

# Leasburg Dam State Park and Fort Selden State Monument

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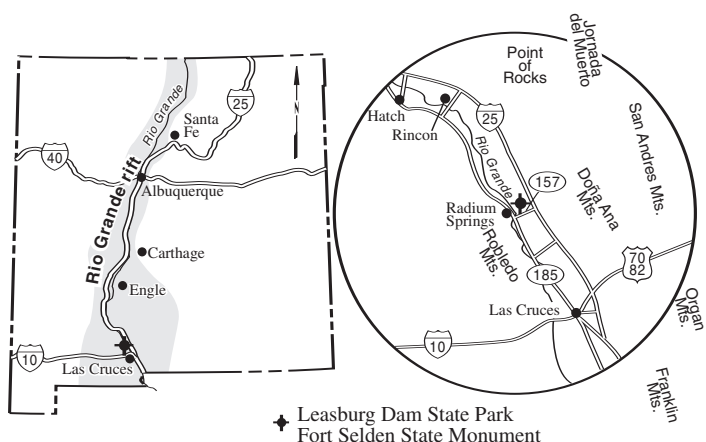


FIGURE 1—Location of Leasburg Dam State Park and Fort Selden State Monument.

## Introduction

Leasburg Dam State Park is adjacent to Fort Selden State Monument on NM-157 (Fort Selden Road) at the Radium Springs exit on I-25, north of Las Cruces (Fig. 1). It is an area rich in both geology and history. At an altitude of 4,200 ft, Leasburg Dam State Park's 140 acres offers picnicking, camping, hiking, wildlife viewing, fishing, canoeing, and kayaking (Figs. 2, 3). Restrooms, showers, electric sites, and an RV dump station are available at the main campground. The playground is built from recycled materials, including the equivalent of 21,768 plastic containers, 48,227 aluminum cans, 34,317 soup cans, and 79 car tires (Fig. 4). A cactus garden with identification signs is near the park office. Most camping sites include picnic shelters, some of which are made of cobbles of rhyolite, andesite, sandstone, volcanic breccia, and limestone. A day-use area lies along the Rio Grande. Camping is not allowed at Fort Selden, so many visitors to the fort camp at the state park. The location was an ancient Indian campground and a crossing point for Spanish caravans headed across the Jornada del Muerto. Living-history demonstrations of 19th century military life at Fort Selden highlight many weekends during the summer.

Wildlife viewing, especially bird watching, is popular at the state park. A bird list is available from the park office. In the winter months many species of ducks, teals, snow geese, cranes, herons, egrets, swans, and pelicans migrate through the southern Rio Grande valley and can be seen at the state park. Numerous raptors, including owls, turkey vultures, eagles, and hawks, can be seen hunting in the area. Small mammals common to the park include rabbits, squirrels, chipmunks, rodents, coyotes, and foxes.

## History

Leasburg Dam State Park and Fort Selden lie along the historic El Camino Real, at the southern end of the Jornada del Muerto, which is Spanish for "journey of the dead man." The Jornada del Muerto offered travelers a shortcut, saving at least a day's travel compared to the longer, winding route along the Rio Grande that traversed many treacherous tributary canyons and arroyos. The Jornada del Muerto, however, was waterless, sandy, desolate, and vulnerable to raids by Apache Indians. Many travelers lost their lives taking the shortcut. Fort Selden was built in 1865 to protect travelers on the El Camino Real and Jornada del Muerto.

Don Juan de Oñate blazed El Camino Real when he led an expedition into New Mexico in 1598. One of the members of the expe-

