

## Rapid Watershed Assessment Jornada Draw Watershed



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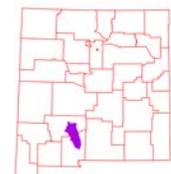
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## Overview

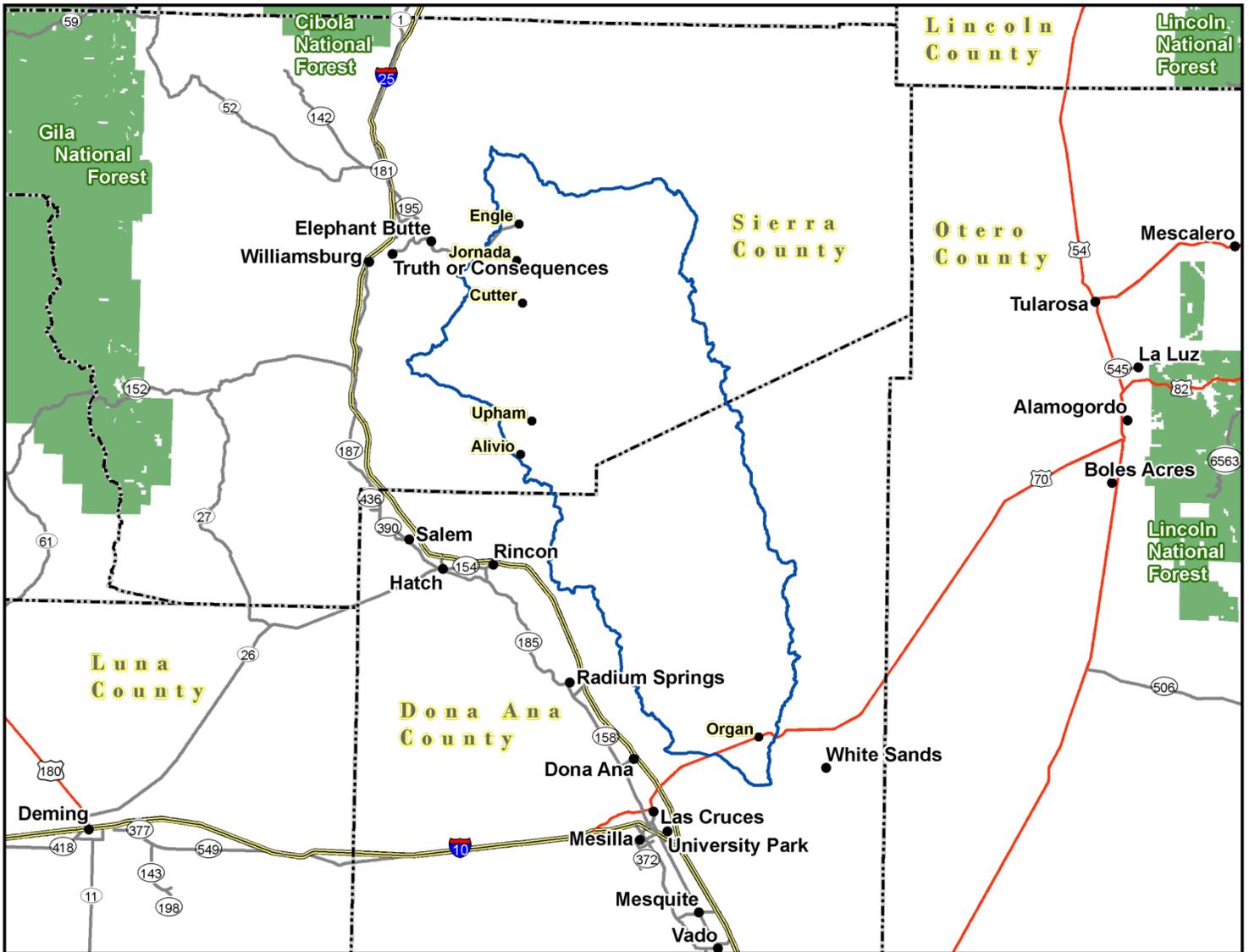
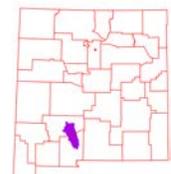


Figure 1. Jornada Draw Watershed Overview.

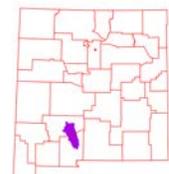


## Overview

The Jornada Draw Watershed is located in southwest New Mexico and covers 799,651 total acres (3,236 sq. km). Portions of the Jornada Draw Watershed are in Dona Ana and Sierra counties. Table 1 summarizes the distribution of the Jornada Draw Watershed.

<u>County</u>	<u>County Acres Total</u>	<u>Acres in HUC</u>	<u>% of HUC in County</u>	<u>% of County in HUC</u>
<b>Dona Ana</b>	<b>2,441,254</b>	<b>376,813</b>	<b>47</b>	<b>5</b>
<b>Sierra</b>	<b>2,711,910</b>	<b>422,837</b>	<b>53</b>	<b>5</b>
<b>Sum (Σ)</b>	<b>--</b>	<b>799,651</b>	<b>100</b>	<b>--</b>

Table 1. Jornada Draw watershed acreage distribution.



## **Physical Setting**

### **Geology:**

The Jornada Draw HUC is part of the Rio Grande aquifer system. It is bordered on the west by the Fra Cristobal Range near Bert Cook Well, Caballo Mountains, McLeod Hills, and Doña Ana Mountains; passes through the town of Organ to Baylor Peak in the Organ Mountains; and is bounded on the east by the San Augustin Mountains, and San Andres Mountains south of Granddaddy Peak. During the Late Tertiary Period, the Rio Grande flowed through the Jornada del Muerto, but today it is a closed basin with no access to the Rio Grande.

The Organ Mountains are a Tertiary Period granite intrusion. The Doña Ana Mountains are also Tertiary Period intrusive and volcanic rocks. The San Andres Mountains, San Augustin Mountains, Fra Cristobal Range, and Caballo Mountains are composed of 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. Between the Fra Cristobal Range and the Caballo Mountains is Cretaceous Period sandstones and shales and Tertiary Period basalt to andesitic lava flows. The valley floor contains small areas of Tertiary Period basaltic andesites and volcaniclastic sedimentary units. Most of the valley floor is Quaternary-Tertiary Period partly compacted sands and gravels of the Santa Fe group. The Santa Fe Group consists of alluvial fans, river channel deposits and inter-bedded volcanic rocks preserved in a complex of depressed fault blocks within the Rio Grande depression. Quaternary Period piedmont alluvial sediments form alluvial fans, eolian deposits are in the northern part of the HUC, and alluvium are the rest of the sediments on the valley floor.

Resource concerns are high sediment erosion and water runoff. In addition, the lowering of valleys by river incision is a continuing process. Many valleys are flanked by terraces. Rivers respond by aggrading during climates that promote large sediment yield and large, stable discharges; and incise during climates that produce flashy flows and reduce the sediment supply. 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, igneous rocks and volcanics is usually along fracture zones which are hard to intercept with water wells. Groundwater quality ranges from good to fair 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 Jornada Draw 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.



