergent Herbaceous Wetlands	3,014	< 1%
Bare Rock/Sand/Clay	2,768	< 1%
Open Water	2,065	< 1%
High Intensity Residential	1,542	< 1%
Woody Wetlands	1,471	< 1%
Commercial/Industrial/Transportation	289	< 1%
Pasture/Hay	6	< 1%

Table 3. Extent of NLCD classes in the Upper Pecos watershed.



Land Use / Land Cover

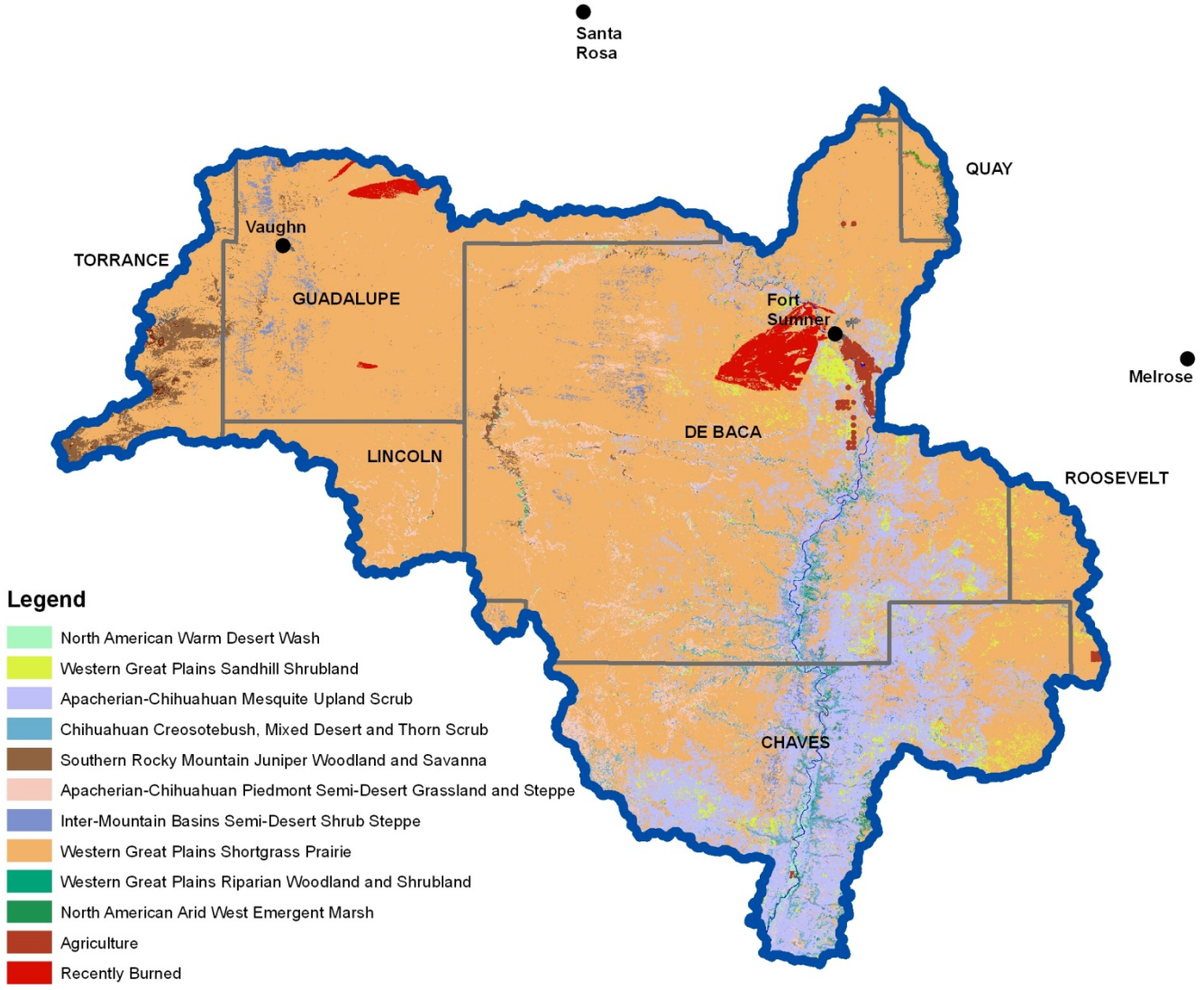
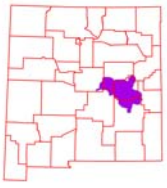


Figure 7. Subset of the SWREGAP over the Upper Pecos Watershed. The 12 dominant ecosystems are displayed in the legend.

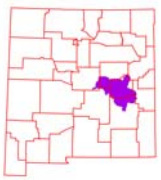


Land Use / Land Cover

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
Western Great Plains Shortgrass Prairie	1,943,312	72
Apacherian-Chihuahuan Mesquite Upland Scrub	368,803	14
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	98,794	4
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	58,475	2
Western Great Plains Sandhill Shrubland	53,306	2
Southern Rocky Mountain Juniper Woodland and Savanna	40,260	1
Inter-Mountain Basins Semi-Desert Shrub Steppe	39,297	1
Recently Burned	36,692	1
Agriculture	11,015	< 1
Western Great Plains Riparian Woodland and Shrubland	5,696	< 1
North American Arid West Emergent Marsh	5,559	< 1
North American Warm Desert Wash	4,722	< 1
Open Water	4,120	< 1
Southern Rocky Mountain Pinyon-Juniper Woodland	3,375	< 1
Colorado Plateau Mixed Low Sagebrush Shrubland	2,955	< 1
Western Great Plains Cliff and Outcrop	2,675	< 1

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 4,123 miles (6,635 km) of water courses in the Upper Pecos River Watershed. The majority of these courses typically flow intermittently in summer months during periods associated with high intensity convective thunderstorms.