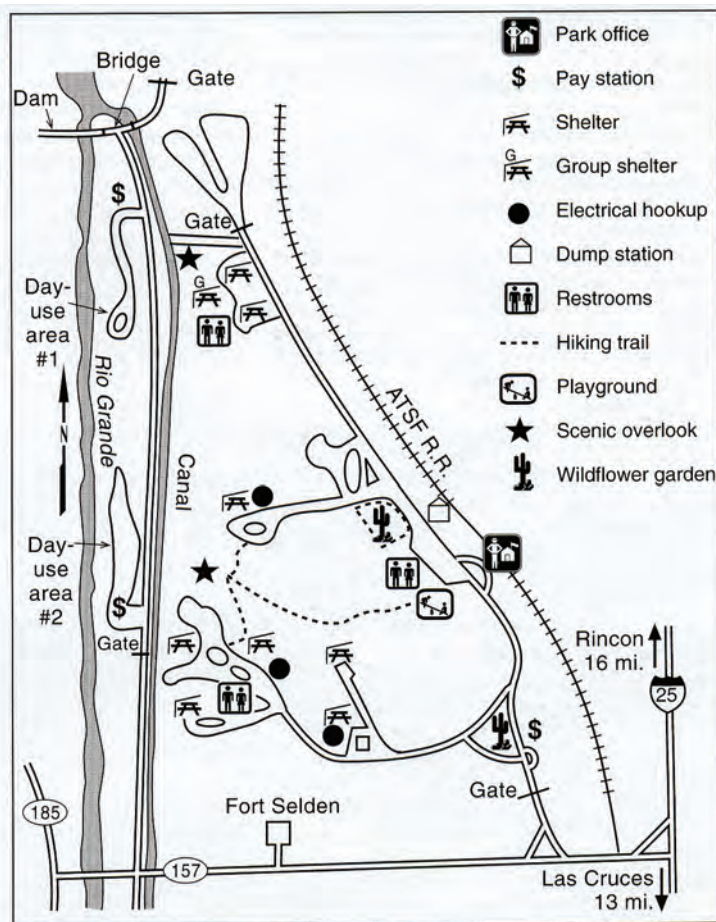


FIGURE 2—Facilities at Leasburg Dam State Park. Reprinted by permission of Southeast Publications USA, Inc.

dition, Pedro Robledo, died near the park and was buried at El Paraje de Robledo, Robledo campsite, which is located south of Radium Springs (Simmons, 1991). His gravesite became a well-known landmark on El Camino Real (Julyan, 1996). The Robledo Mountains were named for Pedro Robledo. El Camino Real became a major trade route between Mexico, El Paso, and Santa Fe.

The southern Rio Grande area north of Las Cruces remained largely uninhabited until the 1850s. After the Mexican War of 1846 when the American Territory of New Mexico was established, farmers began settling in the fertile Mesilla Valley, south of Leasburg Dam and Fort Selden. The Gadsden purchase of much of southern New Mexico in 1853 assured continued growth in Mesilla Valley.

In 1862, Confederate forces captured Fort Bliss in El Paso and Fort Fillmore near Las Cruces. The troops continued north along El Camino Real, past the future site of Fort Selden, only to be defeated by Union forces at Glorieta Pass near Santa Fe. The defeated soldiers were forced to retreat along the same route, ending any hopes of adding New Mexico to the Confederacy. During the 1860s, gold and silver were discovered in the mountains surrounding Silver City to the west, adding to the commerce of the area; however, raids by Apache Indians increased in southwestern New Mexico.

Fort Selden was established in April 1865 adjacent to the Rio Grande, at the southern end of the Jornada del Muerto (Cohrs and Caperton, 1993). The fort was erected to protect settlers in the



FIGURE 3—Campground at Leasburg Dam State Park.



FIGURE 4—Playground at Leasburg Dam State Park.

Mesilla Valley to the south and to guard travelers crossing the Jornada del Muerto. It was named for Colonel Henry R. Selden (1820–1865) of the U.S. Army who died 2½ mos before construction of Fort Selden. Colonel Selden commanded troops during the Mexican War and fought at Valverde and Glorieta Pass in New Mexico during the Civil War.

The plan of the fort (Fig. 5) followed tradition with a central parade ground surrounded by long rows of buildings (Bieberman, 1979). Most of the buildings at Fort Selden were constructed of adobe since wood was lacking in the area (Fig. 6). Adobe requires a lot of care and maintenance, and deterioration of the adobe walls was a constant problem. A heliograph station was built on the north peak of the Robledo Mountains, now known as Lookout Peak. A heliograph is a sun telegraph. Reflections of the sun's rays thrown from a mirror signaled the next station in a series of heliograph stations between Fort Bliss, El Paso, and Fort Cummings near Cooke's Peak. African American soldiers served at Fort Selden. The Indians referred to the African Americans as "Buffalo Soldiers" because their short, curly hair and fighting spirit resembled that of buffaloes. The fort was first abandoned in 1878 and used as a mail station. Then in 1880, the fort was reactivated to protect workers building the Atchison, Topeka, and Santa Fe Railroad. The fort had to be nearly completely rebuilt because of deterioration of the adobe structures. Captain Arthur MacArthur with his family, including his son Douglas MacArthur, was stationed at the fort in 1884–1886 (Cohrs and Caperton, 1993).