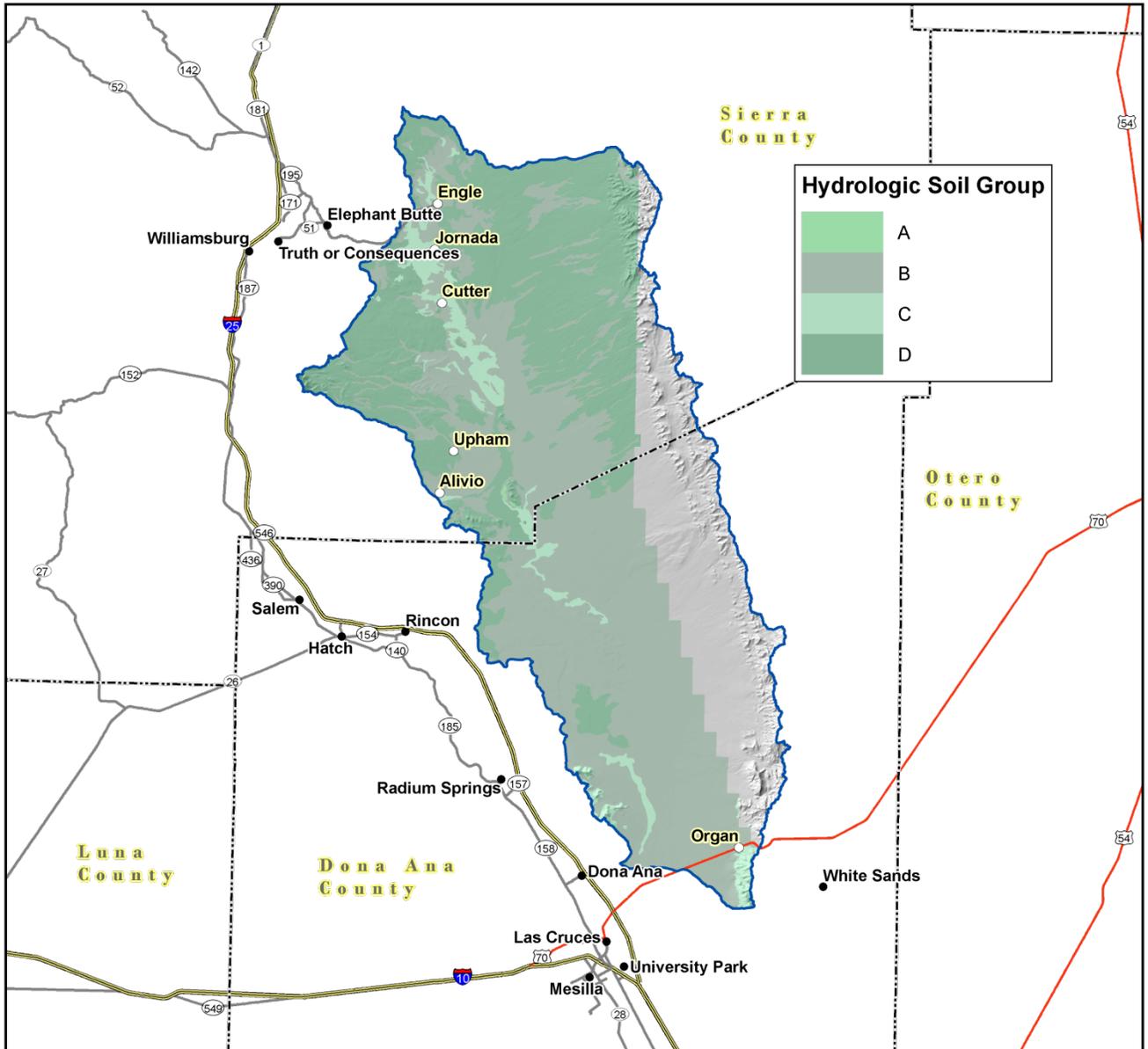
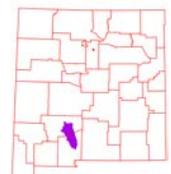


Figure 2. Jornada Draw Watershed Hydrologic Soil Group.



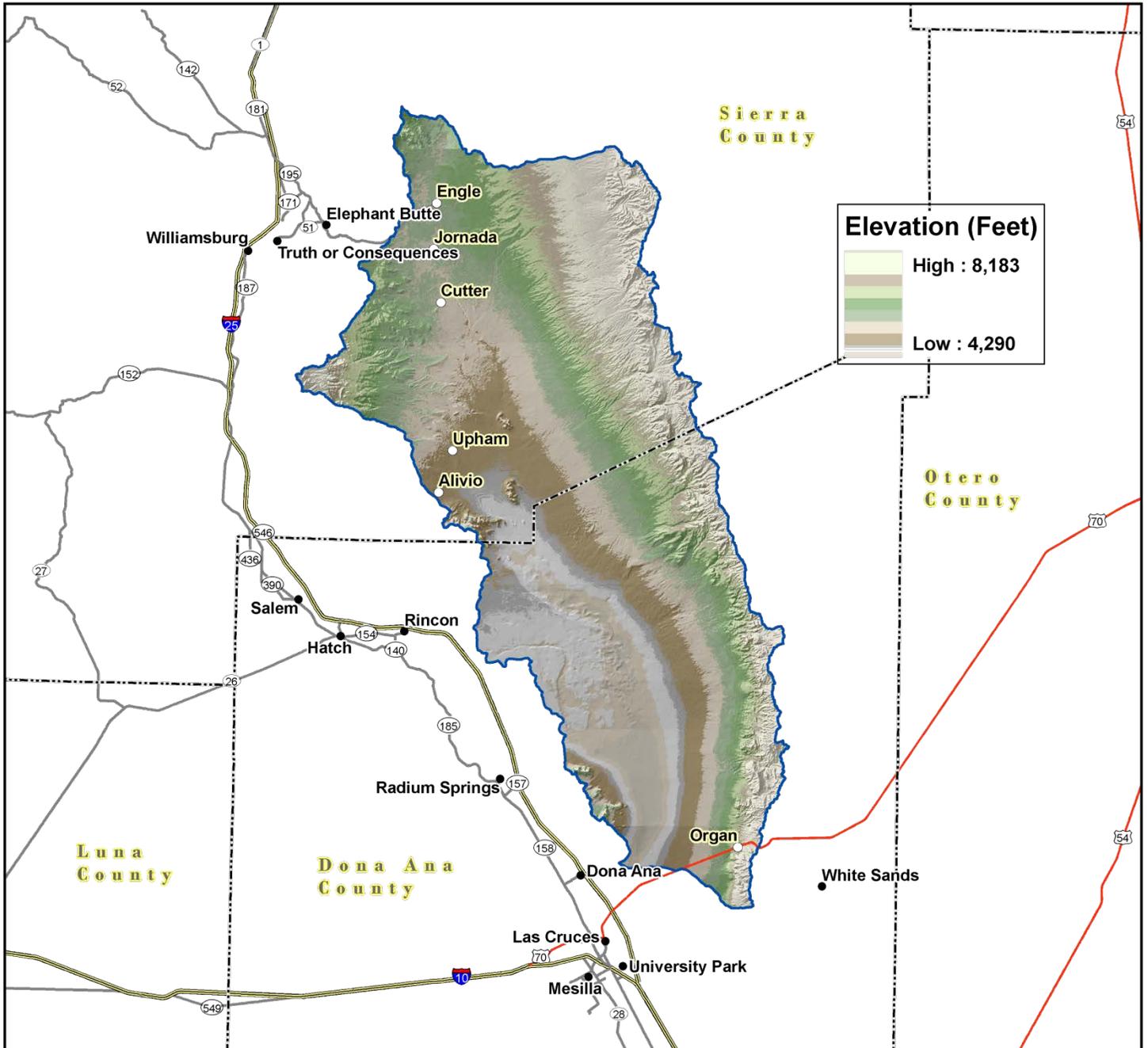


Figure 3. Jornada Draw Watershed Shaded Relief.