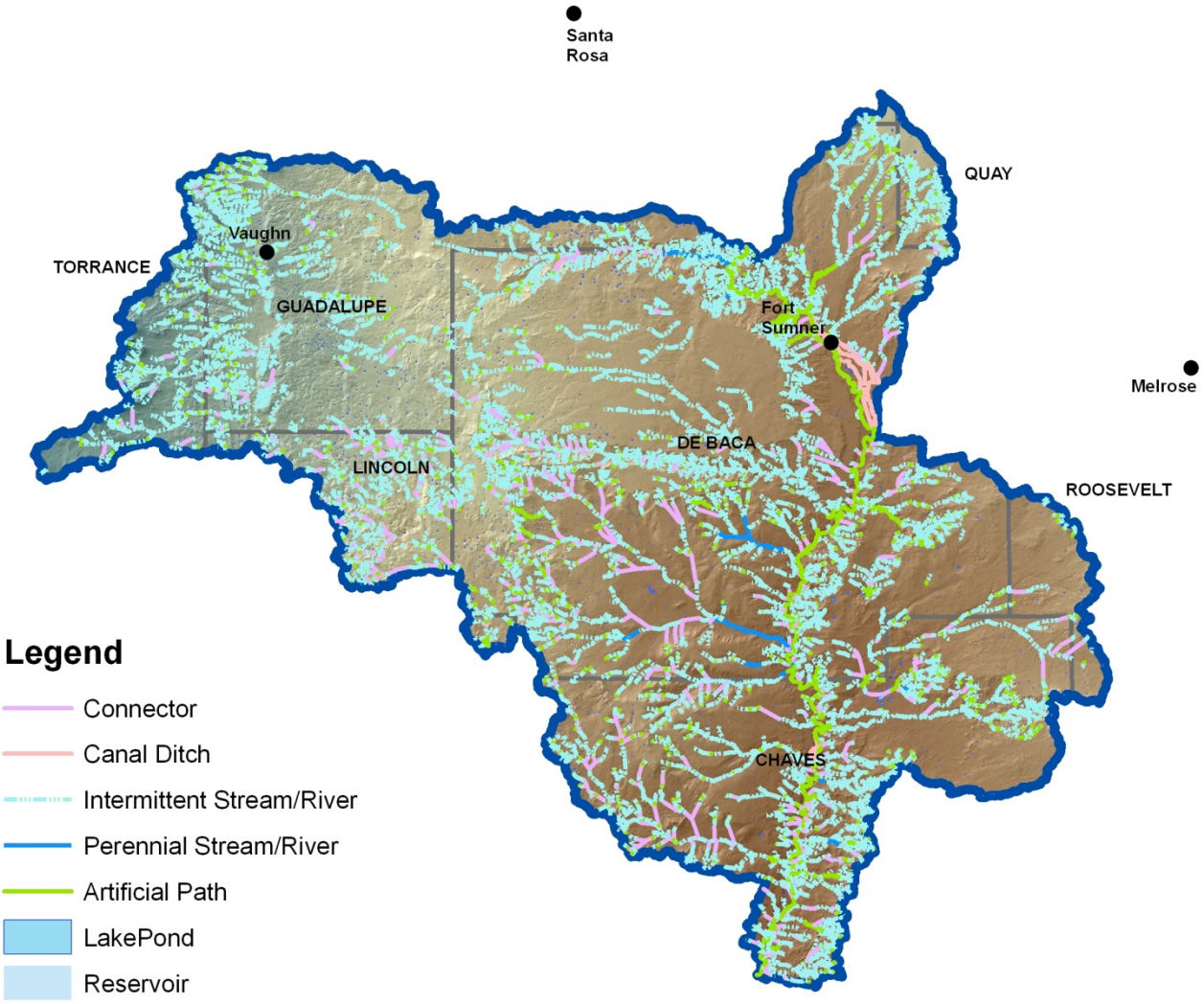
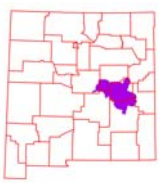
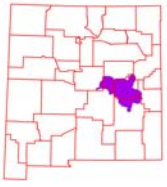


Figure 8. National Hydrologic Dataset (NHD) of the Upper Pecos.



Water Course Type	Miles
Artificial path	248
Connector	317
Canal / Ditch	44
Intermittent Stream / River	3,476
Perennial Stream / River	38
Sum (∑)	4,123

Table 5. NHD Water Course Type and Extents



There are 22 water gauging stations in the watershed. USGS Site 08385648 is at the southern end of the watershed on the Pecos River above Acme, NM. During the period 1993 – 1999, this site has had mean annual discharge of 185 cubic feet per second ranging from 121.6 (1999) to 245.6 (1998) cubic feet per second.