The last of the Apache war chiefs, Geronimo and Naiche were captured in 1886, thereby ending the raids by the Apache Indians, and the fort became obsolete. The fort was finally abandoned on January 20, 1891. The post cemetery was located at what is now the entrance to Leasburg Dam State Park. The graves were dug up, and the remains were removed to the National Cemetery in Santa Fe. The doors, windows, and other hardware were salvaged, and the adobe walls began deteriorating due to exposure to the elements. Vandals also targeted the fort. After the fort passed through several owners, Harry N. Bailey acquired it. Bailey's son donated it to the State of New Mexico in 1963, and the fort was declared a state monument in 1974. Today the adobe brick walls of the frontier post remain, and a visitor center offers exhibits on frontier military life during the fort's heyday. Various modern methods of preservation of the adobe walls are being tested at Fort Selden. Some of the walls have been capped with plaster, wood planks, and stabilized adobes. Various types of liquids have been tested that can be sprayed onto the walls in efforts to prevent erosion.

A small community was established 5 mi southeast of Radium Springs, but it burned down in 1883, and most of the inhabitants moved to Fort Selden (Julyan, 1996). The Atchison, Topeka, and Santa Fe Railroad was built through the valley, and a station was established near the original town site. Adolph Lea, who was the

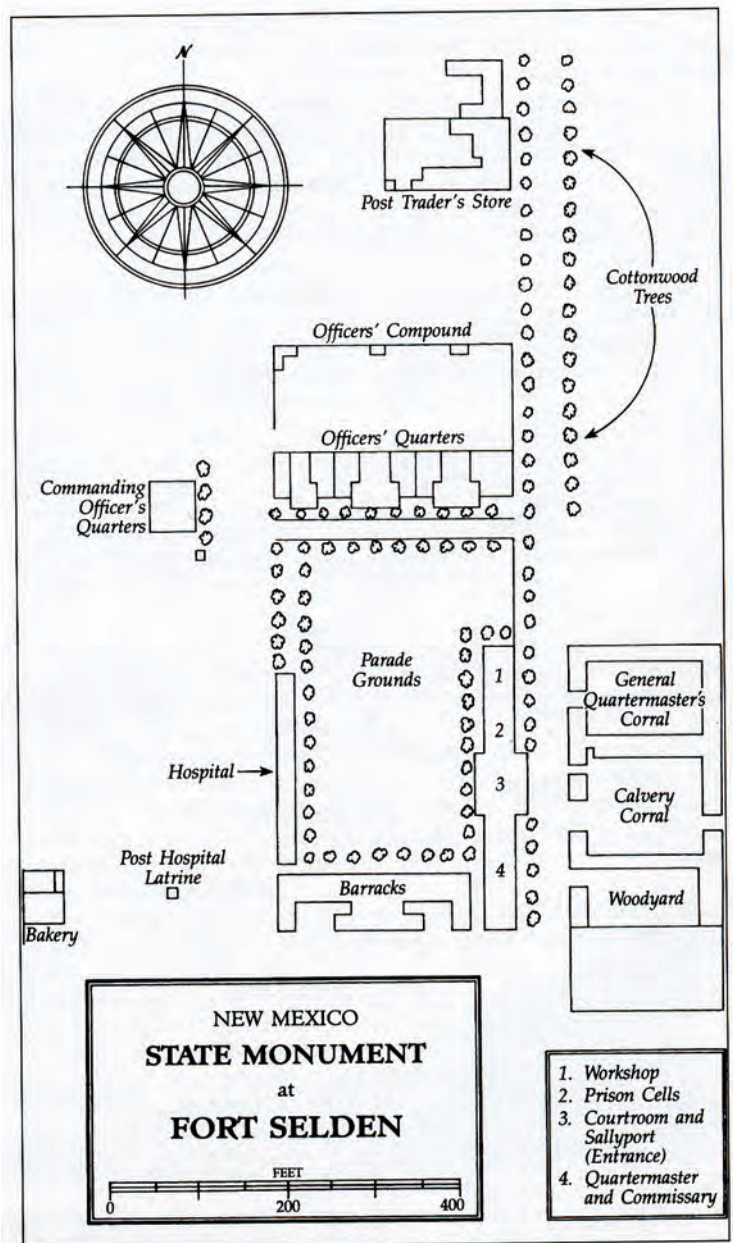


FIGURE 5—Map of Fort Selden (Cohrs and Caperton, 1993); map by Deborah Reade, Santa Fe, reprinted by permission of the Museum of New Mexico Press.



FIGURE 6—Remains of adobe walls at Fort Selden.



FIGURE 7—Leasburg Dam.

post trader at Fort Selden, became the postmaster at the newly established station, which was then named Leasburg.

The U.S. Bureau of Reclamation built Leasburg Dam (Fig. 7) in 1908 as part of a diversion system for irrigation for the Middle Rio Grande Conservancy District (Young, 1984). It is one of the oldest diversion dams in New Mexico, and it supplies water to farms as far south as Las Cruces. The dam was named after the small community of Leasburg. Leasburg Dam State Park was established in 1971.

