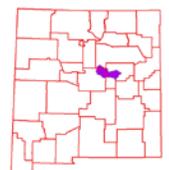


Rapid Watershed Assessment Pintada Arroyo Watershed



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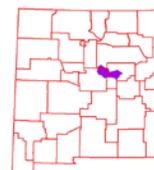


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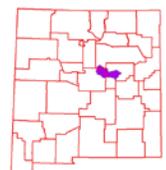
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Overview

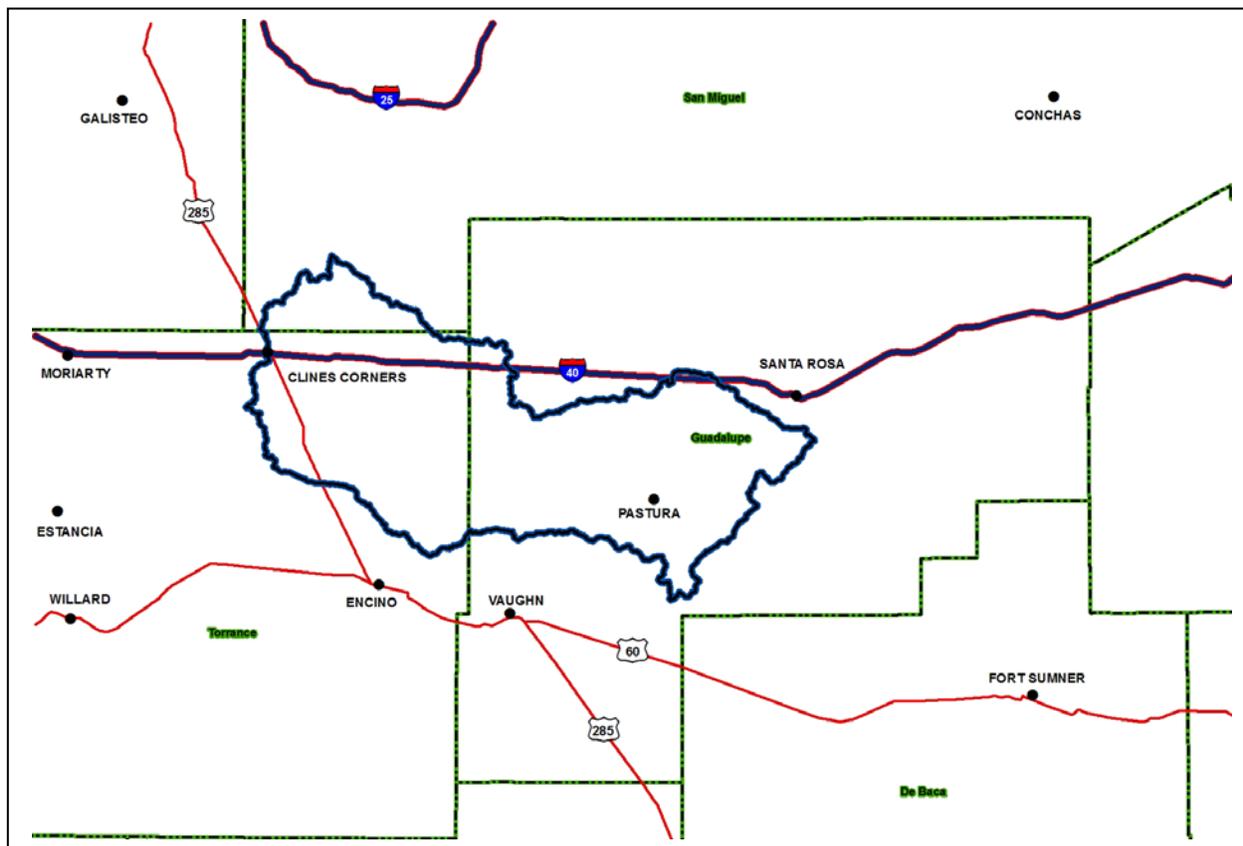
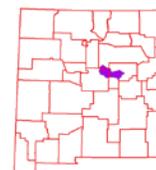


Figure 1. Pintada Arroyo watershed overview.

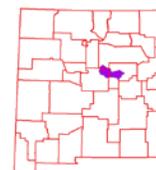


Overview

The Pintada Arroyo Watershed is located in east central New Mexico and covers 658,727 acres (2,666 sq. km). Portions of the Pintada Arroyo watershed extend into Guadalupe, San Miguel, and Torrance counties. Table 1 summarizes the distribution of the Pintada Arroyo watershed.

COUNTY	Co. Acres Total	Acres in HUC	% of HUC in Co.	% of Co. in HUC
Guadalupe	1,938,741	342,966	52	18
San Miguel	3,028,614	50,297	8	2
Torrance	2,139,981	265,464	40	12
Sum (Σ)	--	658,727	100	--

Table 1. Pintada Arroyo watershed acreage distribution.



Physical Setting

Geology:

The Pintada Arroyo watershed lies in the Pecos River Section of the Great Plains Province. Geologically, the bedrock consists of Permian and Triassic aged sedimentary rocks.

The upper portion of the watershed contains Triassic sedimentary rocks which have not been individually classified due to their non-distinct nature. These rocks consist of sandstone, siltstone, and mudstone. Also found in this area are Permian aged rocks including the San Andres Limestone, the Glorieta Sandstone, and shales and sandstones of the Yeso Formation.

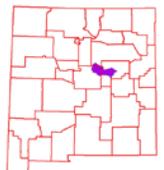
The middle and lower portions of the watershed have exposures of Triassic aged formations consisting of the Santa Rosa Sandstone and the Chinle Shale. Permian aged rocks include the sedimentary rocks of the Artesia Group. These Permian aged rocks consist of shales, limestones and sandstones, but have not been divided into distinct formations.

The watershed is formed from sedimentary rocks including sandstone, limestone, siltstone, mudstone and shale. The softer materials will weather at a more rapid rate than those formed from the limestone and sandstone. Erosion of these rocks can occur with water and wind. Salts will be present in all of these materials which may have an adverse effect on the water quality.

The arroyo is generally dry during most times of the year, and acts as a drainageway during significant precipitation events. The arroyo eventually joins with the Pecos River.

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 fair 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 Pintada Arroyo 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.



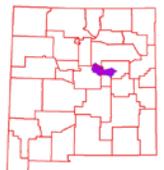
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.



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.