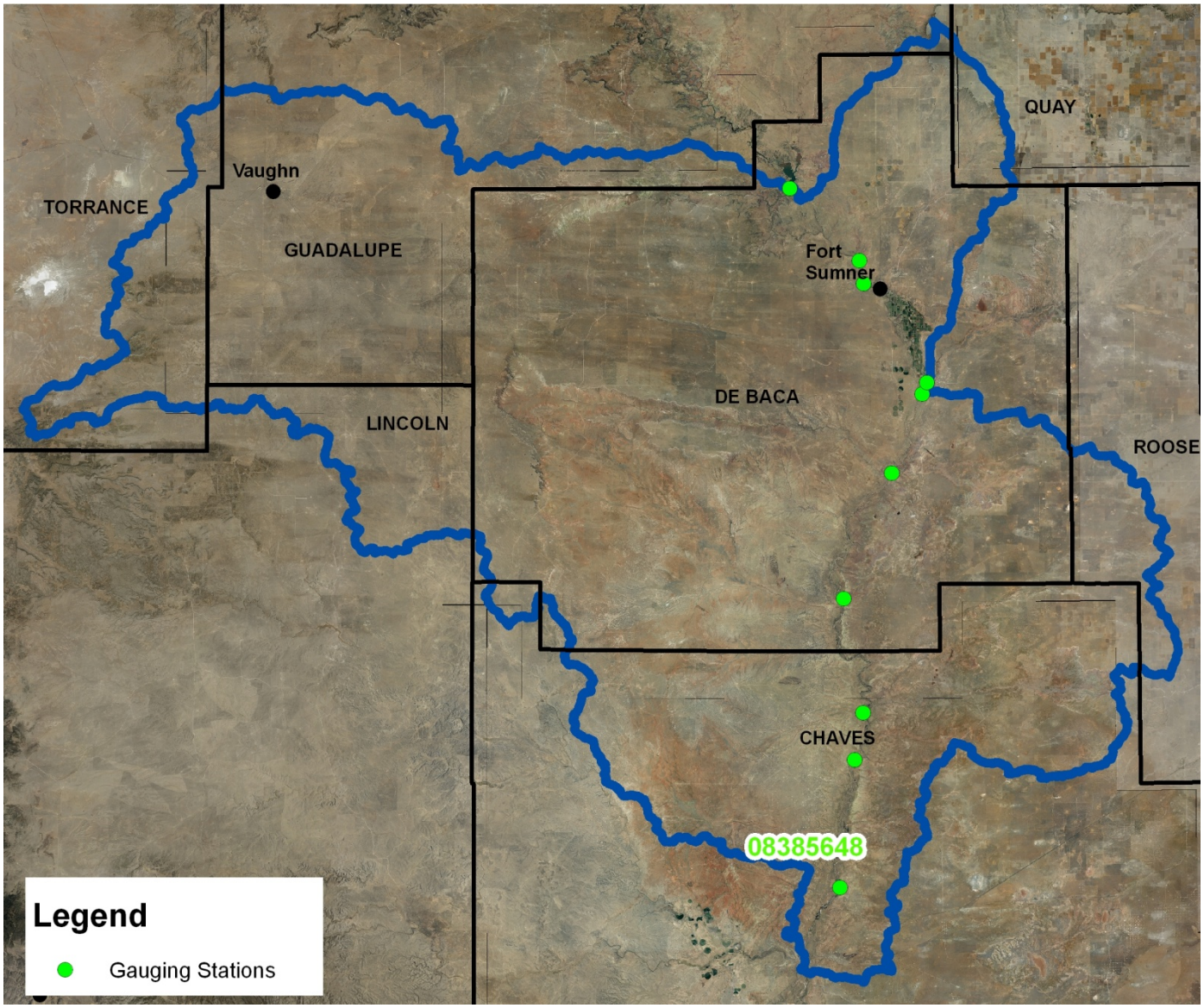
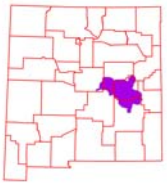


Figure 9. Gauging Stations in the Upper Pecos Watershed



Hydrology

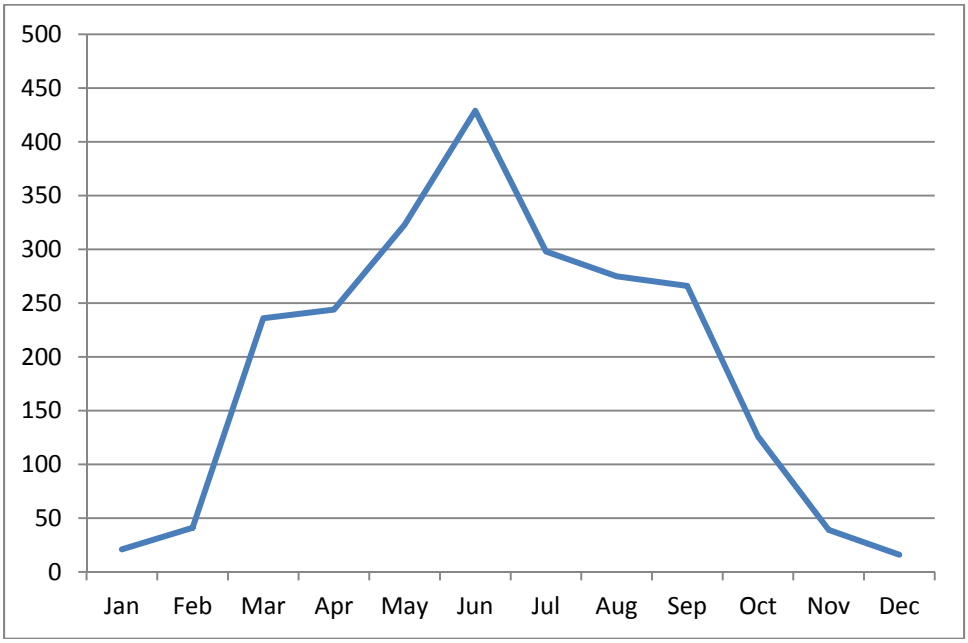
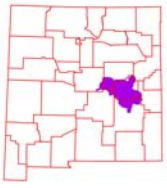


Figure 10. Monthly Average of Mean Daily Flow on the Pecos River above Acme, NM. Period of observation: 1993-1999.



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 Upper Pecos watershed as part of the Rio Grande River Basin.

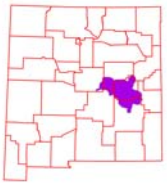
The Upper Pecos watershed has no lakes designated as impaired, and the following reach listed as 303 (d) Impaired Surface Waters:

1. Pecos River (Salt Creek to Sumner Reservoir)

The listed uses for this reach have been designated in Table 6.

Use	**Pecos River** (Salt Creek to Sumner Reservoir)
high quality coldwater aquatic life	
marginal coldwater aquatic life	
Irrigation/irrigation storage	X
domestic water supply	
livestock watering	X
wildlife habitat	X
marginal warmwater aquatic life	NS
Primary contact	
secondary contact	X
Fish culture	
Limited Aquatic Life	
Industrial Water Supply	
Municipal Water Supply	