**Precipitation <sup>1</sup>**

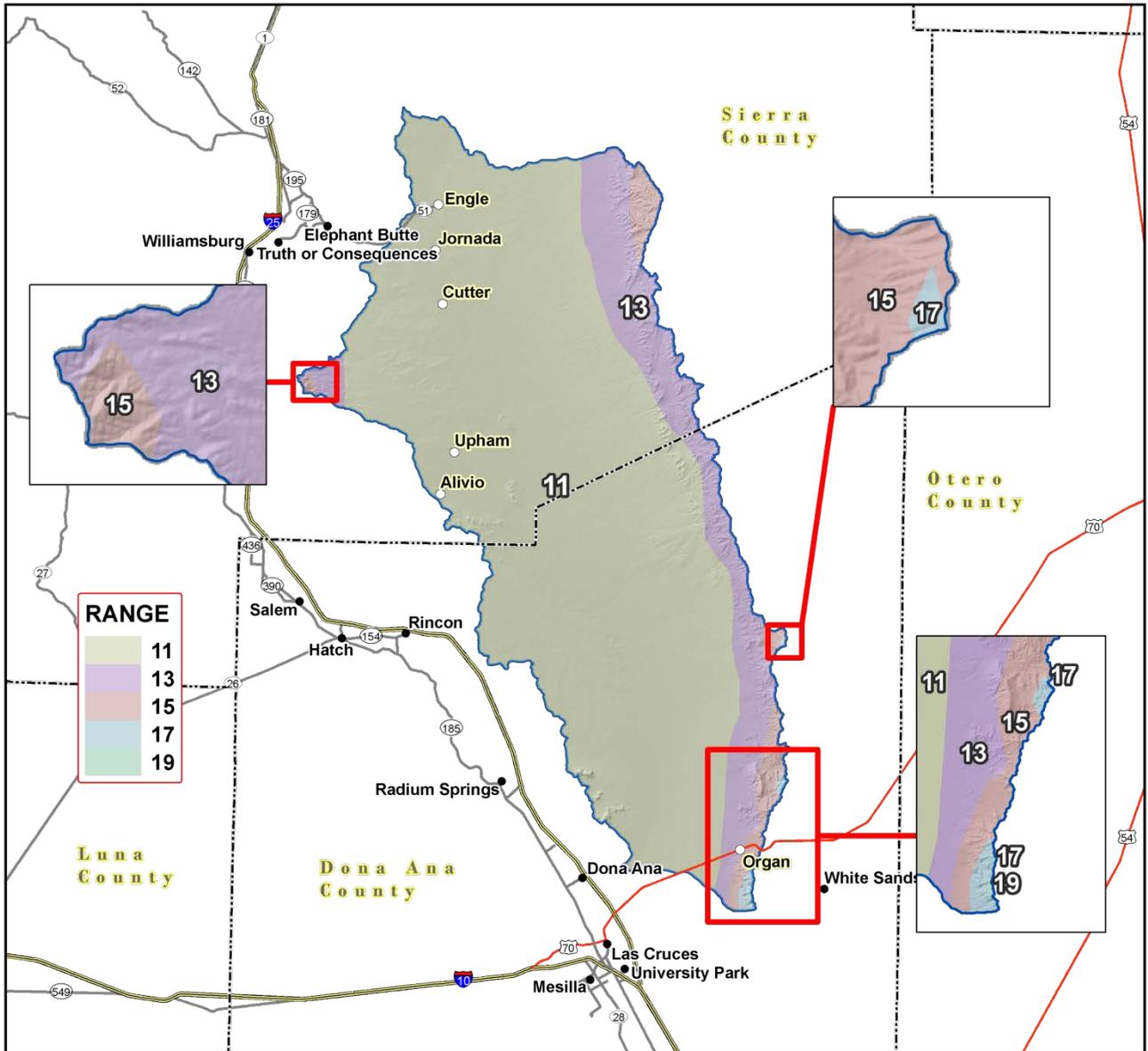


Figure 4. Jornada Draw Watershed Annual Precipitation.



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

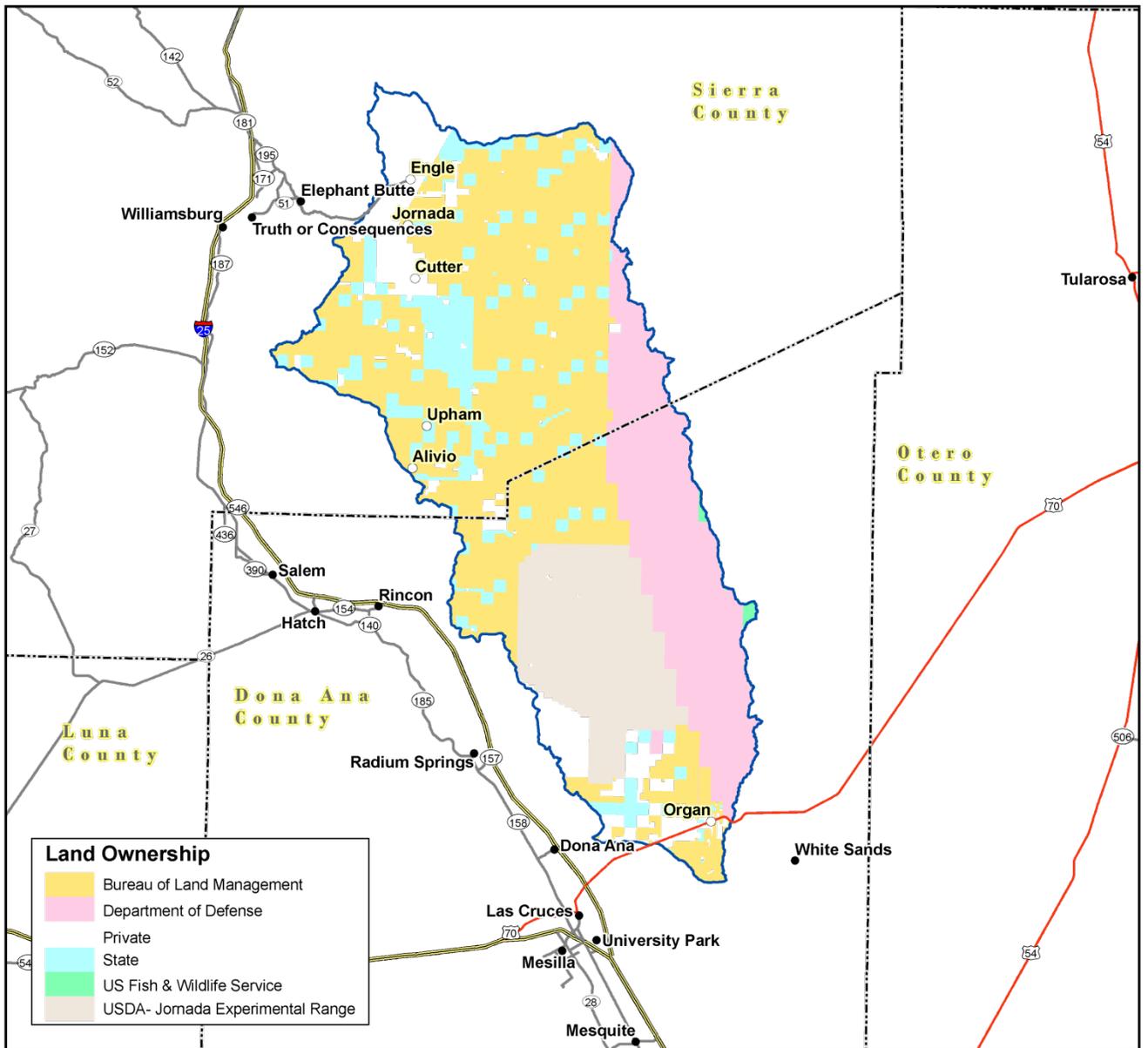


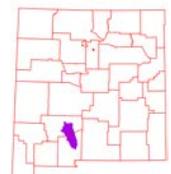
Figure 5. Jornada Draw Watershed Land Ownership.