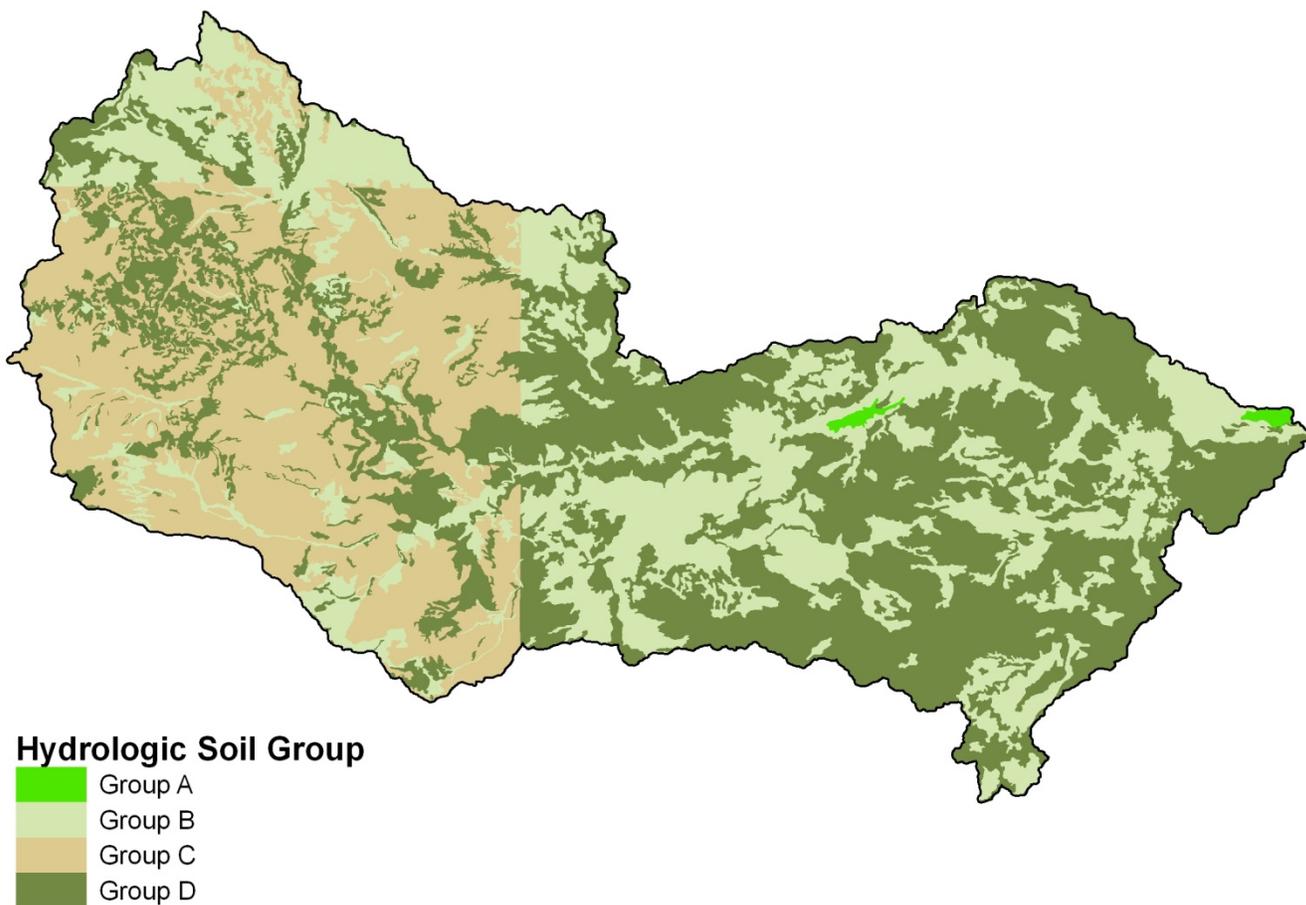
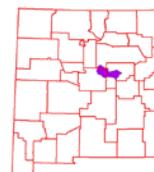


Figure 2. Hydrologic Soil Group



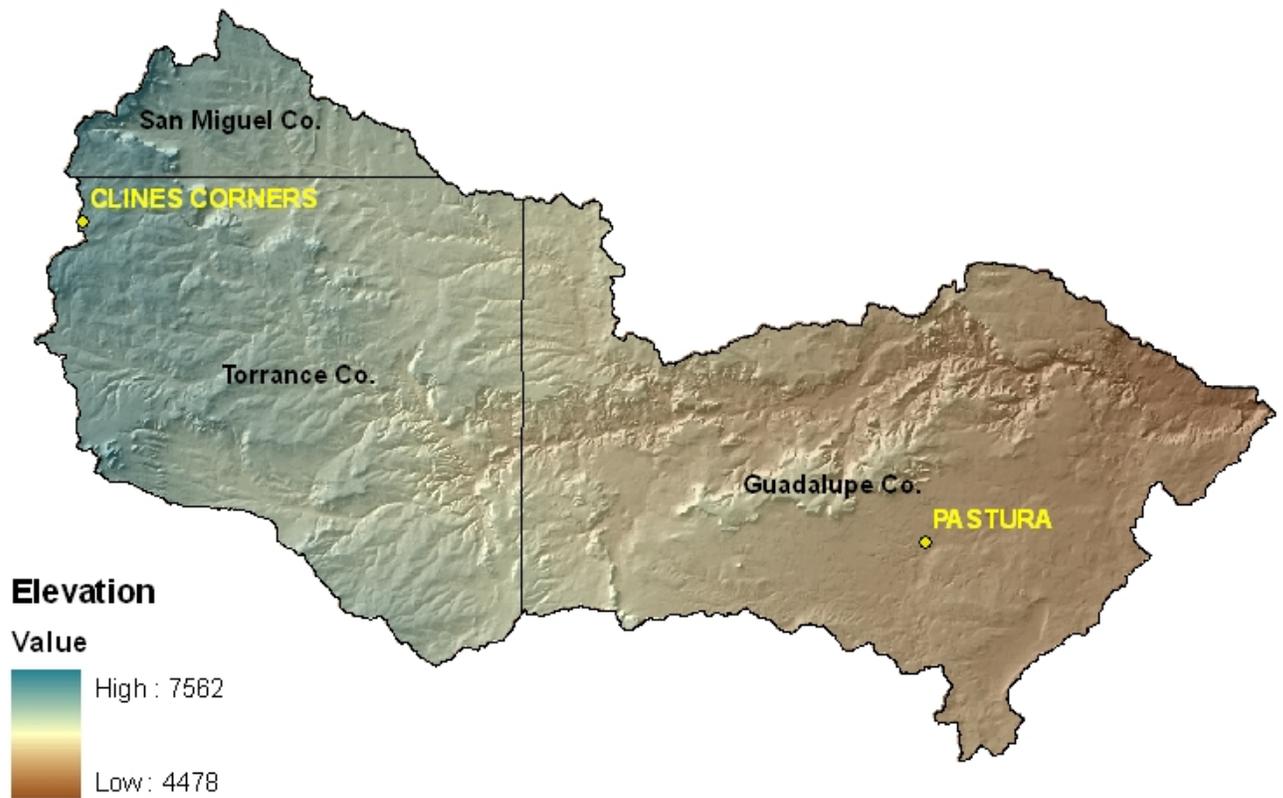
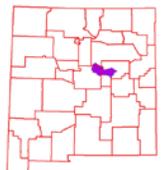


Figure 3. Pintada Arroyo watershed shaded relief.