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



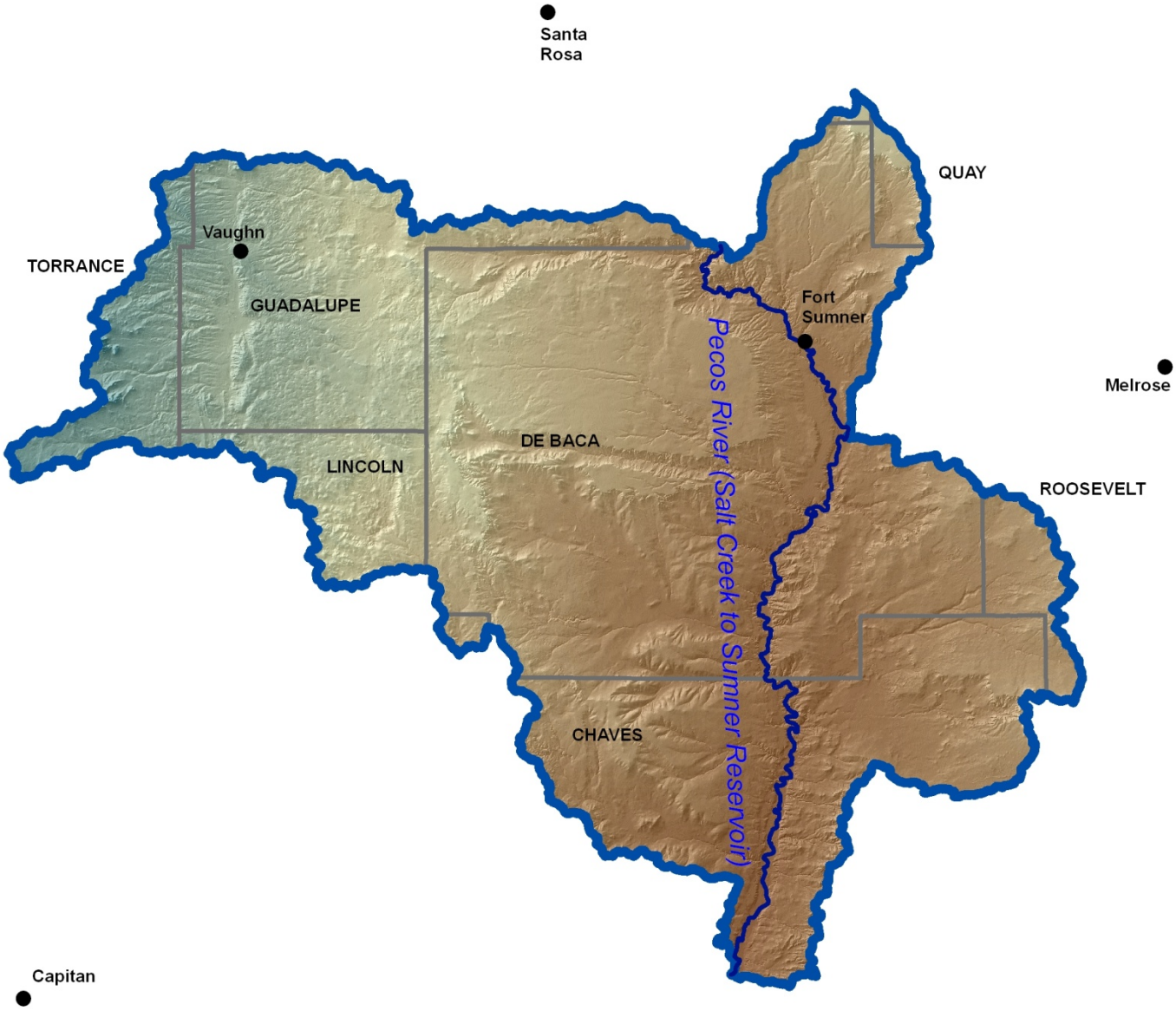
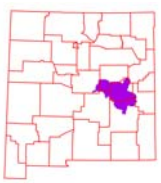


Figure 11. 303 (d) Impaired Waters



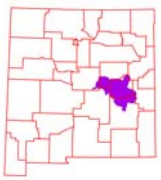
Hydrology

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.

The river and stream reaches total 115 miles (185 km). There are no listed water bodies.

Probable Causes of Impairment	**Pecos River** (Salt Creek to Sumner Reservoir)
Aluminum	
Benthic-Macroinvertebrate Bioassessments	
Copper	
Dissolved Oxygen	×
Total Fecal and Coliform	
Gross Alpha - Adjusted	
Mercury	
Nutrient/Eutrophication	
PCB's	
Sedimentation/Siltation	
Specific Conductance	
Temperature	
Turbidity	
Zinc	
Ammonia (Un-ionized)	
Nitrogen, Nitrate	
Arsenic	

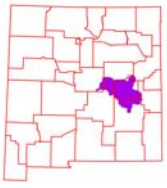
Table 7. Possible Causes of Impairment



Hydrology - Declared Groundwater Basins

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 Upper Pecos watershed is within two Underground Water Basins: the Fort Sumner and the Roswell Artesian.

Groundwater Basin	Acres in Basin	Watershed Acres	% of Declared Basin
Fort Sumner	3,148,831	1,978,441	63
Roswell Artesian	6,920,505	713,290	10