**Land Ownership**

<u>COUNTY</u>	<u>BLM</u>	<u>Department Of Agriculture</u>	<u>Department Of Defense</u>	<u>US Fish and Wildlife Service</u>	<u>Private</u>	<u>State</u>
<b>Dona Ana</b>	<b>91,856</b>	<b>109,450</b>	<b>121,952</b>	<b>2,126</b>	<b>34,645</b>	<b>16,785</b>
<b>Sierra</b>	<b>262,346</b>		<b>33,434</b>		<b>53,722</b>	<b>73,335</b>
<b>Watershed (Σ)</b>	<b>354,202</b>	<b>109,450</b>	<b>155,386</b>	<b>2,126</b>	<b>88,367</b>	<b>90,120</b>
<b>% Watershed</b>	<b>44</b>	<b>14</b>	<b>19</b>	<b>0</b>	<b>11</b>	<b>11</b>

Table 2. Land Ownership in the Jornada Draw watershed.



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

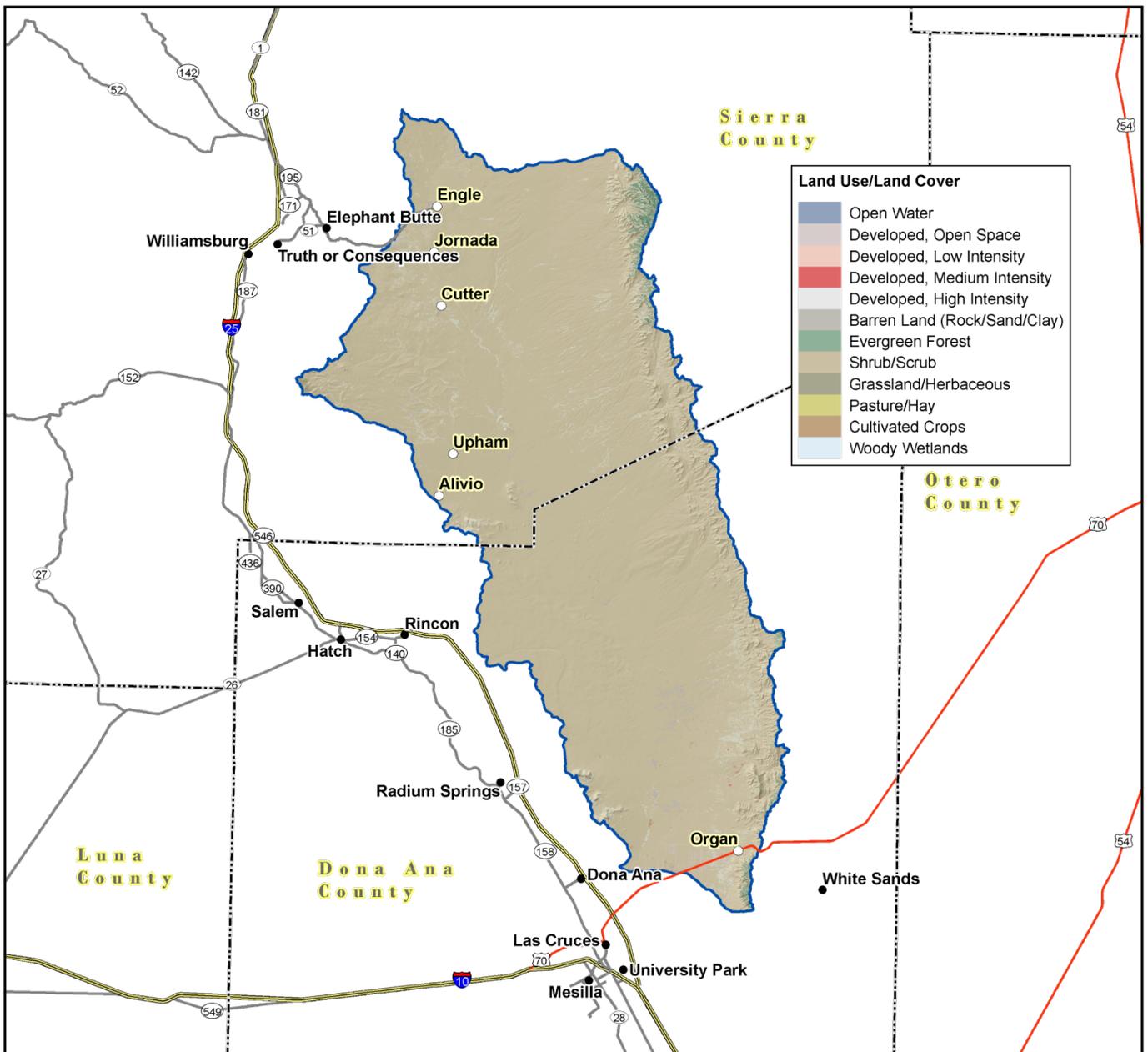


Figure 6. Subset of the National Land Cover Dataset in the Jornada Draw Watershed.



## 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>
<b>Shrub/Scrub</b>	<b>755,324</b>	<b>94</b>
<b>Grassland/Herbaceous</b>	<b>30,210</b>	<b>4</b>
<b>Evergreen Forest</b>	<b>6,638</b>	<b>1</b>
<b>Barren Land (Rock/Sand/Clay)</b>	<b>4,715</b>	<b>1</b>
<b>Developed, Open Space</b>	<b>1,973</b>	<b>&lt; 1</b>
<b>Developed, Low Intensity</b>	<b>324</b>	<b>&lt; 1</b>
<b>Cultivated Crops</b>	<b>316</b>	<b>&lt; 1</b>
<b>Developed, Medium Intensity</b>	<b>38</b>	<b>&lt; 1</b>
<b>Pasture/Hay</b>	<b>32</b>	<b>&lt; 1</b>
<b>Woody Wetlands</b>	<b>27</b>	<b>&lt; 1</b>
<b>Developed, High Intensity</b>	<b>17</b>	<b>&lt; 1</b>
<b>Open Water</b>	<b>11</b>	<b>&lt; 1</b>

Table 3. Extent of NLCD classes in the Jornada Draw Watershed.