Precipitation

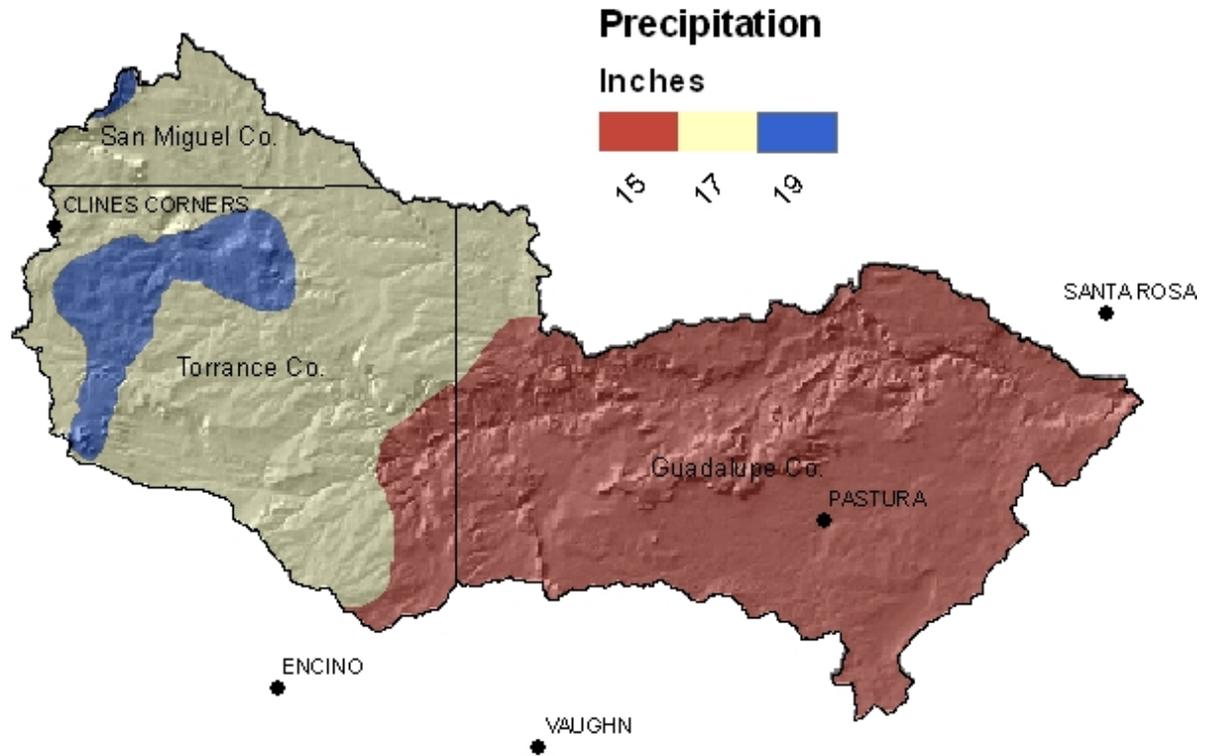
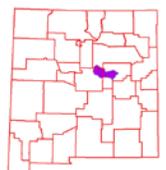


Figure 4. Pintada Arroyo watershed annual precipitation.



Land Ownership ²

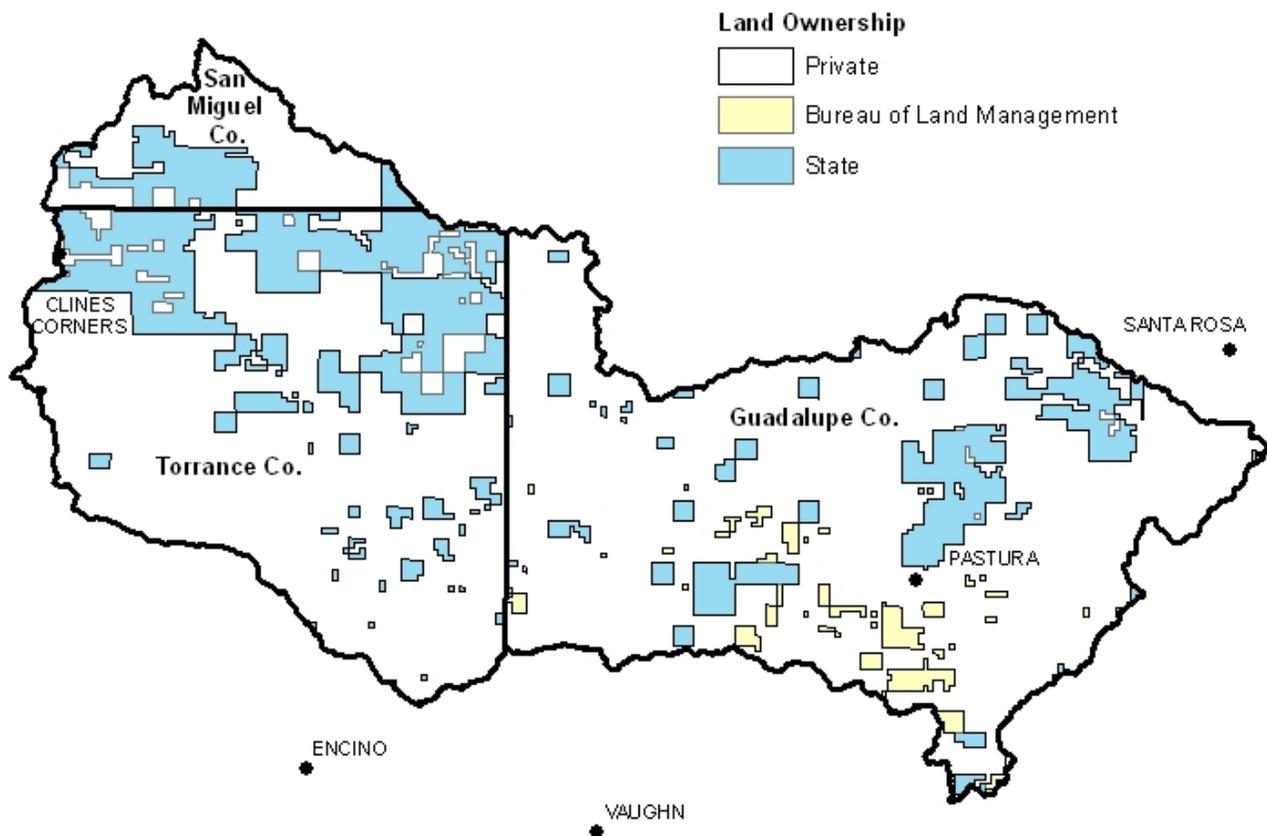
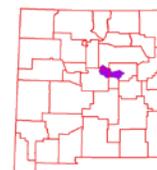


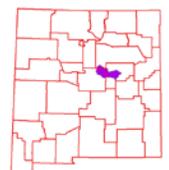
Figure 5. Pintada Arroyo watershed land ownership.