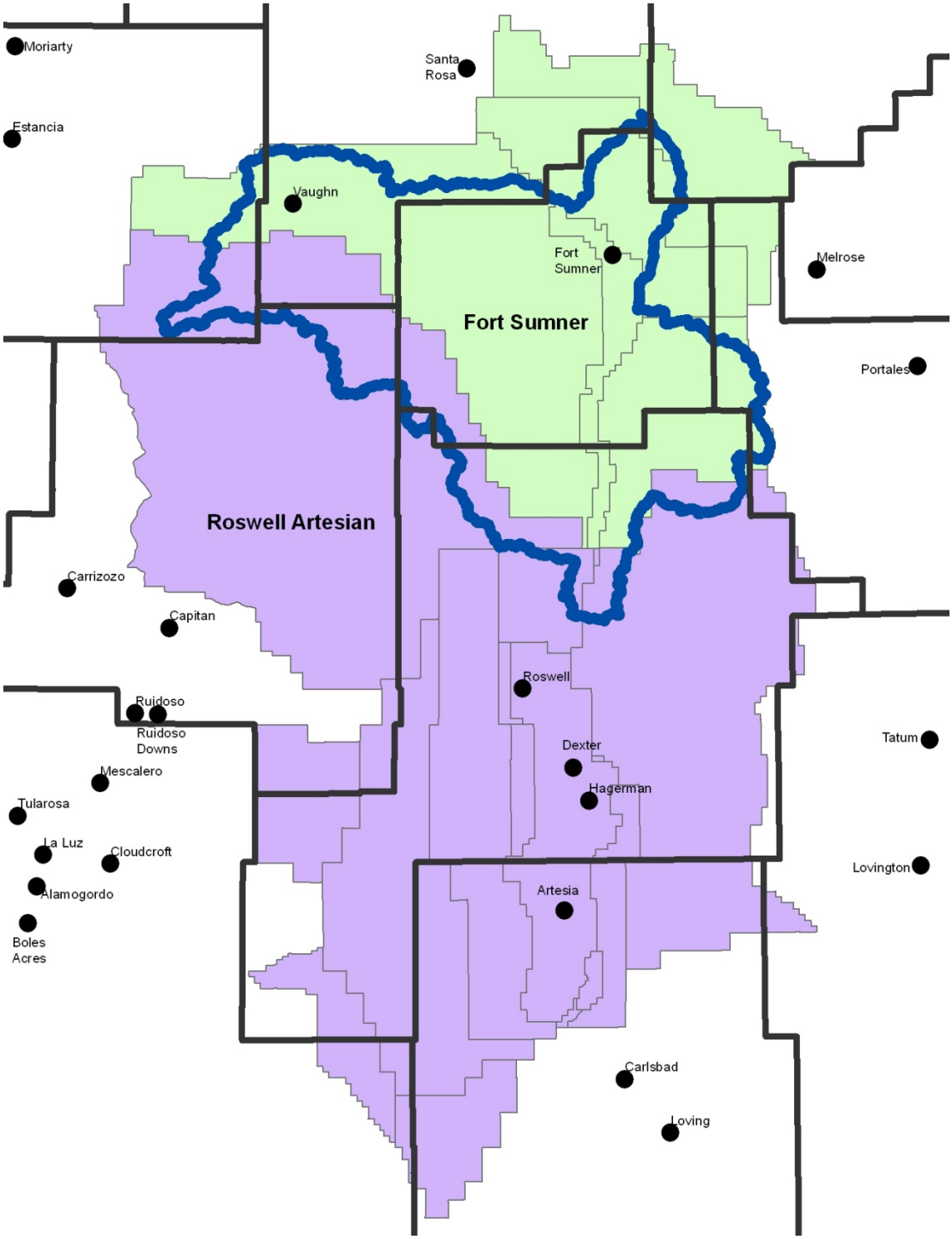
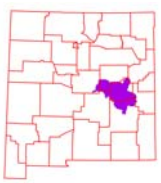


Figure 12. Declared Groundwater Basins of the Upper Pecos.

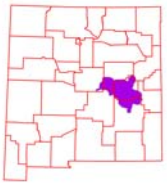


Threatened and Endangered Species [10]

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 7 lists those species which are currently listed and tracked in the Upper Pecos River Watershed.

Common Name	Scientific Name	Tax.Class	Family	Fed Status	State Status
Mexican Tetra	*Astyanax mexicanus*	Actinopterygii	Characidae		T
Arkansas River Shiner	*Notropis girardi*	Actinopterygii	Cyprinidae		E
Pecos Bluntnose Shiner	*Notropis simus pecosensis*	Actinopterygii	Cyprinidae	LE	E
Rio Grande Silvery Minnow	*Hybognathus amarus*	Actinopterygii	Cyprinidae	LE	E
Suckermouth Minnow	*Phenacobius mirabilis*	Actinopterygii	Cyprinidae		T
Pecos Pupfish	*Cyprinodon pecosensis*	Actinopterygii	Cyprinodontidae		T
Bigscale Logperch	*Percina macrolepida*	Actinopterygii	Percidae		T
Pecos Gambusia	*Gambusia nobilis*	Actinopterygii	Poeciliidae	LE	E
Baird's Sparrow	*Ammodramus bairdii*	Aves	Emberizidae		T
Mexican spotted owl	*Strix occidentalis lucida*	Aves	Strigidae	LT	
Bell's Vireo	*Vireo bellii*	Aves	Vireonidae		T
Sand Dune Lizard	*Sceloporus arenicolus*	Reptilia	Phrynosomatidae	PE	E

Table 7. Threatened and Endangered Plant and Animal Species.

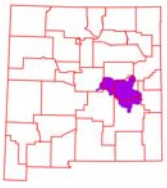


Invasive Species [11]

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 Upper Pecos watershed, the SWEMP has identified 6 species of invasive plants (Table 8). Each of these species is defined as non-native by the USDA PLANTS database.

Scientific Name	Common Name
Zygophyllaceae **(Caltrop Family)**	**African Rue**
Fabaceae **(Pea Family)**	**Camelthorn**
Scrophylariaceae **(Figwort Family)**	**Dalmatian Toadflax**
Brassicaceae **(Mustard Family)**	**Hoary Cress (Whitetop)**
Asteraceae **(Sunflower Family)**	**Musk Thistle**
Asteraceae **(Sunflower Family)**	**Russian Knapweed**

Table 8. Invasive Species Recognized by the SWEMP.



Common Resource Areas[12]

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.