## Land Use / Land Cover

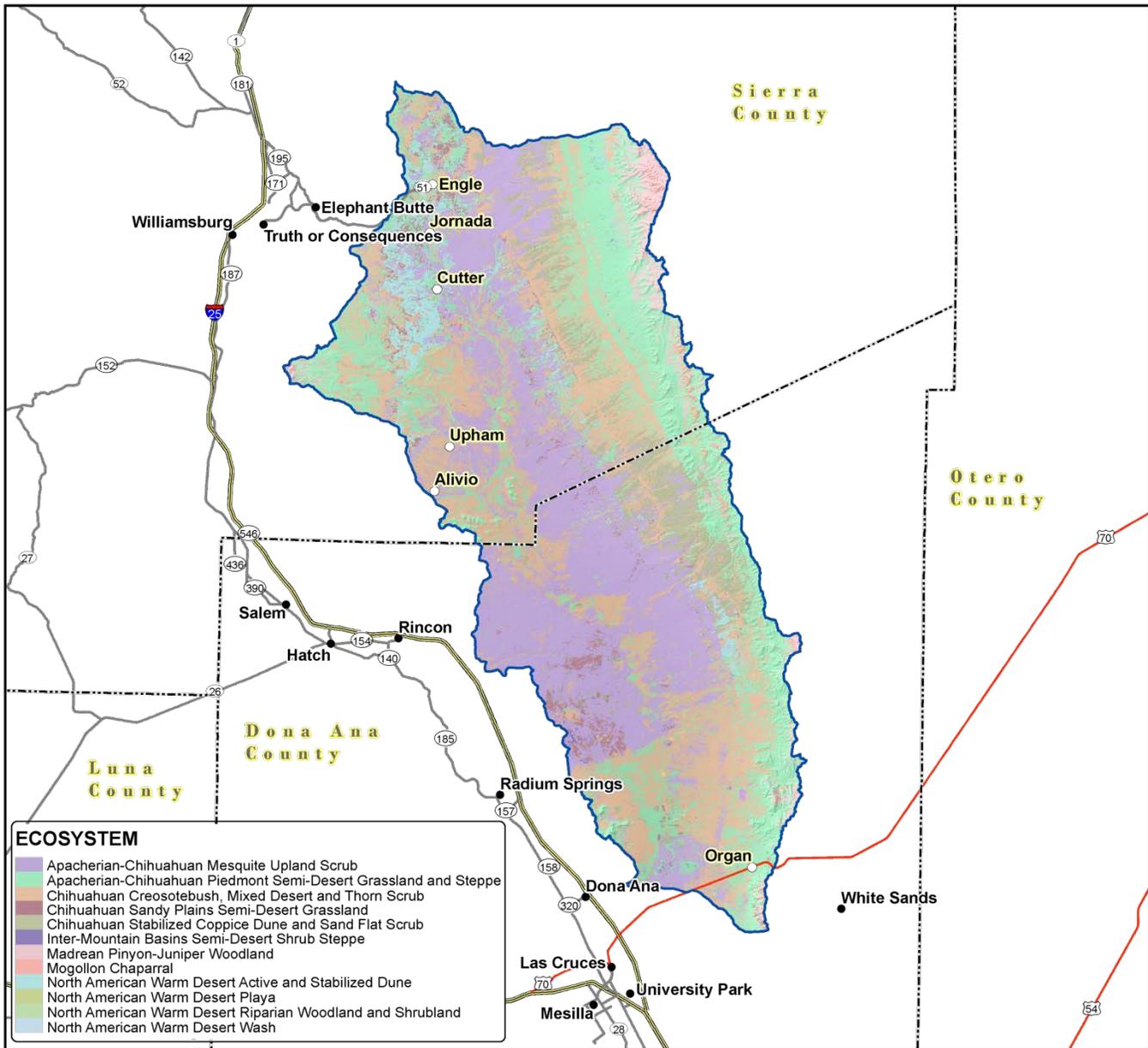


Figure 7. Subset of the SWREGAP over the Jornada Draw Watershed. The 12 dominant ecosystems are displayed in the legend.



## 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>Apacherian-Chihuahuan Mesquite Upland Scrub</b>	<b>247,057</b>	<b>31</b>
<b>Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub</b>	<b>217,406</b>	<b>27</b>
<b>Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe</b>	<b>202,830</b>	<b>25</b>
<b>Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub</b>	<b>50,000</b>	<b>6</b>
<b>North American Warm Desert Active and Stabilized Dune</b>	<b>25,092</b>	<b>3</b>
<b>Madrean Pinyon-Juniper Woodland</b>	<b>20,367</b>	<b>3</b>
<b>Chihuahuan Sandy Plains Semi-Desert Grassland</b>	<b>19,444</b>	<b>2</b>
<b>Mogollon Chaparral</b>	<b>5,718</b>	<b>1</b>
<b>North American Warm Desert Riparian Woodland and Shrubland</b>	<b>2,320</b>	<b>&lt; 1</b>
<b>North American Warm Desert Playa</b>	<b>1,610</b>	<b>&lt; 1</b>
<b>North American Warm Desert Wash</b>	<b>1,244</b>	<b>&lt; 1</b>
<b>Inter-Mountain Basins Semi-Desert Shrub Steppe</b>	<b>1,094</b>	<b>&lt; 1</b>

Table 4. SW Region Gap analysis ecosystem acreages.



## Hydrology <sup>5, 6, 7, 8, 9</sup>

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 1,975 miles (3,179 km) of water courses in the Jornada Draw River Watershed. The majority of these courses typically flow intermittently in summer months during periods associated with high intensity of convective thunderstorms.

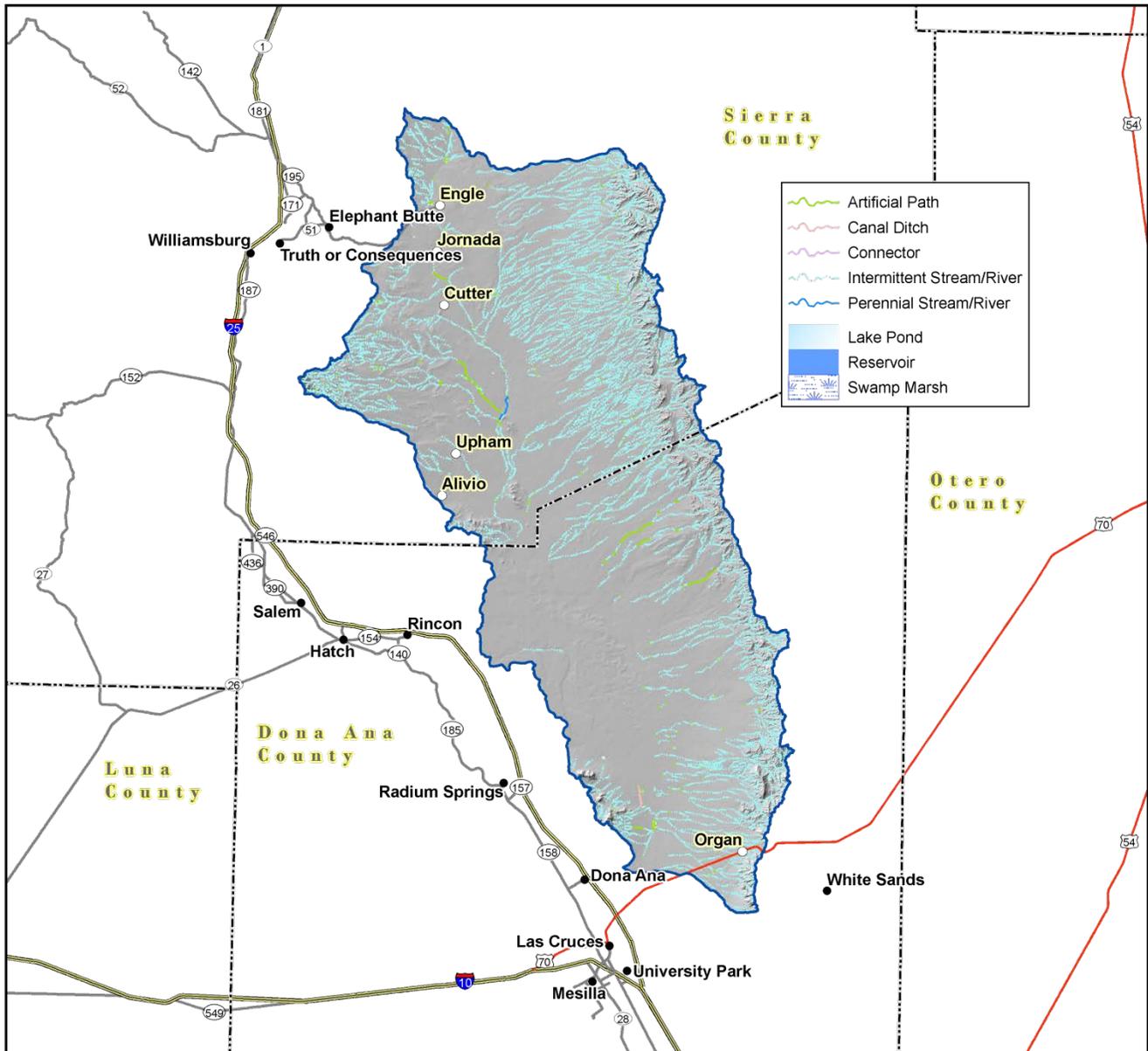
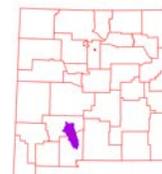