Land Ownership

COUNTY	BLM	Private	State
Guadalupe	11,600	290,600	40,800
San Miguel	-	36,300	14,000
Torrance	-	195,800	69,700
Watershed (Σ)	11,600	522,700	124,500
% Watershed	2	79	19

Table 2. Land ownership in the Pintada Arroyo watershed.



Land Use / Land Cover ^{3,4}

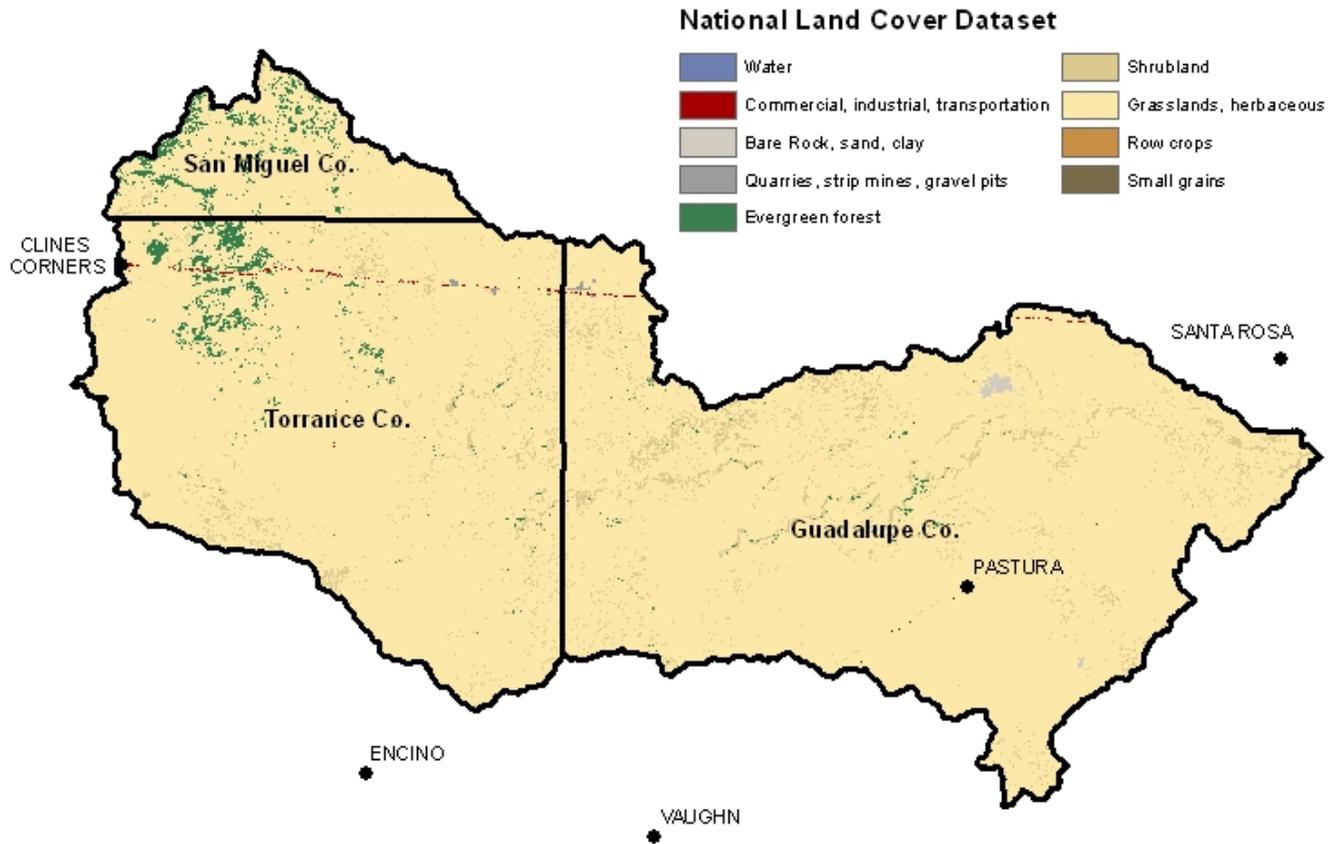
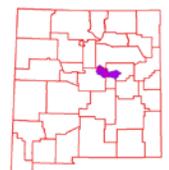


Figure 6. Subset of the National Land Cover Dataset.

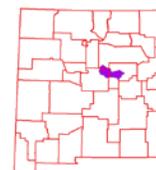


Land Use / Land Cover

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>
grasslands, herbaceous	620,974	94%
shrubland	23,531	4%
evergreen forest	12,146	2%
bare rock, sand, clay	983	< 1%
commercial, industrial, transportation	771	< 1%
quarries, strip mines, gravel pits	286	< 1%
row crops	6	< 1%
small grains	4	< 1%
water	2	< 1%

Table 3. Extent of NLCD classes in the Pintada Arroyo watershed.