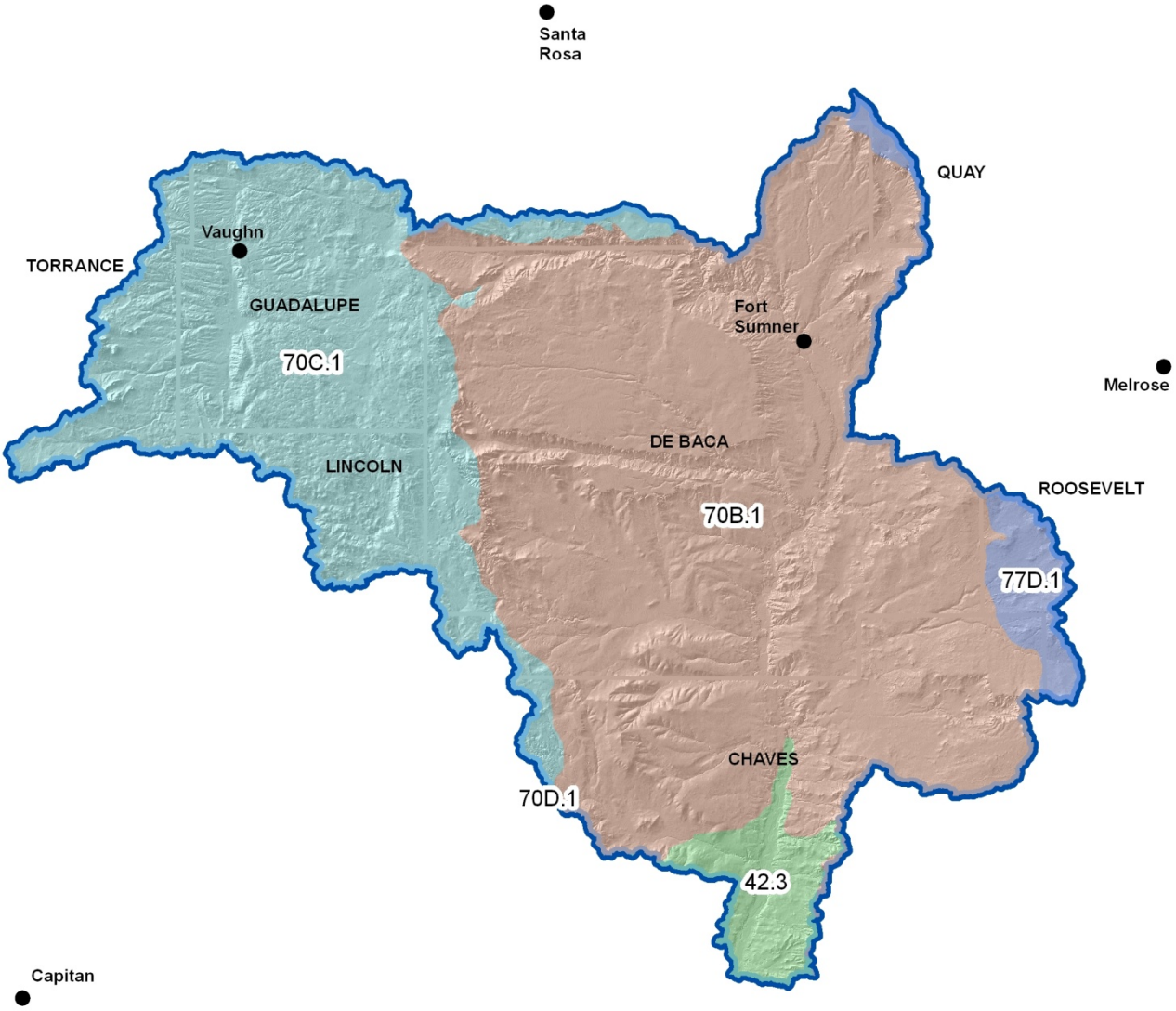
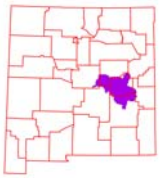


Figure 13. Common Resource Areas of the Pecos Watershed



48.1 – 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.

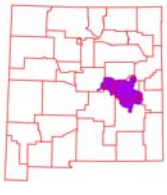
49.1 – Southern Rocky Mountain Foothills
This area is generally a transition between the Great Plains and the Southern Rocky Mountains. The temperature regime is mesic or frigid, and moisture regime is ustic. Characteristic native vegetation ranges from grasslands and shrubs to ponderosa pine and Rocky Mountain Douglas fir forest.

70A.1 – Northern New Mexico Highlands
This unit is characterized by broad, rolling plains broken by closed basins and drainageways that have smooth-shaped valley floors. Rugged breaks are common in the northern part of the area. Native vegetation is mid- to short-grass prairie species in the lowlands, with pinyon and juniper in the higher elevations and on the breaks. The soils are formed in weathered sedimentary rocks of Cretaceous age and igneous rocks of Tertiary and Quaternary age.

70B.1 - Central Pecos Valleys and Plains
This unit is characterized by broad, rolling piedmonts, plains, and tablelands broken by drainageways and tributaries of the Pecos River. Native vegetation is mid- to short-grass prairie species in the lowlands, with pinyon and juniper in the higher elevations and on steeper north-facing slopes. Current land use is predominantly livestock grazing. The soils formed in material weathered from sedimentary rocks of Cretaceous age.

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)

77D.1 - High Plains, Southwestern Part
This area is characterized by nearly level to gently undulating plains with scattered playa depressions. Soil temperature regime is thermic and soil moisture regime is aridic bordering on ustic. Sandy and loamy soils are generally well drained and range from shallow to deep and medium- to coarse-textured. Native vegetation is short- to mid-grasses and sandy sites support tall-grasses with sand shin oak and mesquite. Current land use is mainly rangeland, although irrigated cropland is expanding.

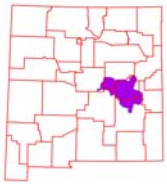


Conservation [13]

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.

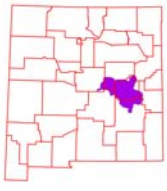
Conservation Practice	2007		2008		2009		2010		2011		TOTAL	
	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres
Access Control			16	5474	8	2737	8	2737	12	3528	44	14476
Brush Management	74	22696	53	17993	12	7155	59	28568	27	9480	225	85892
Conservation Cover			16	5474	8	2737	8	2737	15	3855	47	14803
Conservation Crop Rotation	52	375	33	374	88	2542	27	179	25	344	225	3814
Critical Area Planting			2	2			3	23			5	25
Forage Harvest Mgmt	52	377	33	374	69	581	27	179	17	244	198	1755
Integrated Pest Management	52	375	33	374	86	4260	32	1476	24	338	227	6823
Irrigation Water Mgmt	52	375	32	312	96	2687	27	179	24	340	231	3893
Irrigation Land Leveling	9	105	2	39	8	167	9	123	4	39	32	473
Nutrient Management	51	373	33	394	82	1795	27	179	25	344	218	3085
Prescribed Grazing	98	242577	184	322288	154	229970	105	122814	212	467466	753	1385115
Residue Management					19	1960			7	94	26	2054
Restoration and Mgmt of Rare and Declining Habitats			8	2737	8	2279	8	2737	11	3367	35	11120
Upland Wildlife Habitat Management	87	229541	172	319027	148	224329	97	110992	205	434305	709	1318194
Enhancement – Habitat Management	8	98001									8	98001
SUM (∑)	535	594795	617	674862	786	483199	437	272923	608	923744	2983	2949523

Table 9. 5 year Trends in Applied Conservation Practices. Reported in Acres.