Figure 8. National Hydrologic Dataset (NHD) of the Jornada Draw.



**Hydrology:**

Water Course Type	Miles
Artificial path	27
Canal / Ditch	2
Intermittent Stream / River	1,944
Perennial Stream / River	2
Sum ( $\Sigma$ )	1,975

Table 5. NHD Water Course Type and Extents

**Gauging Stations:**

There are no Gauging stations for this watershed.

**New Mexico Water Quality Control Commission (NMWQCC):**

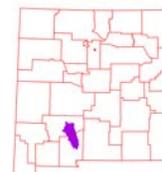
The New Mexico Water Quality Control Commission (NMWQCC) is the issuing agency of water quality standards for interstate and intrastate waters in New Mexico. The NMWQCC has defined the Jornada Draw Watershed as part of the Rio Grande Basin.

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

There are no designated Impaired Surface Waters or water bodies for the Jornada Draw Watershed.

**Declared Groundwater:**

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. There are three declared groundwaters in the Jornada Draw Watershed: Lower Rio Grande, Middle Rio Grande and Tularosa. The surface watershed covers 799,652 of the approximately 23 million acres of the underground water basin in New Mexico.



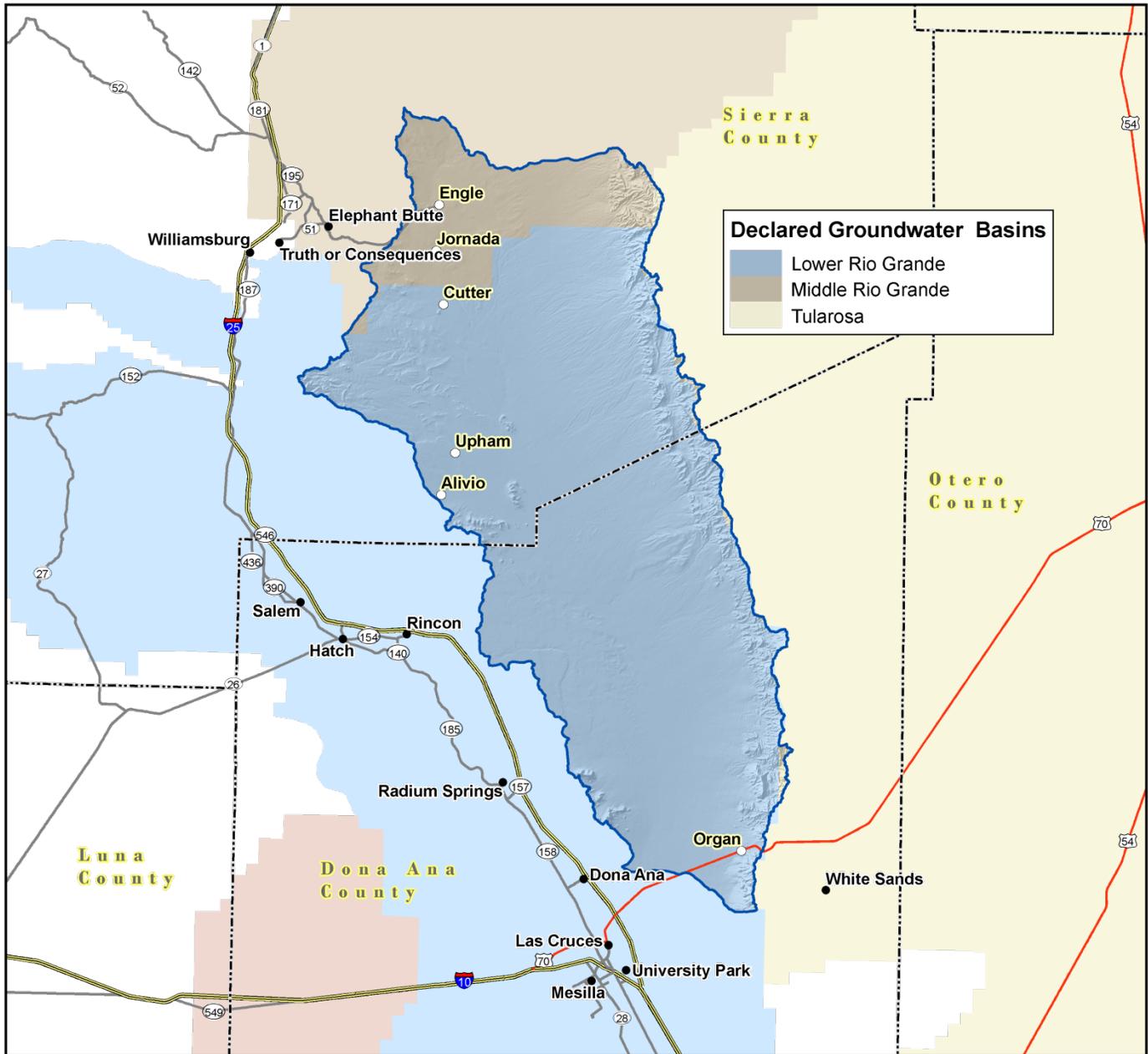


Figure 9. Declared Groundwater Basins of the Jornada Draw.



## 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 6 lists those species which are currently listed and tracked in the Jornada Draw Watershed.

Common Name	Scientific Name	Tax Class	Family	Federal Status	State Status
<a href="#">American Peregrine Falcon</a>	<a href="#">Falco peregrinus anatum</a>	Aves	Falconidae		T
<a href="#">Gray Vireo</a>	<a href="#">Vireo vicinior</a>	Aves	Vireonidae		T
<a href="#">Desert Night-blooming Cereus</a>	<a href="#">Peniocereus greggii var. greggii</a>	Dicotyledoneae	Cactaceae		E
<a href="#">Desert Bighorn Sheep</a>	<a href="#">Ovis canadensis mexicana</a>	Mammalia	Bovidae		T
<a href="#">Organ Mountains Chipmunk</a>	<a href="#">Neotamias quadrivittatus australis</a>	Mammalia	Sciuridae		T

Table 6. 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 Jornada Draw Watershed, the SWEMP has identified 3 species of invasive plants (Table 7). Each of these species is defined as non-native by the USDA PLANTS database.

