

## Rapid Watershed Assessment Western Estancia Watershed



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## Overview

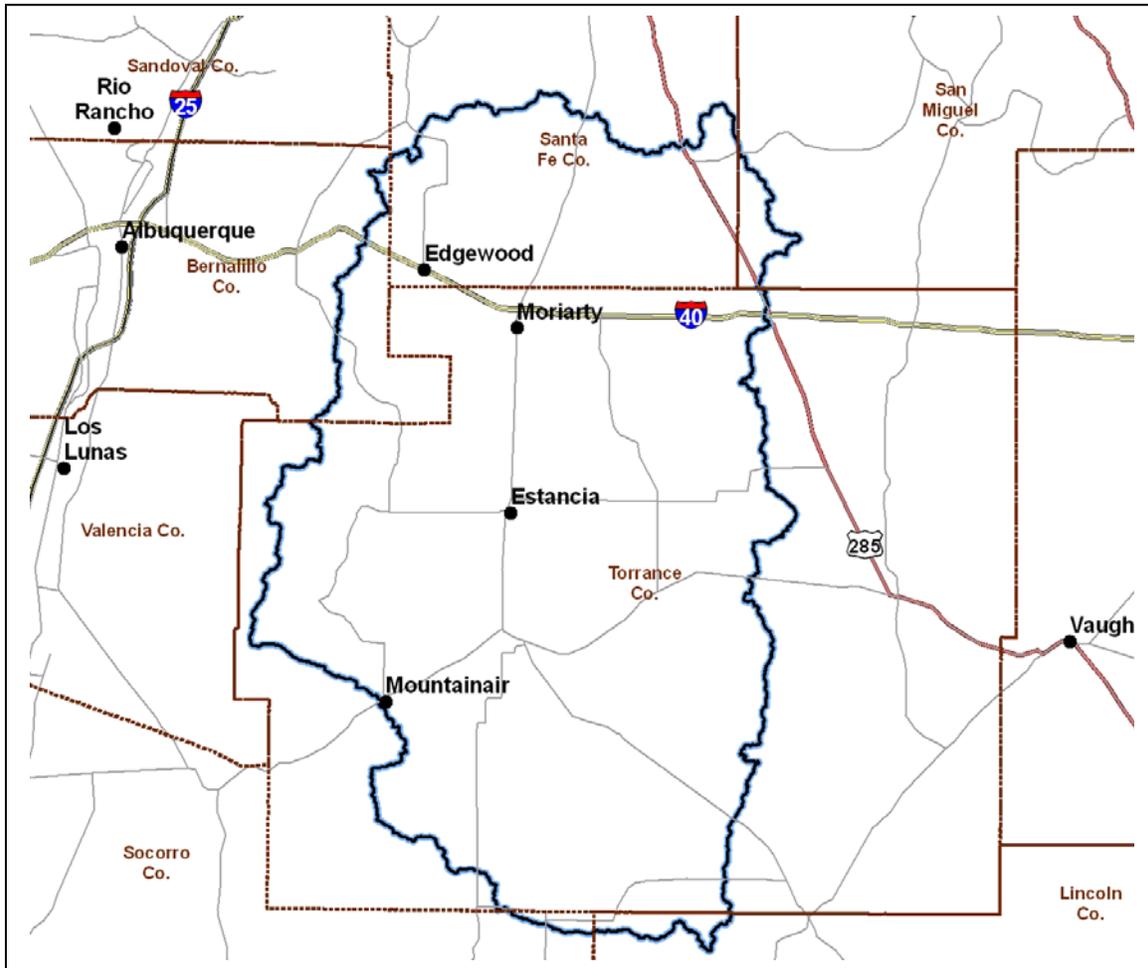
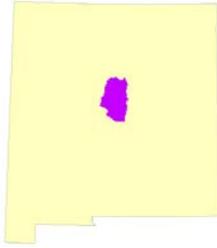


Figure 1. Western Estancia watershed overview.



## Overview

The Western Estancia watershed, in central New Mexico, lies within the Rio Grande-Closed Basins subregion of the Rio Grande hydrologic region. The Western Estancia watershed covers approximately 1.5 million acres (6,300 sq. km.) with portions extending into Santa Fe, Bernalillo, San Miguel, Torrance, Lincoln, and Socorro counties. The distribution of the watershed is provided in Table 1.

| COUNTY           | Co. Acres Total | Acres in HUC | % HUC in Co. | % Co. in Watershed |
|------------------|-----------------|--------------|--------------|--------------------|
| Lincoln          | 3,089,795       | 13,075       | 1            | < 1                |
| San Miguel       | 3,028,627       | 18,981       | 1            | 1                  |
| Santa Fe         | 1,222,180       | 271,502      | 18           | 22                 |
| Socorro          | 4,255,339       | 5,784        | < 1          | < 1                |
| Torrance         | 2,139,990       | 1,174,536    | 76           | 55                 |
| Bernalillo       | 747,774         | 67,006       | 4            | 9                  |
|                  |                 |              |              |                    |
| Sum ( $\Sigma$ ) |                 | 1,550,884    | 100          |                    |

**Table 1. Western Estancia watershed acreage distribution.**



### **General History of the area:**

Located in the Central or geographical heart of New Mexico. Before the Estancia Basin, there was an inland sea that occupied the valley, up until 10,000 years ago. When the water evaporated, halite salts were left behind and thousands of years later became a highly coveted commodity. The Pueblo Indians that settled at Abò, Quarai, and Gran Quivira, and later to the Spanish and Anglo settlers, used the salt as a commodity and traded it with other tribes, developing trade routes that ran through the valley and along the eastern foothills of the Manzano Mountains. The trade route was later called “Salt Missions Trail” which started at Tijeras Canyon and heads south following the contours of the mountain foothills, passing through Hispanic villages that still retain their original names and character (Manzano, Tajique, Chilili, Escobosa and Yrisarri). Today, the playa lakes in Estancia Basin range in size from a few acres to more than 12 mi long (Meinzer, 1911; Talmage and Wootton, 1937).

The County itself was created from parts of Lincoln, San Miguel, Socorro, Santa Fe, and Valencia Counties in 1903 and named after the railroad developer “Francis J. Torrance”. The first county seat was at Progreso, a sheep ranch of Col. J. Francisco Chaves. Estancia became the Torrance County seat in 1905, and was incorporated in 1909. The word Estancia is a Spanish word for large estate, cattle ranch, or resting place and is identified with the springs in the area. It was ranching country until the early 20th century, when the coming of the railroad opened it to homesteaders and farmers. Pinto beans were the best known local crop until the 1950s. Ranching and urban sprawl are the current mainstay.



## **Physical Setting**

### **Geology:**

The Estancia Basin is about 100 km long and 45 km wide. It is located within the Mexican Highland Section of the Basin and Range Physiographic Province. The basin floor is covered with Quaternary to Holocene lacustrine to alluvium deposits with localized outcroppings of Pennsylvanian, Permian and Triassic aged rocks.

The western edge of the basin is formed by the eastern dip-slope of the Sandia-Manzano Mountains. These mountains are Precambrian aged granitic core with Pennsylvanian to Permian aged limestones draped across the back slope of these narrow ranges. The eastern boundary is formed by the Pedernal uplift. The Pedernal Hills are an ancient and worn mountain range that has been reduced to low hills. The northern end is formed by the Tertiary aged laccoliths forming the Cerillos, Ortiz, San Pedro and South Mountain areas. These igneous rocks intruded into strata from Pennsylvanian to Tertiary in age, producing volcanic domes. Overall this structure is known as the Ortiz Porphyry Belt.

The southern end of the basin is closed forming a bolson. Water entering this area from the surrounding mountains remains within the basin where it may infiltrate or evaporate. Several salty lakes are found in the lower areas of the Estancia Basin, which are believed to have hydrologic connectivity to the mountains defining the western boundary of the watershed.

### **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 Western Estancia 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.