Conservation Practice	2007		2008		2009		2010		2011		TOTAL	
	#	Feet	#	Feet	#	Feet	#	Feet	#	Feet	#	Feet
Conservation Completion Incentive First Year	10		1								**11**	
Diversion	1	335					1	1272			**2**	**1607**
Fence	14	113896	14	74303	10	85743	11	57484	8	40183	**57**	**371609**
Grade Stabilization Structure					1		2		3		**6**	
Irrigation Water Conveyance, Ditch and Canal Lining, plain concrete	18	9222	10	5949	7	3796	14	6049	13	4691	**62**	**29707**
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	8	2950	3	1591	3	1392	3	2809	3	2143	**20**	**10885**
Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic	1	20	1	4968							**2**	**4988**
Pipeline	16	130822	4	25540	16	95808	15	70879	7	39182	**58**	**362231**
Pumping Plant	3		3				4		3		**13**	
Structure for Water Control	16		18		11		15		15		**75**	
Water Well	2		2		3				5		**12**	
Watering Facility	26		11		16		20		28		**101**	
Wildlife Watering Facility			5		3						**8**	
Windbreak/Shelterbelt Establishment	1	270			3	921	2	2134			**6**	**3325**
SUM (∑)	**116**	**257515**	**72**	**112351**	**73**	**187660**	**87**	**140627**	**85**	**86199**	**433**	**784352**

Table 10. 5 Year Trends in Location Specific Applied Conservation Practices. Reported in Feet if Linear (i.e. Fence)



Soil Resource Inventory [14]

The Upper Pecos Watershed has a number of certified National Cooperative Soil Survey (NCSS) inventories, and is completely covered by soil surveys.

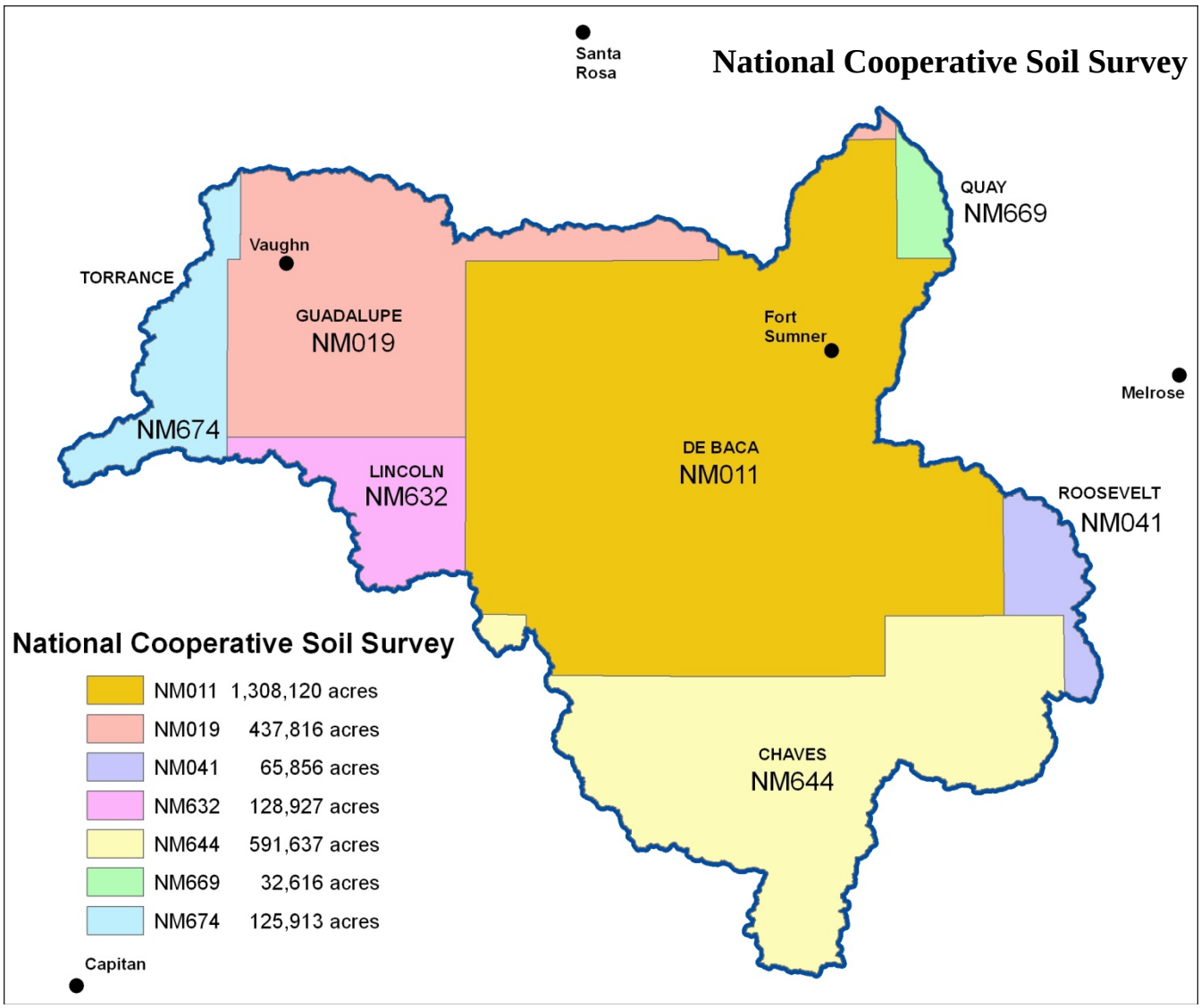
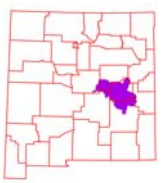


Figure 14. National Cooperative Soil Suvey of Upper Pecos

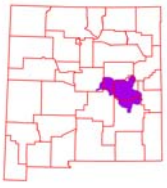


Soil Resource Inventory

In order to evaluate the susceptibility of erosion within the Upper Pecos 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 11. 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.