Land Use / Land Cover

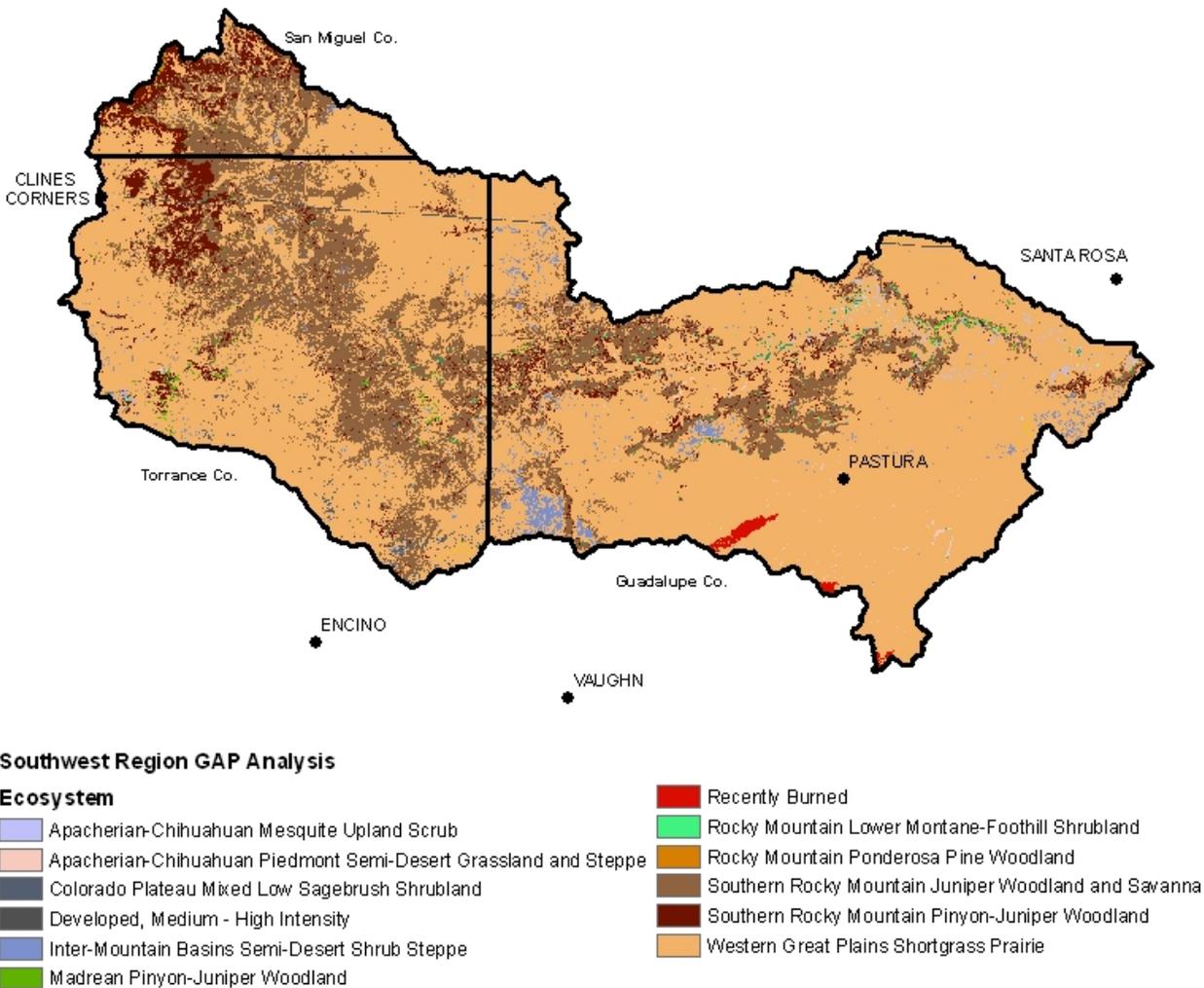
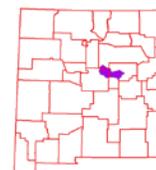


Figure 7. Subset of the SWREGAP over the Pintada Arroyo watershed. The 12 dominant ecosystems are displayed in the legend.

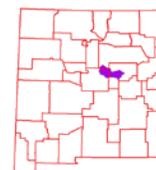


Land Use / Land Cover

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.

<u>Ecosystem</u>	<u>Acres</u>	<u>% of Watershed</u>
Western Great Plains Shortgrass Prairie	466,800	71
Southern Rocky Mountain Juniper Woodland and Savanna	135,700	21
Southern Rocky Mountain Pinyon-Juniper Woodland	33,100	5
Inter-Mountain Basins Semi-Desert Shrub Steppe	9,300	1
Recently Burned	2,000	< 1
Colorado Plateau Mixed Low Sagebrush Shrubland	1,800	< 1
Apacherian-Chihuahuan Mesquite Upland Scrub	1,600	< 1
Madrean Pinyon-Juniper Woodland	1,400	< 1
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	1,300	< 1
Developed, Medium - High Intensity	1,100	< 1
Rocky Mountain Ponderosa Pine Woodland	800	< 1
Rocky Mountain Lower Montane-Foothill Shrubland	800	< 1
Western Great Plains Riparian Woodland and Shrubland	700	< 1
Western Great Plains Foothill and Piedmont Grassland	700	< 1
Inter-Mountain Basins Mixed Salt Desert Scrub	600	< 1
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	500	< 1
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	500	< 1
Western Great Plains Cliff and Outcrop	300	< 1
North American Warm Desert Active and Stabilized Dune	200	< 1
Chihuahuan Gypsophilous Grassland and Steppe	200	< 1
Chihuahuan Sandy Plains Semi-Desert Grassland	100	< 1
Madrean Juniper Savanna	100	< 1
North American Warm Desert Wash	100	< 1
Open Water	100	< 1

Table 4. SW Region Gap analysis ecosystem acreages.



Hydrology [5](#), [6](#), [7](#), [8](#), [9](#), [10](#)

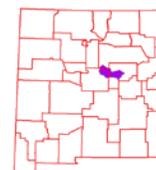
The National Hydrography Dataset (NHD) is a comprehensive set of data that encodes information about naturally occurring and constructed bodies of water, paths through which water flows, and related entities. The NHD identifies about 1,141 miles (1, 840 km) of water courses in the Pintada Arroyo River Watershed. The majority of these courses typically flow intermittently in summer months during periods associated with high intensity convective thunderstorms.

Water Course Type	Miles
Artificial path	39
Connector	2
Canal / Ditch	3
Intermittent Stream / River	1,086
Perennial Stream / River	11
Sum (Σ)	1,141

Table 5. NHD Water Course Type and Extents

There are no gauging stations in the watershed.

The New Mexico Water Quality Control Commission (NMWQCC) is the issuing agency of water quality standards for interstate and intrastate waters. The NMWQCC has defined the Pintada Arroyo watershed as part of the Pecos River Basin. There are no designated Aquatic Life Uses on any reaches in the watershed.



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 Pintada Arroyo Watershed, there are no bodies of water that are listed as impaired as of the 2008-10 listing cycle.