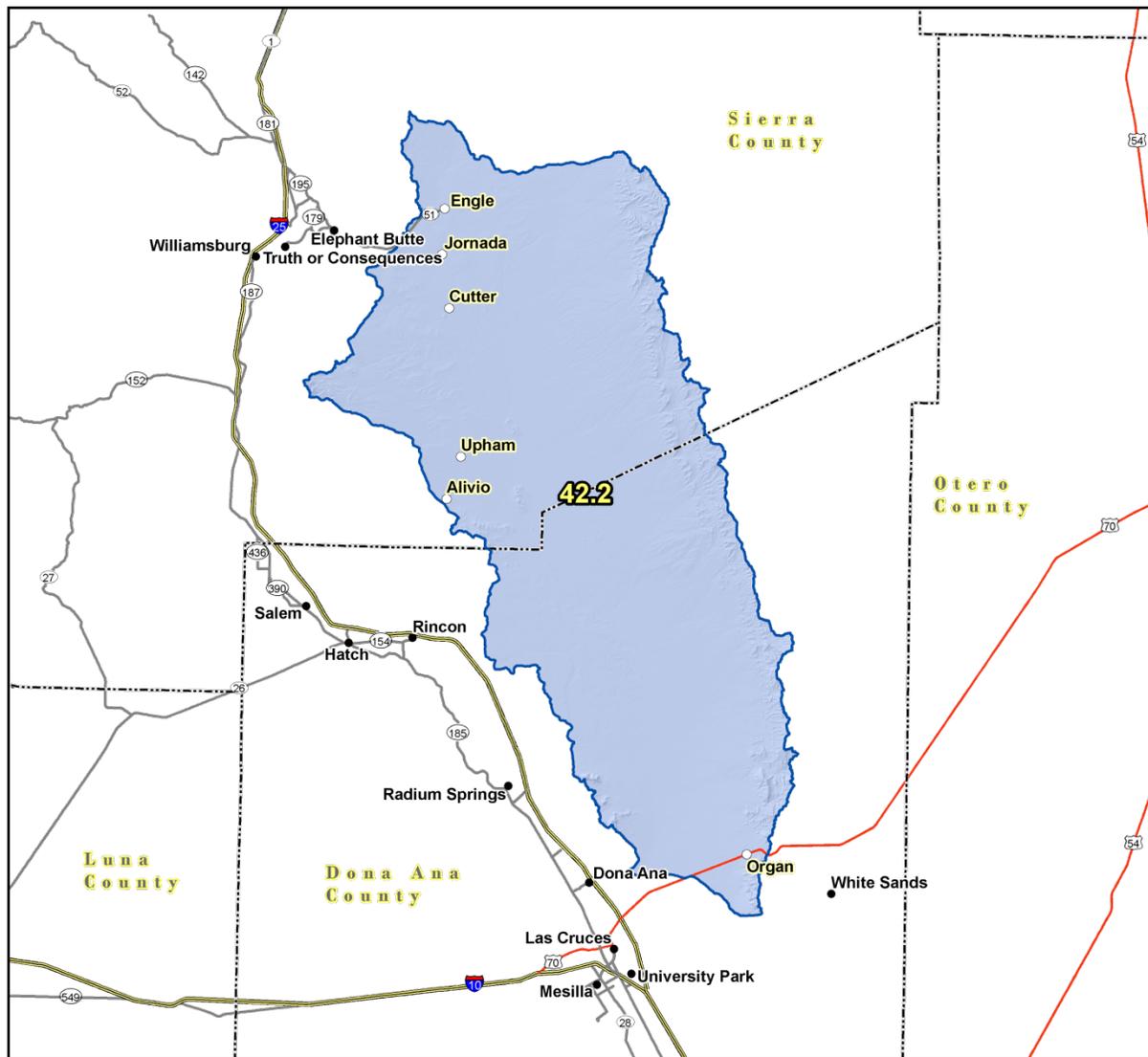
<u>Scientific Name</u>	<u>Common Name</u>
<i>Zygophyllaceae</i> (Caltrop Family)	African Rue
<i>Brassicaceae</i> (Mustard Family)	Hoary Cress (Whitetop)
<i>Asteraceae</i> (Sunflower Family)	Russian Knapweed

Table 7. 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 10. Common Resource Areas of the Jornada Draw Watershed.**

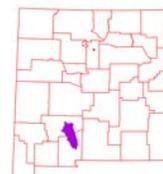


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## **Common Resource Areas**

### **42.2 - Chihuahuan Desert Shrubs**

This unit occurs within the Basin and Range Physiographic Province and is characterized by valley plains, alluvial fans, and mountains. Sediments are from fluvial, lacustrine, colluvial and alluvial deposits. Igneous and metamorphic rock dominate the mountain ranges. Elevations range from 3800 to 5200 feet. Precipitation ranges from 8 to 10 inches per year. The soil temperature regime is thermic. The soil moisture regime is typic aridic. Vegetation includes Creosote, tarbush, soap tree yucca, torrey yucca, tobosa, and alkali sacaton.



## 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	1	31,358	1	974	2	42,861	1	18,532	1	4,075	6	97,800
Prescribed Grazing	1	14,622									1	14,622
Stream Habitat Improvement and Management					1	14,622					1	14,622
Upland Wildlife Habitat Management					1	19,412	1	48,575	1	7,401	3	75,388
<b>SUM (Σ)</b>	<b>2</b>	<b>45,980</b>	<b>1</b>	<b>974</b>	<b>4</b>	<b>76,895</b>	<b>2</b>	<b>67,107</b>	<b>2</b>	<b>11,476</b>	<b>11</b>	<b>202,432</b>

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
Fence			1	242			1	15,977			2	16,219
Pipeline	1	19,189			1	242	1	12,262	1	6,873	4	38,566
<b>SUM (Σ)</b>	<b>1</b>	<b>19,189</b>	<b>1</b>	<b>242</b>	<b>4</b>	<b>242</b>	<b>2</b>	<b>28,239</b>	<b>4</b>	<b>6,873</b>	<b>12</b>	<b>54,784</b>

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



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

The Jornada Draw Watershed has a number of certified National Cooperative Soil Survey (NCSS) inventories. Soils data is available from the NRCS Soil Data Mart at <http://soildatamart.nrcs.usda.gov/> and/or the NRCS Geospatial Data Gateway at <http://datagateway.nrcs.usda.gov/>.

### National Cooperative Soil Survey

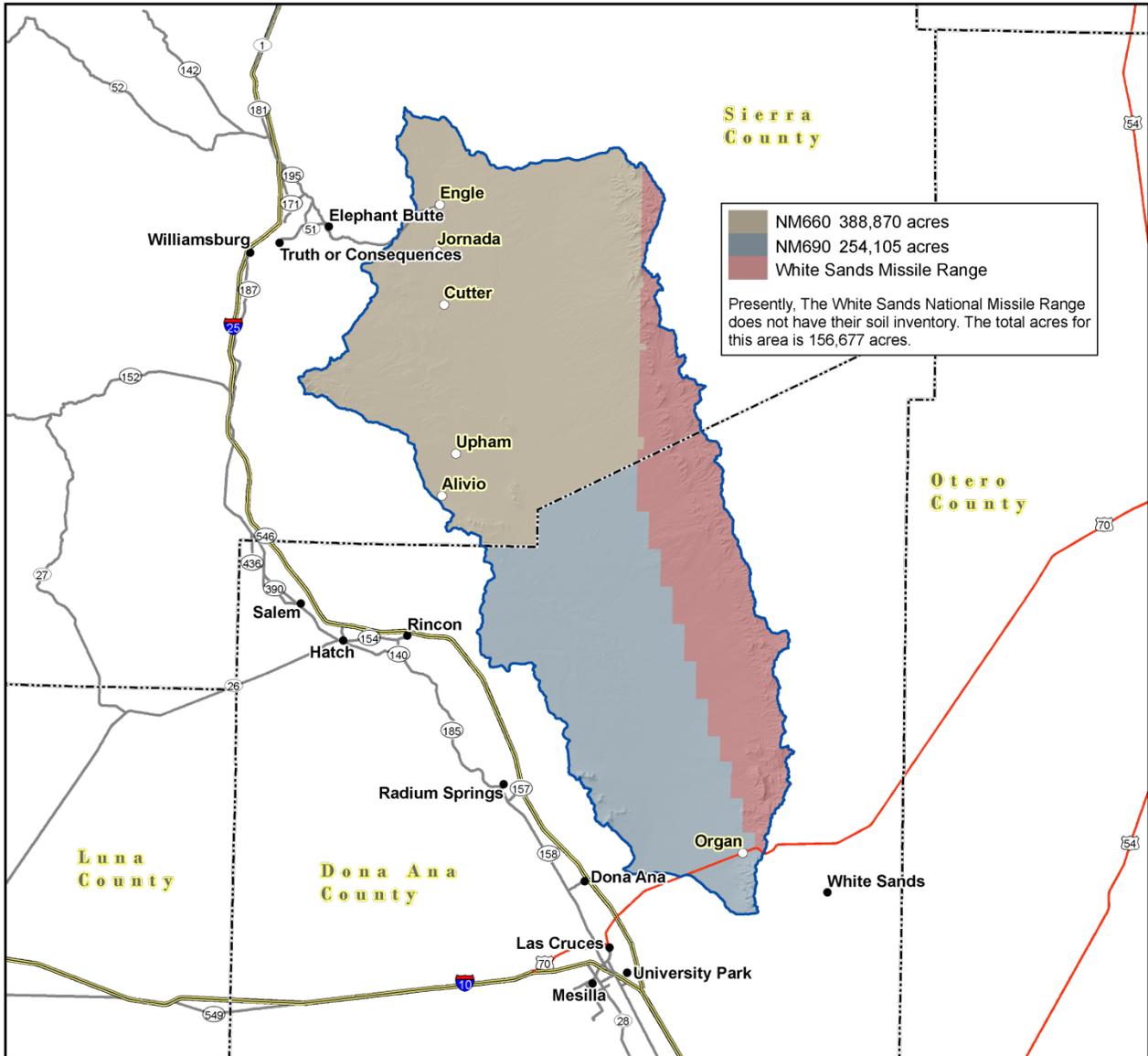


Figure 11. National Cooperative Soil Survey coverage of the Jornada Draw Watershed.



## Soil Resource Inventory

In order to evaluate the susceptibility of erosion within the Jornada Draw 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
99.9 - 10.0	High	1
9.9 - 1.0	Moderately High	2
0.9 - 0.1	Moderately Low	3
0.09 - 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 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.

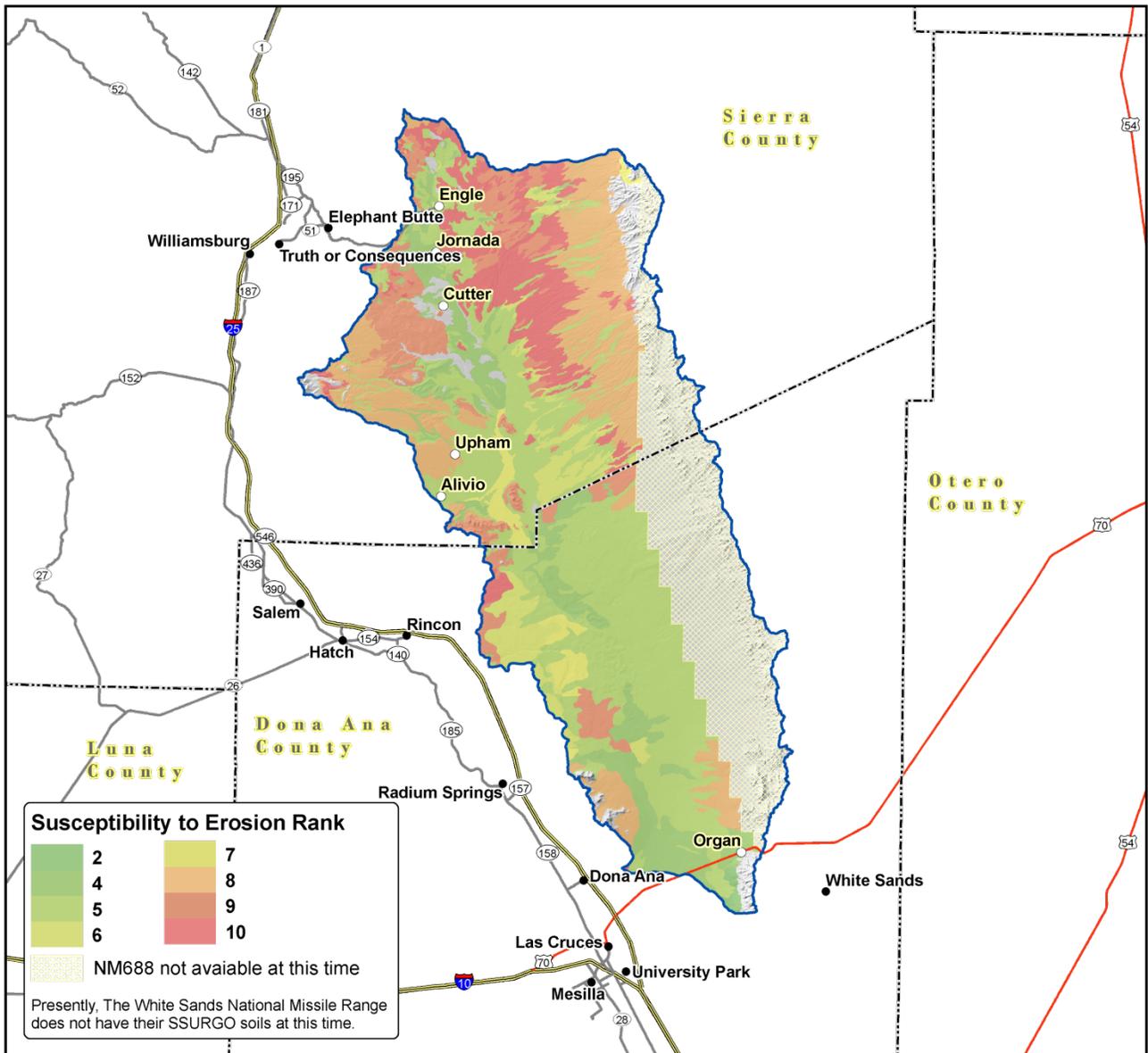


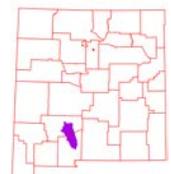
Figure 12. Jornada Draw Watershed Erosion Potential.



## Soil Resource Inventory

<u>Rank</u>	<u>Acres</u>
2	2,169
4	75,850
5	229,573
6	37,371
7	15,836
8	114,299
9	67,733
10	69,942
<b>Sum( <math>\Sigma</math> )</b>	<b>612,772</b>

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



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

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 adj. 2010
Dona Ana	209,233	137,514	154,989	3,656	3,147	2,227	185	38,685	6,344	43,184
Sierra	11,988	3,352	10,265	49	199	49	3	1,032	391	38,641

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



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