The town of Radium Springs was named for warm mineral springs that once flowed nearby. The springs have recently dried up, probably as a result of irrigation in the valley and drier climate. During the time Fort Selden was occupied, the springs were called Fort Selden Springs. A post office was established in 1926, and the name officially became Radium Springs when chemical analyses

indicated that indeed the springs contained high levels of radium (2.57 millimicrocuries of radium per liter of water; Julyan, 1996).

### Geology

Leasburg Dam State Park and Fort Selden lie within the Rio Grande rift, which covers an area of approximately 6,500 mi<sup>2</sup> in central New Mexico. A rift is a long, narrow feature where the Earth's crust is being pulled apart by plate tectonic forces (Fig. 8). As the crust is pulled apart, large blocks in the center of the rift subside, thereby creating an elongate depression known as a graben. The Rio Grande rift is actually a series of linked grabens extending for approximately 600 mi from near Alamosa, Colorado, southward beyond El Paso, Texas. We know that some grabens along the Rio Grande rift have subsided as much as 20,000 ft. The Rio Grande flows south along this rift valley. Unlike most rivers that form valleys by cutting into the rocks, the Rio Grande has attempted to fill up this great depression with only minor periods of actual cutting into the valley-fill deposits!

Basin and Range faulting began about 30 million years ago in New Mexico and resulted in the uplift of the mountains on both sides of the Leasburg–Fort Selden area: the San Andres, Organ, Doña Ana, and Franklin Mountains to the east and the Robledo Mountains to the west. The basin fill in the downfaulted rift valley, in which Leasburg and Fort Selden are located, is comprised of interbedded gravel, sand, silt, and clay, forming the middle Miocene to middle Pleistocene Santa Fe Group, about 15–1 million years old in this area. The sedimentary rock sequence exposed in the Robledo Mountains and other uplifts in the area are buried in the rift valley beneath thousands of feet of Santa Fe Group and

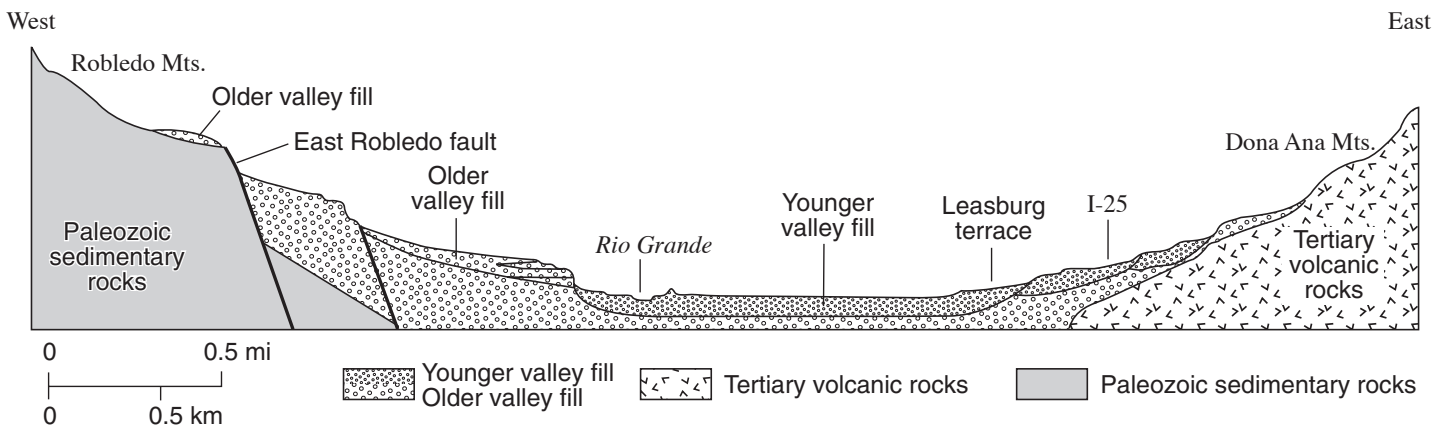
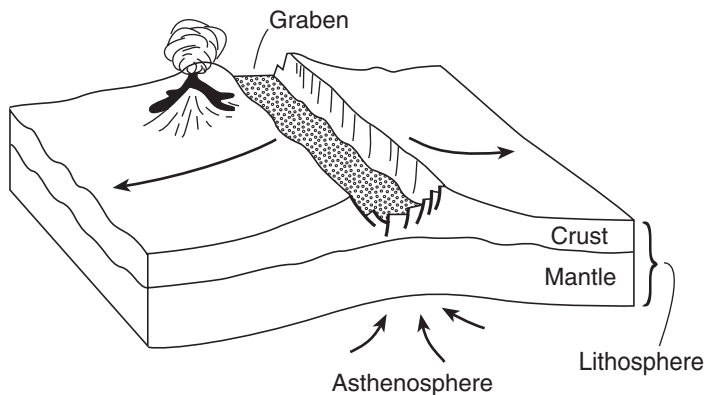


FIGURE 8—Diagram of formation of Rio Grande rift and diagrammatic cross section of the rift valley between the Robledo and Doña Ana Mountains (modified from Hawley and Seager, 1978).



FIGURE 9—View of Robledo Mountains to the south.

younger sedimentary rocks.

The state park and fort are built mostly on a late Pleistocene terrace known as the Leasburg terrace or surface, which formed about 15,000 yrs ago. The terrace deposits were laid down long after an ancestral Rio Grande cut into the underlying Palm Park Formation and upper Santa Fe Group basin-fill deposits (Seager, 1975). The clay needed to make adobe bricks for Fort Selden came from the terrace deposits. The foundation of the dam rests on top of a rhyolite intrusion, which is exposed on the west side of the dam (Bieberman, 1979). Wind blown sand forms local sand dunes that cover the surrounding terrace deposits.

The Robledo Mountains (Fig. 9), on the west side of the river south of Leasburg Dam and Fort Selden, rise to an altitude of 5,890 ft above sea level, nearly 2,000 ft above the Rio Grande. The mountains are part of an uplifted wedge-shaped fault block that consists of Paleozoic and Eocene sedimentary rocks (Kottlowski and Seager, 1998). The oldest rocks exposed in the Robledo Mountains are limestones of the Early Ordovician El Paso Formation, which were deposited in a shallow sea about 570 million yrs ago (Mack et al., 1998). Erosion occurred when the seas withdrew for a short time. Then the seas returned to deposit the Middle to Late Ordovician Montoya Formation, which unconformably overlies the El Paso Formation. The Montoya Formation consists of the basal Cable Canyon Sandstone, Upham Dolomite, Aleman Dolomite, and Cutter Dolomite. The Cable Canyon Sandstone is a basal sandy facies of the Upham Dolomite; the two overlying dolomites were deposited in deeper marine environments. The Early to Middle Silurian Fusselman Dolomite, which unconformably overlies the Montoya Formation, forms prominent dark double cliffs on the mountain slopes. The Fusselman Dolomite was deposited in a marine environment about 438–408 million yrs ago and forms a resistant, brownish-gray ledge of finely crystalline dolomite with abundant chert layers and nodules. The dark-gray, fissile, micaceous Devonian Percha Shale was deposited in lagoons or shallow, stagnant basins and forms slopes above the Fusselman Dolomite. The shallow seas returned to deposit the Early Mississippian Lake Valley Formation that gradationally overlies the Percha Shale and consists of calcareous shale, siltstone, and limestone. Pennsylvanian strata, also deposited in shallow-marine environments, overlie the Mississippian rocks.

The Robledo Mountains are capped by the interlayered Permian Hueco–Abo Formation, representing rocks that were deposited in marine and nonmarine environments. The southernmost outcrops of the Abo Formation and the northernmost outcrops of the Hueco Formation are found interbedded in the Robledo Mountains (Kottlowski and Seager, 1998).

Permian dinosaur trackways that include hundreds of trails and tracks of invertebrate and vertebrate animals are preserved in the Abo Formation in the Robledo Mountains. The trackways are in

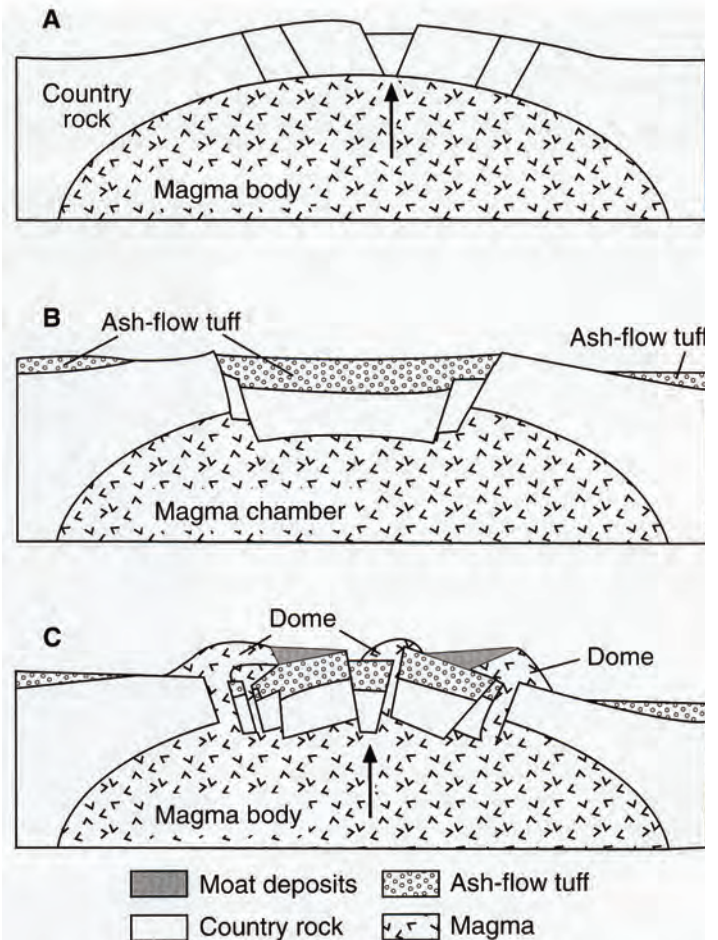


FIGURE 10—Formation of a caldera in three stages (modified from Elston, 1978, fig. 3). A: Magma body intrudes overlying country rock causing doming and stretching of surface. B: Eruption partially empties magma chamber, and roof collapses forming a caldera. Ash-flow tuff erupted fills caldera and blankets surrounding area. C: New magma moves and causes resurgence of doming. Renewed eruptions create domes, and moat deposits fill caldera.

ripple-laminated silty sandstone, originally tidal flats that were subjected to frequent subaerial exposure, as indicated by plant debris and raindrop imprints (Lucas, 1993).

The seas retreated, and the Eocene Love Ranch Formation fanglomerates and Eocene–Oligocene Palm Park Formation were deposited unconformably on the Hueco–Abo Formation about 57.8–36.6 million yrs ago. A rhyolite sill intruded the sedimentary rocks about 35.2 million yrs ago and forms Lookout Peak, the northernmost peak of the range.

The broad central plain of the Jornada del Muerto extends nearly 100 mi to the north, from Radium Springs to north of Carthage in eastern Socorro County. It is one of the many grabens or basins that make up the Rio Grande rift. The Jornada del Muerto lies above the Rio Grande and contains many aligned depressions. It consists of Tertiary and Quaternary reddish clay, gypsum, interbedded breccia tuffs, latitic tuffs, latite-andesite breccias and flows, welded rhyolite tuffs, Pleistocene lake beds, and Recent fluvial gravels and sands in terraces and floodplain deposits. A short-lived divergent stream of the Rio Grande flowed down the Jornada del Muerto at least as far as Engle and presumably continued south to near Rincon, 15 mi north–northwest of the state park. The Rio Grande flowed from Rincon to the south edge of Point of Rocks, an important landmark on the Jornada del Muerto northeast of the state park, then turned south toward the Doña Ana Mountains. At one time the river flowed east of the Doña Ana Mountains before shifting to its present position. The Jornada del

Muerto is now a closed basin with no through drainage.

The Doña Ana Mountains form the low hills east of the state park. Rocks in the Doña Ana Mountains range in age from Pennsylvanian through Recent (Seager et al., 1976). Sedimentary rocks are the oldest rocks and range in age from Pennsylvanian through Eocene. An Eocene andesite and an Oligocene monzonite have intruded the sedimentary rocks. The eruption of the 2,500-ft-thick Doña Ana Rhyolite (ash-flow tuff) initiated caldera collapse about 33–34 million yrs ago (Fig. 10). The Doña Ana caldera is approximately 7–8 mi in diameter and was filled by rhyolite flows, ash-flow tuffs, domes, and breccias. Rhyolite and monzonite dikes intruded the older rocks. Late Tertiary uplift and westward tilting have elevated the mountain range to an altitude of 5,829 ft (Seager et al., 1976). A small amount of copper, gold, and silver were produced from vein deposits during the early 1900s (McLemore, 1998).

The jagged crest of the Organ Mountains can be seen on the skyline above the Doña Ana Mountains. The Organ Mountains are formed by a west-tilted block that exposed rocks ranging in age from Proterozoic through Quaternary. The oldest Proterozoic granitic rocks are overlain by as much as 8,500 ft of Paleozoic and Cretaceous sedimentary rocks, mostly of marine origin (Seager, 1981). About 35 million yrs ago, the Organ batholith and volcanic rocks associated with the Organ caldera were emplaced (Seager, 1981). The Organ batholith is a large complex pluton made up of multiple intrusions and dikes. The Organ batholith formed the core of the Organ caldera, which erupted as pyroclastic flows and lavas that are exposed in the southern part of the Organ Mountains. Uplift and erosion produced younger sedimentary deposits and the rugged topography characteristic of the Organ Mountains. The Organ Mountains mining district was discovered in the 1830s and yielded an estimated \$2.7 million worth of copper, lead, zinc, silver, and gold from carbonate-hosted replacement deposits and vein deposits in Proterozoic rocks. Locally iron, manganese, molybdenum, tin, tellurium, and tungsten are also reported (McLemore, 1998).

The Rio Grande rift is still active today. Low intensity earthquakes are common in this region (Seager and Morgan, 1978). The actual location of many of these earthquakes can not be determined. However, most of the activity is related to continued movement along the East Robledo fault that separates the Robledo Mountains from the valley deposits.

The warm mineral waters at Radium Springs are further proof of an active rift. Hot water around 70°C is pumped from wells that are less than 225 ft deep to heat a 5.7-hectare greenhouse. The springs are part of a shallow geothermal system that is contained in a highly fractured rhyolite that intruded the Eocene Palm Park Formation (Ross and Witcher, 1998). Two drill holes indicate a deeper geothermal system at temperatures >100°C exists in fractured Paleozoic limestone and Proterozoic granite beneath the shallow rhyolite reservoir at depths <3,300 ft (Ross and Witcher, 1998).

### Summary

Leasburg Dam State Park and Fort Selden areas are rich in history and geology. Visitors enjoy picnicking, camping, hiking, wildlife viewing, fishing, canoeing and kayaking at Leasburg Dam State Park, and nearby Fort Selden offers a historical glimpse into

the late 1800s. The dam is one of the oldest structures in the state and diverts water from the Rio Grande into irrigation systems throughout the southern Rio Grande valley.

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