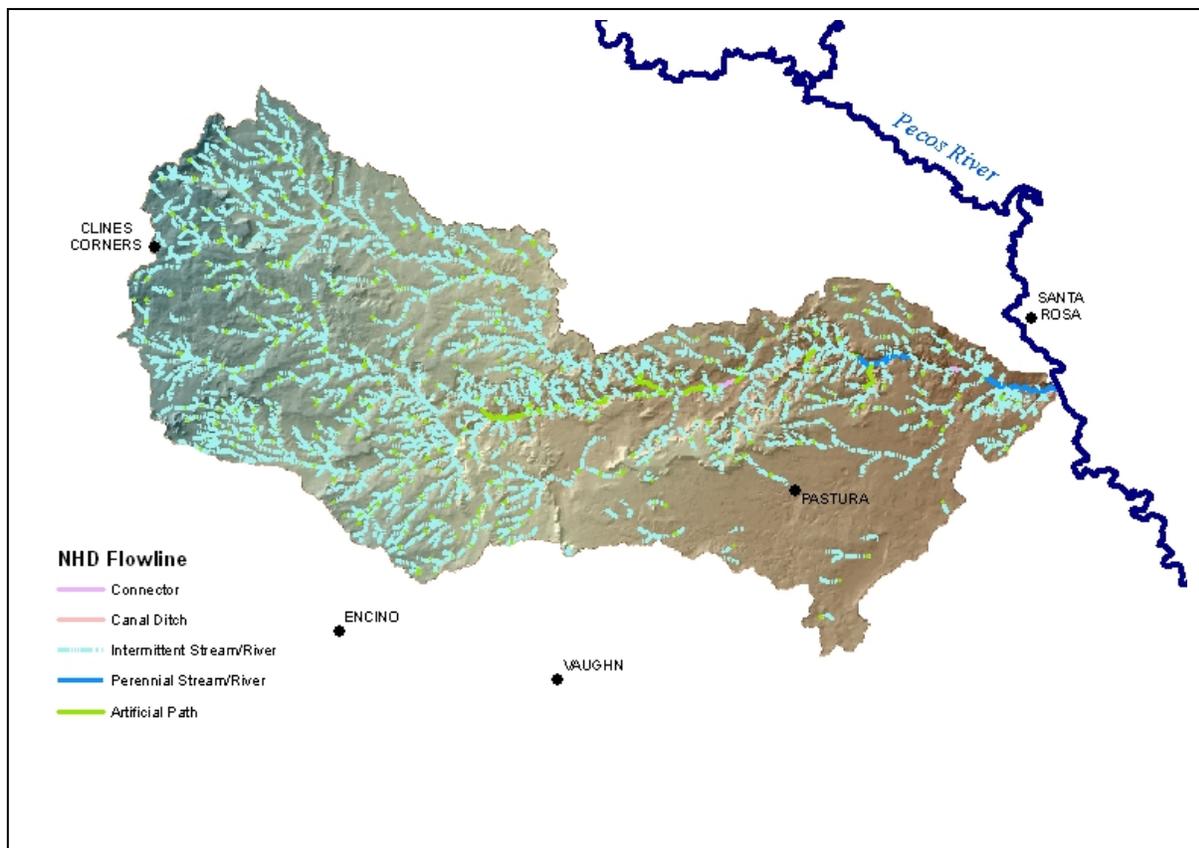
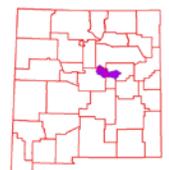


Figure 8. National Hydrologic Dataset of the Pintada Arroyo.



Hydrology

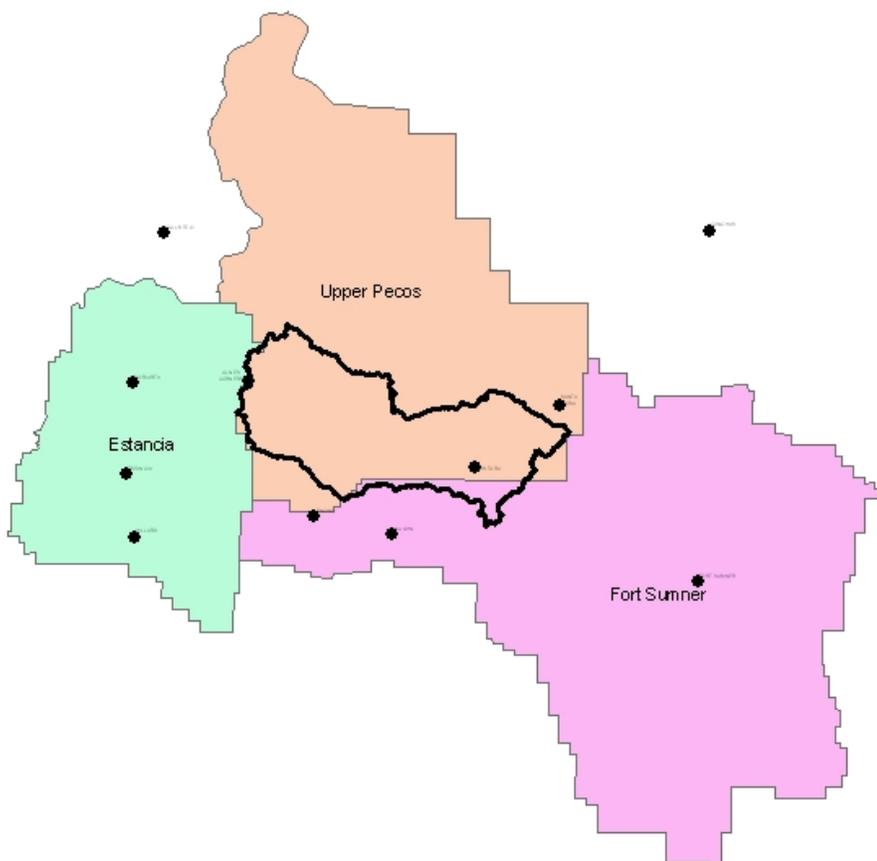
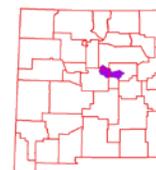


Figure 9. Declared Groundwater Basins of the Pintada Arroyo.

There are two declared groundwater basins in the Pintada Arroyo watershed. 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 and Fort Sumner are the two groundwater basins that are recognized within this watershed and cover approximately 2.4 million acres and 3.1 million acres respectively.



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 7 lists those species which are currently listed and tracked in the Pintada Arroyo River Watershed.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Tax.Class</u>	<u>Family</u>	<u>Fed Status</u>	<u>State Status</u>
Bigscale Logperch	<i>Percina macrolepida</i>	Actinopterygii	Percidae		T

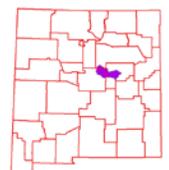
Table 6. Threatened and Endangered Plant and Animal Species

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 Pintada Arroyo watershed, the SWEMP has identified 7 species of invasive plants. Each of these species is defined as non-native by the USDA PLANTS database.

<u>Scientific Name</u>	<u>Common Name</u>
<i>Fabaceae</i> (Pea Family)	camelthorn
<i>Scrophylariaceae</i> (Figwort Family)	Dalmatian Toadflax
<i>Brassicaceae</i> (Mustard Family)	Hoary Cress (Whitetop)
<i>Asteraceae</i> (Sunflower Family)	Musk Thistle
<i>Brassicaceae</i> (Mustard Family)	Perennial Pepperweed (Tall Whitetop)
<i>Asteraceae</i> (Sunflower Family)	Russian Knapweed
<i>Asteraceae</i> (Sunflower Family)	Spotted Knapweed

Table 7. Invasive Species Recognized by the SWEMP



Common Resource Areas¹³

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.

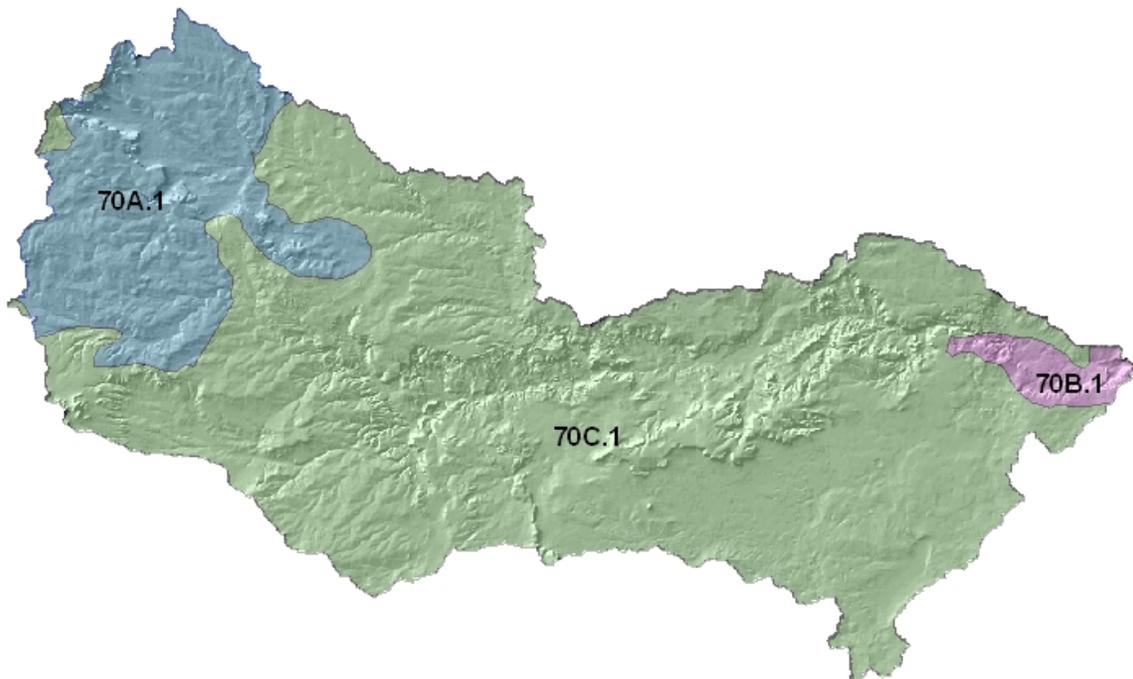
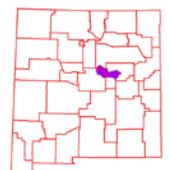


Figure 10. Common Resource Areas of the Pintada Arroyo.



Common Resource Areas

70A.1 – Northern New Mexico Highlands

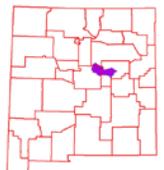
This unit is characterized by broad, rolling plains broken by closed basins and drainageways that have smooth-shaped valley floors. Rugged breaks are common in the northern part of the area. Native vegetation is mid- to short-grass prairie species in the lowlands, with pinyon and juniper in the higher 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)



Conservation ¹⁴

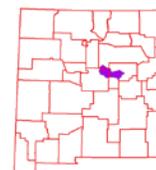
The USDA-Natural Resources Conservation Service (NRCS) focuses on the development and delivery of high quality products and services that enable people to be good stewards of our Nation's soil, water, and related natural related resources on non-Federal lands. The Natural Resources Conservation Service's 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	2006		2007		2008		2009		2010		Total	
	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres
Brush Management	6	1,127	13	1,434	6	1,106	16	1,683	8	1,400	49	6,750
Integrated Pest Management					3	397					3	397
Prescribed Grazing	2	5,070	4	639			14	25,387	1	329	21	31,425
Upland Wildlife Habitat Management	2	5,070			5	3,652	10	21,410	1	329	18	30,461
SUM (Σ)	10	11,267	17	2,073	14	5,155	40	48,480	10	2,058	91	69,033

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

Conservation Practice	2006		2007		2008		2009		2010		Total	
	#	Feet	#	Feet	#	Feet	#	Feet	#	Feet	#	Feet
Diversion					1	10					1	10
Fence	1	3,370	4	17,215	5	30,054	1	4,095			11	54,734
Pipeline			3	18,147	5	23,979	5	9,050	2	3,640	15	54,816
Pond			2				1				3	NA
Pumping Plant			1		1				1		3	NA
Water Well			1		1				1		3	NA
Watering Facility	1		3		20		4		1		29	NA
SUM (Σ)	2	NA	33	NA	11	NA		NA	5	NA	65	NA

Table 9. 5 year Trends in Location Specific Applied Conservation Practices. Reported in Feet if linear (i.e. fence)



Soil Resource Inventory ¹⁵

The entire Pintada Arroyo Watershed has a certified National Cooperative Soil Survey (NCSS) inventory.

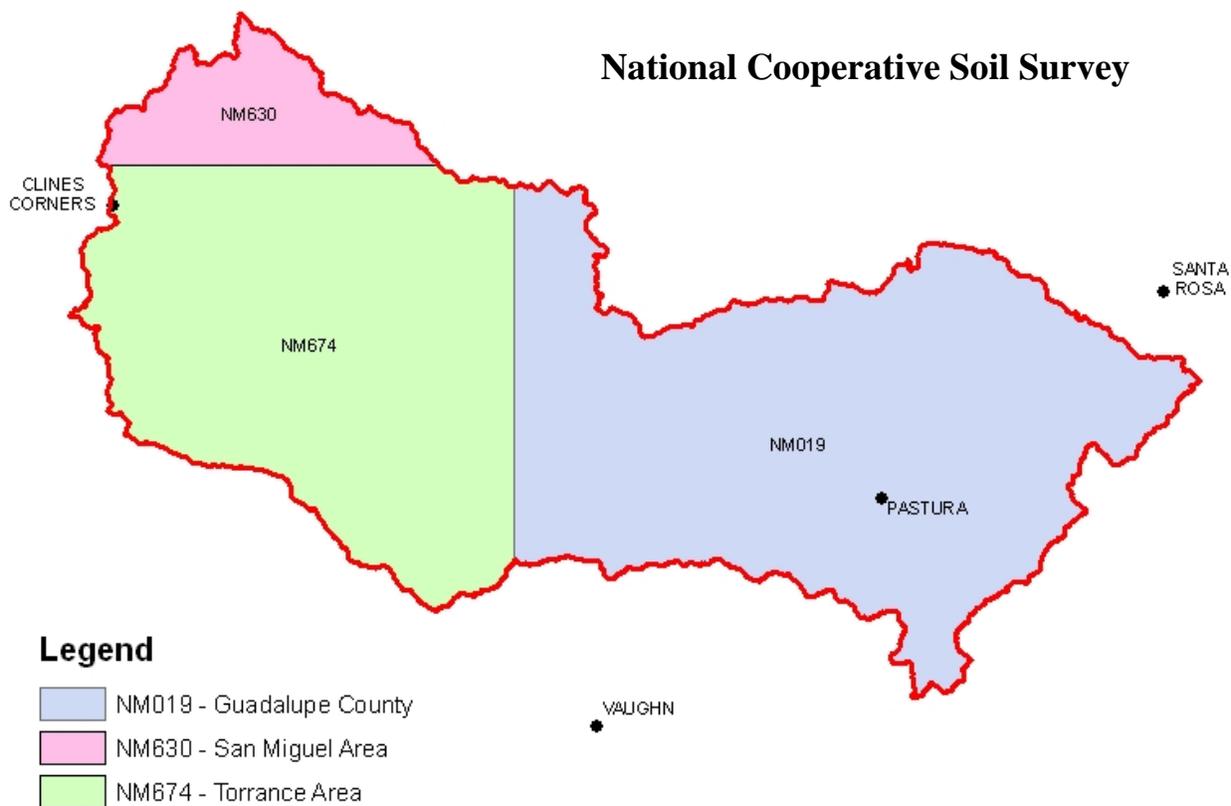
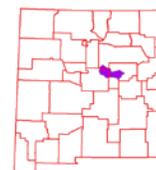


Figure 11. National Cooperative Soil Survey coverage of the Pintada Arroyo Watershed.

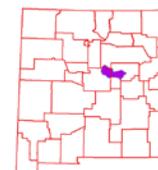


Soil Resource Inventory

In order to evaluate the susceptibility of erosion within the Pintada Arroyo 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 -

<u>SSURGO Value</u>	<u>Nominal Description</u>	<u>Model Rank</u>
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
5 - 10		1
10 - 15		2
15 - 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.

Soil Erosion Susceptibility

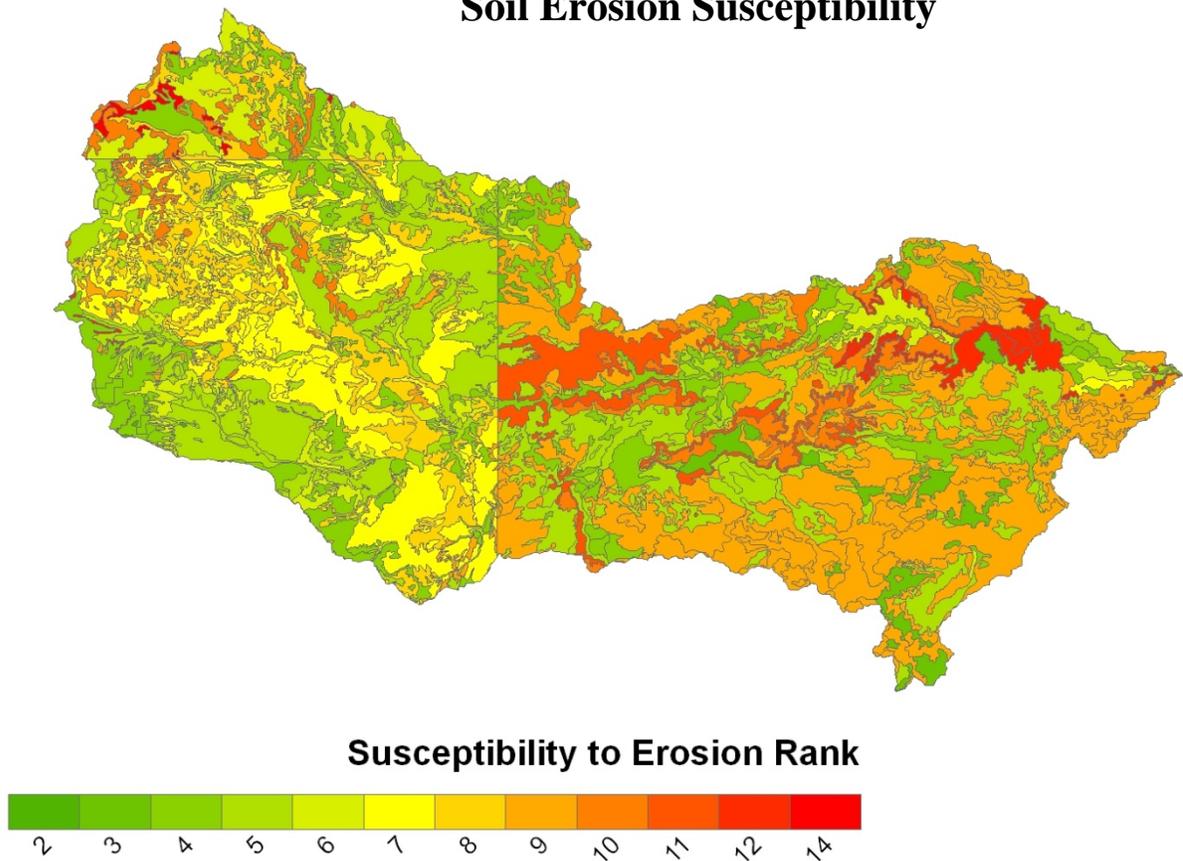
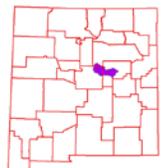


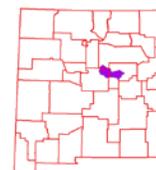
Figure 12. Pintada Arroyo Watershed Erosion Potential



Soil Resource Inventory

Rank	Acres
2	136
3	18,149
4	77,042
5	155,431
6	41,617
7	83,077
8	55,381
9	154,588
10	35,055
11	23,528
12	12,406
13	2,308
Sum(Σ)	658,727

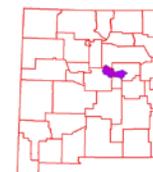
Table 11. Soil Erosion Potential Model Results. A greater rank indicates greater potential for erosion.



Socioeconomic Data ¹⁶

COUNTY	Total population: Total	Total population: Urban	Total population: Rural	Total Pop.: Rural Farm	Total Pop.: Rural Nonfarm	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 in 1999
Guadalupe	4,680	2,530	2,150	269	1,881	3,801	2,530	62	53	25	2	1,828	180	\$28,279
San Miguel	30,126	18,000	12,126	290	11,836	23,487	16,938	236	549	163	25	10,910	1,305	\$31,250
Torrance	16,911	819	16,092	829	15,263	6,283	12,495	280	354	54	22	3,035	671	\$34,461

Table 12. Socioeconomic Data of Counties in the Watershed (2000).



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