### Hydrologic Soil Group

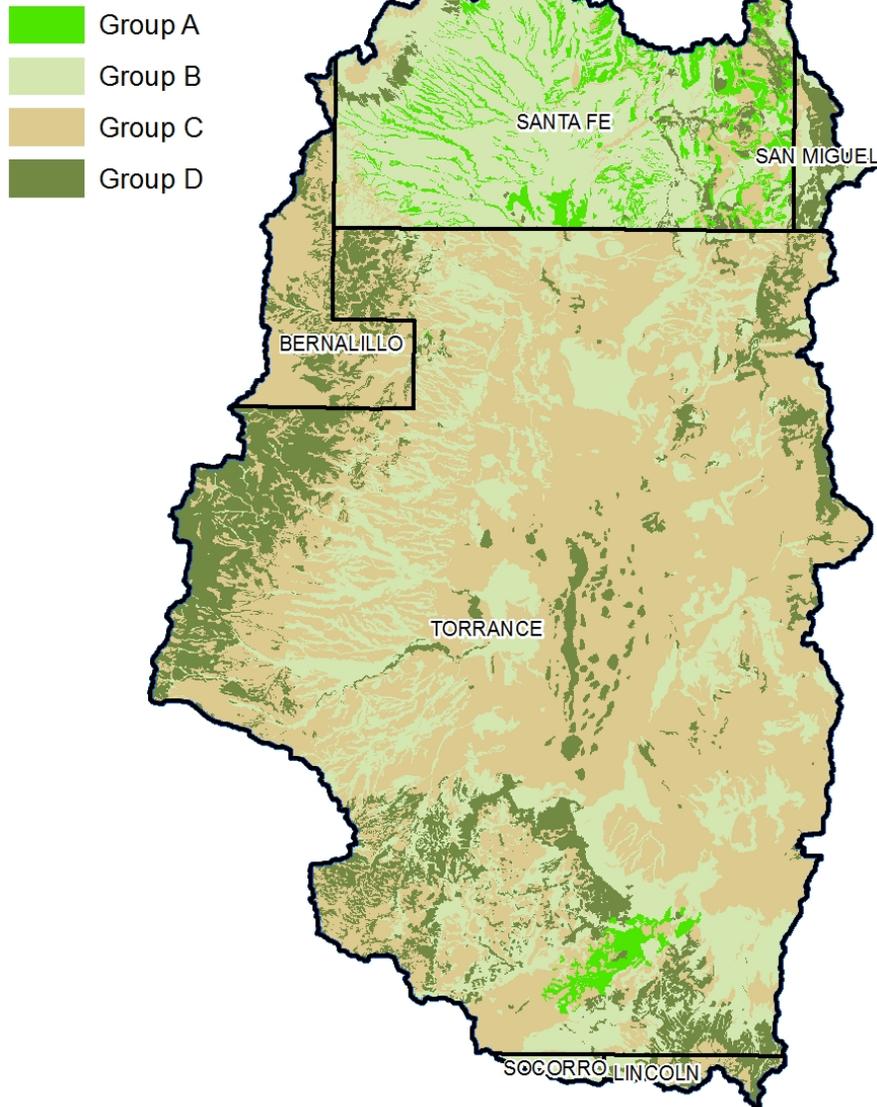


Figure 2. Hydrologic Soil Group

| Slope % | % of Watershed |
|---------|----------------|
| 0 - 5   | 75             |
| 5 - 10  | 10             |
| 10 - 15 | 9              |
| 15 - 25 | 1              |
| > 25    | 5              |

| Aspect | % of Watershed |
|--------|----------------|
| Flat   | 19             |
| North  | 16             |
| East   | 24             |
| South  | 21             |
| West   | 18             |

Table 2. Geomorphic characteristics.



## Physical Setting

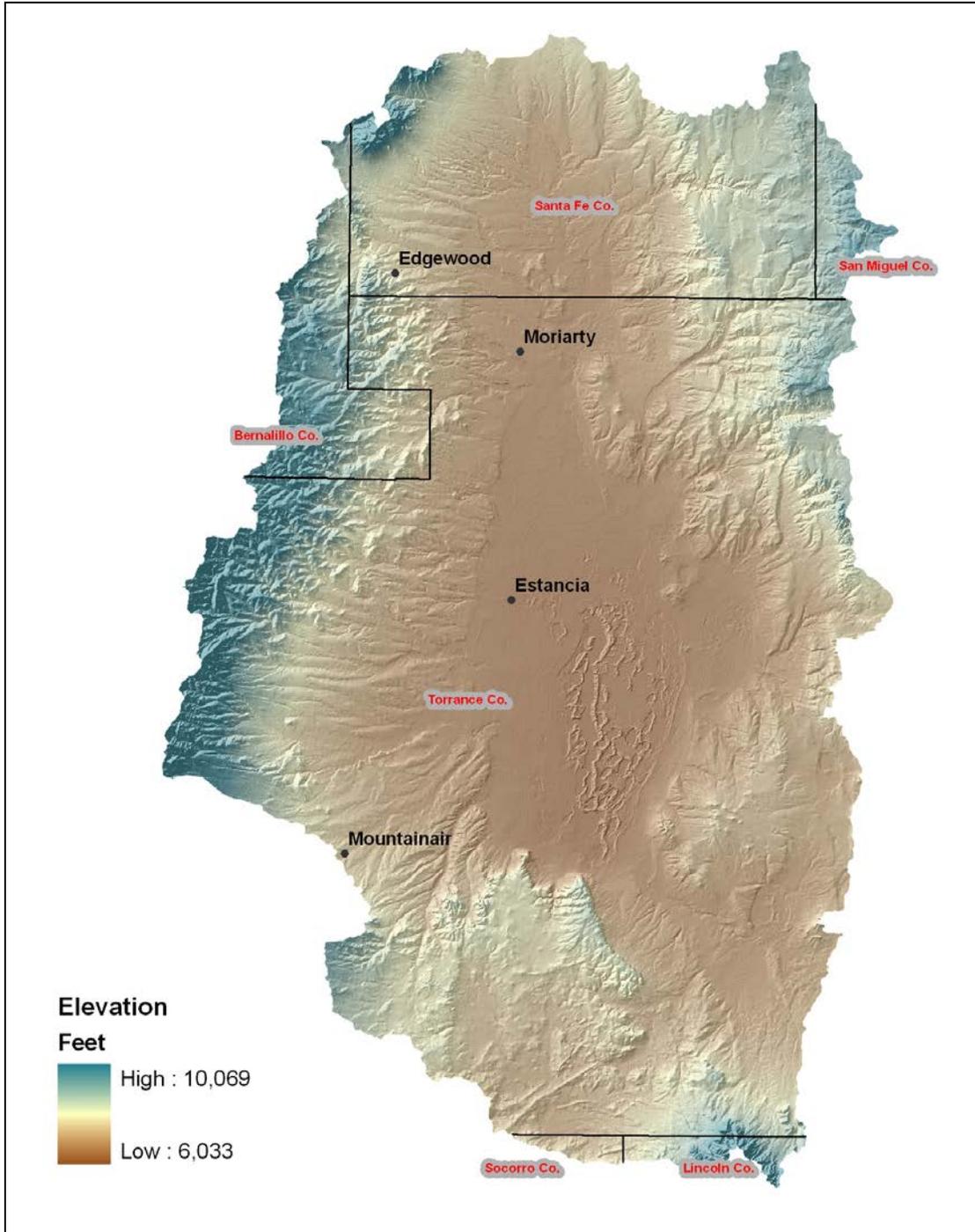
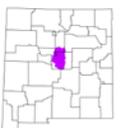


Figure 3. Western Estancia shaded relief.



## Precipitation <sup>1</sup>

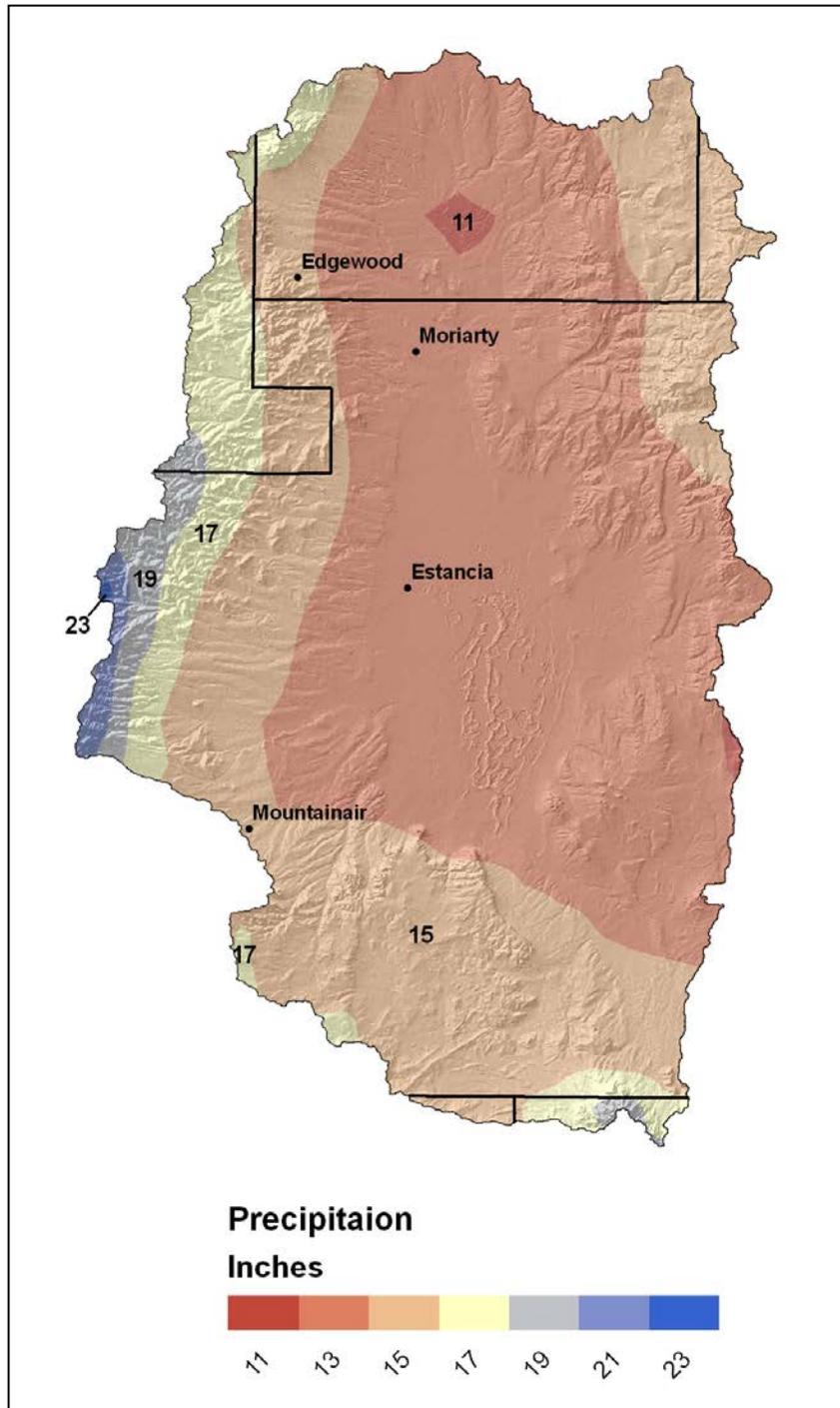
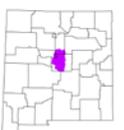


Figure 4. Annual Precipitation.



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

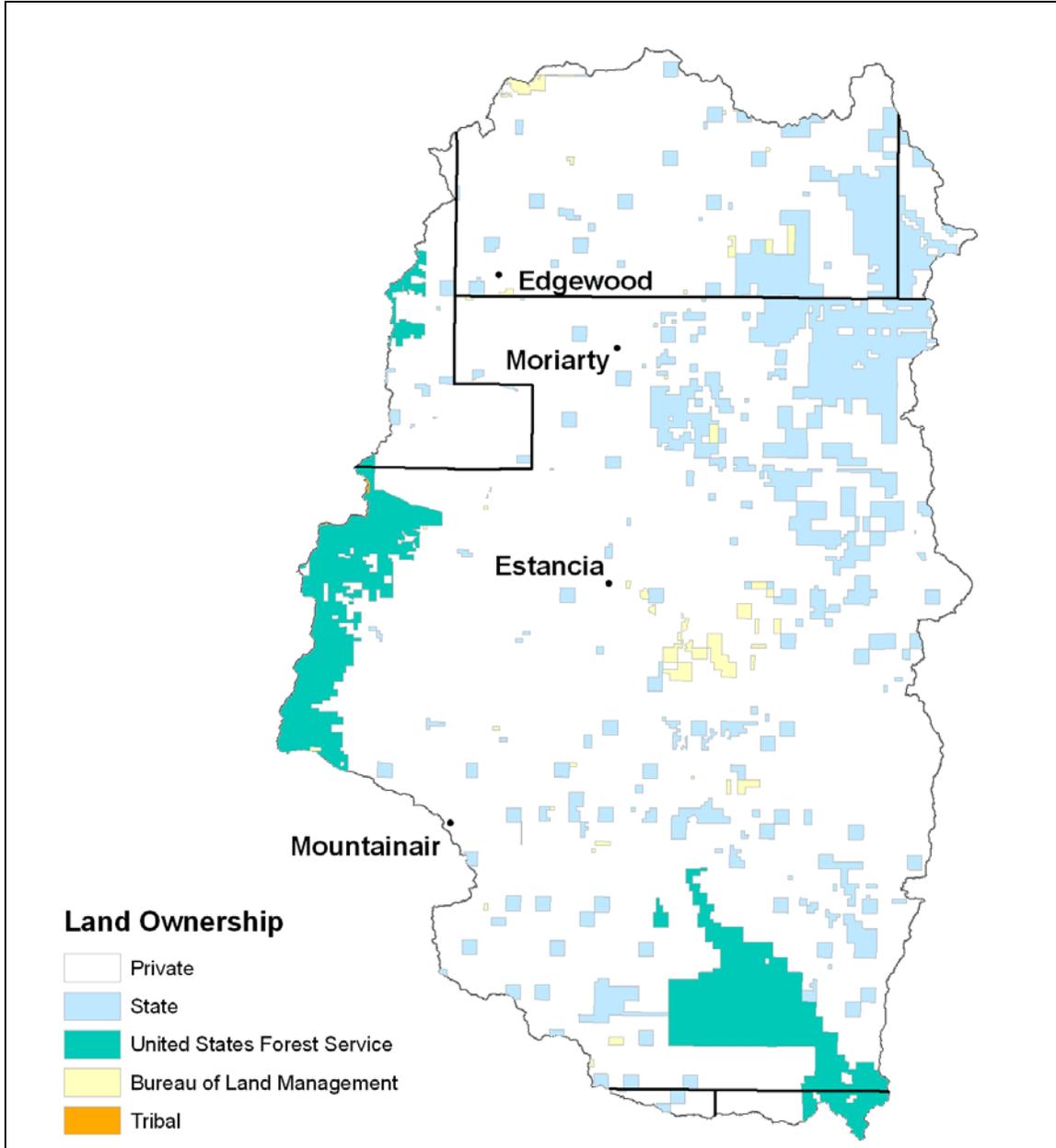


Figure 5. Land ownership.

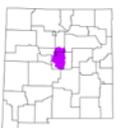


## **Land Ownership**

In the Western Estancia watershed there are 5 land managing entities. Approximately 80% of the area is privately managed. Table 2 summarizes land ownership within the watershed.

|                        | <b>Private</b> | <b>State</b> | <b>BLM</b> | <b>USFS</b> | <b>Tribal</b> |
|------------------------|----------------|--------------|------------|-------------|---------------|
| Torrance               | 932,600        | 137,100      | 10,000     | 95,400      | 200           |
| Santa Fe               | 225,500        | 42,900       | 3,400      |             | ---           |
| Bernalillo             | 60,000         | 2,400        | 0          | 4,600       | 100           |
| San Miguel             | 10,400         | 8,600        | ---        | ---         | ---           |
| Lincoln                | 7,300          |              | ---        | 5,800       | ---           |
| Socorro                | 4,800          | 1000         | ---        | ---         | ---           |
|                        |                |              |            |             |               |
| Watershed ( $\Sigma$ ) | 1,240,600      | 192,000      | 13,400     | 105,800     | 300           |
| % Watershed            | 80             | 12           | 1          | 7           | < 1           |

**Table 3. Land ownership acreage distribution.**



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

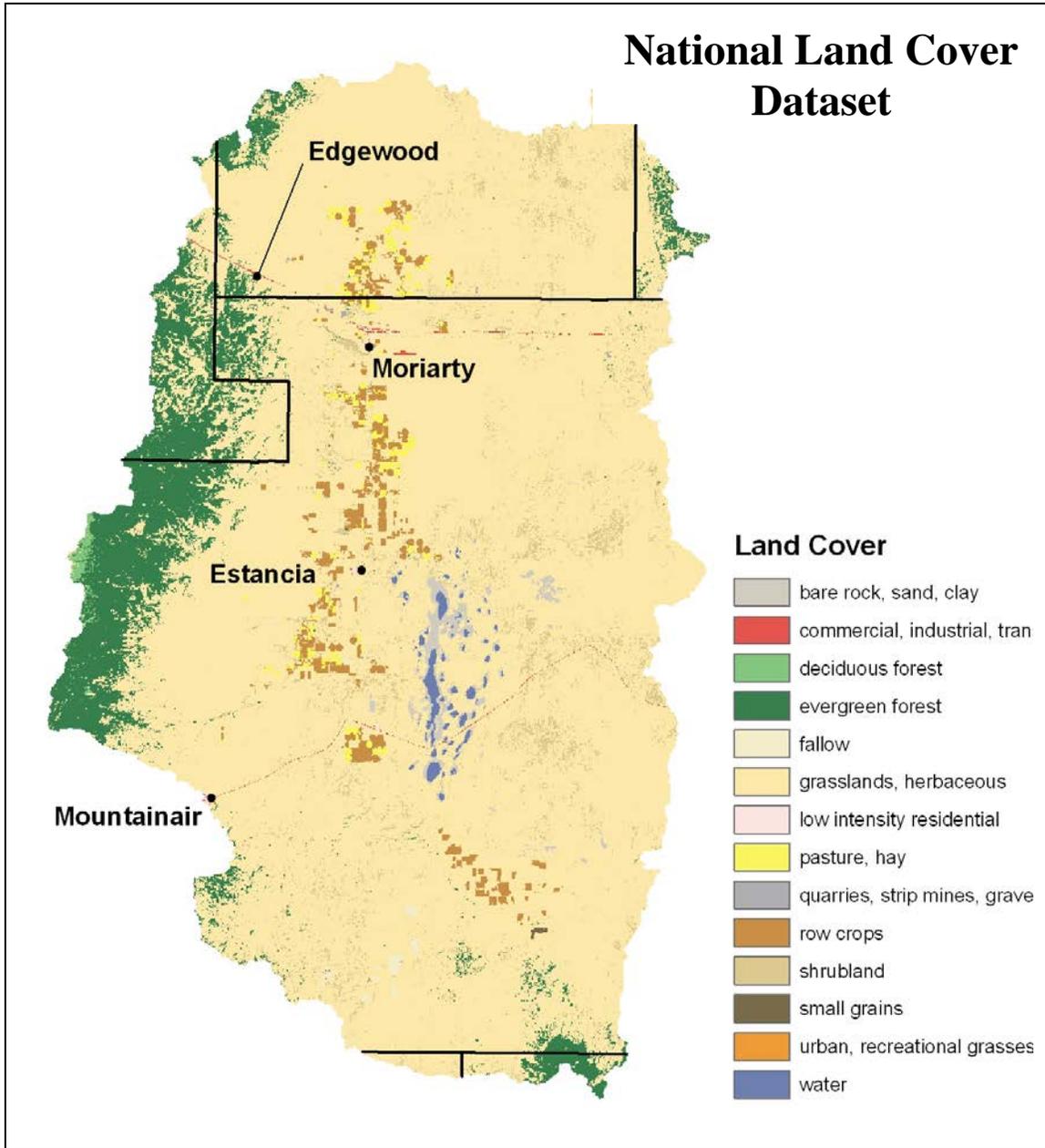


Figure 6. Subset of the NLCD.



## 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 Cover                             | Acres     | % of Watershed |
|--|-----------|----------------|
| grasslands, herbaceous                 | 1,277,200 | 82             |
| evergreen forest                       | 135,700   | 9              |
| shrubland                              | 64,700    | 4              |
| row crops                              | 30,100    | 2              |
| bare rock, sand, clay                  | 14,100    | 1              |
| pasture, hay                           | 13,400    | 1              |
| water                                  | 7,300     | 1              |
| deciduous forest                       | 3,300     | < 1            |
| fallow                                 | 2,800     | < 1            |
| commercial, industrial, transportation | 2,100     | < 1            |
| low intensity residential              | 800       | < 1            |
| quarries, strip mines, gravel pits     | 700       | < 1            |
| small grains                           | 300       | < 1            |
| urban, recreational grasses            | < 100     | < 1            |

**Table 4. Extent of NLCD classes.**



**Land Use \ Land Cover**

**Southwest Region GAP Analysis**

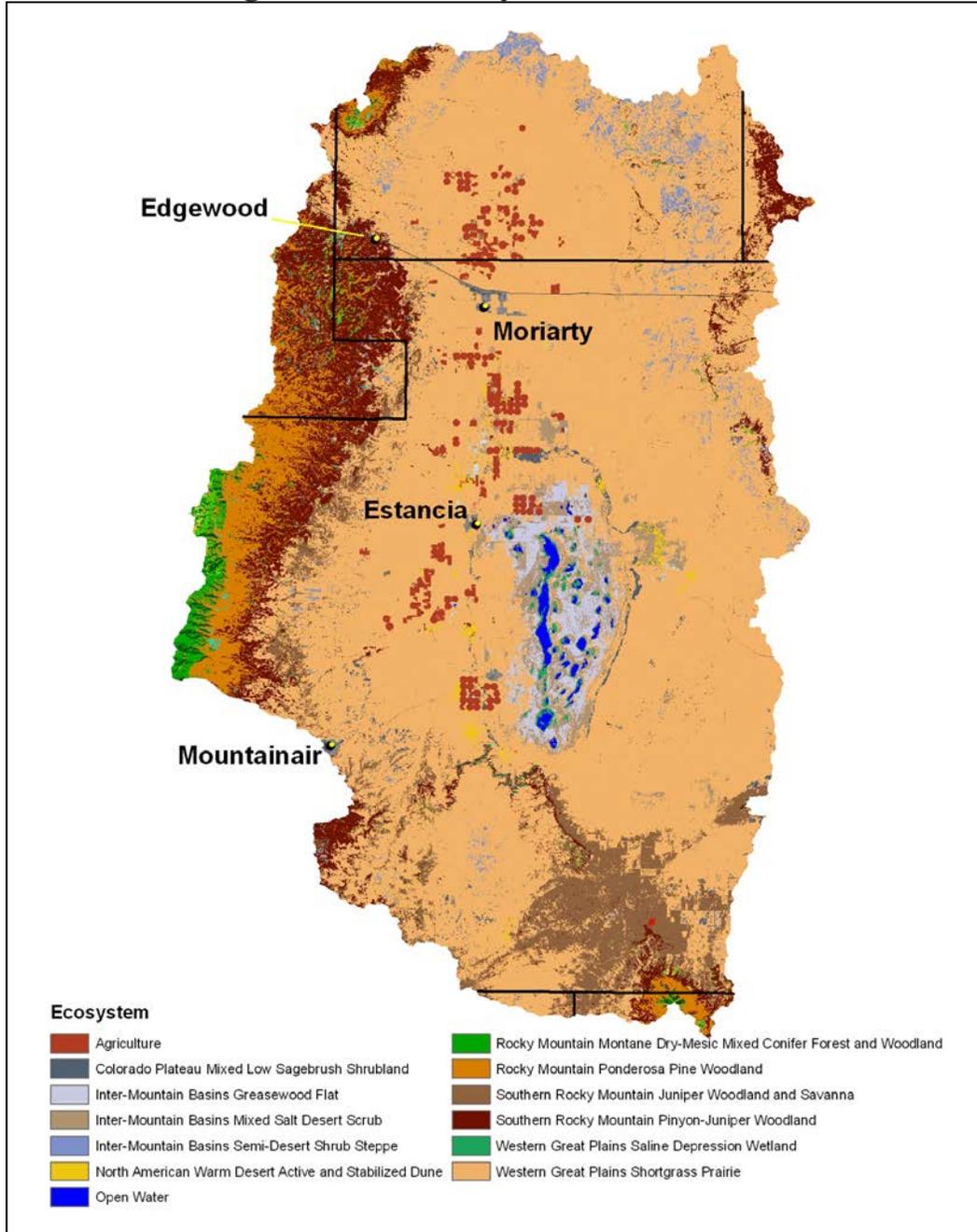


Figure 7. Subset of the SW ReGAP. The 13 dominant ecosystems are listed in the legend.



## 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.

| Ecosystem  | Acres     | % of Watershed |
|--|-----------|----------------|
| Western Great Plains Shortgrass Prairie                            | 1,048,900 | 67             |
| Southern Rocky Mountain Pinyon-Juniper Woodland                    | 128,700   | 8              |
| Southern Rocky Mountain Juniper Woodland and Savanna               | 111,100   | 7              |
| Rocky Mountain Ponderosa Pine Woodland                             | 74,000    | 5              |
| Inter-Mountain Basins Mixed Salt Desert Scrub                      | 45,200    | 3              |
| Inter-Mountain Basins Greasewood Flat                              | 28,500    | 2              |
| Agriculture  | 26,800    | 2              |
| Inter-Mountain Basins Semi-Desert Shrub Steppe                     | 21,600    | 1              |
| Colorado Plateau Mixed Low Sagebrush Shrubland                     | 11,300    | 1              |
| Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland | 8,400     | 1              |
| Open Water   | 7,100     | 1              |
| North American Warm Desert Active and Stabilized Dune              | 6,800     | < 1            |
| Western Great Plains Saline Depression Wetland                     | 5,500     | < 1            |
| Western Great Plains Foothill and Piedmont Grassland               | 4,600     | < 1            |
| Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland     | 4,500     | < 1            |
| Rocky Mountain Gambel Oak-Mixed Montane Shrubland                  | 3,500     | < 1            |
| Madrean Pinyon-Juniper Woodland                                    | 3,200     | < 1            |
| Developed, Open Space - Low Intensity                              | 3,000     | < 1            |
| Developed, Medium - High Intensity                                 | 2,400     | < 1            |
| Rocky Mountain Lower Montane Riparian Woodland and Shrubland       | 1,600     | < 1            |
| North American Warm Desert Playa                                   | 1,200     | < 1            |
| Southern Rocky Mountain Montane-Subalpine Grassland                | 800       | < 1            |
| Western Great Plains Riparian Woodland and Shrubland               | 500       | < 1            |
| Rocky Mountain Aspen Forest and Woodland                           | 400       | < 1            |
| Western Great Plains Cliff and Outcrop                             | 400       | < 1            |
| Inter-Mountain Basins Montane Sagebrush Steppe                     | 400       | < 1            |
| Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe    | 300       | < 1            |
| Chihuahuan Mixed Salt Desert Scrub                                 | 200       | < 1            |
| Madrean Juniper Savanna  | 200       | < 1            |
| Chihuahuan Gypsophilous Grassland and Steppe                       | 200       | < 1            |
| Inter-Mountain Basins Semi-Desert Grassland                        | 100       | < 1            |
| Rocky Mountain Subalpine-Montane Riparian Shrubland                | 100       | < 1            |
| Recently Burned  | 100       | < 1            |
| Chihuahuan Sandy Plains Semi-Desert Grassland                      | 100       | < 1            |

**Table 5. Extent of the SW ReGAP ecosystems.**



**Hydrology** <sup>5,6,7</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 Western Estancia watershed is a closed basin meaning all surface is retained within its boundaries and there are no natural drainages to adjacent watersheds. The NHD identifies approximately 2,900 miles (4,700 km) of water courses within the Western Estancia watershed. Of this, 2,500 miles are designated as streams, rivers, or arroyos which may be either ephemeral or perennial courses. Table 6 summarizes the NHD listings for the Western Estancia watershed.

| Water Course Type | Miles |
|-------------------|-------|
| Artificial path   | 362   |
| Connector         | 2     |
| Pipeline          | 9     |
| Stream / River    | 2,545 |
|                   |       |
| Sum ( $\Sigma$ )  | 2,918 |

**Table 6. NHD water course types and extents.**



## 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 New Mexico Water Quality Control Commission (NMWQCC) is the issuing agency of water quality standards for interstate and intrastate waters. In this role, it is the responsibility of the NMWQCC to assess the waters in New Mexico for compliance with the Clean Water Act. The NMWQCC has subdivided the Western Estancia watershed into 3 reaches. These reaches are listed in Table 7.

| Reach              | Aquatic Life | Livestock Watering | Marginal Cold Water Aquatic Life | Secondary Contact | Marginal Warmwater Aquatic Life | Warmwater Aquatic Life | Wildlife Habitat |
|--------------------|--------------|--------------------|----------------------------------|-------------------|---------------------------------|------------------------|------------------|
| Estancia Park Lake | x            | x                  | x                                | x                 |                                 | x                      | x                |
| Laguna del Pero    | x            | x                  |                                  | x                 | x                               |                        | x                |
| Mike's Playa       | x            | x                  |                                  | x                 | x                               |                        | x                |

|                       |              |                             |
|-----------------------|--------------|-----------------------------|
| x = Designated Use(s) | Not Assessed | Assessed - Fully Supporting |
|-----------------------|--------------|-----------------------------|

**Table 7. NMWQCC designated uses and 303(b) assessments.**



## Hydrology

Within the 2008 - 2010 New Mexico Integrated Clean Water Act Report, 1 of the 3 listed reaches of the Western Estancia watershed were evaluated for compliance with Section 303(d) of the Clean Water Act. This was Laguna del Perro, which did not have any impairments on which it was assessed. It is graphically represented with the other two reaches that are listed with the NMWQCC in Figure 7.

### 303 Listed Waters

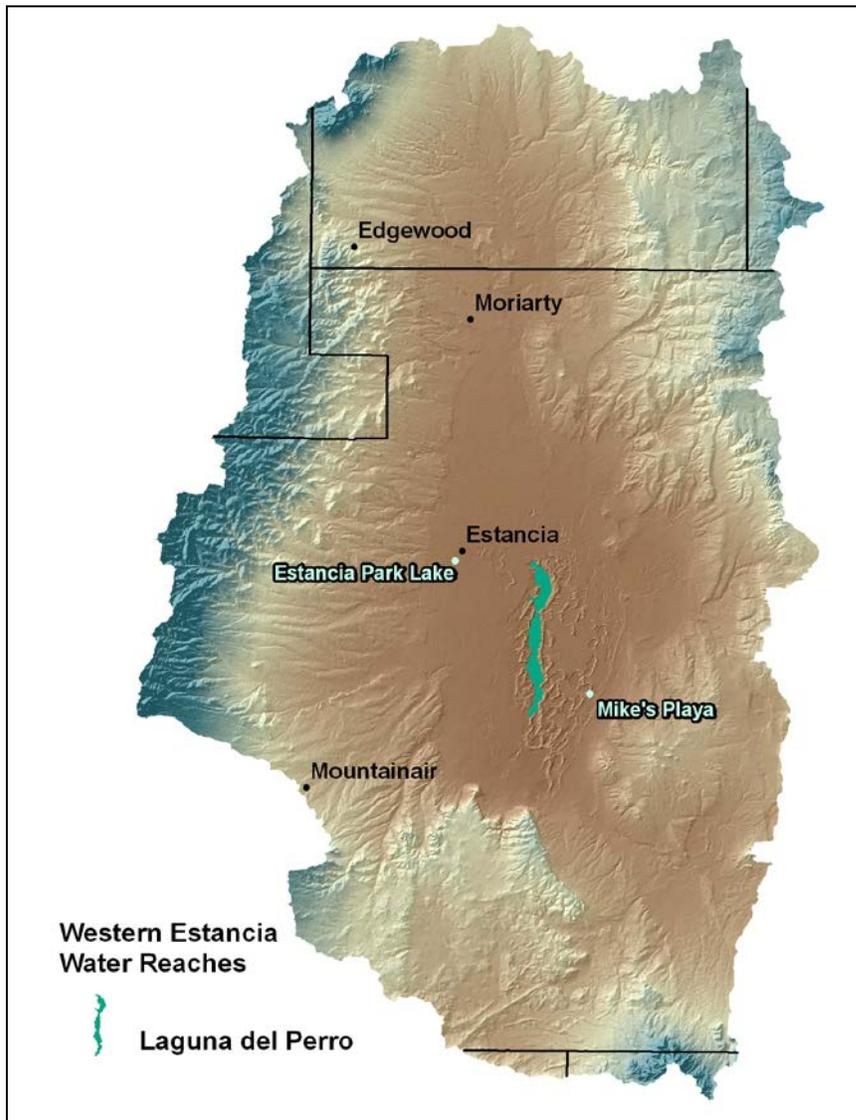
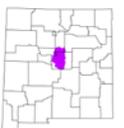


Figure 8. NMWQCC listed water courses.



## Hydrology

There are six declared groundwater basins within the Western Estancia watershed. These basins cover about 85% of the area within the 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 Estancia ground water basin covers almost 95% of the declared basins. Table 8 summarizes groundwater basins in the Western Estancia watershed.

| Groundwater Basin | Acres     | % of Declared Basins |
|-------------------|-----------|----------------------|
| Estancia          | 1,255,887 | 94                   |
| Rio Grande        | 16,406    | 1                    |
| Sandia            | 6,765     | 1                    |
| Upper Pecos       | 17,581    | 1                    |
| Roswell           | 26,291    | 2                    |
| Fort Sumner       | 8,488     | 1                    |
|                   |           |                      |
| % Declared        | 86%       |                      |
| Undeclared        | 219,426   |                      |

Table 8. Declared groundwater basins.



## Threatened and Endangered Species <sup>8</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 (NMNH), a division of the Museum of Southwestern Biology, collects data on the biology, status and location of the New Mexico's biological resources. In addition, NMNH keeps track of any legal or informal status applied to biological resources with respect to rarity or conservation priority by both governmental and non-governmental agencies. As such, NMNH maintains a tracking list of about 600 Threatened, Endangered and Sensitive (TES) animal and plant species of particular concern or sensitivity in New Mexico. Table 9 lists those species which are currently listed and tracked in the Western Estancia watershed.

| Common Name              | Scientific Name                   | Taxonomic Class | Family          | Fed Status | State Status | Global Rank | State Rank |
|--------------------------|-----------------------------------|-----------------|-----------------|------------|--------------|-------------|------------|
| Ferruginous Hawk         | <i>Buteo regalis</i>              | Aves            | Accipitridae    |            |              | G4          | S2B,S4N    |
| Northern Goshawk         | <i>Accipiter gentilis</i>         | Aves            | Accipitridae    |            |              | G5          | S2B,S3N    |
| Mexican Spotted Owl      | <i>Strix occidentalis lucida</i>  | Aves            | Strigidae       | LT         |              | G3T3        | S2B,S2N    |
| Sacramento Groundsel     | <i>Senecio sacramentanus</i>      | Dicotyledoneae  | Asteraceae      |            |              | G3          | S3         |
| Tall Bitterweed          | <i>Hymenoxys brachyactis</i>      | Dicotyledoneae  | Asteraceae      |            |              | G3          | S3         |
| Grama Grass Cactus       | <i>Sclerocactus papyracanthus</i> | Dicotyledoneae  | Cactaceae       |            |              | G4          | S4         |
| A Milk-vetch             | <i>Astragalus siliceus</i>        | Dicotyledoneae  | Fabaceae        |            |              | G3          | S3         |
| Santa Fe Milk-vetch      | <i>Astragalus feensis</i>         | Dicotyledoneae  | Fabaceae        |            |              | G3          | S3         |
| New Mexico Scorpion-weed | <i>Phacelia neomexicana</i>       | Dicotyledoneae  | Hydrophyllaceae |            |              | G5          | S3?        |
| Gunnison's Prairie Dog   | <i>Cynomys gunnisoni</i>          | Mammalia        | Sciuridae       |            |              | G5          | S2         |
| Merriam's Shrew          | <i>Sorex merriami</i>             | Mammalia        | Soricidae       |            |              | G5          | S2         |

**Table 9. NMNH tracked plant and animal species. For field descriptions see [Appendix A](#).**



## **Invasive Species** <sup>9</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 Western Estancia watershed, the SWEMP has identified and cataloged the presence of 3 species of invasive plants (Table 10). These species are defined as non-native by the USDA-PLANTS database.

| <b>Scientific Name</b>     | <b>Common Name</b>   |
|----------------------------|----------------------|
| <i>Poa pratensis</i>       | Kentucky bluegrass   |
| <i>Bromus tectorum</i>     | cheatgrass           |
| <i>Onopordum acanthium</i> | Scotch cottonthistle |
| <i>Cardaria draba</i>      | whitetop             |

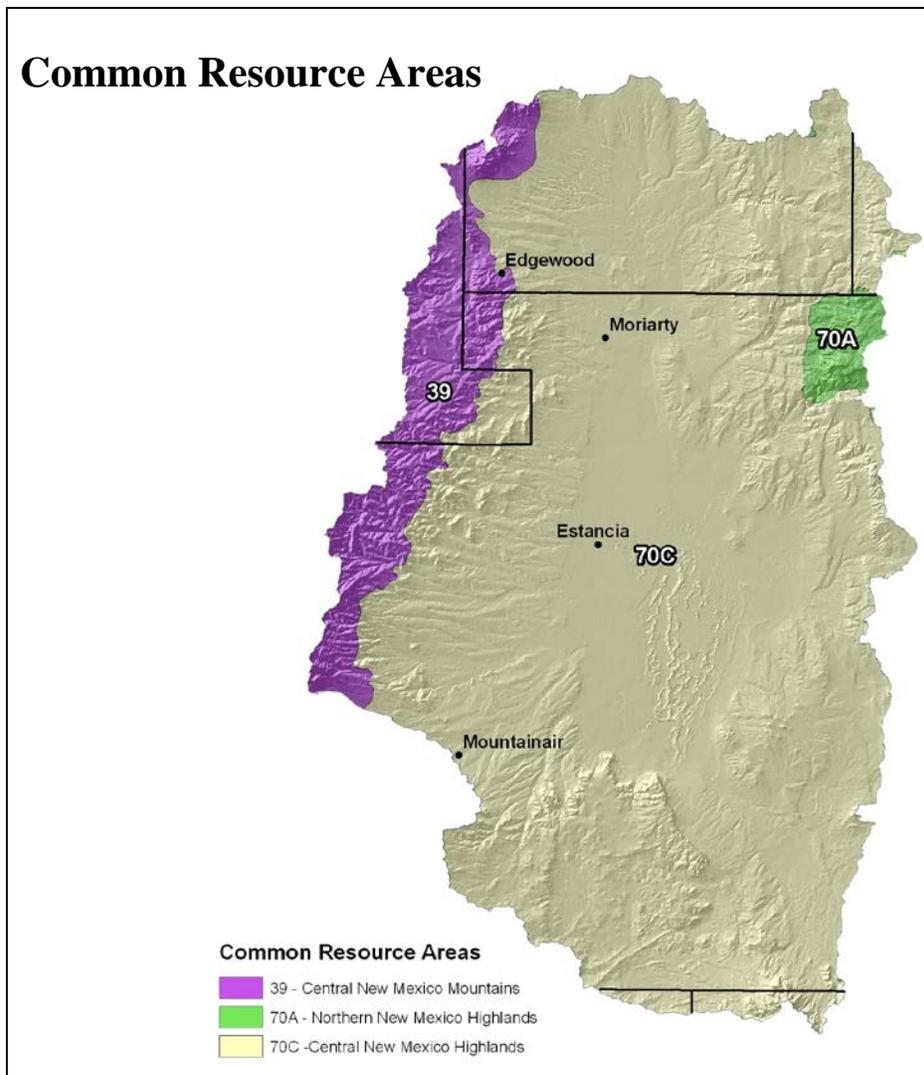
**Table 10.** SWEMP listed invasive plant species.



## Common Resource Areas

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 9. Common Resource Areas.**



## **Common Resource Areas**

### **70C - 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.

### **39 - Central New Mexico Mountains**

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

### **70A - 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.



## Conservation

The USDA-Natural Resources Conservation Service (NRCS) focuses on the development and delivery of high quality products and services that enable agricultural producers to be good stewards of our Nation's soil, water, and related natural resources on non-Federal lands. The Natural Resources Conservation Service's conservation programs aid 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. In fiscal year 2008, 427 planned conservation practices addressed resource concerns on more than 150,000 acres in the Western Estancia watershed. These programs were administered from the Estancia USDA-NRCS Service Center. Tables 11 and 12 summarize these practices.

| <b>Conservation Practice</b>       | <b>Bernalillo</b> | <b>Torrance</b> | <b>Lincoln</b> | <b>Socorro</b> |
|------------------------------------|-------------------|-----------------|----------------|----------------|
| Conservation Crop Rotation         | 4                 | 1,349           | ---            | ---            |
| Irrigation System, Microirrigation | 3                 | 33              | ---            | ---            |
| Irrigation Water Management        | 4                 | 1,790           | ---            | ---            |
| Nutrient Management                | 4                 | 1,711           | ---            | ---            |
| Pest Management                    | 4                 | 1,711           | ---            | ---            |
| Residue Management, Seasonal       | 4                 | 363             | ---            | ---            |
| Prescribed Grazing                 | ---               | 61,924          | 5,787          | 3,038          |
| Upland Wildlife Habitat Management | ---               | 64,489          | 5,787          | 3,038          |
| Brush Management                   | ---               | 4,229           | ---            | ---            |
| Conservation Cover                 | ---               | 881             | ---            | ---            |
| Forest Stand Improvement           | ---               | 17              | ---            | ---            |
| Irrigation System, Sprinkler       | ---               | 305             | ---            | ---            |
| Use Exclusion                      | ---               | 881             | ---            | ---            |
|                                    |                   |                 |                |                |
| <b>SUM (<math>\Sigma</math>)</b>   | <b>23</b>         | <b>139,682</b>  | <b>11,574</b>  | <b>6,076</b>   |

Table 11. 2008 planned conservation practices. Reported in acres.



## Conservation

Table 12 lists planned conservation practices that are location specific (one dimensional) within the Western Estancia watershed. These planned practices occurred solely within Torrance County.

|                           | Conservation Practice  | # of Plans | Total        |
|---------------------------|--|------------|--------------|
| <b>Count Practices</b>    | Dam, Diversion   | 2          | 2            |
|                           | Pumping Plant  | 12         | 241          |
|                           | Spring Development   | 2          | 2            |
|                           | Structure for Water Control  | 3          | 3            |
|                           | Water Well   | 8          | 8            |
|                           | Watering Facility  | 41         | 41           |
| <b>Distance Practices</b> | Fence  | 10         | 42,030 ft.   |
|                           | Irrigation Water Conveyance, Pipeline, <b>High-Pressure</b> , Underground, Plastic | 2          | 1,146.7 ft.  |
|                           | Irrigation Water Conveyance, Pipeline, <b>Low-Pressure</b> , Underground, Plastic  | 1          | 927 ft.      |
|                           | Pipeline   | 28         | 87,169.4 ft. |

**Table 12. Location specific 2008 planned conservation practices.**



## Soil Resource Inventory

All of the ~ 1.5 million acres in the Western Estancia watershed have a certified Soil Survey Geographic Database - National Cooperative Soil Survey inventory. Soil resource inventories have been conducted on 6 distinct areas including lands managed by the Bureau of Land Management and the State of New Mexico, as well as those that are privately held.

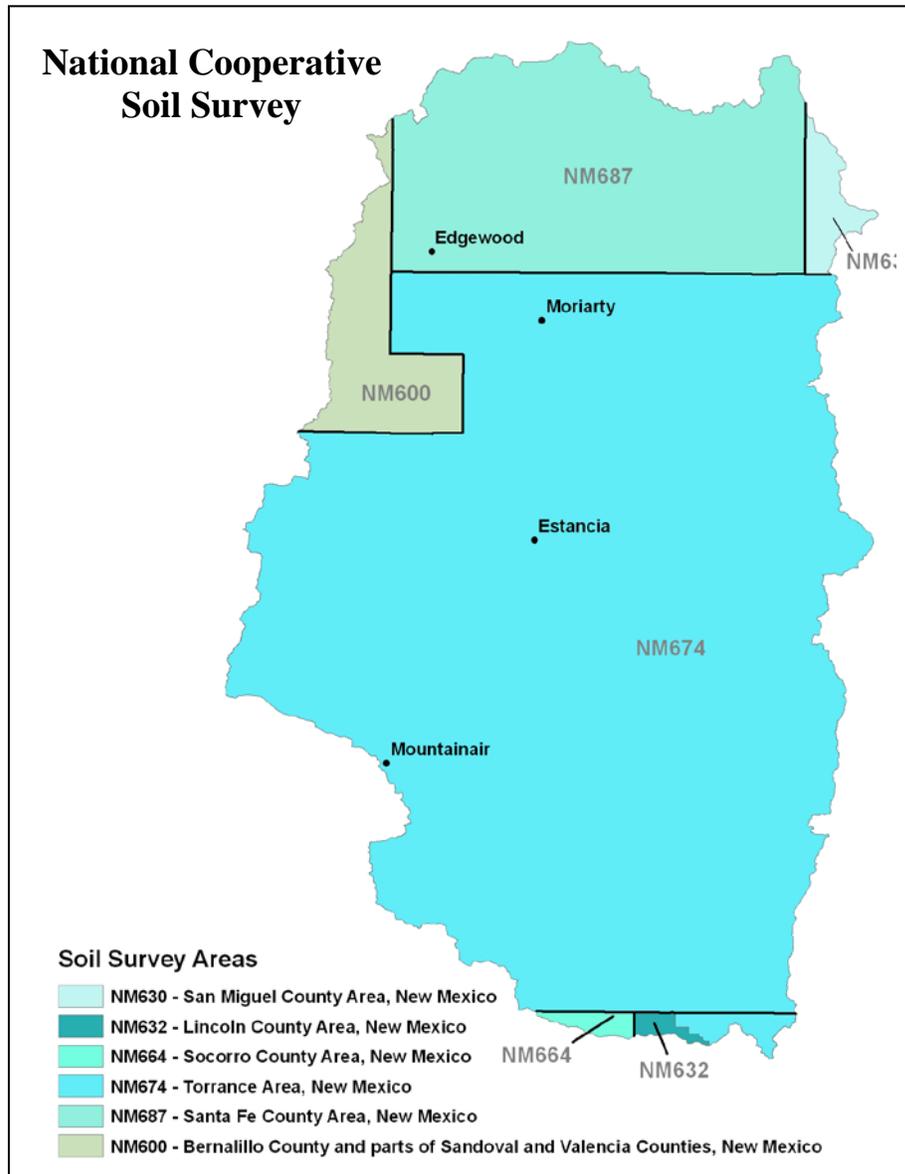


Figure 10. National Cooperative Soil Survey coverage.



## Soil Resource Inventory

In order to evaluate the susceptibility of erosion within the Western Estancia 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> |
|---|----------------------------|-------------------|
| <b>Saturated Hydraulic Conductivity</b> |                            |                   |
| $\mu\text{m} / \text{s}$                |                            |                   |
| 705.0 - 100.0                           | Very High                  | 0                 |
| 100.0 - 10.0                            | High                       | 1                 |
| 10.0 - 1.0                              | Moderately High            | 2                 |
| 1.0 - 0.1                               | Moderately Low             | 3                 |
| 0.1 - 0.01                              | Low                        | 4                 |
| <b>Slope %</b>                          |                            |                   |
| 0 - 5                                   |                            | 0                 |
| 5 - 10                                  |                            | 1                 |
| 10 - 15                                 |                            | 2                 |
| 15 - 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 13. Soil erosion model criteria.



## 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.

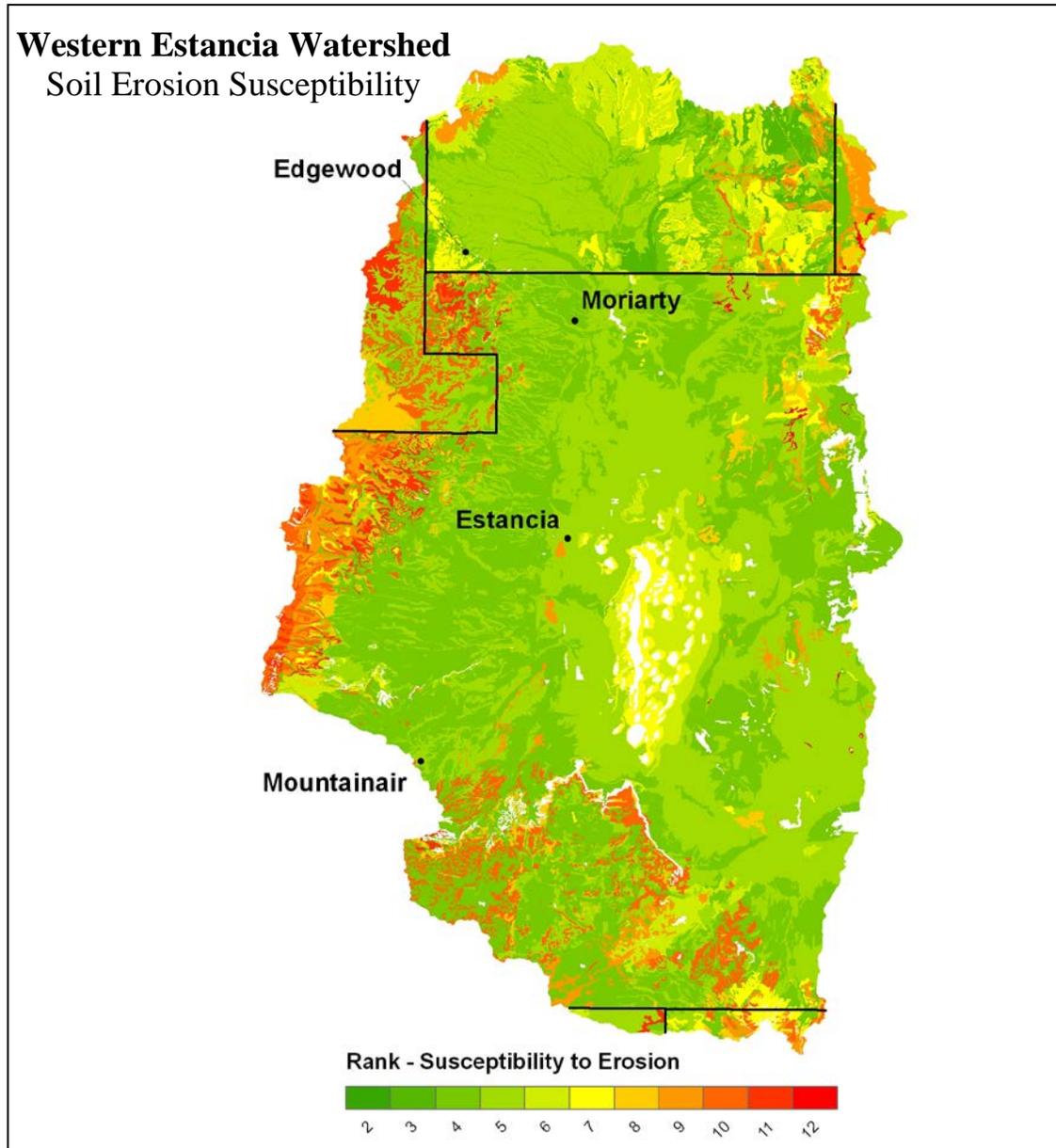


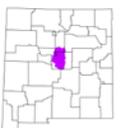
Figure 11. Western Estancia watershed soil erosion potential.



## Soil Resource Inventory

| Rank             | Acres     | % of Watershed |
|------------------|-----------|----------------|
| 2                | 291       | <1             |
| 3                | 26,390    | 2              |
| 4                | 523,308   | 35             |
| 5                | 573,856   | 38             |
| 6                | 108,875   | 7              |
| 7                | 69,653    | 5              |
| 8                | 42,446    | 3              |
| 9                | 58,781    | 4              |
| 10               | 83,267    | 5              |
| 11               | 25,460    | 2              |
| 12               | 2,001     | <1             |
|                  |           |                |
| Sum ( $\Sigma$ ) | 1,514,327 | 100            |

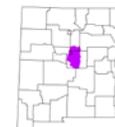
**Table 14. Potential soil erosion model results.**



**Socioeconomic** <sup>10</sup>

| County     | Total Pop. | Total: Urban | Total: Rural | Total: Rural; Farm | Total: Rural; Nonfarm | Hispanic or Latino | White alone | Black or African American alone | American Indian and Alaska Native alone | Asian alone | Native Hawaiian and Other Pacific Islander alone | Some other race alone | Two or more races | Families: Median family income in 1999 |
|------------|------------|--------------|--------------|--------------------|-----------------------|--------------------|-------------|---------------------------------|---|-------------|--|-----------------------|-------------------|--|
| Bernalillo | 556,678    | 532,555      | 24,123       | 134                | 23,989                | 233,527            | 393,666     | 15,303                          | 22,964                                  | 9,864       | 532  | 88,403                | 25,946            | 46,613                                 |
| Lincoln    | 19,411     | 9,251        | 10,160       | 309                | 9,851                 | 4,978              | 16,298      | 65                              | 311                                     | 57          | 9  | 2,149                 | 522               | 40,035                                 |
| San Miguel | 30,126     | 18,000       | 12,126       | 290                | 11,836                | 23,469             | 17,030      | 235                             | 430                                     | 118         | 28   | 11,041                | 1,244             | 31,250                                 |
| Santa Fe   | 129,292    | 97,465       | 31,827       | 643                | 31,184                | 63,461             | 95,200      | 974                             | 3,950                                   | 944         | 80   | 22,881                | 5,263             | 50,000                                 |
| Socorro    | 18,078     | 8,422        | 9,656        | 340                | 9,316                 | 8,782              | 11,338      | 119                             | 2,017                                   | 167         |  | 3,689                 | 748               | 29,544                                 |
| Taos       | 29,979     | 12,171       | 17,808       | 291                | 17,517                | 17,388             | 19,335      | 101                             | 1,892                                   | 74          | 11   | 7,375                 | 1,191             | 33,995                                 |

Table 15. Socioeconomic data for counties with shared boundaries.



## **References**

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6. New Mexico Environment Department – Water Quality Control Commission

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## **Appendix A**

### BASIC FEDERAL STATUS DESIGNATIONS

#### **LE = Listed Endangered**

Species for which a final rule has been published in the Federal Register to list the species as endangered. Species is legally protected by the Endangered Species Act.

#### **LT = Listed Threatened**

Species for which a final rule has been published in the Federal Register to list the species as threatened. Species is legally protected by the Endangered Species Act.

#### **PE = Proposed Endangered**

Species for which a proposed rule has been published in the Federal Register to list the species as endangered

#### **PT = Proposed Threatened**

Species for which a proposed rule has been published in the Federal Register to list the species as threatened.

#### **C or CN = Candidate for Listing**

Substantial information exists in U.S. Fish and Wildlife Service files on biological vulnerability to support proposals to list as endangered or threatened.

#### **SC = Species of Concern**

The terms "Species of Concern" or "Species at Risk" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the US Fish and Wildlife Service, but neither term has official status (currently all former C2 species).

#### **PDL = Proposal for delisting**

Species for which a final rule has been published in the Federal Register to delist the species.

#### **XN = Non-essential Experimental Population**

Species for which a population has been artificially established in the wild which is not essential to the survival of the species in the wild.

#### **T(S/A) = Listed as Threatened Due to Similarity of Appearance**



## **Appendix A**

### STATE STATUS DESIGNATIONS FOR ANIMALS

#### **E = Endangered**

Any species or subspecies whose prospects of survival or recruitment in New Mexico are in jeopardy.

#### **T = Threatened**

Any species or subspecies that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range in New Mexico.

### STATE STATUS DESIGNATIONS FOR PLANTS

**E = Endangered** - The taxon is listed as threatened or endangered under the provisions of the Federal Endangered Species Act (16 U.S.C. Sections 1531 et seq.), or is considered proposed under the tenets of the act [10-29-85,]; or the taxon is a rare plant across its range within the state, and of such limited distribution and population size that unregulated taking could adversely impact it and jeopardize its survival in New Mexico. [10-29-85, 8-31-95]

**SoC = Species of Concern** - A New Mexico plant species, which should be protected from land use impacts when possible because it is a unique and limited component of the regional flora.

### BASIC GLOBAL RANKS

#### **GX = Presumed Extinct**

Believed to be extinct throughout its range. Not located despite intensive searches and virtually no likelihood that it will be rediscovered.

#### **GH = Possibly Extinct**

Known only from historical occurrences. Still some hope of rediscovery.

#### **G1 = Critically Imperiled**

Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).

#### **G2 = Imperiled**

Imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).



## **Appendix A**

individuals (1,000 to 3,000).

### **G3 = Vulnerable**

Vulnerable globally either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations) , or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals

### **G4 = Apparently Secure**

Uncommon but not rare, and usually widespread. Possibly cause for longterm concern. Typically more than 100 occurrences globally or more than 10,000 individuals.

### **G5 = Secure**

Common, typically widespread and abundant.

## **BASIC STATE RANKS**

### **SX = Presumed Extirpated**

Believed to be extirpated. Not located despite intensive searches and virtually no likelihood that it will be rediscovered.

### **SH = Possibly Extirpated**

Known only from historical occurrences. Still some hope of rediscovery.

### **S1 = Critically Imperiled**

Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).

### **S2 = Imperiled**

Imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).

### **S3 = Vulnerable**

Vulnerable in the state either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations) , or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals



## **Appendix A**

### **S4 = Apparently Secure**

Uncommon but not rare, and usually widespread. Possibly cause for longterm concern. Typically more than 100 occurrences in the state or more than 10,000 individuals.

### **S5 = Secure**

Common, typically widespread and abundant.

### VARIANT STATE RANKS

### **S#S# = Range Rank**

A numeric range rank (e.g., S2S3) is used to indicate uncertainty about the exact status of a taxon.

### **SA = Accidental**

Accidental or casual in NM. In other words, infrequent and outside usual range. Includes species (usually birds or butterflies) recorded once or only a few times at a location.

### **SE = Exotic**

An exotic established in state; may be native elsewhere in North America; includes fish native to NM but introduced into watersheds where the species is non-native. An exotic established in NM may be assigned a numeric rank (e.g. SE2) to indicate its status, as defined for S1 through S5.

### **SU = Unrankable**

Currently unrankable due to lack of available information about status or trends.

### **HYB = Hybrid**

### **SRF = False Report**

Element reported in NM but the report is known to be invalid.

### **SNR = Not Ranked**

State conservation status not yet assessed.

### **S? = Unranked**

Rank not yet assessed.



## **Appendix A**

### STATE RANK QUALIFIERS

**? = Inexact numeric rank**

Denotes inexact numeric rank.

**Q = Questionable taxonomy**

Taxonomic status is questionable; numeric rank may change with taxonomy.

**C = Captive or cultivated only**

Taxon at present is extant only in captivity or cultivation, or as a reintroduced population not yet established.

**B = Breeding**

The associated rank refers to breeding occurrences of mobile animals.

**N = Non-breeding**

The associated rank refers to non-breeding occurrences of mobile animals.

**Z = Moving**

Occurs in the state, but as a diffuse, usually moving population; difficult or impossible to map static occurrences.