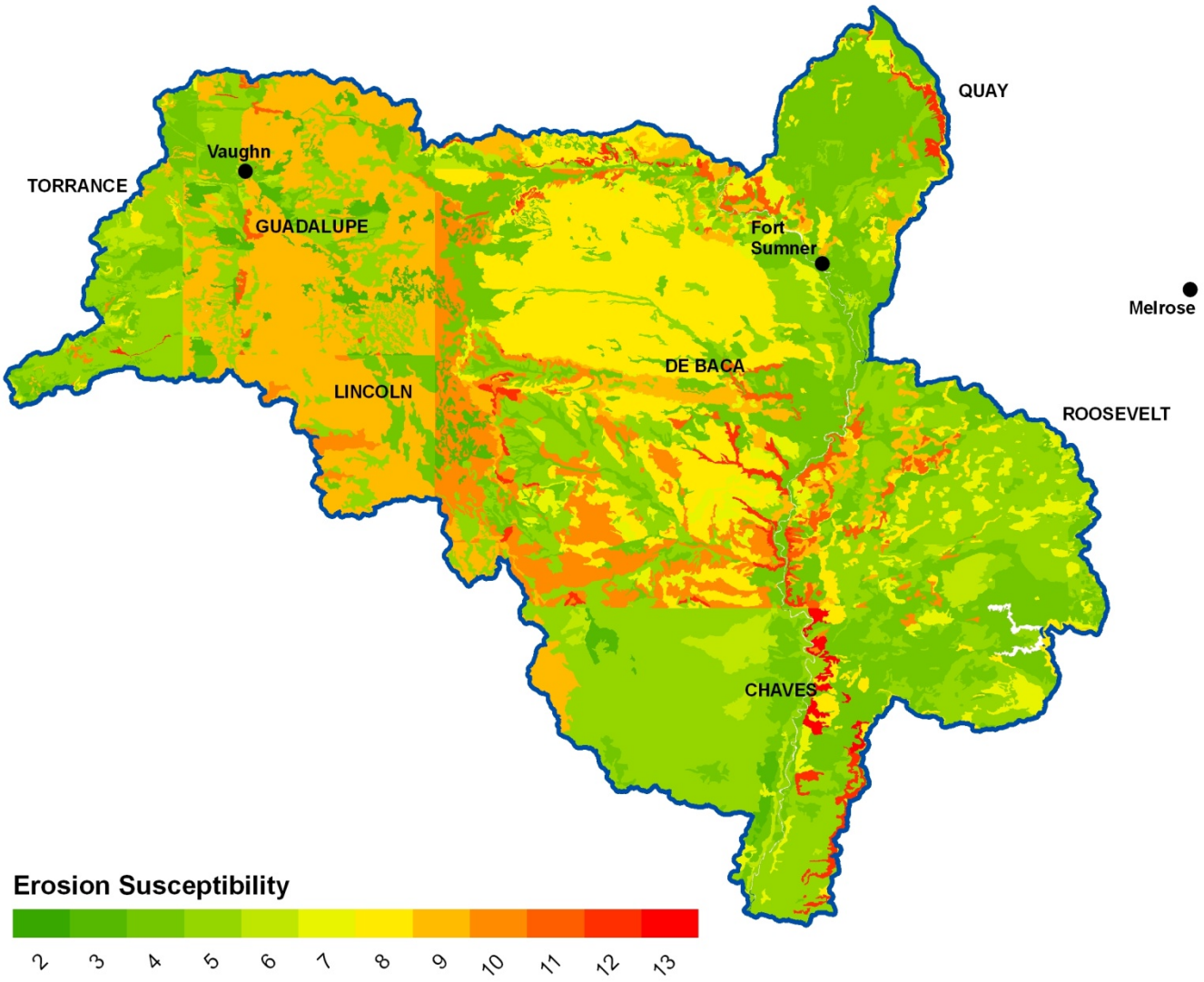
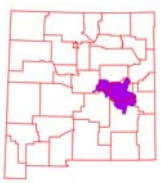


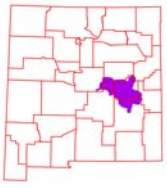
Figure 15. Erosion Potential of the Upper Pecos Watershed



Soil Resource Inventory

Rank	Acres
2	25
3	56,617
4	617,929
5	801,223
6	60,898
7	104,791
8	391,078
9	410,243
10	162,074
11	35,172
12	34,239
13	8,737
Sum(∑)	2,683,026

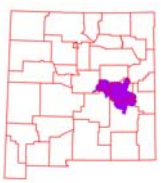
Table 12. Soil Erosion Potential Model Results. A greater rank indicates greater potential for erosion.



Socioeconomic Data [15]

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 (estimate)
Chavez	65,645	34,139	46,518	1,323	814	414	52	14,399	2,125	$34,325
De Baca	2,022	779	1,766	3	13	1	0	160	79	NA
Guadalupe	4,687	3,730	3,298	79	90	62	0	1,004	154	NA
Lincoln	20,497	6,110	17,439	96	489	75	10	1,880	508	NA
Quay	9,041	3,834	7,781	103	113	88	4	648	304	NA
Roosevelt	19,846	7,913	15,252	364	253	175	5	3,164	633	NA
Torrance	16,383	6,399	12,460	219	383	71	8	2,535	707	NA

Table 13. Socioeconomic Data of the Counties in the Watershed (2010).



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6. UNITED STATES GEOLOGICAL SURVEY - http://waterdata.usgs.gov/nwis/rt

7. State of New Mexico Environment Department - ftp://ftp.nmenv.state.nm.us/www/swqb/303d-305b/2010/USEPA-Approved303dList.pdf

8. United States Environmental Protection Agency - http://cfpub.epa.gov/surf/huc.cfm?huc_code=13060003

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13. Natural Resources Conservation Service – Performance Results System http://ias.sc.egov.usda.gov/PRSHOME/

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15. United States Census Bureau - http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml