CHAPTER 3

HUMAN SETTLEMENT PATTERNS, POPULATIONS, AND RESOURCE USE

This chapter presents an overview, in three main sections, of the ways in which each of the three major ecocultures of the area has adapted to the various ecosystems of the Middle Rio Grande Basin. These groups consist of the American Indians, Hispanics, and Anglo-Americans. Within the American Indian grouping, four specific groups—the Pueblo, Navajo, Apache, and Ute—are discussed in the context of their interactions with the environment (Fig. 15). The Hispanic population is discussed as a single group, although the population was actually composed of several groups, notably the Hispanos from Spain or Mexico, the genizaros (Hispanicized Indians from Plains and other regional groups), mestizos (Hispano-Indio “mix”), and mulatos (Hispano-Black “mix”). Their views and uses of the land and water were all very similar. Anglo-Americans could also be broken into groups, such as Mormon, but no such distinction is made here.

In general, as Euro-Americans arrived and their populations grew, and as their new technology was introduced, modification of the physical and biological environment increased over time. Since the late 19th century, the Anglo views, markedly different from the Native and Spanish American views, have been dominant and therefore most influential. This chapter not only documents the chronological evolution of these various environmental adaptations, but also offers a basis for understanding the impact, change, and resulting resource management strategies caused by these differing adaptations, which are addressed in Chapters 4, 5, and 6.

NATIVE AMERICAN SETTLEMENT, POPULATION, AND RESOURCE USE, 1400s–1960

Native American Environmental Views

The Pueblo, Navajo, and Apache groups in the region had developed traditional views toward the physical and biological world quite different from those of the Hispanos and Anglos, whose historical views were derived from western European experiences. Popovi Da, former governor of San Ildefonso Pueblo, commented on the Native American view of their place in the biological world:

The Indian’s vital, organic attitude towards man’s place within the framework of other living creatures has an impact on his actions, thinking, reasoning, judgment, and his ideas of enjoyment, as well as his education and government (Hughes 1983: 9).

This philosophy permeated all aspects of traditional Pueblo life; ecology was not a separate attitude toward life but was interrelated with everything else in life.

Another perspective on Native Americans was given by Vecsey and Venables (1980: 23):

To say that Indians existed in harmony with nature is a half-truth. Indians were both a part of nature and apart from nature in their own world view. They utilized the environment extensively, realized the differences between human and nonhuman persons, and felt guilt for their exploitation of nature’s life-giving life. Indian environmental religions were means of idealizing and attempting to attain a goal of harmony with nature, for both participatory and manipulative reasons, but inherent in their religions was the understanding that they were not in fact at perfect harmony with nature.

To understand a group’s view of the environment, one must examine their cultural elements, such as religion, government, music, and so forth. Perhaps religion is the best expression of Pueblo attitudes toward and use of environmental resources. Traditional Pueblo religion is a complex set of beliefs and practices that permeates every aspect of an individual’s life. For the Pueblo the basic concern is maintaining a continual harmonious relationship with the physical and biological world, or universe, through ritual and ceremony. Another significant aspect of Pueblo religion is its explicit cosmological and philosophical system, sometimes called world view, life-way, or life-road (Beck and Walters 1977: 9; Ortiz 1969: 4; Sando 1992: 30).

Symbols in Pueblo religion are frequent and significant. Kachinas include corn mothers, corn, mothers for life, plants, animals, foreign tribes, and a number of other symbols. Cardinal directions are associated with mountains, animals, and colors. The four sacred mountains mark the boundaries of center place, which the Pueblos found after emerging from the underworld. The center is the open community space within the village, where ritual dances
Figure 15—General locations of Pueblo and nomadic Native American groups 1598–1680.
and other communal activities take place. Around this space is another space, enclosed by the four mountains and the horizon, where sky and earth meet. This boundary is denoted by markers consisting of inconspicuous stones or groups of stones. Within this cosmos are other sacred places—hills, mesas, caves, lakes, springs, streams, and for some, refuse mounds. Spirits are believed to be residents on or in these natural features, and shrines are usually present at these locales (Ortiz 1969: 19–21; Swentzell 1985).

Unusual landscapes in the region, such as El Malpais in Cibola County, have long been used for religious activities by the Zuni, Acoma, and Laguna Pueblos, as well as the Ramah Navajo. Shrines are represented archeologically; all three Pueblo groups maintain shrines there today. Other traditional, religious uses of the area include pilgrimages, collecting materials for religious use, and collecting medicinal plants. The basaltic flow itself is considered to be the blood of a mythical giant killed by the Hero Twins (Holmes 1989: 21–22).

The conception of this universe also included a religious perception of the sky with its meteorological and astronomical phenomena such as clouds, lightning, and the solstices. Celestial bodies were named and perceived as anthropomorphic (Hewett and Dutton 1945: 22–29).

Traditional rituals and ceremonies include oratories, prayers, songs, dances, pilgrimages, sacrificial retreats, and other expressions, performed individually or communally. These may be quests for rains, bountiful crops, and game; perpetuation of “natural” and astronomical cycles; and other observances that occur during the annual, ritual calendar of events, or “cycle of works” (Sando 1992: 31–32).

Due to Spanish domination and influence, Pueblos have also been nominally Roman Catholic for almost 400 years. They maintain this religious duality through a process that has been called “compartmentalization.” The two religions are each distinct socio-ceremonial systems, although there has been integration through sharing or relating to various components, some of which are sacred or “holy” water, religious objects (kachinas and santos), sacred structures (kivas and churches), sacred spaces, and religious leaders (“medicine” men and priests). Catholic elements that the Pueblos have generally accepted are Sunday worship, confirmation, baptism, weddings, and celebration of saints’ days, Christmas, and Easter. Social dances in the churches and on the plazas dominate these latter three celebrations (Dozier 1983: 185–186; Sando 1992: 32–33, 169–170).

### Pueblo Settlement Patterns and Land Use

The major, historic Pueblo villages along the Rio Grande and its tributaries generally had their beginnings in the early to mid 1300s (Fig. 16). Movement from smaller sites into larger sites where populations consolidated began after 1400 and before 1540. The largest villages contained 1,000 to 2,000 rooms, maximum sizes for prehistoric or historic pueblos. This growth appears to have been correlated with the increasing development of floodwater and irrigation farming on floodplains (Dozier 1983: 41; Stuart 1986: 89–90).

The historic Tewa, Tiwa, Keresan, and Piro pueblos were located along the banks of the Rio Grande or tributary drainages on slightly elevated land on floodplains or on terraces or points of land adjacent to them. Many of the pueblos, including those that have survived until today (Table 20), are located at confluences of the Rio Grande and perennial or semi-perennial tributaries. Proximity to water for domestic use and farming and proximity to fertile soils were clearly determinants in locating villages. As pueblos grew in size in the late prehistoric period and as competition for arable lands accelerated during the colonial period, agricultural production shifted to more distant fields, where male residents worked long days and stayed overnight in small one- or two-room dwellings, referred to as field houses, during the farming season (Stewart 1985: 92–96).

Prior to Spanish arrival in the study region, the abandonment of aboriginal villages and population movement to another more favorable environmental site or area was a relatively common adaptive strategy, particularly in marginal areas of limited environmental resources, particularly water or arable soils. Fluctuating climatic conditions, particularly drought, were a primary cause of abandonment (Fosberg 1979: 166–167; Kelley 1952: 382–385; Zubrow 1974: 25, 64). Abandonment was also caused, in part or in

### Table 20—Siting of extant Rio Grande Basin pueblos.

<table>
<thead>
<tr>
<th>Pueblo</th>
<th>Drainage</th>
<th>Elevation (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taos</td>
<td>Río Pueblo de Taos</td>
<td>7,050</td>
</tr>
<tr>
<td>Picuris</td>
<td>Río Penasco</td>
<td>8,400</td>
</tr>
<tr>
<td>San Juan</td>
<td>Confluence of Río Grande and Chama River</td>
<td>5,800</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>Río Grande and Santa Clara Creek</td>
<td>5,600</td>
</tr>
<tr>
<td>San lideonfeno</td>
<td>Río Grande and Pojoaque Creek</td>
<td>5,560</td>
</tr>
<tr>
<td>Tseque</td>
<td>Río Tseque</td>
<td>6,800</td>
</tr>
<tr>
<td>Nambe</td>
<td>Nambe River and Pojoaque Creek</td>
<td>6,095</td>
</tr>
<tr>
<td>Pojoaque</td>
<td>Pojoaque Creek</td>
<td>5,845</td>
</tr>
<tr>
<td>Cochiti</td>
<td>Río Grande and Santa Fe River</td>
<td>5,600</td>
</tr>
<tr>
<td>Santo Domingo</td>
<td>Río Grande and Galisteo Creek</td>
<td>5,190</td>
</tr>
<tr>
<td>San Felipe</td>
<td>Río Grande and Tongue Arroyo</td>
<td>5,700</td>
</tr>
<tr>
<td>Santa Ana</td>
<td>Río Grande and north bank of Jemez River</td>
<td>5,340</td>
</tr>
<tr>
<td>Zia</td>
<td>Jemez River</td>
<td>5,450</td>
</tr>
<tr>
<td>Jemez</td>
<td>Jemez River</td>
<td>5,600</td>
</tr>
<tr>
<td>Sandia</td>
<td>Río Grande and Sandia Wash</td>
<td>5,030</td>
</tr>
<tr>
<td>Isleta</td>
<td>Río Grande and Hell Canyon Wash</td>
<td>4,880</td>
</tr>
<tr>
<td>Laguna</td>
<td>Río San Jose and Encinal Creek</td>
<td>5,795</td>
</tr>
<tr>
<td>Acoma</td>
<td>(near) Acoma Creek</td>
<td>7,000</td>
</tr>
</tbody>
</table>

Source: Burdett et al. 1990: 33, 34, 44–46, 56–57; Stubbs 1950: 23–90
Figure 16—Major historic Pueblo language groups and villages, 1598–1680.
totality, by flooding, epidemic diseases, raids, warfare, and political and social pressures exerted by the Spanish (Schroeder 1968: 291, 303–304). During extended drought periods, the Pueblo would sometimes rely more heavily on hunting, gathering, and trade for subsistence (Upham 1984: 248–251). The length of the drought seems to have determined whether the abandonment was temporary or permanent. Earls (1985: 162) stated

A drought three years or less does not appear to have caused the inhabitants to abandon their villages. A drought three years or more did cause some abandonment, usually temporary movement to other villages. Prolonged droughts of 5–10 years caused permanent abandonment.

Dobyns (1983: 310–11) and Palkovich (1985: 418) suggested the following as four major elements common to abandonment, migration, and survival strategy:

1. abandonment of settlements located in marginally productive environmental niches,
2. migration to environments that were more productive in terms of the basic subsistence technology of the peoples involved,
3. amalgamation of survivors of abandoned settlements into a diminished number of continuing or new ones, in an attempt to maintain a number of inhabitants culturally defined as proper by each group, and
4. amalgamation of survivors of diverse lineage and even ethnic origins into a diminished number of polities, resulting in
   a. intermarriages, further diluting and erasing earlier ethnic distinctions,
   b. adoption of locally determinant group languages, reducing linguistic diversity, and
   c. sometimes very rapid changes in many conventional understandings formerly shared for the purpose of adjusting to the survival demands of quickly altering man:land ratios, colonial manipulation or domination, and so forth.

The Pueblo and other Native Americans also employed relocation to higher, wetter (and cooler) sites as a survival strategy in extreme droughts. A change to colder temperature regimes would sometimes cause movement to lower, warmer locations. The movement of Pueblo peoples from the Pajarito Plateau to the lower canyons, such as Frijoles, or even the Rio Grande Valley, is one example. Contrasting, during warmer-than-normal periods, groups sometimes moved to higher, cooler locations (Stuart 1985: 91–92).

The total number of occupied Pueblo villages at the beginning of the historic period may have been as high as 134. The maximum number of residents in each pueblo was 800–1,000. With Spanish invasion and occupation, this settlement system was disrupted, and a number of pueblos were abandoned. By the early 1600s, about half of these villages had been abandoned (Schroeder 1979: 254), and the remaining Pueblo settlements were restricted to four square leagues each (6.75 square miles) for farming and other resource uses. Some 90 missions were established in as many pueblos, and Pueblo men and boys were required to herd livestock, farm, and collect firewood for the missionaries. Civil authorities required them to work hides, collect pinyon nuts and salt, and weave blankets and garments (Dozier 1983: 46–49; Simmons 1979a: 181–183). As a rule, distant field houses and agricultural plots were ignored during the farming season.

In the Rio Arriba, Taos and Picuris, both northern Tiwa-speaking pueblos, have been occupied throughout the historic period. Apparently no other pueblos in this Tiwa area were occupied at the time of Spanish contact (Schroeder 1979: 251; Fig. 16).

Of 12 extant Tewa villages in the Upper Rio Grande Drainage around 1600, only eight remained occupied in 1630. Of this number, six have survived until today (Fig. 16): San Juan, Santa Clara, Pojoaque, Nambe, Tesuque, and San Ildefonso. Ten large upland Keres village sites were abandoned by 1630; seven Keres towns continued to be occupied: Cochiti, Santo Domingo, San Felipe, Santa Ana, Zia, Laguna (Fig. 17), and Acoma. Coronado recorded seven Tewa-speaking villages in the Jemez Mountains; only one, Jemez Pueblo, has survived until today. Among the Tiwas, five large pueblos were abandoned by 1650, while eight survived until 1680. The only two surviving Southern Tiwa villages are Sandia and Isleta (Fig. 16). In all, some 20 large floodplain villages were abandoned between 1540 and 1680 in the Rio Abajo (Dryeson 1971: 89–92; Schroeder 1979: 238–239, 242–247).

As noted, availability of adequate, proximate surface water was a primary determinant in siting of villages and farmlands, as evidenced by the 18 extant pueblos in the Middle and Upper basins (Table 20). This dependence on water for personal consumption, farming, and livestock raising is also documented by the archeological and archival records. For example, the Tano Pueblos lived in seven early historic villages located near springs and marshes along Galisteo Creek or its tributaries (Fig. 16). The Tano abandoned the area by the late 1600s, primarily due to drought and nomadic Indian raids (Schroeder 1979: 238–239, 247–248).

To the south, at the north end and on the east side of the Sandia Mountains, there was another small cluster of 7–10 pueblos. They, too, were located near springs or arroyos. These pueblos have been referred to as the “Ubates” (Schroeder 1979: 248–250).

Farther south, in the Salinas Province, there were up to 18 Tompiro pueblos recorded between 1581 and 1598
(Fig. 16). These were located in upland pinyon-juniper or juniper-grassland savannah, near springs or small ephemeral streams on the south and east sides of the Manzano Mountains. Some of the pueblos depended on wells for their domestic water supply. Here, more dependence was placed on rainfall, which was higher than that of the Rio Grande Valley. The saline lakes of the Estancia Valley lay to the east. During droughts, which brought Apache raids and famine, surface water was virtually nonexistent. By the 1660s only six pueblos were occupied, and within a decade only two remained. These last two were abandoned sometime before the Pueblo Revolt; refugees from all of the Tompiro villages joined with Piros along the Rio Grande (Schroeder 1979: 237, 239–241).

To the west, along the middle Rio Puerco and Rio San Jose, were the pueblos and fields of Laguna and Acoma. Along with Zuni Pueblo, farther to the west and outside the Middle Basin, these villages are referred to as the Western Pueblo. Laguna Pueblo (1699), as the name suggests, was also located near a small lake, now dry. Acoma was located on a mesa with springs at its base and potholes on top in which rain or snowmelt collected. A nearby creek also provided water. The Navajo also lived along the Puerco from the mid 1700s to mid 1800s, hunting and gathering and practicing limited farming. Utilization of springs and runoff water was the key to the successful raising of crops in the area (Schroeder 1979: 239, 245–246; Scurlock 1990a: 320).

Ten ancestral villages located across the Piro, or Southern, Pueblo region (Fig. 16) continued to be occupied in the 16th century, but nine other sites were abandoned and new villages established. Most of these pueblos were located on gravel benches and low alluvial banks adjacent to the river. Settlements placed away from the Rio Grande floodplain were situated on mesas, ridges, or in one instance, on an open alluvial flat at the mouth of a canyon. Village plans consisted of large plaza communities, which were common in the preceding century, or small pueblos of variable forms and 8–36 rooms, which have been called the “colonial style.” Construction tech-
niques included puddled-coursed adobe, cobble masonry, and rock-block masonry. At a few sites adobe blocks were set on a masonry base (Marshall and Walt 1984: 139–140).

With the establishment of four Spanish mission churches at Piro villages and four estancias, or large ranches, there was major impact on the Pueblo residents. In addition to experiencing a severe decline in population as indicated above, large portions of various ancestral villages were abandoned, and some groups moved to new sites. A relatively large number of Piro, about one-third of the total population, moved to three upland sites in the Magdalena area, perhaps as a strategy to remove themselves from the devastating European diseases along the Rio Grande and to afford stronger protection from raiding Apaches or Spaniards (Marshall and Walt 1984: 141).

Following the reconquest of the Pueblos by the Spanish in 1692–96, the new government forced the indigenous population into large villages rather than the smaller, dispersed settlement clusters prevalent in the pre-revolt period (A.D. 1540–1680). This may have been an important factor in the spreading of European diseases among the Pueblo. Near the end of the 1700s, the total population had declined to 9,453. This decrease continued throughout the next century, but at a lesser rate (Palkovich 1985: 403, 410–413).

In the early 1800s there were only 20 pueblos (not counting the satellite villages of Laguna) within the Rio Grande drainage. By the 1830s, this number had decreased to 18, the current number (Fig. 16). Agricultural and grazing lands were lost to Spanish-speaking squatters in the 1700s and 1800s, even though this practice was illegal. Only the highest of officials could authorize the sale of Indian lands. Local officials did, however, allow Hispanics to obtain holdings on Pueblo lands in some instances (Brayer 1939: 16–19). Most of this acreage, about 10 percent of Pueblo holdings, was choice, irrigable land (Simmons 1979b: 214–216).

The U.S. Surveyor-General approved the Pueblo land grants in 1852 and recommended congressional confirmation. Ten years after the signing of the Treaty of Guadalupe Hidalgo, Congress, in 1858, confirmed 35 land grants, totalling 700,000 acres, which had been made by the Spanish to the Pueblo. President Lincoln issued patents to the Pueblos for these grants. Subsequently, territorial officials considered these lands to be disposable property that could be purchased by non-Indians. Following litigation, the Supreme Court ruled in 1876 that the Pueblos had undisputed title to their lands and could dispose of them as they wished; they would not be protected by the Federal Government. This led to usurpation of some Indian land by dishonest non-Indians (Brayer 1939: 21; Sando 1992: 110, 112; Simmons 1979b: 214). Trespass also continued on Pueblo lands. Legislation in the late 19th and early 20th centuries established that the Pueblos were wards of the U.S. Government, which had a trusteeship relationship and jurisdiction over Pueblo land and water. As wards, the Pueblos could not alienate their lands without approval of the government. The government recognized that the Pueblo had “a communal title to their lands” (Sando 1992: 112–122).

Since the late 1700s, and especially after 1859, most of the Pueblos have significantly increased their land holdings (Table 21). Between 1877 and 1933, the Pueblos obtained new lands through acts of Congress, executive order, and community and individual initiative. Much of this land was overgrazed, depopulated rangeland. By 1944 the Pueblos, exclusive of Zuni, owned just over 1,000,000 acres, of which 19,022 were agricultural, and the remainder were used for grazing. At Santa Ana, new farmlands were acquired to provide basic subsistence needs and trade surpluses (Aberle 1948: 11, 84; Dozier 1983: 109).

The Santa Fe Railroad acquired rights-of-way across Pueblo lands in the late 19th century (Fig. 18). Some of this land was good agricultural acreage, especially at Laguna. The railroad also employed hundreds of Pueblos, taking them away from traditional agricultural pursuits (Ortiz 1980: 111).

The influx of Anglo settlers in the late 1800s resulted in increased competition for water rights and arable land in the region. In the Winters v. United States case, the Supreme Court ruled that Indians “had prior and paramount rights to all of the water they needed in the present and future.” And, “in times of shortage, Indian rights had to be honored before the claims of other users” (Bayer et al. 1994: 239). The loss of productive land in the Middle Valley due to waterlogging, high water tables, and salinization was also a problem. These pressures and hardships led to impoverishment and dependency for the subsistence farmers among the Pueblo and Hispano populations. The 1930s drought compounded their problems, and many were forced to leave or sell their farms and livestock and to find low-paying jobs as laborers away from the reservation or village. Some had to go out of state to find employment. For other Pueblos, crafts work supplemented, or eventually replaced, subsistence agriculture (Ortiz 1980: 109–111).

**Navajo, Apache, Southern Ute Settlement Patterns and Land Use**

In general, nomadic groups in the region—the Navajo, Apache, and Ute—selected campsites near surface water, fuelwood, and grass for their livestock, and in locations protected from adverse weather. Summer camps of the Apache or Navajo practicing agriculture were near plots of arable soils, and hunting and gathering camps were located near the specific resources sought (Jorgensen 1983: 687–688; Scurlock 1991a: 27).

In the historic colonial period, Navajos lived in the environment formerly occupied by Pueblo Indians from the
Table 21—Pueblo land/grazing holdings, 1858–1990.

<table>
<thead>
<tr>
<th>Pueblo</th>
<th>Year</th>
<th>Acreage</th>
<th>Pueblo</th>
<th>Year</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taos</td>
<td>1858</td>
<td>15,400</td>
<td>Santo Domingo</td>
<td>1858</td>
<td>65,571</td>
</tr>
<tr>
<td></td>
<td>1924</td>
<td>47,334</td>
<td></td>
<td>1905</td>
<td>66,231</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>95,341</td>
<td></td>
<td>1990a</td>
<td>71,093</td>
</tr>
<tr>
<td>Picuris</td>
<td>1858</td>
<td>14,959</td>
<td>San Felipe</td>
<td>1858</td>
<td>30,285</td>
</tr>
<tr>
<td></td>
<td>1939</td>
<td>15,359</td>
<td></td>
<td>1902</td>
<td>43,201</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>14,947</td>
<td></td>
<td>1942</td>
<td>51,211</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1990a</td>
<td>48,930</td>
</tr>
<tr>
<td>San Juan</td>
<td>1858</td>
<td>12,213</td>
<td>Santa Ana</td>
<td>1869</td>
<td>15,406</td>
</tr>
<tr>
<td></td>
<td>1939</td>
<td>20,584</td>
<td></td>
<td>1939</td>
<td>19,136</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>12,236</td>
<td></td>
<td>1990a</td>
<td>61,931</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>1858</td>
<td>12,224</td>
<td>Zia</td>
<td>1858</td>
<td>16,282</td>
</tr>
<tr>
<td></td>
<td>1905</td>
<td>45,742</td>
<td></td>
<td>1924</td>
<td>16,669</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>45,828</td>
<td></td>
<td>1938</td>
<td>57,807</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1990a</td>
<td>121,600</td>
</tr>
<tr>
<td>San Ildefonso</td>
<td>1858</td>
<td>15,413</td>
<td>Jemez</td>
<td>1858</td>
<td>17,314</td>
</tr>
<tr>
<td></td>
<td>1929</td>
<td>19,844</td>
<td></td>
<td>1942</td>
<td>40,368</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>26,198</td>
<td></td>
<td>1990</td>
<td>89,624</td>
</tr>
<tr>
<td>Pojoaque</td>
<td>1858</td>
<td>11,593</td>
<td>Sandia</td>
<td>1858</td>
<td>22,884</td>
</tr>
<tr>
<td></td>
<td>1944</td>
<td>11,593</td>
<td></td>
<td>1990a</td>
<td>22,870</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>11,601</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nambe</td>
<td>1858</td>
<td>12,560</td>
<td>Isleta</td>
<td>1858</td>
<td>109,362</td>
</tr>
<tr>
<td></td>
<td>1902</td>
<td>18,788</td>
<td></td>
<td>1938</td>
<td>192,813</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>19,124</td>
<td></td>
<td>1990a</td>
<td>211,103</td>
</tr>
<tr>
<td>Tesuque</td>
<td>1858</td>
<td>16,706</td>
<td>Laguna</td>
<td>1884</td>
<td>99,970</td>
</tr>
<tr>
<td></td>
<td>1937</td>
<td>17,024</td>
<td></td>
<td>1942</td>
<td>244,733</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>16,813</td>
<td></td>
<td>1990a</td>
<td>484,495</td>
</tr>
<tr>
<td>Cochiti</td>
<td>1858</td>
<td>22,763</td>
<td>Acoma</td>
<td>1858</td>
<td>94,159</td>
</tr>
<tr>
<td></td>
<td>1938</td>
<td>26,491</td>
<td></td>
<td>1917</td>
<td>153,844</td>
</tr>
<tr>
<td></td>
<td>1990a</td>
<td>50,681</td>
<td></td>
<td>1942</td>
<td>88,197</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1990a</td>
<td>211,103</td>
</tr>
</tbody>
</table>

*a Does not include leased or fee lands.
Sources: Aberle 1948: 69–83; Sando 1992: 275

Middle and Upper Rio Grande basins, primarily along the upper and middle Puerco and Chama rivers (Fig. 15). Although this area had limited and erratic precipitation, it was diverse enough to afford a relatively wide range of exploitable resources. Temporary camp sites were established near reliable surface water sources and close to potentially good hunting, farming, and plant-collecting areas (Bailey 1980: 40; Jorgensen 1983: 687). These sites were generally located at the upper edge of Great Basin grasslands or in the zone above, the pinyon-juniper woodlands on terraces, hills, and mesas. Some of these sites were temporary encampments at pronghorn (antelope) capture and kill sites or plant gathering-processing areas. Temporary shelters were constructed of forked-sticks, vertical posts, or brush (Scurlock 1990a: 38).

Navajos were practicing corn horticulture when first contacted by the Spanish in the late 1500s; they probably were cultivating beans and squash as well. Fields were located on alluvial plains or valleys, washes, or near springs. Floodwater farming was practiced along streams and arroyos that carried seasonal runoff, which was diverted to the fields. Flats and mesa tops were sometimes cultivated using dry-farming techniques (Scurlock 1990a: 38–39; Fig. 19).

Hunting was the most important Navajo method of food procurement in the early colonial period. Seasonal communal hunts of pronghorn, deer, perhaps bison (to the east), and small game, such as rabbits, were conducted. Pronghorn were driven into chute-and-pound enclosures. Later, Navajo raids on Spanish and Pueblo settlements to
acquire livestock or produce increased. During times of peace, trading for these and other items was practiced. Limited fishing may have provided meat as well (Scurlock 1990a: 38–39).

Some of the early droughts and Spanish raids (1709–late 1740s) may have forced some Navajos to take refuge on the wetter northern and eastern slopes of Turquoise Peak (Mt. Taylor) in the Cebolleta-San Mateo ranges before the mid 18th century. Also, between 1725 and 1745, Navajos were attracted to the springs and small lakes in the valley between the Cebolleta uplands and Chacra Mesa (Scurlock 1990a: 65, 67, 75, 77).

The most severe drought years were in the late 1740s, when the entire region experienced meager crop yields, poor forage for sheep herds, and decimated native plant and animal populations. These environmental hardships, combined with those brought about by the Ute-Comanche raids, forced the Navajos to completely abandon the San Juan and Chama River basins by the early 1750s and to scatter to the southwest and west (Scurlock 1990a: 67).

For most of their pre-reservation existence, the Apaches were engaged in a predominantly seminomadic hunting and gathering subsistence pattern over much of the region (Fig. 15). Movement was correlated with the seasonal availability of resources, especially edible plants, and extended from the higher mountain ranges (such as the Farao Apache in the Sandia Mountains), where they lived from late spring to early fall, to lowland camp areas in the late fall and winter (Gunnerson 1974: 240; Thomas 1940: 7). This annual round, or “winter below” as it has been called, ended in the mid to late 19th century with their placement on reservations (Scurlock 1991a: 37). As with the Navajo, raiding became more important to the Apaches through time as a means of obtaining food, sheep, horses, and mules.

Nicolas de Lafora, in 1766, described this subsistence pattern for the “Gileno” Apaches in southwestern New Mexico and southeastern Arizona:

... live separately and wander about subsisting by hunting and gathering mescal through the

Figure 18—View to west showing Pueblo men and their wagons, Santa Fe rail line (center), Santo Domingo Pueblo, and Rio Grande (line of trees above pueblo). Photo by John K. Hillers, ca. 1880. Courtesy Museum of New Mexico (negative no. 4359).
sierras of El Hacha, La Boca, El Alamillo, San Policarpo, La Florida, El Tabaco, Corral de Piedras, El Quinteros, Santo Domingo, El Capulin, La Escondida, and the other intervening hills and rugged mountains. . . . All those Indians are in the neighborhood of the presidio of Janos, and their rancherias encircle it especially in winter when extreme cold forces them to abandon the sierras of El Cobre and Los Mimbres. There are also other Indians from the more northerly Gila. This group maintains a sort of capital in Los Mimbres mountains where their chief, Chafalote, stays with many families and horses as long as the season allows (Kinnaird 1967: 78–79).

The general region occupied by Ute and Southern Paiute Indians in the mid 1500s was referred to by the Spanish as Copala, the mythical home of the Aztecs. This same region, located west-northwest of the Middle and Upper basins, later became known as Teguayo. Onate, at San Gabriel-San Juan Pueblo, organized an expedition to explore this country, where he and other Spaniards thought they would find bountiful gold and silver. The expedition moved across western New Mexico and into central Arizona, where, not surprisingly, no such riches were found, but contacts were made with Indians, probably Utes or Paiutes, who said they were from Copala (Delaney 1974: 13–14; Milich 1966: 64–68, 114; Tyler 1954: 343).

Reference was made in a 1626 document to Capote Utes who had visited Jemez Pueblo a few years before the first Spanish colonists arrived at San Juan Pueblo in 1598. These Utes reportedly had reached the pueblo via the Chama River valley from their camps north of the San Juan River (Schroeder 1965: 54). Later in the historic period, the Capote, one of two bands of the Eastern Utes that ranged into the study region, lived in northern New Mexico, around later Chama and Tierra Amarilla, and southern Colorado, near the headwaters of the Rio Grande (Fig. 15). The other band, the Weeminuche, occupied the valleys of the San Juan River and its northern tributaries in northwestern New Mexico and adjacent southwestern Colorado into southeastern Utah (Delaney 1989: 6–7).

Before acquisition of the horse, Ute bands had been divided into smaller family units for much of the year so that they could more effectively procure food by hunting and gathering. Hunting and gathering would take place in the semiarid lower elevations of their territory in the spring, then move to the mountains in summer and early fall (Calloway et al. 1986: 336–337, 339; Delaney 1989: 7–8). From early spring to late fall the men would hunt deer, elk, pronghorn, and smaller mammals. The women would gather various edible grass seeds, wild fruit, and pinyon nuts. Occasionally they would cultivate corn, beans, and squash in high mountain valleys or meadows (Calloway et al. 1986: 343; Delaney 1974: 7–8).

Late in the fall, family units would begin to move out of the higher mountains into sheltered areas within the southern part of their territory for the winter months. This was a time for various social activities, culminating with the Bear Dance in early spring (Delaney 1989: 10–11).

The Utes probably obtained horses soon after 1670 from their encounters with the Spanish or from the Navajos or Apaches. This newly acquired mobility brought more changes for the Southern Utes. They were able to range farther (east) on communal buffalo hunts and trading expeditions, and raids could be executed with greater swiftness and efficiency. Individual bands apparently increased in size with this new ability to obtain subsistence resources (Delaney 1974: 11–12, 16; Roe 1955: 75; Schroeder 1965: 54).

Their new raiding capabilities also produced an increased frequency of attacks on northern Rio Grande communities, which apparently forced the Spanish to arrange a peace treaty with the Utes. This treaty seems to have been in effect until the Pueblo Revolt in 1680 (Schroeder 1965: 54).

**Native American Populations and Disease**

Fluctuations in Native American populations occurred due to birth rate, disease, famine, and warfare. Various infectious diseases, such as smallpox, were introduced early in the historic period by the Spaniards. Some researchers have suggested that this disease and perhaps others, such as whooping cough, measles, and chicken pox, were spread northward from Mexico through contact between regional Native American groups before first

---

**Figure 19—Pueblo floodwater corn field, Hopi, Arizona, ca. 1919. Photo by Wesley Bradfield, courtesy Museum of New Mexico, Santa Fe (negative no. 43289).**
contact with Spaniards in 1540. With no immunity or effective treatment for these infectious maladies, native populations were dramatically impacted in the 17th and 18th centuries. During serious outbreaks of smallpox, such as those in 1719, 1733, 1738, 1747, 1749, 1780–81, and 1788–89, the mortality rate was as high as 50 percent of populations. As indicated previously, the forced concentration of Pueblo populations into large villages may have been a factor in this high percentage. In spite of the development and diffusion of a vaccine for this disease by the turn of the century, serious outbreaks occurred among the Pueblos in 1852, 1883, and 1898. The Navajo, various Apache groups, and the Southern Ute also experienced population declines during the historic period (Crosby 1973: 37–39, 42–43; Thornton 1987: 76–79, 99–102).

Historic figures of the total Pueblo population vary considerably for the early colonial period, depending on the observer. A detailed breakdown of 66 different population estimates from 1539–41 to 1910 was compiled and evaluated for accuracy by Palkovich (1985: 403–408). For the late 1500s-early 1600s these estimates range from 15,850 to 60,000. The actual number probably falls in between, but probably nearer the lower figure. The compiled figures were for 34 extant and extinct pueblos, some of which were or are out of the Basin, such as Zuni. The highest population estimate made by Onate (60,000), an estimate thought too high by many historians, was recently evaluated as relatively accurate by Palkovich (1985: 408); this estimate included Hopi villages as well. For the 17th century, a population estimate of 16,442 for the Pueblos made by Fray Bartolome Marquez is also viewed as reliable (Palkovich 1985: 408–409).

The 15th century Piro Pueblo, who inhabited the Rio Grande and major tributaries from south of Belen to below San Marcial, underwent a significant increase in population due to biological growth and emigrants from surrounding regions. Piros expanded onto elevated areas along the river floodplain and the west bank of the Rio Grande, mainly in the area below San Pedro Wash. Irrigation systems were developed to support nearby large villages. The estimated population at this time was 7,500 (Marshall and Walt 1984: 137–138, 140).

Piro population numbers recorded by early Spanish observers vary from 6,000 to 12,000; historians generally discount the first, which was an estimate by Espeso in 1583. Following Spanish settlement, a decrease in population began. In 1630 Fray Benavides recorded the figure of 6,000; the region was totally abandoned by 1680. This decline was due to Spanish pressures, drought-famine, European diseases, and raiding and warfare (Earls 1985: 126–127, 133, 149–150).

In 1680 the Pueblos probably numbered almost 17,000; European diseases, famine, and warfare were the principal causes of this decrease. By 1750 the Pueblo population declined to 12,000, while the nomad population stayed the same. By 1821 the Pueblo population had declined to about 5,000 (Dozier 1983: 130; Earls 1985: 124–125; Table 22).

The Pueblo population in the general study region was 5,400 in 1860–61 and increased to only 7,124 by 1904. By 1924 the total climbed to 10,565 and by 1964 to 20,822. For the Pueblos in the Middle Basin, the 1964 total was 16,817 (Hewett 1925: 1–2; Simmons 1979b: 221; Table 23).

| Table 22—Pueblo population in the Middle Rio Grande Basin, 1680–1821. |
|---------------------|-------|--------|--------|-------|
| 1680 | 1749 | 1798 | 1821 |
| Galisteo | 800 | 350 | — | — |
| San Marcos | 600 | — | — | — |
| Cochiti | 300 | 521 | 505 | 339 |
| Santo Domingo | 150 | 40 | 1,483 | 726 |
| San Felipe | 300 | 400 | 282 | 310 |
| Santa Ana | 300 | 600 | 634 | 471 |
| Zia | — | 600 | 262 | 196 |
| Jemez | 5,000 | 574 | 272 | 330 |
| Sandia | 3,000 | 440 | 236 | 310 |
| Alamedad | 1,500 | — | — | — |
| Laguna | — | 228 | 802 | 779 |
| Acoma | 2,000 | 960 | 757 | 477 |
| Isleta | 2,000 | 500 | 479 | 511 |
| Tajiqua | 300 | — | — | — |
| Totals | 16,750 | 5,213 | 5,712 | 4,449 |

* Abandoned.  
Sources: Palkovich 1985: 401; Simmons 1979a: 185

| Table 23—Pueblo population in the Middle Rio Grande, 1904–1968. |
|---------------------|-------|--------|--------|--------|--------|-------|
| Pueblo | 1904 | 1924 | 1932 | 1942 | 1950 | 1968 |
| Cochiti | 217 | 267 | 295 | 346 | 497 | 707 |
| Santo Domingo | 846 | 1,054 | 862 | 1,017 | 1,106 | 2,248 |
| San Felipe | 489 | 526 | 555 | 697 | 784 | 1,542 |
| Santa Ana | 224 | 224 | 236 | 273 | 288 | 448 |
| Zia | 116 | 154 | 183 | 235 | 267 | 517 |
| Jemez | 498 | 580 | 641 | 767 | 883 | 1,707 |
| Sandia | 79 | 92 | 115 | 139 | 139 | 248 |
| Laguna | 979 | 1,003 | 1,077 | 1,304 | 1,470 | 2,449 |
| Isleta | 1,366 | 1,901 | 2,192 | 2,686 | 2,894 | 4,996 |
| Acoma | 734 | 955 | 1,073 | 1,322 | 1,447 | 2,688 |
| Total | 5,548 | 6,756 | 7,229 | 8,786 | 9,775 | 17,550 |

Sources: Dozier 1983: 122; Hewett 1925: 1–2

Native American Resource Use

Over time the Pueblos and other regional Native American groups developed strategies and institutions to ensure an adequate subsistence base. One strategy that evolved among the Pueblo prevented misuse of resources
through regulation of overuse and depletion. Pueblo villages had societies that were responsible for the maintenance of different aspects of their eco-cultural world—weather, illness, agriculture, flora, and fauna. Another strategy was based on balanced reciprocity, in which mutual assistance and redistribution of food among all levels within the village, through rituals and barter for services performed, took place (Dozier 1983: 151–152; Ford 1972: 8–10; Friedlander and Pinyan 1980: 18).

Pueblo harvests of cultigens were supplemented by hunting of various vertebrate animals, gathering of an array of native food plants, collecting of a variety of invertebrate organisms, fishing, and trading with other aboriginal groups, especially for meat (Dozier 1983: 127–129; Earls 1985). An annual cycle of land use activities at Santa Ana and Cochiti, basically common to all basin Pueblos, follows (Bayer et al. 1994: 169–170; Lange 1959: 124–131; Table 24). The Navajo, Apache, and Southern Ute practiced horticulture but on a more limited scale.

Table 24—Annual cycle of Santa Ana and Cochiti land use.

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late February or early March</td>
<td>Clean ditches, plow fields.</td>
</tr>
<tr>
<td>April–May</td>
<td>Plant and irrigate fields, water orchards, move flocks and herds onto mesa, Espiritu Santo tract, and east toward Placitas.</td>
</tr>
<tr>
<td>June–August</td>
<td>Tend fields and livestock. Hunt (communally) rabbits.</td>
</tr>
<tr>
<td>September–October</td>
<td>Harvest corn, wheat, melons, chiles, and fruit. Thresh wheat and carry crops back to old pueblo. Move livestock toward valley.</td>
</tr>
<tr>
<td>October–November</td>
<td>Hunt (communally) bison, deer, elk, pronghorn, and rabbits.</td>
</tr>
<tr>
<td>November</td>
<td>Process crops and store for winter.</td>
</tr>
<tr>
<td>December–February</td>
<td>Conduct religious ceremonies, produce arts and crafts, etc.</td>
</tr>
</tbody>
</table>


Agriculture

All of the early historic Pueblo groups were primarily dependent on agriculture along the Rio Grande, its major tributaries and arroyos, and occasionally on alluvial fans for their subsistence base. At the time of Spanish exploration and early settlement, the Pueblos held most of the productive farmlands in northern and central New Mexico. Some Middle Rio Grande Pueblos did utilize ditch irrigation in the valley, albeit on a limited scale. In 1591 Spanish explorer Espejo noted that the Tewa Pueblo practiced irrigation agriculture (Schroeder and Matson 1965: 117). Also, the Pueblos were irrigating fields at the mouth of Las Huertas Creek in the late 1500s (Wozniak 1987).

Clark (1987: 71) described the early historic Pueblo method of irrigation farming:

Apparently the common method of watering was periodic flooding of fields and certainly in advance of planting so that the plants could draw water from the soil during the early growing season. On streams of considerable size, normally there was no problem of supply during the spring because of melting snows which fed them. Water was simply conducted through wide but shallow canals from which it was diverted by laterals serving small plots. Later in the season, as the flow diminished, temporary check dams of logs, brush, mud, and stone retarded the flow, backing the water into the canals and into the fields.

Associated with this practice were “private irrigation organizations,” which maintained ditches and other water control structures and controlled the times and amounts of water flows onto the fields. Their operations influenced how the Spanish formed irrigation associations in the frontier communities, especially those made up of genizaros (Ortiz 1980: 55–56).

Historic Pueblo field and irrigation systems, however, became more similar to the engineering and organization of the Spanish in the early colonial period. Ditches came from the Rio Grande or other perennial streams, springs, or cienegas and were laid out for gravity-flow of the water. Wing diversion dams were built of logs, rocks, or brush. The Spanish field system based on the “long lot,” long, narrow plots that were an adaptation to local topographic and water resources and allowed maximum access to water, was never really adopted by the Pueblo (Carlson 1975: 53–54; Wozniak 1987). The Navajo selected locations for fields based on closeness to water, soil type, and levelness (Hill 1938: 26–27).

The limited Pueblo ditch farming along the upper and middle main stem of the Rio Grande in the early historic
period was not as intensive as that practiced by the Spanish. The Spanish system, which the Pueblos basically adopted, involved the use of a network of ditches that carried water impounded by upstream diversion dams and whose flow was controlled by gates. More labor was required than that of floodwater farming, but average crop yields were higher, notably for the native corn and introduced wheat. The amount of irrigation possible was related to various climatic elements, and the amount temporally necessary was related to climatic variation. Irrigation often prevented starving or even a decrease in crop production; this was supplemented by trading for food with distant groups, as previously mentioned (Wozniak 1987; Zubrow 1974: 64).

Irrigation farming was less risky than floodwater or dry farming and generally ensured adequate crops. More intensive irrigation agriculture was required to grow Spanish wheat, barley, oats, and various fruit in the colonial period. Irrigation systems of the Pueblos remained essentially the same in organization and extent from 1846 to 1910. One reason for this was the decline in population until about 1900 (Wozniak 1987).

Estimates of the amount of land being cultivated by the Middle Rio Grande Valley Pueblos in the 16th century vary from 15,000 to 25,000 acres. With Spanish coloniza- tion beginning in 1598, the combined acreage steadily increased. By 1880 the amount of irrigated land began to decrease due to various environmental problems, but these were basically corrected by 1940. Some 20,696 acres were under cultivation by the Middle Valley Pueblos in 1945 (Harper et al. 1943: 51–52; Table 25; see Chapter 4).

The early historic Pueblos generally practiced floodwater farming, utilizing diversion structures, check dams, reservoirs, contour terraces, grid gardens, and gravel mulch gardens. All of these were elements of a soil and moisture conservation system that maximized effective use of surface water for crops in the semi-arid environment of the region (Cordell 1984: 203–204; Jorgensen 1983: 693, 696–697; Wozniak 1987).

The three major nomadic groups also engaged in floodwater farming but on a much smaller scale. Hydrologist Kirk Bryan (1929: 445) described the basic method of Native American floodwater farming in the Southwest:

The areas utilized are variable in size and location, but each is chosen so that the local rainfall may be reinforced by the overflow of water derived from higher ground. The selection of a field involves an intimate knowledge of local conditions. The field must be flooded, but the sheet of water must not attain such velocity as to wash out the crop nor carry such a load of detritus as to bury the growing plants. Such conditions require a nice balance of forces that occur only under special conditions. Shrewd observations and good judgment are necessary in the selection of fields.

There are a number of archeological and early historical documented examples of this type of farming in the study region. In 1583 Espejo described sandy flats more than 2.5 miles wide on each bank of the Rio Grande, which were in cultivation by the Piro Pueblo. Other fields were under irrigation. Furthermore, some fields were located in or at the edge of marshes, probably to take advantage of the high water table (Earls 1985: 169–171, 180).

In the early to mid 1800s Cochiti still practiced floodwater farming at the mouth of arroyos, and the water was spread by the construction of diversion structures of logs, rocks, and brush. Probably more of this type of farming was done than that of irrigation before 1800. Dry farming was practiced at the base of the nearby Jemez Mountains. Floodwater farming at the pueblo had been largely abandoned by the late 1800s, although a few resident farmers practiced this technique until about 1930. Damaging floods were a factor in discontinuing this farming method. In 1890 small plots of 1.5–2.0 acres were planted on an island in the Rio Grande, a short distance below Cochiti (Lang 1959: 78–79).

In 1890 cultivated crops provided from 50 to 84 percent of the food consumed by the San Juan Puebloans (Ford 1972: 7). The amount produced for the late prehistoric period was below 50 percent. Surplus crops were stored to sustain them through one to three dry years in which cultigens would fail. Also, wild plants were collected and various animals hunted to supplement agricultural produce. Trade was another mechanism used to obtain food. Among the Pueblos, women “owned” the land, the seed, and the stored crops (Hughes 1983: 69).

Regional Pueblos were primarily cultivating corn, beans, and squash when first contacted by the Spanish. The Pueblos grew at least nine varieties of corn (Ford 1972: 7). Grain amaranth, bottle gourd, cotton, and common sunflowers were also grown, but these were of lesser importance (Nabhan 1979: 260–261). Of the cultigens introduced by the Spaniards, the Pueblos adapted chile, wheat,
cantaloupe, melon, peach, and apricot into their farming practice (Ford 1987: 76–82; Toll 1992; Table 26).

Pueblo irrigated lands and systems of the Middle Basin began to increase in acreage about 1905, when the U.S. Indian Irrigation Service initiated programs. The Middle Rio Grande Conservancy District program, including construction of irrigation dams and ditches, also reclaimed arable land. At Cochiti, irrigated lands increased from about 600 to 1,867 acres in 1950. Other valley Pueblos experienced similar expansion of irrigated lands (Lange 1959: 80; Nelson 1946: 74; Wozniak 1987).

The cycle of agricultural activities for each year was essentially the same for all of the historic Middle Rio Grande pueblos; Cochiti farm activities are listed in Table 27. Field preparation, irrigation, and sowing (of wheat) began in February and accelerated with planting of more crop types in March and early April and the planting of corn in mid to late April, with periodic irrigation and weeding from late spring and over most of the summer. Harvest occurred from mid July (grains) through mid October, followed by the “first fruits” ceremony on November 2.

Spanish livestock overgrazing on Pueblo and surrounding traditional use lands decimated cool-season, edible grasses. However, with a new, dependable, and nutritional wheat crop produced by irrigation, the Pueblos no longer needed to collect native grass seeds. Reliance on wheat and other introduced crops, as well as Spanish livestock, led to a decrease in Pueblo hunting of indigenous fauna

### Table 26—Historic Native American cultigens.

<table>
<thead>
<tr>
<th>Cultivated vegetables</th>
<th>Semi–cultivated vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize (corn)—Zea mays (Chapalote and Maiz de Ocho vars.)</td>
<td>Devil’s claw—Proboscidea parviflora</td>
</tr>
<tr>
<td>Cockscomb—Amaranthus cruentus</td>
<td>Wild potato—Solanum spp.</td>
</tr>
<tr>
<td>Grain amaranth—A. hypochondriacus</td>
<td>Zuni tomatillo—Physalis philadelphica</td>
</tr>
<tr>
<td>Calabasa verde—Cucurbita mixta</td>
<td>Goosefoot—Chenopodium spp.</td>
</tr>
<tr>
<td>Crook-neck squash—C. moschata</td>
<td>Rocky Mountain beeweed—Cleome serulata</td>
</tr>
<tr>
<td>Pumpkin—C. pepo</td>
<td>Hopi black dye sunflower—Helianthus annuus</td>
</tr>
<tr>
<td>Bottle gourd—Lagenaria siceraria</td>
<td>Common sunflower—H. annuus</td>
</tr>
<tr>
<td>Hopi short-stapled cotton—Gossypium hirsutum</td>
<td></td>
</tr>
<tr>
<td>Lima Bean—Phaseolus lunatus</td>
<td>Hopi short-stapled cotton—Gossypium hirsutum</td>
</tr>
<tr>
<td>Common bean—P. vulgaris</td>
<td>Hopi short-stapled cotton—Gossypium hirsutum</td>
</tr>
</tbody>
</table>

Sources: Ford 1987; Hewett and Dutton 1945; Robbins et al. 1916

### Table 27—Annual traditional farming activities, Cochiti Pueblo, 1880.

<table>
<thead>
<tr>
<th>Season</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td>Sowing of wheat began. Clans assist with planting. Fields irrigated prior to sowing if ground is very dry.</td>
</tr>
<tr>
<td>March</td>
<td>Completion of wheat sowing. Irrigation ditches cleaned. Spring dance just before or after cleaning to assure good crops.</td>
</tr>
<tr>
<td>April</td>
<td>Ground broken with plows and oxen. Planting of corn began after the 20th. Melons, watermelons, beans, squash, and chile subsequently planted. Clans assisted with planting. Irrigation prior to planting. Ground pulverized with shovel or hoe.</td>
</tr>
<tr>
<td>May–early June</td>
<td>Planting of corn completed. Punche (tobacco) planted.</td>
</tr>
<tr>
<td>June</td>
<td>Corn fields pulverized. Fields irrigated every 7 or 8 days.</td>
</tr>
<tr>
<td>July</td>
<td>Last weeding of fields. Wheat harvested just after July 14 feast day. Livestock brought from ranges to village to thresh wheat and other grains.</td>
</tr>
<tr>
<td>August</td>
<td>Fields irrigated every 7 or 8 days. Threshing of grains continued.</td>
</tr>
<tr>
<td>September</td>
<td>Harvesting of corn, beans, chile, peaches, etc. began. Cacique’s field harvested ceremonially first. Clans assist in harvesting.</td>
</tr>
<tr>
<td>October</td>
<td>Last cutting of alfalfa in early part of month. Harvesting of corn completed by mid-month.</td>
</tr>
<tr>
<td>November</td>
<td>All Souls’ Day celebrated on the 2nd. The “offering of the first fruits,” primicia, conducted at church. Feasts at homes. Gifts of food made to children.</td>
</tr>
</tbody>
</table>

Livestock Raising

Although Coronado brought sheep, cattle, and horses with his expedition in 1540, and even left a few sheep with each of the two or three friars who chose to remain among the Pueblos in 1542, none of these animals appears to have survived. No livestock from later 16th century expeditions apparently survived either, until 1598, when Onate brought the first colonists and some 4,000 sheep, 1,000 cattle, 1,000 goats, and 150 horses. Some died from natural causes or were butcheted en route, but many survived and represented the beginnings of livestock raising in New Mexico (Baxter 1987: 2–4).

The herds around the early Spanish and Pueblo settlements generally increased on lush grasses little grazed by wild mammals, and new herds of domesticated animals were brought to New Mexico by the missionary caravans. Flocks of sheep and other livestock were established at missions founded at the pueblos. By 1639 each priest possessed 1,000 to 2,000 sheep, considerably more than lay Hispanic citizens. Here the Pueblos were taught the fundamentals of livestock raising, and some readily incorporated the use of meat, hides, and wool into their subsistence living. However, the considerable labor expended by the Pueblos in caring for the mission stock fostered general resentment among some villagers (Arnon and Hill 1979: 304–305; Baxter 1987: 8; Campa 1987: 43–44).

Although the Spaniards prohibited the Pueblos and other Native Americans from using horses, the Apaches, Navajos, and Utes had acquired horses through raiding and trading by the 1620s–70s. At first they were used as food or beasts of burden, but it was not long until these groups were riding and successfully raising these animals. For the Pueblos, oxen became the favored animal for pulling the introduced plow and cart; mules and burros were adapted as pack animals. Livestock, primarily horses, were also used in threshing grains, a custom learned from the Spanish (Bailey 1980: 67, 69; Campa 1987: 44–45; Lange 1959: 98).

The Pueblos, in turn, introduced sheep and goats to the Navajo, perhaps through trade before the Pueblo Revolt, and certainly during the Spanish reconquest of 1692–96. As refugees fleeing from the Spanish army, the Jemez and other Pueblos lived with the Navajo. The latter, quickly learning to raise, eat, and shear the sheep and goats, incorporated these practices, which soon became a significant part of their new nomadic lifeway (Fig. 20). By 1700 the Navajo had at least 1,000 sheep (Bailey 1980: 66–69, 76–77).

Following resettlement, Spanish herds were again built up, and raids made on them by nomadic Indian groups were resumed to increase their own stocks. As a result, horses and mules, prized as mounts or food, were scarce in the Rio Grande settlements (Bancroft 1889: 276; Simmons 1985: 85). Sheep were a major target as well, and pueblos like Laguna lost many animals to raiders (Ellis 1979: 442). Overall numbers of livestock at some of the pueblos in the 18th century grew slowly, in spite of the raids and declining village populations due primarily to disease and warfare. A partial inventory of Santa Ana’s livestock in 1763 indicated a diversity of domesticated animals: more than 67 cows, a number of calves, 29 oxen, 8 bulls, 50 sheep, 74 goats, 8 horses, 1 mare, 1 colt, 3 mules, and a number of pigs (Bayer et al. 1994: 80–81, 83).

The subjugation of nomadic groups by the army in the 1860s–70s and the opening of rail lines in the region led to a sharp rise in livestock numbers at some of the Pueblo villages and elsewhere in the region. For example, cattle herds increased five-fold between 1880 and 1890 on Santa Ana lands. Navajo sheep and goat herds also increased sharply after their resettlement on reservation lands. Some 1.5 million sheep were counted on reservation lands in 1885 (Bailey and Bailey 1986: 41; Bayer et al. 1994: 174, 176).

The number of Pueblo sheep in the region decreased by more than one-half between 1900 and 1930. Of all the pueblos in the basin, Laguna emerged in this century as the leading sheep raising village in terms of numbers. At Acoma and Zuni, sheep also were an important source of...
income. By 1935 there were 52,000 sheep on Laguna’s rangelands. In this year the United Pueblos Agency implemented a grazing management plan based on carrying capacity of the land, which had been exceeded not only on Navajo and Laguna lands but also on all Pueblo lands. A controversial livestock reduction program soon followed (Aberle 1948: 19–20, 43; Ellis 1979: 443). Various organizations to administer livestock operations evolved among the Pueblos during the early to mid 20th century. Initially, the war captain was in charge of stock and the rangelands. Subsequently, sheep and cattle officers replaced the war captain at some villages. A cattle trust was established at Isleta, and eight holding groups for sheep and cattle were organized in 1943 (Aberle 1948: 32; Hoebel 1979: 410).

In recent years, livestock raising has grown as an important income through sales, as well as a food source for the Pueblos (Table 28), although sheep have all but disappeared. Among the Navajo, however, sheep, as well as goats, are a major source of income. Cattle represent a large percentage of the stock held by the Pueblos today.

Hunting and Gathering

Indigenous animals and plants were harvested for food, medicine, arts-crafts, and construction by all Native Americans throughout the protohistoric and historic periods. Even among the agriculturalists, such as the Pueblos, hunting and gathering have always been important due to partial or total crop losses related to drought, insect infestations, and raids (Fig. 21). The hunting and gathering system was based on three elements related to production, consumption, and redistribution: sexual division of labor (males hunted, females gathered), almost immediate consumption, and redistribution via kin connections within the group to which the producers and consumers belonged. These two activities involved extensive

Figure 21—Late prehistoric petroglyphs: Pueblo hunter (?) with lance, horned serpent, and rear paw print of a bear, Abo area. Photo by author.
utilization of landscape resources, with little labor expended, compared to irrigation agriculture.

Fauna

A wide range of large to medium-sized mammals were hunted by historic Pueblo and other groups in the region. Major species included buffalo, elk, deer (mule and white-tailed), pronghorn, and bighorn sheep. Bands of hunters traveled in the fall to hunt buffalo on the Llano Estacado to the east of the Basin (Fig. 22); these animals were important for meat and hides. Smaller meat and fur animals hunted, trapped, or snared were beaver, rabbit (cottontail and jackrabbit), prairie dog, squirrel (rock, ground, and tree), badger, weasel, and skunk (Basehart 1973: 148, 156; Hamilton 1975; Opler 1965: 316–327; Tiller 1983: 441). As an example, mammals used historically by Santa Clara Pueblo are listed in Table 29.

For centuries Pueblo Indians have maintained a close association with more than 200 species of indigenous birds, as well as macaws and parrots imported from Mexico. During this time birds were incorporated into virtually every aspect of community life. Various species of birds were associated with “sacred” directions. Birds were related to the sky, earth, sun, moon, snow, “life source,” crop plants, water, seasons, rain, rainbows, and drought, death, day, dusk, night, agriculture, hunting, racing, war, purification, speech, and “balance of man and nature.” Some 100 different birds, or their parts, were used in Pueblo ritual and ceremony. Birds also have an essential place in Pueblo myth and folklore (Tyler 1979: xii-xiii, 3–12).

Birds were taken with bow-and-arrow, traps, snares, and by hand. Eagles were taken from nests on cliffs or in trees when young, then caged and raised in the village. Cochiti and Jemez Pueblos captured adult eagles by hiding in a plant-covered pit with a tethered rabbit as bait next to the pit. When an eagle plunged and grasped the live bait, the hunter raised up and grasped the eagle by both legs, then covered the bird with a blanket or large skin (Tyler 1979: xiii, 53–58). Eagles were either kept in cages or tethered to a perch on roofs (Fig. 23).

In basic tasks such as planting a field or building a room, it was necessary to make a presentation of feathers from

**Table 28—Pounds of meat sold and consumed, Acoma and Laguna, 1938–1943.**

<table>
<thead>
<tr>
<th>Livestock class</th>
<th>1938</th>
<th>1939</th>
<th>1940</th>
<th>1941</th>
<th>1942</th>
<th>1943</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>387,031</td>
<td>349,350</td>
<td>398,195</td>
<td>487,899</td>
<td>438,092</td>
<td>431,097</td>
</tr>
<tr>
<td>Sheep</td>
<td>749,596</td>
<td>1,129,464</td>
<td>986,088</td>
<td>857,114</td>
<td>867,330</td>
<td>624,545</td>
</tr>
<tr>
<td>Swine</td>
<td>6,700</td>
<td>19,780</td>
<td>6,716</td>
<td>11,132</td>
<td>16,936</td>
<td>24,165</td>
</tr>
<tr>
<td>Poultry</td>
<td>9,808</td>
<td>11,440</td>
<td>5,626</td>
<td>13,818</td>
<td>14,473</td>
<td>21,970</td>
</tr>
<tr>
<td>Total</td>
<td>1,153,135</td>
<td>1,510,034</td>
<td>1,396,625</td>
<td>1,369,963</td>
<td>1,336,831</td>
<td>1,101,777</td>
</tr>
</tbody>
</table>

*Source: Aberle 1948: 87*

**Table 29—Santa Clara use of mammals (non-food).**

<table>
<thead>
<tr>
<th>Mammals</th>
<th>Body part</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalo</td>
<td>Hide</td>
<td>Robes, bedding, rugs</td>
</tr>
<tr>
<td>Deer</td>
<td>Hide</td>
<td>Clothing</td>
</tr>
<tr>
<td>Elk</td>
<td>Hide</td>
<td>Clothing</td>
</tr>
<tr>
<td>Pronghorn</td>
<td>Hide</td>
<td>Clothing</td>
</tr>
<tr>
<td>Bighorn sheep</td>
<td>Hide</td>
<td>Clothing</td>
</tr>
<tr>
<td>Bear</td>
<td>Hide</td>
<td>Robes, bedding, rugs</td>
</tr>
<tr>
<td>Jackrabbit</td>
<td>Hide</td>
<td>Robes, blankets</td>
</tr>
<tr>
<td>Cottontail</td>
<td>Hide</td>
<td>Robes, blankets</td>
</tr>
<tr>
<td>Mountain lion</td>
<td>Hide</td>
<td>Quivers</td>
</tr>
<tr>
<td>Bobcat</td>
<td>Hide</td>
<td>Clothing, robes, quivers</td>
</tr>
<tr>
<td>Wolf</td>
<td>Hide</td>
<td>Quivers</td>
</tr>
<tr>
<td>Gray fox</td>
<td>Hide</td>
<td>Ceremonial costumes</td>
</tr>
<tr>
<td>“Plains” fox</td>
<td>Hide</td>
<td>Ceremonial costumes</td>
</tr>
<tr>
<td>Beaver</td>
<td>Hide</td>
<td>Headbands, hats, hair ties, dance costumes</td>
</tr>
<tr>
<td>Porcupine</td>
<td>Quills</td>
<td>Needles, clothing decoration</td>
</tr>
<tr>
<td>Otter</td>
<td>Fur</td>
<td>Headbands, collars</td>
</tr>
<tr>
<td>Rock squirrel</td>
<td>Hide</td>
<td>Dolls</td>
</tr>
<tr>
<td>Chipmunk</td>
<td>Hide</td>
<td>Hair ties</td>
</tr>
<tr>
<td>Weasel</td>
<td>Hide</td>
<td>Hair braid wraps</td>
</tr>
</tbody>
</table>

*Source: Hill 1982: 49–54*
appropriate birds. Birds and feathers were also used in rituals that supported religious ceremonialism, and these became counters that ordered a complex symbol system. Certain birds were related to gods, acted as messengers between Pueblos and their gods, or represented signals between individuals. Bird designs were commonly used on pottery at Zuni, Acoma, and Zia. Domesticated turkeys, golden eagles, macaws, and parrots were commonly kept in villages. Their main use was providing skins or individual feathers; turkeys and golden eagles were sometimes killed for ritual sacrifice (Bunzel 1972: 24, 32, 93–128; Franklin 1968: 5–21; Tyler 1979: xi–15, 52–53, 54, 55).

Other major uses of feathers by the Pueblos included robes, blankets, clothing, hunting fetishes, corn fetishes, breath-feathers, prayer-sticks, ceremonial headdress, other religious paraphernalia, quivers, shield, mask and basket decoration, and arrow fletching (Hill 1982: 47–59; Table 30). Trade in feathers, especially those from macaws and parrots to the south, was widespread. Eagle claws and turkey feet were also used in paraphernalia. The live birds themselves were probably traded as well (Tyler 1979: 3–6, 44, 50, 52, 68, 91, 120, 170, 266).

A number of these birds were also used by the Apache and Navajo (Mayes et al. 1977: 5). The Western Apache ate wild turkeys, quail, dove, geese, ducks, some small birds, and various bird eggs (Buskirk 1986: 137–142). Vulture feathers were also used by the Mescalero for adornment and ritual use (Basehart 1973: 156; Opler 1965: 327–329).

The Navajo used feathers from various species of birds. The feathers of eagles, which were ritually hunted, and turkey feathers were used in fletching arrow shafts. Feath-
ers from both species were also used in decorating baskets, hats, masks, and other items. Hawk, crow, owl, bluebird, warbler, and other small birds were used in decorating ceremonial clothing and paraphernalia. Eagle claws were strung on necklaces (Kluckhohn et al. 1971: 415).

Most Pueblo groups and the Navajo and Apache groups generally did not eat reptiles, amphibians, fish, or mollusks until recent times. However, faunal remains from Piro archeological sites in the valley include snakes, turtles, and frogs, as well as gar and buffalo fish. Rattlesnakes were not killed by members of any of these groups. Live snakes were sometimes used in Pueblo ceremonies, and tortoise shells were used in making a rattle. Eel skins were used by the Tewa Pueblo for making leggings and moccasins (Basehart 1973: 12; Buskirk 1986: 142; Earls 1985: 264–265, 273; Hewett and Dutton 1945: 116–120; Opler 1965: 330–332).

Flora

Numerous plants were systematically collected for wild food and other uses by the Pueblos (Table 31). Some major foods included seeds or fruits from grasses, amaranths, pigweed, sunflower, hackberry, juniper, pinyon, prickly pear, and yucca. Medicinal or arts-crafts material sources were cottonwood, willow, mountain mahogany, Apache plume, and juniper.

Wild food plants represented in Piro Pueblo archeological sites include, in decreasing order of importance, yucca, prickly pear, hedgehog cactus, and mesquite. Cattail pollen was abundant, indicating that it was an important food. Pinyon nuts, a relatively important Pueblo and Spanish native food, have not been recovered archeologically from Piro sites, but have been recovered from other Pueblo sites in the Middle Valley north of Belen (Earls 1985: 268, 270). Fuel and construction woods used by all Pueblo groups were cottonwood, pinyon, willow, juniper, and saltbush. Mesquite and creosote bush were also used by the Piro (Earls 1985: 268, 270; Scurlock and Johnson 1993: 277–278).

Throughout the prehistoric and historic periods of the American Southwest, the various species of pinyon and juniper have been commonly used woods for heating and cooking fuel. Annual consumption of pinyon and juniper wood by a prehistoric Chaco Canyon family has been estimated to be 1.55 to 2.35 cords (Samuels and Betancourt 1982: 512; Weigle 1975: 13); this range was probably the same for late prehistoric-historic Pueblos. At the time of Spanish arrival in the 1500s, some northern Pueblos and other Native American groups were primarily using dead wood for fuel. With the introduction of the metal axe and increase in Rio Grande Basin populations of Spaniards, green pinyon and juniper were increasingly harvested for fuelwood. By 1800–50, live wood had been harvested around all of the northern Pueblos for some distance. In this century, some Pueblos have discouraged the cutting of green wood (Ford 1987: 74, 86; Hewett and Dutton 1945: 59; Hughes 1983: 5; Lange 1959: 145; Whiting 1966: 3, 62–63).

Several plants were important to the Apaches, Navajos, and Utes as food. These were, in decreasing order of importance, acorns, pinyon nuts, datil yucca fruit, and prickly pear tunas. Mescal, or agave, and mesquite beans were perhaps the most important wild food sources for Southern Apache bands. These wild food plants are perennial, which under normal climatic conditions would be available annually. Other food plants collected included sunflower seeds, walnuts, juniper berries, various other edible berries, grass seeds, roots, and green plants (“pot herbs”), as well as various other seeds. The Navajos’ diet was made up of about 50–60 percent domestic plants (Scurlock 1990a: 39, 1991: 38–39).

Rocks and Minerals

A relatively large number of regional rocks and minerals were utilized in various ways by the Pueblo and other Native Americans. These uses included the manufacture of tools, weapons, jewelry, pottery, paint, plaster, and house construction (Table 32).

<table>
<thead>
<tr>
<th>Birds</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ducks</td>
<td>Arrow fletching, ceremonial paraphernalia, and costumes</td>
</tr>
<tr>
<td>Canada goose</td>
<td>Arrow fletching</td>
</tr>
<tr>
<td>Sandhill crane</td>
<td>Arrow fletching</td>
</tr>
<tr>
<td>Golden eagle</td>
<td>Arrow fletching, ceremonial paraphernalia, and dance costumes</td>
</tr>
<tr>
<td>Bald eagle</td>
<td>Arrow fletching, ceremonial paraphernalia, and dance costumes</td>
</tr>
<tr>
<td>Red-tailed hawk</td>
<td>Arrow fletching, dance costumes</td>
</tr>
<tr>
<td>Cooper’s hawk</td>
<td>Arrow fletching, dance costumes</td>
</tr>
<tr>
<td>Sharp-shinned hawk</td>
<td>Arrow fletching, dance costumes</td>
</tr>
<tr>
<td>Turkey vulture</td>
<td>Arrow fletching, dance costumes</td>
</tr>
<tr>
<td>Blue grouse</td>
<td>Arrow fletching, ceremonial paraphernalia, and dance costumes</td>
</tr>
<tr>
<td>Wild turkey</td>
<td>Arrow fletching, ceremonial paraphernalia, and costumes</td>
</tr>
<tr>
<td>Scaled quail</td>
<td>Arrow fletching</td>
</tr>
<tr>
<td>Greater roadrunner</td>
<td>Ceremonial paraphernalia</td>
</tr>
<tr>
<td>Flycatcher</td>
<td>Ceremonial paraphernalia</td>
</tr>
<tr>
<td>Steller’s jay</td>
<td>Dance, hair ornament</td>
</tr>
<tr>
<td>Pinyon jay</td>
<td>Dance, hair ornament</td>
</tr>
<tr>
<td>Black-billed magpie</td>
<td>Dance, hair ornament</td>
</tr>
<tr>
<td>Scott’s oriole</td>
<td>Ceremonial?</td>
</tr>
<tr>
<td>Bullock’s oriole</td>
<td>Ceremonial?</td>
</tr>
<tr>
<td>Western tanager</td>
<td>Ceremonial?</td>
</tr>
<tr>
<td>Hepatic tanager</td>
<td>Ceremonial?</td>
</tr>
<tr>
<td>Yellow warbler</td>
<td>Ceremonial?</td>
</tr>
<tr>
<td>Grace’s warbler</td>
<td>Ceremonial?</td>
</tr>
<tr>
<td>Yellow-breasted chat</td>
<td>Ceremonial?</td>
</tr>
<tr>
<td>Mountain bluebird</td>
<td>Ceremonial?</td>
</tr>
<tr>
<td>Western bluebird</td>
<td>Ceremonial?</td>
</tr>
</tbody>
</table>

Source: Hill 1982: 47–59
<table>
<thead>
<tr>
<th>Common English name</th>
<th>Scientific name</th>
<th>Medicinal</th>
<th>Food</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willow</td>
<td>Salix spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cottonwood</td>
<td>Populus spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspen</td>
<td>Populus tremuloides</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mint</td>
<td>Labatiae spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yerba buena</td>
<td>Mentha spicata</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pennyroyal, poleo</td>
<td>Mentha arvensis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horehound</td>
<td>Marrubium vulgare</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregano</td>
<td>Monarda methaefolia</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Doveweed</td>
<td>Croton texensis</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spurge</td>
<td>Euphorbia serpyllifolia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coyote gourd</td>
<td>Cucurbita foetitissima</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mormon tea</td>
<td>Ephedra spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thistle, poppy</td>
<td>Argemone spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caltrop</td>
<td>Kallstroemia hirsutima</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bearberry, Kinnikinnick</td>
<td>Arctostaphyllos uvaursa</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rabbitbrush</td>
<td>Chrysothamnus spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dandelion</td>
<td>Taraxacum officinale</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Blanket flower</td>
<td>Gaillardia spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian tea, cota</td>
<td>Thelesperma spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western coneflower</td>
<td>Rudbeckia spp.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cutleaf coneflower</td>
<td>Rudbeckia lacinata</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gumweed</td>
<td>Grindelia squarrosa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundsel</td>
<td>Senecio spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sneezeweed</td>
<td>Helianthemum spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gay feather</td>
<td>Liatris punctata</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sunflower</td>
<td>Helianthus annuus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sagebrush</td>
<td>Artemisia spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand sagebrush</td>
<td>Artemisia filifolia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wormwood</td>
<td>Artemisia tetrophylata</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broomweed, snakeweed</td>
<td>Gutierrezia sarothrae</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yarrow</td>
<td>Achillea lanulosa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oak</td>
<td>Quercus spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening primrose</td>
<td>Oenothera spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paintbrush</td>
<td>Castilleja spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scarlet penstemon</td>
<td>Penstemon barbatus</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderberry</td>
<td>Sambucus spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Santa Fe phlox</td>
<td>Phlox spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rocky Mountain beeplant</td>
<td>Cleome serrulata</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creosote bush</td>
<td>Larrea tridentata</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spider milkweed</td>
<td>Asclepias asperula</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milkweed</td>
<td>Asclepias spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand verbena</td>
<td>Abronia fragrans</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skunkbush</td>
<td>Rhus trilobata</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild flax</td>
<td>Linum spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colorado four o’clock</td>
<td>Mirabilis multiflora</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td>Brassica spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dogweed</td>
<td>Dyssoxia spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barberry</td>
<td>Mahonia repens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon grape</td>
<td>Mahonia repens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mountain mahogany</td>
<td>Cerocarpus montanus</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stickleaf</td>
<td>Mentzelia spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild tobacco</td>
<td>Nicotiana spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mullein</td>
<td>Verbascum thapsus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meadow rue</td>
<td>Thalictrum fendleri</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stonecrop</td>
<td>Sedum spp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jimsonweed, sacred datura²</td>
<td>Datura spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wolfberry</td>
<td>Lycium pallidum</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purslane</td>
<td>Portulaca oleracea</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western wallflower</td>
<td>Erysimum capitatum</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water cress</td>
<td>Rorippa nasturtium</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow parsnip</td>
<td>Heracleum lanatum</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wafer parsnip</td>
<td>Cymopterus spp.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

continued on next page
<table>
<thead>
<tr>
<th>Common English name</th>
<th>Scientific name</th>
<th>Medicinal</th>
<th>Food</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osha</td>
<td><em>Ligusticum porteri</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Yerba mansa</td>
<td><em>Anemopsis californica</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa</td>
<td><em>Medicago sativa</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bullrush</td>
<td><em>Scirpus spp.</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattail</td>
<td><em>Typha latifolia</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prickly pear</td>
<td><em>Opuntia spp.</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spiny hedgehog cactus</td>
<td><em>Echinocereus triglochidiatus</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholla, walkingstick</td>
<td><em>Opuntia imbricata</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Four-wing saltbush</td>
<td><em>Atriplex canescens</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mallow</td>
<td><em>Malva neglecta</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Indian ricegrass</td>
<td><em>Oryzopsis hymenoides</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>June grass</td>
<td><em>Koeleria cristata</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dock</td>
<td><em>Rumex spp.</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Lambquarters</td>
<td><em>Chenopodium spp.</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Wormseed</td>
<td><em>Chenopodium ambrosioides</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onion, wild</td>
<td><em>Allium spp.</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Ponderosa pine</td>
<td><em>Pinus ponderosa</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Douglas fir</td>
<td><em>Pseudotsuga douglasii</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Yucca</td>
<td><em>Yucca elata, glauca, baccata</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Solomon’s seal</td>
<td><em>Smilacina amplexicaulis</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sego lily, mariposa lily</td>
<td><em>Calochortus spp.</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild lily of the valley</td>
<td><em>Smilacina stellata</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Baneberry*</td>
<td><em>Actaea arguta</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Boxelder</td>
<td><em>Acer negundo</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Wild rose</td>
<td><em>Rosa fendleri</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Wild strawberry</td>
<td><em>Rosa fendleri</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Chokecherry</td>
<td><em>Prunus melanocarpa</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Wild plum</td>
<td><em>Prunus americana</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Apache plume</td>
<td><em>Fallugia paradoxa</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Deer’s ears, green gentian*</td>
<td><em>Swertia radiata</em></td>
<td>X</td>
<td>X</td>
<td>X(?)</td>
</tr>
<tr>
<td>Cranesbill</td>
<td><em>Erodium cicutarium</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mountain and Richardson’s geranium</td>
<td><em>Geranium caespitosum, G. richardsonii</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Rocky Mountain iris*</td>
<td><em>Iris missouriensis</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mountain lillac</td>
<td><em>Ceanothus fendleri</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Scouring rush</td>
<td><em>Equisetum</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Spectacle pod</td>
<td><em>Dithyrea wislizeni</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Vervain</td>
<td><em>Verbena macdougalii</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Verbena</td>
<td><em>Verbena spp.</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Serviceberry</td>
<td><em>Amelanchier prunifolia</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Hackberry</td>
<td><em>Celtis reticulata</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Puffballs</td>
<td><em>Cycoperdon spp.</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Bracket fungus</td>
<td><em>Polyporus halowi</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Walnut</td>
<td><em>Juglans major</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>One-seed juniper</td>
<td><em>Juniperus monosperma</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rocky Mountain juniper</td>
<td><em>Juniperus scopulorum</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alligator juniper</td>
<td><em>Juniperus deppeana</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>New Mexico locust</td>
<td><em>Robinia neomexicana</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Wild pea, peavine</td>
<td><em>Lathyrus decaphyllus</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mesquite</td>
<td><em>Prosopis glandulosa</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Screw bean, tornillo</td>
<td><em>Strombocarpa pubenscens</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Indian potato</td>
<td><em>Hoffmanseggia densiflora</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Locoweed*</td>
<td><em>Astragalus spp.</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vetch</td>
<td><em>Vicia spp.</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sweet clover</td>
<td><em>Melilotus spp.</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Ground-cherry</td>
<td><em>Physalis neo-mexicana</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Wild potato</td>
<td><em>Solanum fendleri, S. Jamesii</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Silverleaf nightshade</td>
<td><em>Solanum elaeagnifolium</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Wild grape</td>
<td><em>Vitis arizonica</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Gooseberry</td>
<td><em>Ribes lepantnum</em></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

* Poisonous.

Sources: Castetter 1935; Robbins et al. 1916
Several types of rocks that could be flaked to make tools and weapons were collected, including jasper, agate, chalcedony, chert, obsidian, quartz, and quartz sandstone. These materials were quarried from outcrops or gathered as surface nodules or cobbles. One of the best known quarry sites for siliceous stone in New Mexico is Cerro Pedernal, near Abiquiu. Quarrying was done with an assortment of stone tools. Cores or preforms were usually produced at the mine site, then transported back to activity areas or nearby campsites or farther, to base camps or villages, where complete tools or weapons were made (Bryan 1938; Christiansen 1974: 9; Warren 1974).

One of the minerals long mined in New Mexico for jewelry or other ornamentation is turquoise; the earliest archeological context has been dated to pre–700 A.D. Most of the turquoise recovered from Pueblo sites came from quarries and mines in the Cerrillos area. Two major periods of mining in the Cerrillos district occurred: late Pueblo II to early Pueblo III (A.D. 1000 to 1150 or 1200) and Pueblo IV (ca. AD 1350 to 1700). Of the two, archeological evidence indicates that the latter period was the most intensive one for Pueblo mining (Scurlock 1993b; Snow 1981; Warren and Mathien 1985; Fig. 24).

Other rocks and minerals were used in making jewelry, fetishes, paint, and inlay, including jet, quartz, azurite, galena, peridot, malachite, calcite, hematite, limonite, kaolinite, and gypsum (Ferguson and Hart 1985; Northrop 1959). Pueblo fetishes of a variety of mammals were, and are still, made; common mammals represented are mountain lion, bear, deer, elk, and badger. Stone was the most popular material from which fetishes were constructed, but bone, shell, wood, and clay (ceramic) were sometimes used (Scurlock 1993b; Tyler 1975: 22, 66–67, 233, 240).

Galena, or lead, was mined in the Cerrillos area, the San Pedro Mountains, at the north end of the Sandia Mountains, and in the Sangre de Cristo Mountains, north of Pecos Pueblo. Much of the lead mined from the early 1300s to about 1700 in the Pueblo region was used in producing a glaze to decorate ceramics. Between 1450 and the late 1500s, Tonque Pueblo, located east northeast of Bernalillo, produced most of the lead-glazed wares for the northern Rio Grande Pueblos (Scurlock 1993b; Warren 1969; Warren and Mathien 1985).

Navajos also made tools and weapons from chert, chalcedony, and obsidian. Turquoise, jet, and garnet were used for making jewelry. Rock-alum, and sometimes gypsum, were used as a mordant in a dye preparation. White clay, red ocher, and yellow ocher were used for dyes and paints (Kluckhohn et al. 1971: 418–419).

Clays used in making ceramics by various native groups usually came from deposits located relatively close to pottery-making centers, although in some instances they were imported. Sources were usually found in arroyo banks, canyon walls, or hillside outcrops; some of the better documented deposits are east of Acoma, between Truchas and Picuris Pueblo near Taos, and near Ramah. Temper of crushed rocks or coarse sand grains was usually added to the clay before firing. The pigment sources named above were used for monochrome or polychrome decorations (Dittert and Plog 1980: 17–19, 23; Friedlander and Pinyan 1980).

Salt was used throughout the prehistoric and historic periods and was harvested at several well-known loca-

<table>
<thead>
<tr>
<th>Rock/mineral</th>
<th>Location</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Red clay”</td>
<td>Nambe area</td>
<td>Pottery</td>
</tr>
<tr>
<td>Clay</td>
<td>Truchas, Canada de Cochiti, Santa Fe Canyon</td>
<td>Pottery</td>
</tr>
<tr>
<td>Gypsum</td>
<td>La Bajada area</td>
<td>Whitewash, plaster</td>
</tr>
<tr>
<td>Volcanic sand/rock</td>
<td>Various locations near pueblos</td>
<td>Pottery temper</td>
</tr>
<tr>
<td>“Yellow stone”</td>
<td>Valle Grande</td>
<td>Pottery temper</td>
</tr>
<tr>
<td>Mica</td>
<td>Taos – Petaca area</td>
<td>Pottery paint</td>
</tr>
<tr>
<td>“Reddish sandstone”</td>
<td>Canada de Cochiti</td>
<td>Paint</td>
</tr>
<tr>
<td>Basalt</td>
<td>Jemez Mountains</td>
<td>Grinding implements, well foundations</td>
</tr>
<tr>
<td>“White mineral”</td>
<td>Jemez Mountains</td>
<td>Beads</td>
</tr>
<tr>
<td>Fibrolite</td>
<td>Sangre de Cristo Mountains</td>
<td>Axes</td>
</tr>
<tr>
<td>Obsidian</td>
<td>Jemez Mountains</td>
<td>Tools, weapons</td>
</tr>
<tr>
<td>Malachite</td>
<td>Jemez Mountains</td>
<td>Paint, jewelry</td>
</tr>
<tr>
<td>Copper</td>
<td>Abiquiu area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sandia Mountains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jemez Mountains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cerrillos Mountains</td>
<td></td>
</tr>
<tr>
<td>Azurite</td>
<td>Jemez Mountains, Sandia Mountains, Nacimiento Mountains, Cerrillos Mountains</td>
<td>Paint, jewelry</td>
</tr>
<tr>
<td>Turquoise</td>
<td>Cerrillos</td>
<td>Jewelry, ornamentation</td>
</tr>
</tbody>
</table>

Salt was used in preserving meat, as a food seasoning, as a medicine, and for ritual purposes. Ceremonial pilgrimages to collect the salt at the above sites were made by the Pueblos, Navajos, and other Native American groups. The Cochitis collected the substance in loosely woven baskets, which allowed the water to drain through, then the salt was taken to shore and placed in sacks. At the Zuni Salt Lake, western Pueblos and Navajos collected throughout the historic period, and, for the Pueblos, in the later prehistoric as well. Navajos sometimes stored the salt in a pot with a flat stone lid, which was placed in a rock shelter. The salt was ground on a metate prior to use (Ferguson and Hart 1985; Hewett and Dutton 1945: 46–48).

Sandstone and limestone were commonly used in masonry construction by the Pueblos throughout their history. On the Pajarito Plateau, the softer tufa was a popular building material. The Navajos, and to a much lesser extent the Apaches, used sandstone or limestone in construction of houses, storage buildings, corrals, and other structures. Building stone was picked up or quarried from bedrock, outcrops, and sometimes from abandoned structures. Adobe became increasingly popular as a building material during the historic period (Nabokov and Easton 1989; Scurlock 1993b: 322, 334–335, 356, 364–370).

**Resource Trade**

During the historic period a variety of raw materials and handicrafts was exchanged between villages and camps of these regional groups: Navajo, Apache, Ute, Western Pueblos, Rio Grande Pueblos, and various Southern Plains tribes. Indigenous and exotic raw materials and cultivated plant products, animal byproducts, feathers, shells, rocks, minerals, and a variety of crafted items produced in one village were desired by another community “because they were not locally available or because they confirmed social bonds” (Scurlock...
Pottery, agricultural produce, horses, salt, and other items were produced and traded by the Pueblos. Buckskins, elk hides, otter skins, buffalo robes, shields, and pitch were acquired from the Utes. Navajos produced buckskin, basketry, and woven items, especially blankets, for trade. Deer, rabbit, and other animal meats were traded among all of these groups. Various minerals were also exchanged; alum was sought by the Spanish during this period (Delaney 1989: 12, 19, 1991: 38–39; Scurlock 1990a: 39).

<table>
<thead>
<tr>
<th>Item</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornmeal</td>
<td>Food</td>
</tr>
<tr>
<td>Barley flour</td>
<td>Food</td>
</tr>
<tr>
<td>Wheat</td>
<td>Food</td>
</tr>
<tr>
<td>Bread</td>
<td>Food</td>
</tr>
<tr>
<td>Beans</td>
<td>Food</td>
</tr>
<tr>
<td>Gourds</td>
<td>Food</td>
</tr>
<tr>
<td>Corn</td>
<td>Food</td>
</tr>
<tr>
<td>Chile</td>
<td>Food</td>
</tr>
<tr>
<td>Punche</td>
<td>Smoking tobacco</td>
</tr>
<tr>
<td>Sheep</td>
<td>Food, woven items</td>
</tr>
<tr>
<td>Woven kilts</td>
<td>Clothing, ceremonial</td>
</tr>
<tr>
<td>Belts</td>
<td>Clothing</td>
</tr>
<tr>
<td>Mantas</td>
<td>Clothing</td>
</tr>
<tr>
<td>Turquoise jewelry</td>
<td>Adornment</td>
</tr>
<tr>
<td>Twilled yucca baskets</td>
<td>Container, ceremonial</td>
</tr>
<tr>
<td>Willow wicker baskets</td>
<td>Container, ceremonial</td>
</tr>
<tr>
<td>Pottery</td>
<td>Container</td>
</tr>
<tr>
<td>Buckskins</td>
<td>Clothing, miscellaneous</td>
</tr>
<tr>
<td>Elk skins</td>
<td>Clothing, miscellaneous</td>
</tr>
<tr>
<td>Pronghorn skins</td>
<td>Clothing</td>
</tr>
<tr>
<td>Tallow</td>
<td>Candles</td>
</tr>
<tr>
<td>Osha</td>
<td>Medicine</td>
</tr>
<tr>
<td>Cachana</td>
<td>Amulet</td>
</tr>
<tr>
<td>Cottonwood</td>
<td>Drums</td>
</tr>
<tr>
<td>Mica</td>
<td>Pottery temper</td>
</tr>
<tr>
<td>Travertine</td>
<td>Fetishes</td>
</tr>
<tr>
<td>Kaolin</td>
<td>Pottery slip</td>
</tr>
<tr>
<td>Unidentified black mineral</td>
<td>Pottery paint</td>
</tr>
<tr>
<td>Shell</td>
<td>Beads</td>
</tr>
</tbody>
</table>


SPANISH EXPLORATION, SETTLEMENT, POPULATION, AND RESOURCE USE, 1540–1846

Exploration and settlement of New Mexico was part of Spain’s expansion into the new world, which began in 1492. Three primary driving forces behind this national expansion were finding and mining of gold and silver, colonizing the new lands, and converting native peoples to Catholicism. These interrelated objectives of the Spanish conquest were carried out by men who embraced and introduced a new world view of “patron-client social relations, material wealth, iron tools, food markets, domesticated animals, Aristotelian logic, divine right and blessing” to New Mexico (Ford 1987: 73). This new system, and an array of new, highly infectious diseases, would result in relatively major changes in the Pueblo environment—the people, fauna and flora, surface water, and other components—over the two and a quarter centuries of the colonial period.

In addition to being driven by a desire for accumulating material wealth, the Spanish church and government pursued, with righteous zeal, a program of aggressive conversion of the region’s Native Americans to Christianity. Believing that providence sided with them and that indigenous peoples in the New World were inferior, 16th century Spaniards led a moral crusade to spread Spanish culture, centered in Catholicism, to these pagans (Weber 1992: 21).

Weber (1992: 21) wrote this about the Spanish-Catholic view of the Native Americans and their environment at the time:

Like other Christians, Spaniards understood that their god had given them ‘dominion’ over all creatures on the earth, including these infidels. The god of the Christians, according to their holiest text, had ordered them to ‘be fruitful and multiply, and replenish the earth and subdue it, and have dominion over the fish of the sea, over the fowl of the air, and over every living thing that moveth upon the earth.’

Moreover, according to Weber (1992: 22, 48, 312), the Spanish believed their god was extraterrestrial and had created nature separate from themselves. Additionally, they regarded the natural environment as made up of various resources, which they could exploit as needed for themselves.

Spanish Exploration

Following the 1519–20 Spanish conquest of the Aztecs and their allies, colonization, complemented by the establishment of a missionary program, moved steadily northward from Mexico. By the mid 1500s, the frontera had reached what is now central and northwest Mexico, from where exploration and colonization of Nuevo Mexico, as it was soon to be called, was launched.

Spurred by stories of riches told by Cabeza de Vaca, who may have wandered along the present New Mexico-Chihuahua border in late 1535–early 1536, and supported by a viceroy eager to expand Spain’s New World territory northward, the first of several 16th century entradas (expeditions) to the land of the Pueblo Indians, as the Spaniards came to call them, was initiated in 1539. An advance party of the expedition, led by Fray Marcos de Niza, reached the Zuni village of Hawikuh, one of the fabled Seven Cities of Cibola. The black leader of the
vanguard, Esteban, who had been with Cabeza de Vaca, was killed by the Zunis. His Mexican Indian servants fled back to Niza, who was leading the main contingent. Fear for his own safety overcame his desire to visit one of the villages, so Niza, who had seen the village only from a distance, proceeded back to Mexico with reports as enthusiastically misleading as those of Cabeza de Vaca (Scurlock 1987: 92).

Soon a new Spanish expedition dedicated to finding gold and silver and to Christian crusading was organized under the leadership of Francisco Vasquez de Coronado. Entering New Mexico in July 1540 near the place of Esteban’s death, Coronado, with some 300 Spaniards (including three women) and 800 Mexican Indian allies, began a 2-year exploration and military campaign against the Rio Grande Pueblos and Plains Apaches as far east as modern Kansas. Expedition headquarters during the severe winter of 1540–41 were made at Kuaua, a Tiguex pueblo on the west bank of the Rio del Norte near the modern community of Bernalillo. Coronado, faced with shortages of food, clothing, and fuel for heating in the extreme cold, began to appropriate these necessities from the inhabitants of nearby pueblos. This soon led to conflict and escalated to retaliatory raids by the Pueblos and sieges by the Spaniards until the Tiguex villages in the area were subjugated. Following a lengthy exploration onto the Great Plains and a second winter of hardship, the army broke camp on the Rio del Norte and returned to Mexico in 1542. Although the expedition was a failure from the viewpoint of those who had expected the discovery of vast mineral wealth in the region, information on the Pueblos and their water-and soil-rich river valley and flanking mountains with abundant game, forests, and grasslands piqued the interest of some Spaniards. The possibility that mineral riches might be found in the region also persisted (Scurlock 1987: 92).

In 1581 a Franciscan lay brother, Agustín Rodriguez, and a military captain, Francisco Sanchez Chamuscado, led a small party of Spaniards from the new mining frontier of southern Chihuahua on a more direct route to New Mexico, to La Junta on the Rio Grande, then upriver to El Paso, then northward to the Piro, Tiguex, and other Pueblo settlements. This river corridor was also a long-time natural route of movement for aboriginal peoples in the region. After exploring the Zuni area, the Galisteo Basin, and the plains east of the Pecos River, two friars elected to remain in the Tiguex Province pueblo of Puaray when the main body of the expedition returned to Mexico the following year (Scurlock 1987: 92).

A few months after the return of the Chamuscado-Rodriguez expedition, Antonio de Espejo, a wealthy rancher, organized an expedition ostensibly to rescue the two friars who had remained in New Mexico. Reaching New Mexico in late 1582, he learned of the death of the two priests. While visiting a number of northern pueblos, Espejo learned of mineral deposits in the region. These stories led him on a search for gold and silver as far west as present Prescott, Arizona, an area where he did find a little silver in copper outcrops. Returning to Mexico, Espejo embellished and exaggerated the information on the potential mineral riches of New Mexico (Scurlock 1987: 92).

As Spanish civil authorities began considering colonization of New Mexico, Gaspar Castano de Sosa, lieutenant governor and captain general of Nuevo Leon, led his own colonizing expedition of some 160 persons into the territory via the Rio Pecos and the Pecos Pueblo in late 1590–early 1591. After subduing the population at Pecos, Sosa led his party west to Santo Domingo Pueblo, where he hoped to begin a permanent settlement. Before the would-be colonists could become established, a contingent of soldiers from Mexico arrived, arrested them for undertaking the expedition without a royal license, and escorted Sosa’s ill-fated party back to Mexico (Scurlock 1987: 92).

In 1593 Captain Francisco Leyva de Bonilla led another illegal expedition into New Mexico from Chihuahua. Forsaking his ostensible goal of campaigning against the Toboso, Gavilan, and other Mexican Indian groups who had been raiding ranchos and stealing livestock in northern Mexico, he marched as far north as San Ildefonso Pueblo. There his party spent at least a year committing depredations against the Pueblos, including the abduction of women as slaves. In 1594 the Bonilla expedition traveled eastward in hopes of rediscovering Coronado’s Quivira (Kansas). On the Arkansas River, one of Captain Leyva’s soldiers killed him and took command of the expedition. Not long afterward the Spanish forces were attacked by Wichita Indians; only a boy and a mulatto woman survived. Also surviving was the legend that the Spaniards had found large quantities of gold in the area (Scurlock 1987: 92).

**Settlement Patterns**

Following the five Spanish exploratory expeditions conducted in the region during the previous 58 years, Juan de Onate brought the first Hispanic settlers up the Rio del Norte to northern New Mexico in 1598, reaching San Juan Pueblo on the east bank of the river, just above the confluence with the Rio Chama. Here he founded the colony and the Spanish seat of government for the province of New Mexico. Subsequently, the capital, named San Gabriel, was moved to Yunque Pueblo, across the Rio Grande. Like those Spaniards before him, Onate did not find abundant precious minerals in the region, but he did carry out a relatively successful colonization and mission program of the Pueblo region over the next 9 years. In addition to religious activity, the basic purpose of the new seat of government and colony was to secure the Spanish frontier,
which here marked the most northerly of settlements at that time, against indigenous or foreign threats. In the first few years of colonization, the Spanish settlers relied to a great extent on the Tewa Pueblos for housing and food production, primarily corn, and some wheat grown from seeds brought by Onate’s expedition (Ford 1987: 74–75).

Spanish settlement subsequently spread southward down the river, into the Middle Rio Grande Valley at Cochiti and stretching as far south as the Socorro area (Fig. 25). The Spanish later named this reach Rio Abajo, and that above Cochiti, to Taos Pueblo, the Rio Arriba. The capital was moved from San Gabriel to Santa Fe in 1609–10. Missions reached the Bernalillo to Isleta section of the valley by the 1620s (Simmons 1982: 36–39). Estancias, or large ranches, or more rarely, haciendas, were established on some 35 encomiendas, formal grants of portions of Pueblo lands made to Spaniards who ostensibly were to care for these Indians. In return, they were to receive a tribute from residents of the nearby pueblo. Annual tribute was basically a manta (blanket) or a hide and a fanega (1.5 bushels) of corn from each Pueblo Indian (Ortiz 1980: 32). The encomenderos oversaw livestock raising, farming, and programs involving the Pueblos, whose villages were near the ranches. Although it was illegal, these Indians were commonly forced to work for the encomendero, as well as to pay tributes (Anderson 1985: 353–363).

Prior to the Pueblo revolt of 1680, there were 23 extant estancias or haciendas in the study region (Hackett and Shelby 1942: 228, 380). In addition, there were scattered settlements of ranchos, or small farms-livestock operations, which were basic subsistence units of the average colonists. Labores, square tracts measuring 1,000 varas on each side, were given to farmers. Also part of this early colonization were small (about 106 acres) land holdings known as caballerias, which cavalry men or officers received from the government. A foot soldier received about one-fifth of this acreage; this parcel was called a peonia (Carlson 1990: 6). Those who were primarily livestock raisers were granted at least a sitio, or a square league (about 6.76 square miles). Five sitios, about 34 square miles, composed an estancia or hacienda.

There were also 35 missions established at pueblos in the study region by the 1630s. The missionaries introduced stock raising, adobe brick construction, and new crafts, such as the weaving of wool on European looms and leather working, to Pueblo residents. Some were “employed” as livestock herders and gardeners (Dozier 1983: 49). This usurpation of Pueblo time and effort by missionaries and Spanish officials meant they had little or no time for work in their own fields or to hunt and gather (Jones 1979: 109–110; Simmons 1969: 10–11; Westphall 1983: 3–4, 8, 123–124).

As mentioned, the new Spanish province was divided into two administrative units, the Rio Arriba and the Rio Abajo. These two areas were also environmentally distinct; the upper river (Rio Arriba) extended from Taos to La Bajada near Cochiti Pueblo and consisted of higher, colder, and narrower valleys in the Rio Grande drainage. The lower river (Rio Abajo) reached from Cochiti to below Socorro and was lower in elevation, milder in climate, and richer in broad and fertile bottom land in the river valley than the first district. These basic differences in resources and climate determined that smaller and less influential land holders characterized the Rio Arriba, whereas larger land holders with considerably more socio-political power evolved in the Rio Abajo (Westphall 1983: 8–9).

The new colony was further divided into six rural districts, or alcaldias, each of which was administered by an alcalde mayor. His duties included overseeing the distribution and use of lands, waters, and laborers. Some alcaldes could not read or write, and therefore land and water transactions in their jurisdiction were not always recorded, which led to conflicts of ownership and use. They also illegally took Pueblo land and water and allowed Hispanic settlers to “squat” or otherwise use Pueblo lands (Tainter and Levine 1987: 89; Westphall 1983: 15, 112, 126).

As stated previously, the earliest communities and estancias were located at or near Pueblo villages, which in turn were situated along streams, on some of the best arable lands with dependable supply of surface water (Simmons 1969: 10). Poorer settlers lived in scattered ranchos, due in part to scarce arable lands in the Rio Arriba, located on or near irrigable streams or other surface water, such as springs or cienegas (marshes), with fields nearby. This settlement pattern was thus determined by the “lay of the land,” especially in the Rio Arriba. Irrigation ditches, field locations, pastures, and the settler’s home itself were laid out in relation to local topography, available water, vegetation types, and arable soils. Located immediately around the rancho home were outbuildings for food storage or livestock, irrigated gardens, orchards, and small meadows called vegas. Fields were generally located farther from the settler’s house, and grazing lands still farther away. The topography of the land determined, in part, drainage, wind movement, and temperature variations, something the farmer-rancher had to know and understand if he were to successfully grow crops (Briggs and Van Ness 1987: 158–159, 181; MacCameron 1994: 27, 29; Simmons 1969: 13, 17).

A new seat of government, Santa Fe, was established in 1609–10 and declared a villa, or formal administrative town. About a century later, Santa Cruz and Albuquerque would be established with this designation (Jones 1979: 10–11, 115–118).

After Spanish reconquest of New Mexico in 1693–96, the capital was reestablished at Santa Fe, and some residents resettled old pueblo, estancia, and hacienda sites and fields. Resettlement was accomplished primarily through government land grants (Fig. 26). There were two basic types of land grants (mercedes reales) made to
Figure 25—Some early Hispanic settlements, 1598–1680.
Figure 26—Major Hispano settlements, 1693–1821.
Spaniards in the 1700s—early 1800s—those to individual citizens and those to a group of settlers. These private individuals were usually prominent men who were former military personnel or their descendants to whom the government owed salary payments. These grants were given to foster and maintain a livestock industry, and owing to the relatively low carrying capacity of the land, they were large in size.

Private grants usually evolved to share some of the same settlement characteristics of communal grants through the giving of arable tracts by the private grantee to any new-comer or male coming of age who wanted farm and limited grazing land. Settlers shared produce with the grant owner, which generally limited them to a subsistence level of living (Carlson 1990: 9, 11).

The communal grants were generally given to poor, landless families. Agricultural villages, either in the form of fortified plazas or clusters of scattered ranchos, known as poblaciones, were spawned by these grants. This settlement pattern fulfilled the government’s strategy of “establishing effective political control with an assumed defensive bulwark [better] than did the sparsely populated private grants” (Carlson 1990: 9). In all, there were 113 private and community grants, totalling 7,294,190 acres, given by the Spanish government between 1693 and 1821 (Westphall 1983: 11). Those granted in the Middle Rio Grande Basin between 1693 and 1846 are shown in Fig. 27 and listed in Table 34.

Land grants required the same basic ecological elements as the early settlements: arable soils, relatively abundant surface water, grazing lands, gathering and collecting areas for building materials, fuelwood, and medicinal and edible plants. Every land grant resident had communal rights to use pasture and wooded lands, collectively called ejidos. Residents could also hunt on these lands. Water holes, known as aguajes, springs, and all subsurface water (wells and springs) were also for communal use for watering livestock (Briggs and Van Ness 1987: 17–19; Carlson 1990: 32–33; Westphall 1983: 10). Following harvest, grazing of stubble on private farmlands was also a communal right. This system, which embraced the principle that no individual had the right to monopolize and use these natural resources, provided for community subsistence and individual well-being (Briggs and Van Ness 1983: 189; Westphall 1983: 198).

Prior to making a grant, a local administrator, the alcalde mayor, determined if the action would adversely affect any Pueblo settlement or third party, as well as the capacity of the land’s resources (arable, grazing, and wood-producing) to support the proposed number of settlers. This system, although developed to ensure the economic survival of the colony, resulted in the long-term use or conservation of land and water in the region (MacCameron 1994: 29).

A third type of landholding prominent in this period was the small holding claim occupied by a ranchero. These were individual plots of land held by squatters on public or Pueblo lands. By 1846 there were more than 6,000 of these tracts in the region (Westphall 1983: 11, 193–194).

The historical relationship between Spaniards and the land is partially reflected in place names. Spanish laws of settlement, enacted in 1573, called for the naming of geographic features (Schroeder and Matson 1965: 5). Steele (1983: 293, 298–299) noted that the Spanish, by naming landscape features, “incorporated hitherto profane space into the sacred cosmos of order and beauty.” Thus, these elements were elevated from the “natural world into their Spanish world.” The function of a place name for a natural feature was to denominate and to dominate. Examples of common names of topographical or other ecological features include cuesta (slope) angostura (narrow), cienequilla (little marsh), atrisco (place of the waters), and algodones (cotton fields). Settlements at or near these features commonly took that name.

Natural features or villages were also named for animals, such as mosca (fly), gallinas (turkeys), pajaro (little bird), ojo del oso (bear spring), and las nutrias (the beavers). Some locations or settlements were named for plants, such as Alameda (cottonwood grove), Jarales (willows or oshiers), and Pinos (pines) (Pearce 1965: 4, 75, 105, 113, 121; Steele 1983: 298–299). Native American names for geographical locations were generally retained, but they were frequently assimilated into Spanish sounds, syllables, and spelling. Examples include chaco, taken from the Navajo name chahatquel, meaning wash or river; nacimiento (nativity) from the Navajo name nazisetgo (gopher water); and Tesuque (the pueblo) from tat unge onwi (spotted dry place) from the Tewa Pueblo.

Spanish Population, Hygiene, and Disease

The first group of settlers, led by Onate in 1598, numbered 600–700 individuals; they lived at or around San Juan Pueblo. Death and desertion kept the growth rate relatively low in the early 1600s, but the Hispanic population, including “mixed bloods,” did increase to about 2,900 by the 1670s (Table 35). These citizens were scattered from Taos to Socorro, west to Laguna-Acoma, and east to Gran Quivira and Quarai. Of this total, over 400 Spaniards were killed during the Pueblo Revolt of 1680 (Jones 1979: 119).

Vargas brought 100 soldiers and 70 families to resettle New Mexico beginning in 1693. By 1744, the estimated Hispanic population had grown to 505 families, totalling about 2,500 (Jones 1979: 120–123; Table 35). About 1,000 of these were residents of the Middle Basin in 1749 (Tjarks 1978: 60). By 1752 the total provincial population had more than doubled to 7,666; about 4,233 Hispanics were living in the Middle Basin in 1776 (Jones 1979: 61). In 1790, census figures vary from 9,172 to 15,000. For the Middle Rio Grande Basin there were minimally 5,991 persons of Spanish origin in 1790 (Jones 1979: 127; Tjarks 1978: 60–61; Table 35).
Figure 27—Spanish–Mexican land grants in the Middle Rio Grande Basin, 1693–1846.
Spanish population growth in the 18th century was relatively slow due to deaths caused by various diseases and New Mexico's isolation, limited tillable soil, and lack of rich mineral deposits (Westphall 1983: 7). Hostile Indian groups and lack of adequate surface water were other factors.

As the regional settlement reached its maximum expansion to the north, east, and south in the mid 1700s, the government granted communal land along these frontier boundaries to genizaros, non-Pueblo Indians who had been converted to Christianity and who were the poorest class in the province. They provided some security against nomadic Indian raids; their communities commonly had to be abandoned then resettled one or more times due to attacks by the Comanche, Navajo, or Apache (Ortiz 1980: 47–48).

In 1817 the population, Spanish and mixed bloods, had increased to almost 28,000 (Table 35). Mixed bloods were
Irrigated fields were generally measured by varas (33.3 inches, or 2.8 feet); long-lots varied from 357 varas (1,000 feet) to 1,886 varas (5,300 feet) in length. The average width of these parcels was about 150 varas (420 feet). Allotted fields were controlled by the individual, but the construction and maintenance of the irrigation system was a community effort (Simmons 1969: 13–14; Westphall 1983: 199–200).

A main ditch, or the acequia madre, was dug from the water source above the village or rancho, usually created by damming a creek or spring (Figs. 28 and 29) with a brush, log, or stone diversion structure. Water from larger streams, such as the Rio Grande, was sometimes diverted into ditches by a wing dam. Ditch construction avoided removal of large trees and obstacles, which resulted in a winding configuration for this acequia. This ditch followed the Upper Valley edge contour to the long-lot (suerte). Water was released into the acequia at the dam, then moved by gravity flow through the ditch to gated laterals, or sangrias, which distributed the water over the fields. These acequias were also used to water livestock (Carlson 1990: 31–33, 36–37, 69–70; Westphall, 1983: 9, 183).

One of the best historic descriptions of acequia systems in New Mexico is that of W.W.H. Davis (1983: 196–197), who wrote

The system of acequias, or irrigating ditches, is a subject so new to the American farmer, that an explanation at some length of the manner in which the land is cultivated by means of them may not be uninteresting. It must be borne in mind, as we have already remarked, that all the land capable of being farmed lies in the valleys through which runs a river or other stream large enough to supply the necessary quantity of water. Now, supposing the arable land to lie on both sides of the stream, as is the case of the valley of the [Rio Grande] Del Norte, the first thing for the proprietors to do is to dig a large ditch on each side of the river, called acequia madre, or mother ditch, from three to five yards wide, and from two to six feet deep, with strong banks. It is necessary to tap the river sufficiently high up, so that the level of the water in the acequia will always be above the land to be irrigated, else it could not be overflowed. The valleys are generally narrow, approached on either side by hills, and it is customary to cut the ditch along their base, when only one is required for a given tract of country, so that after the water shall have been distributed, the surplus can find its way back to the river. The main ditch is sometimes several miles in length, and resembles a miniature Erie Canal; and it is dug by the joint labor of all the proprietors along the line, each one being required

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1680</td>
<td>2,900</td>
</tr>
<tr>
<td>1744</td>
<td>2,500</td>
</tr>
<tr>
<td>1752</td>
<td>3,402</td>
</tr>
<tr>
<td>1789</td>
<td>13,982</td>
</tr>
<tr>
<td>1800</td>
<td>8,173</td>
</tr>
<tr>
<td>1810</td>
<td>26,926</td>
</tr>
<tr>
<td>1817</td>
<td>27,791</td>
</tr>
</tbody>
</table>

Source: Jones 1979: 119–131

Spanish Resource Use

Agricultural Fields and Irrigation Systems

In wider valleys, agricultural fields were long, narrow, generally rectangular in shape, and stretched from the higher edge of the floodplain to the lower, center of the valley, sometimes close to the stream that provided the necessary irrigation water. Alvar Carlson (1990: 31) wrote on the ecological uniqueness of these plots, which he called long-lots: “... [they] developed in the Rio Arriba apparently as a result of local assessments of physical conditions. They represent a practical and equitable method of partitioning irrigable land; antecedent of these riverine farms are not to be found in Spain, which did have communal grazing lands.”
to furnish a number of hands in proportion to his land to be irrigated.

The acequia madre being completed, in the next place the inferior proprietors dig smaller ditches tapping the main one, for the overflow of their lands that lie adjacent to the point of junction. These are called contre acequias, or cross ditches. Still smaller ditches are constructed to convey the water on to the land of the individual owners, being always dug upon the highest part of that intended to be irrigated.

The irrigated field system served to integrate “man, land, and water over time and space” and “contributed enormously to the maintenance of ecological boundaries that correspond physically to the geographical limits of the microbasins drainage system” (Briggs and Van Ness 1987: 187). This system assured the individual farmer and his community of access to and virtual control over the local water supply. This configuration also ensured that population growth and close-knit social organizations were facilitated as well (Carlson 1990: 23). Diversion dam-acequia systems adequately provided a means of replenishing topsoils eroded by wind and water and nutrients used by crops; rich silt carried in the irrigation water was disseminated over the fields. Some low-lying fields and pastures were also subjected to the deposition of rich sediments carried by overbank flooding of area streams. Conversely, severe flooding washed out irrigation systems, damaged crops, and cut into fields. Like the Pueblo, however,
the ranchero generally adapted to these vagaries successfully (Simmons 1991b: 71).

In 1600 there were an estimated 22 ditches, irrigating some 25,555 acres, in the Middle Valley (Table 36). Between 1600 and 1700, some 39 new ditches were constructed in the Middle Valley, bringing the total to 61 ditches irrigating about 73,580 acres. Over the next century there were 9 more ditches constructed and an additional 26,800 acres of irrigated land. By 1850 there were 10 more ditches and 22,935 more irrigated acres. The total number of ditches peaked at 82 in 1880, after which time there was a decline due to environmental problems—a rising water table, a build-up of salts in and waterlogging of soils, and a lack of sufficient water because of upstream diversions, mainly in the San Luis Basin of southern Colorado (Sorenson and Linford 1967: 154, 156).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of ditches</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600</td>
<td>22</td>
<td>25,555</td>
</tr>
<tr>
<td>1700</td>
<td>61</td>
<td>73,580</td>
</tr>
<tr>
<td>1800</td>
<td>70</td>
<td>100,380</td>
</tr>
<tr>
<td>1850</td>
<td>80</td>
<td>123,315</td>
</tr>
<tr>
<td>1880</td>
<td>82</td>
<td>124,800</td>
</tr>
<tr>
<td>1910</td>
<td>79</td>
<td>45,220</td>
</tr>
<tr>
<td>1925</td>
<td>60</td>
<td>40,000</td>
</tr>
<tr>
<td>1950</td>
<td>?</td>
<td>172,400</td>
</tr>
</tbody>
</table>

Source: Sorenson and Linford 1967: 154, 156

Spanish Livestock Raising

The grazing of livestock began in the study region in late 1598, the year that Juan de Onate led the first Spanish settlers and 4,000 sheep, 1,000 cattle, 1,000 goats, and 150 mares with colts to the Upper Rio Grande Basin. Some of the wealthier individuals brought their own livestock as well. These parent flocks of early Spanish herds grew, and from these animals new livestock grazing operations were begun at a number of missions and other settlements in northern New Mexico. As early as 1630 overgrazing occurred at some of these locales (Baxter 1987: 4; Ford 1987: 85–86; Simmons 1991: 96).

As indicated, livestock raising became an important component of the subsistence economy of the average Hispanic settler. Sheep, goats, cattle, oxen, mules, horses, burros, and pigs provided meat, hides, wool, lard, and transportation. They also produced manure, which fertilized fields, and provided hoof action, which trampled grain on the threshing floor (Fig. 30). The average settler’s herds and flocks were generally small (20–100 animals), while those of the wealthier land holders were large (several hundred to many thousands) (Briggs and Van Ness 1987: 188–189).

Sheep, not cattle, soon became the principal Spanish livestock raised in the region, for three primary reasons: (1) high protein meat, hides, and tongues of buffalo were commonly available through trade with the Indians or hunting on the eastern plains; (2) the nomadic Indian raiders preferred cattle to sheep; and (3) mining settlements in Chihuahua and Durango to the south provided a strong market for New Mexico sheep, which were annually driven down the Rio Grande Valley to these areas (Simmons 1988: 7). Also, the most popular breed of sheep, the churro, was well adapted for the semi-arid rangelands found in the region. Having the ability to obtain moisture from plants, this breed could survive drought conditions better than other sheep or cattle (Baxter 1987: 20). Their long, staple wool also provided protection against severe winter conditions.

The Spanish employed a transhumance system of livestock grazing based on seasonal availability of forage plants and water. Beginning in the spring, the sheep, goats, and cattle were moved from their lower, protected winter pastures and herded into the grant uplands, or commons, following the appearance of spring grasses and shrubs from the pinyon-juniper to the mixed conifer zone. By early summer the stock had been herded as high as subalpine meadows, or even up to the tundra above 12,500 feet in northern New Mexico. These uplands, with their understory and meadow grasses, were common lands shared by the Hispanic villagers. In the 18th century some land grants in northern New Mexico were made exclusively for the purpose of grazing livestock (Bailey 1980: 54; Briggs and Ness 1987: 160–161, 166–167, 189).

In general, livestock numbers increased over most of the 17th century and dropped sharply during the post revolt-reconquest period. The successful Pueblo Revolt of 1680, which drove the Spanish south to El Paso, interrupted the development of livestock raising in New Mexico for 13 years. In 1693 the Spaniards reoccupied New
Mexico and, with 4,820 sheep, cattle, and goats, began livestock raising again. By the middle of the next century Spanish herds and flocks had increased to more than 100,000 animals, distributed from Taos to Belen. However, the total number declined to 69,000 in 1777 and prompted Governor Mendinueta to impose an embargo of exports of sheep and processed wool. Subsequently, under Governor Chacon from 1794 to 1805, sheep numbers increased sharply (Baxter 1987: 13, 16, 42, 51–52, 60–64; Table 37).

Pastures, rangelands, and meadows on virtually every Spanish land grant in northern and central New Mexico were grazed intensively throughout the 18th century until the mid 1900s (Fig. 31). As an example, goats and sheep from the villages of San Jose de las Huertas and Placitas at the north end of the Sandias, and from San Antonio and Tijeras on the south and east side of the mountains, were grazed in this range from about 1785 to the early part of this century. Meadows and springs were camping areas for herders and bedding grounds for their herds. Some 6,000 goats were in the Sandias prior to the establishment of the Manzano Forest Preserve, later designated part of the Cibola National Forest in 1908 (Cooper 1988: 4; Montoya 1983: 20–21; Nordhaus 1966: 17; Quintana and Kayser 1980; Scurlock 1983: 14, 16).

Table 37—Livestock numbers in New Mexico, 1598–1830. a

<table>
<thead>
<tr>
<th>Year</th>
<th>Sheep</th>
<th>Cattle</th>
<th>Goats</th>
<th>Horses</th>
<th>Mules</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1598</td>
<td>4,000</td>
<td>1,000</td>
<td>1,000</td>
<td>150</td>
<td>—</td>
<td>6,150</td>
</tr>
<tr>
<td>1694</td>
<td>2,100</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>3,000</td>
</tr>
<tr>
<td>1697</td>
<td>4,000</td>
<td>650</td>
<td>170</td>
<td>—</td>
<td>—</td>
<td>4,820</td>
</tr>
<tr>
<td>1757</td>
<td>112,182b</td>
<td>16,157</td>
<td>c</td>
<td>7,356</td>
<td>—</td>
<td>135,695</td>
</tr>
<tr>
<td>1777</td>
<td>69,000</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>69,000</td>
</tr>
<tr>
<td>1820s</td>
<td>1,000,000</td>
<td>5,000</td>
<td>—</td>
<td>850</td>
<td>2,150</td>
<td>1,008,000</td>
</tr>
</tbody>
</table>

a Does not include Navajo flocks.
b Includes Hopi flocks.
c Included with sheep.
Sources: Baxter 1987; Denevan 1967; Simmons 1988: 12

By the early 1700s Navajos in northwestern New Mexico adapted the Spanish sheep herding techniques learned from Pueblo refugees from the reconquest. Numbers of Navajo sheep ranged from 8,000 head in 1721 to 64,000 by 1742. In 1789, as a result of an order by Governor Concha that ewes would no longer be slaughtered or exported to Mexico, Navajo and Spanish flocks began to increase rapidly (Bailey 1980: 77, 111). This mushrooming in flock numbers was also probably due to above-average
precipitation in the 1790s, which produced better grazing and browsing conditions. These larger livestock numbers, and the Navajo strategy of grazing sheep outwardly and radiantly from hogan or village sites during the day and then returning them to associated corrals at night, perhaps initiated the first major, regional overgrazing west and north of Spanish and Pueblo settlements. An average grazing area around hogan-village sites was probably about 5 square miles. When forage was depleted at a site, residences were simply moved (Scurlock 1990a: 70).

By 1820 there were at least one million Spanish sheep in New Mexico. An even higher number of sheep, up to three million, was reached between this time and the mid 1800s (Table 37). There were about 240,000 sheep and goats, 5,000 cattle, and 3,000 horses and mules in the Santa Fe-Albuquerque area alone. Apache and Navajo raids on Spanish and Pueblo sheep flocks reduced the sheep numbers to 377,000 by 1850. Losses due to droughts, blizzards, and predators also contributed to the decline. A major increase followed, with the total reaching five million sheep by 1880. This sharp rise in sheep was due to subjugation of nomadic Indian raiders, market demands from the east and west coasts, and the construction of the first railroad across the territory (Baxter 1987: 63, 90–91; Denevan 1967: 691, 696; Dortignac 1956: 56, 61).

Logging and Wood Use

Native Americans and Hispanos never logged on a large scale prior to 1846. Pinyon, juniper, ponderosa, spruce, and fir logs and poles were used for building houses, shade shelters, roofing, fences, and door-window framing by various historic Native American groups, and by Hispanos as well. Local logging and wood cutting occurred throughout the colonial and Mexican periods, and the amount of lumber produced by Spaniards in New Mexico was small due to limited technology.

Ponderosa pine was the primary wood used as building material; this included vigas, portales, corbels, and furniture. This wood was also used in making tool handles, ox yokes, cupboards, and santos. Vigas were sometimes made from Douglas fir, which was also used for plow shafts and bridge timbers. Pinyon pine was used for fuelwood and the manufacture of saddletrees, spinning-wheel legs, and plowshares. Juniper, a hard and strong wood, was used for lintels, short beams, corrals, and jacales. Juniper, too, was a preferred fuelwood (Jones 1932: 272–273; Scurlock and Johnson 1993: 277–278).

Cottonwood, found along rivers and streams in the region, was used in making dippers, ladles, spoons, mixing bowls, and wine barrels. It was also used in making
carreta wheels, door and window lintels, and vigas. Frames were made from Gambel oak, as were stirrups and stays of blacksmith bellows (Jones 1932: 273).

Following the example of Southwestern Indians, Spanish colonial villagers preferred pinyon and juniper for their fuelwood. The surrounding pinyon-juniper woodlands were intensively exploited around settlements. As nearby fuelwood was exhausted by increasing populations at places like Santa Fe and Albuquerque, pack mules, burros, and horses were used to transport pinyon and juniper from up to 20 miles away (Fig. 32). Hispanic woodcutters and haulers sold or bartered their firewood in the villages and to missions located at pueblos. “Pitch pine,” no doubt pinyon, was used for heating and cooking at one of New Mexico’s three villa churches, Santa Cruz de la Canada, in the late 1700s. Residents on the Elena Gallegos grant, which extended from today’s North Valley of Albuquerque to the foothills of the Sandias, commonly used the pinyon-juniper and ponderosa pine, spruce, and fir in higher vegetation zones. In the early years of the Manzano Forest Reserve, later the Sandia District of the Cibola National Forest, grazing and logging permits were generally issued upon request. Grazing and timber and fuelwood cutting continued until termination in the 1950s (Nordhaus 1966: 17).

Mining
As previously stated, potential mineral wealth was a major reason for Spanish exploration and settlement of the study region. Based on their experience in South America and central Mexico, Hispanics thought gold and silver would be easy to find and mine in New Mexico, but that was not the case. Beginning with Coronado, the region’s streambeds, canyons, and mountain ranges were searched for rich mineral deposits. He and Espejo, Sosa, and Onate, who came later in search of gold and silver, found no substantial amounts of these precious metals. These men and early missionaries did determine that lead, sulphur, alum, and garnet deposits existed in the region (Northrop 1975: 8–10). After early settlement, a number of mines, primarily silver-bearing deposits, were recorded by various Spaniards during the colonial period (see chronology at end of this chapter). Most of these recorded mines were only claims to locales suspected of having mineral deposits. Some were prospected, but only a few were actually mined, and production was small (Christiansen 1975: 12–17; Schroeder 1977: 23).

Perhaps the earliest Spanish mining in the Middle Basin was for lead and turquoise in the Placitas and Cerrillos districts, long worked by the prehistoric Pueblo (Schroeder 1977: 21). From the mid 1600s to early 1800s, lead and a little silver and copper were mined by Spaniards at Tecolote in the Las Huertas drainage at the north end of the Sandia Mountains. This lead was made into musket shot for use by the Spanish military (Scurlock 1983: 12). Also in this general location, at La Mina del Tiro, gold may have been worked by the Spanish before the Pueblo Revolt; ore was definitely mined by the second decade of the 18th century. This was the only underground lode mining by Spaniards in the region documented to date. Lead was also produced from this mine; it, too, was primarily used for casting musket balls (Christiansen 1975: 17–18; Warren and Weber 1979: 8–9).

Non-precious minerals and rocks were also mined by the Spanish in the colonial period, such as mica from Petaca in Rio Arriba County. Sheets of this translucent mineral were used to cover window openings. Native copper deposits in Rio Arriba County near Abiquiu, and in Sandoval County in the San Diego Canyon of the Jemez

![Figure 32](image-url)
Mountains, were worked for the making of copper containers, utensils, and other items. Salt was procured from the lakes of the Salinas Province, a long-time source mined by the Pueblos and other Native Americans dating from the prehistoric period. Although undocumented, evidence of Spanish mining in the Rio Hondo near Taos and on Socorro Peak in the Rio Abajo was reported by later Anglo miners (Christiansen 1975: 20; Pratt and Snow 1988: chapt. 3, 58–60; Scholes 1937: 394–395).

The disruption of Pueblo mining and the usurpation of mines and ores by the Spanish were causal factors in the revolt of 1680. The Spanish took over the Tonque-Cerrillos area lead ore deposits, which had been mined by the Pueblo for use in manufacturing lead glaze for decorating pottery (Schoeder 1977: 24, 31). As a result, the Pueblo had to revert to use of mineral pigment paint (Peckham 1940: 122).

**Hunting and Fishing**

The first Spanish hunting in the region was that of soldiers, members of the early entradas. They, and later settlers, hunted bears, bighorn sheep, deer, elk, pronghorn, hares, rabbits, geese, ducks, and grouse for their meat, even though most had only bows and arrows or lances. Maulings of hunters, farmers, and herders byizzly bears were not uncommon in the colonial period. More commonly, Spanish settlers relied on bartering with the Indians for wild animal meat and hides, except for the buffalo. Like the Pueblo, groups of Spanish hunters, known as ciboleros, traveled onto the plains of eastern New Mexico and western Texas in the fall to hunt these animals for their meat, marrow bones, tongues, hides, and tallow. Rarely, government personnel or the military were called upon by the highest authorities, including the King of Spain, to capture bison and elk and ship them to Mexico City, or even Madrid (Simmons 1991b: 19–22, 99–101).

Beginning in 1598, Hispanics fished in the Rio Grande and major tributaries with hook and line or throw nets (Simmons 1978: 35). Trout, catfish, “stickleback,” and eels were the common species caught and eaten. Unidentified species of turtles, along with tortoises, were also taken as food (Bustamante and Simmons 1995: 12–13).

**Fur Traders and Trappers**

Trade with the United States was legalized when Mexico (including New Mexico at the time) gained independence from Spain in 1821. The Santa Fe Trail from Missouri to New Mexico was quickly “opened” over a route long used by Native Americans and Hispanos. Thus, at Santa Fe the trail linked with the old Camino Real, or Chihuahua Trail, which followed the Rio Grande into the State of Chihuahua (Figs. 33 and 34). Unlike other trails across the West, the Santa Fe Trail was not an emigrant road, but a route of commerce over which Anglos, and later Hispanic New Mexicans, introduced a variety of new trade goods and made large profits either by retailing, wholesaling, or bartering. Some items taken back to the states included furs, buffalo hides, and mules. Also, the trail was used heavily by fur trappers, who took thousands of beavers (sometimes illegally, without a Mexican permit) and many fewer river otters from the Rio Grande, Chama, Santa Fe, Pecos, and Gila drainages in New Mexico. The Anglo market also induced Native Americans to harvest furs, which they traded for metal tools, beads, alcohol, and other items (Beck 1962: 104–118).

The strong market for beaver felt spurred these Anglo trappers to roam over hundreds of miles of main stem and tributary reaches in search of fur-bearing animals. The large number of beaver methodically taken by the trappers caused a severe reduction or extirpation of local populations, as well as the river otter. Most regional streams have never recovered in terms of beaver populations reaching...
Figure 33—Major trails and roads, 1821–1880.
pre–1820 levels. Frequently, these trappers also hunted
black bears, grizzly bears, elk, and deer for their hides and
meat or simply for sport. The independent, free-spirited
lifestyles of these men frequenting the mountainous West
earned them the label of “Mountain Men.” Taos became a
supply center and southern Rocky Mountain rendezvous
site for these individuals from the 1820s to the early 1840s.
It also became the home of such colorful trappers-traders
as Kit Carson, Charles Bent, and “Old Bill” Williams (We-

Three other old trade routes connecting Taos and Santa
Fe to northwest Mexico, California, and eastern markets
were used by Anglos for trading and trapping (Fig. 33). The
first was the Sonora Trail, which left the Rio Grande
near later Hatch and extended southwest to the Santa Rita
mine near later Silver City, then followed the Gila River
into southern Arizona and Sonora or southern California.
Another, the Old Spanish Trail to the Great Basin and Cali-
ifornia, went northwest from Santa Fe, across southwest
Colorado and central Utah, then branched in central Ne-
vada, with one trail to San Francisco and the other to Los
Angeles. New Mexicans drove sheep and mules and car-
rried Navajo blankets over this route to trade in California.
In exchange they generally received horses or gold. In 1849
both of these routes were used by Anglo Americans to reach
the gold fields of California. The last trail was along the
Canadian River, which had been used for hundreds of years,
connecting with Pecos Pueblo and the Santa Fe-Albuquer-
que areas (Weber 1971: 68–69, 116–117; Fig. 33).

Anglo Settlement and Land Grant
Adjudication

The Anglo settlers who followed the trader-trappers
and the U.S. Army to New Mexico in the mid to late 19th
century were looking for relatively cheap or free land,
water, and other resources, with little or no regulatory
use laws. Some dreamed of getting rich through making
maximum profit aided by inexpensive local labor; some
attained this goal, but most did not. As a group, they
brought new land use ideas and technologies for farming, ranching, mining, and transporting marketable resources.

**Settlement**

Some Anglos obtained land and water rights by trading with or purchasing from Hispanic owners, by marrying into Hispano families with land, by litigation and settlement of Spanish land grants, or by “squatting” on Spanish land grants or Pueblo lands. A few Anglos had received large land grants from the Mexican government prior to 1846, primarily in the Rio Arriba, or Upper Basin.

With the outbreak of the U.S.-Mexican War in 1846, American troops invaded and occupied New Mexico. The cessation of this conflict was formalized by the signing of the Treaty of Guadalupe Hidalgo in 1848. A major component of this treaty was the responsibility of the United States to protect the property and rights of Hispanic citizens in the new territory, especially land grant heirs. Subsequent court litigation as to who held legal title to the grants occurred over the remainder of the 19th century and into this century. However, congressional and judicial concerns led to “strict legalistic guidelines were drawn and equitable rights of the villagers were excluded. Legal procedures were lengthy and expensive. The most important policy which emerged was the denial of community ownership of the common pasture lands. These lands were declared public domain and thrown onto the market for homesteading…” (Ortiz 1980: 13, 90).

About 77 percent of the land-grant acreage, almost 9 million acres, held by Hispano and Indian subsistence farmers of northern and central New Mexico was lost to non-native interests. Of about 1,000 land grant claims in New Mexico, totalling some 10 million acres, only about 2 million acres were patented and confirmed. Most of the grant lands became public domain, state land, and railroad land. Much of the public domain in the mountains later became national forests. Location of surface water played a role in the resolution of these land claims and subsequent distribution of parcels. Attorney Thomas B. Catron, the most prominent land grant attorney of the time, controlled a substantial amount of land with significant natural resources in the region (Ortiz 1980: 92–93, 96; Westphall 1983: 143–144, 234).

To administer this public lands program and to establish the township-range grid, the Office of the U.S. Surveyor-General was created on July 22, 1854, in Santa Fe. The first duty of the Surveyor-General was to survey the public domain, primarily arable lands, but he was also responsible for making recommendations to Congress on land claims of Hispanics and Pueblos for resolution of ownership. Most of the township-range surveys in the region were not completed until 1876–84; some were not finished until much later. Although the Surveyor-General’s office could not legally survey grazing lands, this was done under the direction of Surveyor-General Henry M. Atkinson from 1876 to 1883, probably as a result of pressure from powerful cattle raisers. He had various financial interests in a number of New Mexico land and cattle corporations, himself (Westphall 1965: 1–4, 17–18, 24–28, 162–165).

The distribution of the public domain was based on a system of uniform-sized grids, imposed on the land, and effected through the use of modern surveying and map making. Unlike the Spanish custom of imprecise documenting and recording of land boundaries, ownership, and land transfers, the Anglo system entailed precise recording and detailed transaction records (Briggs and Van Ness 1987: 193–194). The township, range, and section grid system inaugurated by the Anglos ignored regional topography and hydrology in terms of parcel boundaries. A particular square or rectangular parcel might contain no surface water or arable land, or fragmented resources. Thus, unlike the Hispanic system of land tenure based on a subsistence economy, the Anglo system encouraged the use of land and water resources as market commodities to be exploited for immediate profit (Briggs and Van Ness 1987: 194).

Anglo and Hispano settlers secured 160-acre tracts of public land through the Donation Act of 1854. However, claimants of Spanish or Mexican land grants were not allowed to file for a donation claim. Land holders under this act also could not acquire land under the Pre-emption Act, the Homestead Act of 1862, or the Mining Act of 1872. The 1862 act was amended in 1909 to allow individuals to file on and claim 320 acres (Brown 1970: 13; Westphall 1965: 1, 37, 43; Worster 1979: 87). The General Revision Act, passed by Congress in early 1891, authorized the President to set aside any part of the public domain. Many ranchers, lumbermen, and miners protested vigorously (Athearn 1985: 129).

Anglo homesteaders filed on public domain outside the land grants and otherwise claimed unoccupied land. Most of the public land available for homesteading in the study region was therefore away from the floodplains of lower, permanent streams, in upland valleys with grasslands, in canyons or on mesas with pinyon-juniper woodlands, and in the foothills or mid elevations of mountains at or near meadows and open forests. Homestead certificates in northern New Mexico increased from only three in 1879 to 263 in 1882. Homesteading in the region peaked during the following 10 years, spurred by completion of transcontinental railroads across New Mexico. Many homesteaders failed due to adverse weather, floods, inadequate water supplies, and lack of sufficient knowledge about farming or livestock raising in arid and semi-arid environments. Much of this public land was acquired by ranchers, private developers, or, later, the Forest Service (Kelly 1955: 396–397; Perrigo 1982: 107; Westphall 1965: 44–47, 168–169).
Anglo Population and Disease

As noted, the earliest and most rapid Anglo population growth over the entire period occurred in and around the existing Spanish communities along the Rio Grande, notably Santa Fe, Albuquerque, Belen, and Socorro. Following the U.S. Army occupation and the first Anglo settlers, 1846–50, there was a total of 61,547 non-Indian persons in the territory, which at that time included Arizona (Table 38). The large majority of the inhabitants counted were 54,000 Hispanics. Some 2,923 of these residents were born in other parts of the United States or in foreign countries.

By 1860 the total population, again including Arizona, had increased to 93,516. Among these were 6,647 persons born outside of New Mexico. There were 156 settlements in the region in that year; 107 of these had populations of less than 500. Ten years later, after New Mexico and Arizona were made separate territories, the total population was 91,874 (Bancroft 1889: 459, 642; Clark 1987: 31, 39; Harper et al. 1943: 57; Workers of the Writers’ Program 1940: 329, 429, 431–432; Table 38). Over the remainder of the decade, 1871–80, population increased by 30 percent to 119,565; non-Indians numbered 109,793. This figure included 1,015 blacks, who were mainly soldiers or ex-military personnel, and Native Americans.

Following completion of the Santa Fe Railroad and subsidiary trunks, Anglo migration to the basins accelerated sharply (Fig. 35). In 1883 there were about 130,000 residents in the territory; Anglos numbered about 32,500 (Bancroft 1889: 723). The 1890 census counted 160,282, and the 1900 census, 195,310 persons (Table 38). Most of these individuals lived on farms and ranches or in settlements of less than 1,000 population. During the first decade of this century, the territorial population almost doubled when it reached 327,301. Most of this rapid growth was due to individuals homesteading, seeking cures for ailments, and ranching and farming in the southern part of the study region (Westphall 1965: 27; Workers of the Writers’ Program 1940: 432–433).

Improvement of existing roads and construction of new ones also facilitated Anglo movement into the study region (Fig. 35). The first surfaced highway in New Mexico was built in 1915 from Raton to El Paso. From Santa Fe south, this route followed the old Camino Real, for which the new road was named.

Although medical practice was improving, older diseases still persisted. Smallpox, which had caused so many deaths in the colonial period, especially among the Pueblo, struck them and Hispanics again in 1852, killing hundreds (Thornton 1977: 99). In 1877 at Santo Domingo, about 20 men and 100 boys were killed by the same disease. Smallpox struck at Las Vegas that same year, where 82 people died, and also struck Arroyo Hondo, where mining was stopped due to the epidemic (Pearson 1986: 10; Perrigo 1982: 78–79). From late 1882 until 1898 outbreaks of smallpox occurred in Pueblo and Hispanic communities (Lange and Riley 1966: 383, 1970: 14; Thornton 1987: 102; White 1962: 101–102, 322). Other diseases that resulted in deaths included measles, diphtheria, whooping cough, and influenza, especially during the worldwide outbreak of 1918. Tuberculosis, introduced by Anglos, began to spread to Native Americans and Hispanics in the early 1900s (Baca 1995: 237–238; Simmons 1982: 345; Tiller 1983: 454).

Anglo Resource Use

Agriculture and Water

Many Anglo farmers brought new farm techniques, crops, and technology. Maximum commercial returns were pursued using steel plows, which penetrated the ground more deeply than Spanish plows. Other more efficient equipment and seeds of new crop varieties were also introduced. New farming techniques included crop rotation and wire fencing to protect fields from livestock. There was a marked increase in the number, size, and value of farms in the 1850s, due primarily to Anglos entering the region’s agricultural industry. This technological investment and increase in farms and farm size was spurred by population growth, the increasing influx of military personnel, and the brisk traffic on the Santa Fe Trail (Bancroft 1889: 644–645; Beck 1962: 263–265; Sunseri 1979: 20–23).

In 1848 and 1850–51 the U.S. and territorial legislatures passed laws to protect existing irrigation systems, farm fields, and traditional water use rights. A number of other irrigation laws were passed in the 1880s and 1890s, primarily in response to population growth and associated pressures on agriculture (Clark 1987: 25, 31, 65; Westphall 1965: 25, 84; Wozniak 1987).

### Table 38—New Mexico population, 1850–1910.

<table>
<thead>
<tr>
<th>Year</th>
<th>Hispanics/Anglos</th>
<th>Indians</th>
<th>Blacks</th>
<th>MRGB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>61,571&lt;sup&gt;a&lt;/sup&gt;</td>
<td>30,000&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1860</td>
<td>93,516&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1870</td>
<td>91,874</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1874</td>
<td></td>
<td>7,000&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1,015</td>
<td></td>
</tr>
<tr>
<td>1880</td>
<td>119,565</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1883</td>
<td></td>
<td></td>
<td>130,000&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>1890</td>
<td>160,282</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1900</td>
<td>195,310</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1910</td>
<td>327,301</td>
<td></td>
<td>75,036&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Arizona territory included.
<sup>b</sup> All Native Americans.
<sup>c</sup> Pueblo.
<sup>d</sup> Combined populations of Santa Fe, Albuquerque, Belen, Socorro.
<sup>e</sup> 32,500 Anglos.

Figure 35—Major railroads, roads, and highways, 1879–1915.
The Federal Desert Land Entry Act of March 3, 1877, was intended to stimulate irrigation development through individual enterprise. A settler could buy a section of land for $1.25 an acre, up to 640 acres, if the claimant irrigated the land within 3 years (Buchanan 1988: 29). Claims could be made on unsurveyed public land. One problem with this act in New Mexico was the strict interpretation of the law by the General Land Office, which required irrigation of the entire 640 acres, something difficult to do in the region. This size tract was simply too large for most individuals to irrigate on their own. One result of the legislation was the control of substantial grazing land around surface water for the 3 years. Also, at the time of filing on the land, payment of only 25 cents per acre was required, so individuals could control sizable tracts along streams for 3 years before making proof of reclamation and completing payment. Because of these and other abuses, the law was revoked in 1892 (Westphall 1965: 77–81).

The newly created U.S. Geological Survey (1879) began a survey of the irrigation systems in the region in late 1888 (Follett 1896). This agency also established its first streamflow gauging station at Embudo in January of the following year (Beal and Gold 1988: 99; Wozniak 1987). A number of irrigation companies were organized locally, some of which failed by constructing ditch systems in environmentally unsuited areas (Westphall 1965: 82). Another important piece of legislation affecting irrigation was the Reclamation Act passed in 1902. This law authorized the Secretary of the Interior to construct irrigation projects in the western territories and states, and it established the U.S. Reclamation Service as a separate agency from the Geological Survey. Irrigation works were significantly expanded over the next 2 decades. Also, a small farmer could irrigate up to 160 acres with water from federal irrigation projects (Clark 1987: 79–82, 110, 168; Wozniak 1987).

An estimate of the land in cultivation in the Middle Rio Grande Valley when the U.S. Territory of New Mexico was created in 1850 was 87,880 acres, of which 40,185 were irrigated (Table 39). This land was planted primarily in corn, wheat, beans, and melons. The demand for Rio Grande water at this time averaged 2.75 acre-feet per acre (Hedke 1925: 15; State Engineer Office 1967: 78, 81).

In 1860 there were some 54,500 acres under irrigation, and 57,200 at the end of the decade. By 1870 there were 143,007 acres of “improved land” with 4,480 farms valued at over two million dollars. In 1870, the estimated number of acres of irrigated farmland in the territory was 57,200. About 85 percent of the farms in New Mexico during this period were less than 50 acres; in the study region, farms averaged 61 acres. By 1880 irrigated acreage had increased to 94,900 (Clark 1987: 29; Dryson 1971: 181; Miller 1989: 81; Table 39). Corn, wheat, oats, barley, sorghum, rye, beans, peas, potatoes, hay, and tobacco were the major crops grown by Anglos, Hispanos, and Pueblos (Bancroft 1889: 768; Clark 1987: 29; Miller 1989: 132; Table 39).

Ten years later there were 95,000 to near 125,000 acres in cultivation in the Middle Rio Grande Valley. Environmental problems, such as waterlogging, caused this total to drop to about 31,700 acres in 1896 (Table 39). Along the Rio Puerco Valley, from Casa Salazar to Cuba, the cultivated acreage varied from more than 18,000 in the late 1880s to 3,000 acres in the early 1940s due to incising of the river and lowered water table, erosion, increase in flood intensity and frequency, and drought (Harper et al. 1943: 51–53). The amounts of irrigated acres on this and other tributaries for 1898 are listed in Table 40. The completion of the Santa Fe Railroad and other major lines from 1879 to 1882 brought a large wave of Anglo farmers to the region. New, introduced crops included millet, sorghum grains, and kafir corn, all drought resistant. By 1900 there were more than five million acres under cultivation in the territory, and in 1910 there were 35,676 farms averaging

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of ditches</th>
<th>Irrigated acreage</th>
<th>Agricultural land acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>80</td>
<td>40,185</td>
<td>87,880&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>1880</td>
<td>82</td>
<td>94,900</td>
<td>100,000 to 124,800&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>1896</td>
<td>71</td>
<td>31,700</td>
<td>50,000</td>
</tr>
<tr>
<td>1910</td>
<td>79</td>
<td>45,220</td>
<td>?</td>
</tr>
<tr>
<td>1918</td>
<td>55</td>
<td>47,000</td>
<td>?</td>
</tr>
<tr>
<td>1925</td>
<td>60</td>
<td>40,000</td>
<td>?</td>
</tr>
<tr>
<td>1942</td>
<td>8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>60,000</td>
<td>118,000</td>
</tr>
</tbody>
</table>

<sup>a</sup> Estimated figures
<sup>b</sup> Main canals

Sources: Clark 1987: 29; Hedke 1924: 19–20, 1925: 15; Wozniak 1987

<table>
<thead>
<tr>
<th>Drainage</th>
<th>Drainage area (square miles)</th>
<th>Number of ditches</th>
<th>Irrigated acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Fe River</td>
<td>480</td>
<td>44</td>
<td>5,920</td>
</tr>
<tr>
<td>Galisteo River</td>
<td>1,400</td>
<td>23</td>
<td>2,240</td>
</tr>
<tr>
<td>Rio Grande (White Rock Canyon to Albuquerque)</td>
<td>830</td>
<td>22</td>
<td>8,070</td>
</tr>
<tr>
<td>Jemez River</td>
<td>900</td>
<td>27</td>
<td>5,790</td>
</tr>
<tr>
<td>Rio Grande (Albuquerque to confluence with the Río Puerco)</td>
<td>940</td>
<td>33</td>
<td>17,840</td>
</tr>
<tr>
<td>Río Puerco</td>
<td>6,400</td>
<td>62</td>
<td>18,380</td>
</tr>
<tr>
<td>Río Grande (Confluence of Río Puerco to San Marcial)</td>
<td>800</td>
<td>16</td>
<td>5,790</td>
</tr>
<tr>
<td>Total</td>
<td>11,750</td>
<td>227</td>
<td>64,030</td>
</tr>
</tbody>
</table>

Source: Follett 1898: 81–88

---

Table 39—Irrigation agriculture in the Middle Rio Grande Valley, 1850–1942.

Table 40—Irrigation agriculture in the Middle Rio Grande Basin, 1898.
316 acres (Beck 1962: 265–267). Major crops cultivated over the next 3 decades are shown in Table 41.

### Livestock Raising

Anglo ranchers, like Hispano and Native American livestock raisers, faced a number of environmental problems, such as droughts, floods, windstorms, erosion, nutrient depletion of soil, accumulation of salts in soil, and insect infestations. Early in the period, a lack of adequate transportation to markets was also a problem. Anglo livestock raisers, primarily from Texas, brought the first large cattle herds to the Middle Basin since the early Spanish entradas. Sheep, however, remained the dominant livestock on pastures and rangelands in the region until the coming of the railroad in 1880. Demand for wool and mutton locally and in California gold fields after 1848 spurred Anglos, as well as Hispanos, to produce more sheep. Rio Abajo sheepmen drove thousands of sheep to the mines in California from 1849 to the late 1850s.

There were almost 400,000 sheep along the Middle Valley and on flanking uplands in 1846–50, notwithstanding the loss of about 453,292 sheep to Indian raiders during this period. Jose Leandro Perea of Bernalillo alone owned 200,000 sheep. Some observers noted that “the hillsides and the plains . . . covered with sheep and cattle.” In 1870 there were 435,000 sheep in the Middle and Upper Rio Grande basins (Carlson 1969: 28; Espinosa and Chavez n.d.: 75–78; Table 42; Abert 1962: 60–62, 65, 96–97).

By 1880 there were some 400,000 head of cattle in the territory. As mentioned, most of the cattle belonged to Texas ranchers, who had driven their cattle into the region to support the growing demand for beef, especially at logging camps, mining camps, railroad camps, and military posts. New breeds of cattle and sheep, better producers of meat and wool, were also introduced in the late 1800s (Atearn 1985: 130; Baydo 1970: 113, 125; Clark 1987: 54). By 1890 the total number of cattle in the Upper and Middle basins had sharply increased to 210,000 head (Bayer et al. 1994: 174; Harper et al. 1943: 49; Williams 1986: 120; Table 42).

Bernalillo County rangelands had 475,000 sheep and 41,700 cattle alone in 1883. By 1890, the total number of sheep in the Middle Valley had risen to 1,717,000 animals (Table 42). By 1900 the sheep population had increased to 1,732,000 head (Bayer et al. 1994: 174; Harper et al. 1943: 49; McCall 1851: 5; Ortiz 1980: 80; Rothman 1882: 28, 33; Simmons 1988: 8; Tiller 1992: 101–103; Fig. 36).

Most of the rangeland close to Middle Valley population centers had been overgrazed prior to 1846, and the sharp increase in livestock that occurred over the next 5 decades exacerbated the environmental decline. Three years after its organization in 1881, the Southwestern Stockmen’s Association and local livestock groups attempted to control overgrazing in the region to some extent. In 1889 the Territorial Assembly passed an act to prevent overstocking, and the General Land Office began requiring ranchers to obtain permits to graze on public lands. The introduction of barbed wire, which led to the end of open range, generally prevented trespass and overgrazing of some ranges (Baydo 1970: 113, 125; Clark 1987: 54).

Most of the livestock in the region from the late 1800s to early 1900s were grazed on homesteaded or leased public lands, land grants in dispute, new forest reserve lands, or in trespass on Hispano and Indian grant lands. Texas cattle men were especially aggressive in taking or

---

### Table 41—Principal crops in the Middle Rio Grande Valley, 1919–1942.

<table>
<thead>
<tr>
<th>Crop type</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>13,334</td>
</tr>
<tr>
<td>Wheat</td>
<td>5,900</td>
</tr>
<tr>
<td>Oats</td>
<td>708</td>
</tr>
<tr>
<td>Barley</td>
<td>354</td>
</tr>
<tr>
<td>Sorghum grain</td>
<td>354</td>
</tr>
<tr>
<td>Sorghum fodder</td>
<td>1,416</td>
</tr>
<tr>
<td>Mixed grain</td>
<td>236</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>19,234</td>
</tr>
<tr>
<td>Hay (misc.)</td>
<td>3,540</td>
</tr>
<tr>
<td>Irrigated pastures</td>
<td>5,310</td>
</tr>
<tr>
<td>Truck garden</td>
<td>1,416</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1,888</td>
</tr>
<tr>
<td>Orchard</td>
<td>1,652</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55,342</strong></td>
</tr>
</tbody>
</table>

Sources: Scurlock et al. 1995: 93; Workers of the Writers’ Program 1940: 82–83.

---

### Table 42—Livestock numbers in New Mexico, 1850–1900.

<table>
<thead>
<tr>
<th>Year</th>
<th>Sheep</th>
<th>Cattle</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>377,000*</td>
<td>—</td>
<td>377,000</td>
</tr>
<tr>
<td>1860</td>
<td>830,000</td>
<td>—</td>
<td>830,000</td>
</tr>
<tr>
<td>1870</td>
<td>619,000</td>
<td>137,314</td>
<td>756,314</td>
</tr>
<tr>
<td></td>
<td>435,000*</td>
<td>14,000</td>
<td>449,000</td>
</tr>
<tr>
<td>1880</td>
<td>2,000,000</td>
<td>400,000</td>
<td>2,400,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,000,000</td>
<td>3,400,000</td>
</tr>
<tr>
<td>1890</td>
<td>4,000,000</td>
<td>210,000</td>
<td>4,210,000</td>
</tr>
<tr>
<td></td>
<td>1,517,000*</td>
<td>—</td>
<td>1,517,000*</td>
</tr>
<tr>
<td>1900</td>
<td>3,500,000</td>
<td>843,000</td>
<td>4,343,000</td>
</tr>
<tr>
<td></td>
<td>1,732,000*</td>
<td>211,000</td>
<td>1,943,000*</td>
</tr>
</tbody>
</table>

*Does not include Navajo flocks.
*Middle and Upper Valley.
trespassing on Pueblo and Jicarilla Apache lands. Hispanics also continued to trespass on Indian lands to graze their livestock. National forest reserves were created from old Spanish grant land or the public domain, much of which had been grazed for a long time. Many local residents, especially Hispanics who lost their free grazing rights on common lands, grazed their stock on the new forest reserves, for which permits were required beginning in 1912 (Bahre 1991: 116; Brown 1985: 124; Carlson 1969: 29, 33, 37, 39; deBuys 1985: 237–241; Denevan 1967: 699; Roberts 1963: 115–116).

Beginning in the 1920s, the Forest Service had to deal with permittees grazing more animals than agreed upon. Also, large livestock owners, many of whom were Anglo, were leasing or buying permits from smaller livestock raisers, who were primarily Hispano. The Forest Service stepped up enforcement to solve these two problems. Additionally, to prevent control of large areas of rangeland by a small number of wealthy individuals, the Forest Service began limiting the maximum number of animals that could be grazed on a single permit. For the Carson and Santa Fe national forests this was about 400 livestock units in the early 1980s (deBuys 1985: 242–246).

In the 1940s Hispano users of the public woodlands, forests, and meadows in New Mexico and southern Colorado began to abandon labor-intensive sheep herding and to switch to cattle, which can range over an area without human herders. The overgrazed ranges supported fewer animals; thus, there were fewer permits issued by the Forest Service. A changing economy, from a subsistence to a cash situation, also resulted in a steady decline in the number of Hispano permittees on forest lands (deBuys 1985: 247–249).

Logging and Timber

Native New Mexicans and Hispanics never logged on a large scale prior to the territorial period. However, population growth, military activities, mining, and other activities stimulated the development of the timber industry by Hispanos and Anglos. The demand for logs to saw into lumber was generated by the boom in building—military posts, houses, businesses, bridges, mine timbers, and railroad construction. Wood was especially needed on the treeless grasslands for use as building materials and fuelwood. Clear-cutting was generally practiced in mountain forested areas; only steep slopes were untouched.

Figure 36—Sheep at the mouth (?) of Coyote Canyon, Manzano Mountains. Cobb photo, ca. 1900. Courtesy Albuquerque Museum (negative no. 1981.2.57).
in logging areas. A variety of logging tools and equipment, including cross-cut saws, double-bitted axes, large wagons and industrial harnesses, and draft horses, were introduced by Anglos. Portable and permanent steam-driven motors, rip saws, tables, and other equipment for sawmills were also introduced. Felling, haulung, and in some instances, floating logs in the Rio Grande were techniques new to the territory as well.

As early as the mid 1850s, Anglo American settlers were operating sawmills at Glorieta Pass and near Taos. The first planing mill was established at Las Vegas, New Mexico, in 1879, the year the Atchison, Topeka, and Santa Fe Railroad reached this community (Jones 1932: 3–4). Harvesting ponderosa and other mountain timber for use as lumber, railroad ties, or mine timbers caused relatively significant reduction in local woodlands and forests in the late 19th and early 20th centuries. Cross-ties for regular gauge rail lines were 8 to 8.5 feet in length, 6 to 7 inches in thickness, and 7 inches in width and were made from “green” timber. One railroad company constructing a line across New Mexico in 1885 used 937,240 feet of “native pine,” which included pinyon as well as ponderosa pine, for ties. An estimated five million board-feet of lumber was consumed in New Mexico in 1886 (Bunting 1964: 11; Ensign 1888: 76, 80; Perry 1922: 521; Tratman 1889: 55).

The Santa Fe Railroad constructed a second set of tracks across northern New Mexico in 1914; a minimum of 16 million new ties were needed. The construction and maintenance of the first track in 1879–1907 had resulted in the exhaustion of tie timber on lands adjacent to the right-of-way. To supply the needed ties, the Santa Barbara Tie and Pole Company was started near the Santa Fe National Forest in 1909, and over the next 17 years all timber from the pinyon-juniper zone to timberline was cut on 65,750 acres of land (deBuys 1985: 227–230).

Stumpage price in 1932 was estimated to be $3 per thousand feet. About this same time, a Taos County company was selling narrow-gauge ties for 6 cents and standard gauge for 8 cents to the Denver and Rio Grande Railroad. About 4,000 ties a year from the Carson National Forest were sold by this company. In 1935 the volume of ties doubled over the earlier figure. Other ties were cut on a privately owned, old land grant along the Rio Pueblo and Santa Barbara valleys. Some 30 individuals clear-cut over 600 or 700 acres in these locations, which initiated erosion (Perry 1922: 521, 523; Weigle 1975: 209–210).

Fuelwood

An estimated 10,000 cords of fuelwood were used in the southern Rocky Mountain region in 1760–69 for cooking and heating. This figure doubled in 1770–79, remained about the same in 1780–89, then increased to 25,000 in 1790–99. With the arrival of relatively large numbers of Anglo-American settlers in New Mexico after 1846, demands for fuelwood accelerated. A burro load from the Sangre de Cristo Mountains, about half a cord, cost 25 cents in nearby Santa Fe at this time. Over the late 1800s Hispanic woodcutters were the primary suppliers of fuelwood in communities, and some woodcutters were contracted by the U.S. Army at forts in the region, where wood consumption for heating and cooking was high. In 1861 fuelwood delivered to garrisons some distance from pinyon-juniper woodlands was bringing $3.75 for a cord of pinyon (Balcomb 1980: 52–53; Dobyns 1981: 96; Frazer 1983: 11, 180).

By the middle of the 19th century, following the Anglo conquest and settlement, annual fuelwood consumption had increased to 105,000 cords, and by about 1870 had increased to over five million cords. The estimate of fuelwood consumed by New Mexicans was 170,000 cords in 1879. Throughout the remaining years of the 1800s and into the 20th century, Hispanic woodcutters from villages and towns in central and northern New Mexico, eastern Arizona, and southern Colorado supplied pinyon and juniper fuelwood to regional residents. Wagons, burros, or pack horses were used to transport pinyon and juniper wood from the mountains to towns such as Taos, Santa Fe, and Albuquerque until World War II. Cutters sold their fuelwood and fence posts at wood yards in these communities. Fuelwood use peaked in the region at 675,000 cords in 1918 (Reynolds and Pierson 1942: 9–10, 17–18). A decline followed due to the widespread use of natural gas for cooking and heating (Balcomb 1980: 52–53; Waters 1981: 36).

Mining in Territorial New Mexico generated extensive commercial use of pinyon, juniper, pine, and fir in the historic period. Vast stands of pinyon were consumed to make charcoal for fuel used in the smelting or roasting processes; “green” trees down to 2-inch diameter were preferred over dead wood. Sometimes horse or cattle manure was added to the fuelwood. One source stated that the pinyon, juniper, and other conifer wood was the best when at least 80 to 90 percent dry. Pinyon killed by fire was the next preferred source for smelting fuel (Christiansen 1974: 95; Ensign 1888: 77–78).

Charcoal for smelting and roasting was made by partially burning wood in virtually airtight kilns that could systematically and gradually exclude oxygen. Kilns varied in construction and design; fired brick, beehive-shaped stone kilns (Fig. 37) or simple pits covered with earth were used. Green wood was allowed to dry before it was burned in the kiln. Depending on the size of the kiln, burning varied from 3 weeks to more than a month, then the ovens were allowed to cool between a week and 10 days before removal of the charcoal. Juniper required a higher temperature for conversion to charcoal, so this wood had to be processed in a fired-brick kiln. A charcoal pit “kiln” produced from 2,800 to 3,300 bushels of charcoal from 100 cords of wood. An estimated 300 bushels of charcoal per acre of pinyon-juniper woodland were produced by charcoal makers in the late 19th century (Lanner 1981: 122, 125; Young and Budy 1979: 116–117).
Pinyon and juniper, with their array of branches from near ground surface to the peak of their crowns, were difficult to fell and buck into cordwood by hand, requiring an estimated two to three times as much labor as that needed to cut and buck ponderosa. Fuelwood yields of pinyon-juniper woodlands varied from less than one cord in sparse stands to more than 25 cords per acre in the densest stands. Smelter furnaces at large mining sites working at capacity would consume from 15,000 to about 18,000 bushels of pinyon-juniper charcoal a day (Lanner 1981: 124–125; Randles 1949: 346; Young and Budy 1979: 117).

Mining
Major changes in the mining industry also resulted with the coming of the Anglos to New Mexico. New mining equipment, techniques, and markets, backed with investment money, opened many new mining areas and increased production at existing mines. New mining technology included several environmentally destructive techniques of recovering precious metals, such as hydraulic nozzling, which used a powerful stream of water to wash away soil in placer deposits, separating it from gold and silver. Shortage of water needed in processing was a general problem, however, and flooding of some mining operations was an infrequent obstacle (Beck 1962: 245, 247; Christiansen 1974: 23–26).

Almost all of the mine deposits proved to be small in extent or to have low grade ores. Prospective mining areas, located on disputed land grants, had to wait development until the courts ruled. Roads were poor, so transportation was limited until the main railroad and spur lines were constructed in 1879–90s. No significant amount of gold or silver (compared with Colorado or California) was ever mined. Owing to a general lack of safety and health concerns, illness and mortality rates among miners were high (Beck 1962: 246; Christiansen 1974: 26–27, 34–35, 95).

Some of the best producing areas were the Mexican period gold mines in the Ortiz and San Pedro mountains. New, relatively productive mines were located at Elizabethtown (gold, 1870s), Cerrillos (silver, lead, and some gold, 1870s–80s), Bland-Albemarle (silver, gold, 1889–1910),
Table 43—Major mining areas/activities, 1600 to 1945.

<table>
<thead>
<tr>
<th>Mining district</th>
<th>County</th>
<th>Materials mined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldy (A)</td>
<td>Colfax</td>
<td>Gold, silver, copper, lead</td>
</tr>
<tr>
<td>(Aztec, Baldy Mountain, Cimarron Copper Park, Eagle Nest, Maxwell’s Mount Baldy, Old Baldy Mountains, Ute Creek, Virginia City, Willow Creek)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cimarroncito (A)</td>
<td>Colfax</td>
<td>Gold, silver, copper</td>
</tr>
<tr>
<td>(Bonito, Cimarron Canyon, Urraca, Urraca Creek)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elizabethtown (A)</td>
<td>Colfax</td>
<td>Gold</td>
</tr>
<tr>
<td>(Cimarron, Eaglenest, E-Town, Hematite, Iron Mountain, Moreno, Moreno Valley, Moreno Creek, West Moreno)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red River (A)</td>
<td>Taos</td>
<td>Molybdenum</td>
</tr>
<tr>
<td>(Questa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harding (A)</td>
<td>Taos</td>
<td>Tantalum</td>
</tr>
<tr>
<td>Anchor (A)</td>
<td>Taos</td>
<td>Gold</td>
</tr>
<tr>
<td>(Keystone, La Belle, Midnight, Red River)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picuris (A)</td>
<td>Taos</td>
<td>Copper, gold, silver, optical calcite, sillimanite</td>
</tr>
<tr>
<td>(Copper Hill, Copper Mountain, Dixon, Glenwoody, Harding Mine, Hondo Canyon, Penasco, Picuris, Rinconada, West Picuris)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red River (A)</td>
<td>Taos</td>
<td>Gold, silver, copper</td>
</tr>
<tr>
<td>(Alum Gulch, Black Copper, Black Mountain, Lower Red River, Moly, Questa, Sulphur Gulch)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rio Colorado Placers (A)</td>
<td>Taos</td>
<td>Gold</td>
</tr>
<tr>
<td>(Colorado Creek)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rio Grande Valley (A)</td>
<td>Taos</td>
<td>Gold</td>
</tr>
<tr>
<td>(Rio Grande placers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twining (S and A)</td>
<td>Taos</td>
<td>Copper</td>
</tr>
<tr>
<td>(Amizette, Arroyo Hondo, Rio Hondo)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abiquiu (S and A)</td>
<td>Rio Arriba</td>
<td>Copper</td>
</tr>
<tr>
<td>(Cobre Basin, Cobre Canyon, Copper Canyon)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abiquiu Stone (S and A)</td>
<td>Rio Arriba</td>
<td>Building stone (sandstone and tuff)</td>
</tr>
<tr>
<td>and tuff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bromide No. 2 (A)</td>
<td>Rio Arriba</td>
<td>Gold, silver, copper, lead, zinc</td>
</tr>
<tr>
<td>(Bromide, Headstone, Tusas Mountain)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chama Placers (A)</td>
<td>Rio Arriba</td>
<td>Gold</td>
</tr>
<tr>
<td>(Rio Chama Placers Region)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gallina (A)</td>
<td>Rio Arriba</td>
<td>Copper, silver, clay, Chert</td>
</tr>
<tr>
<td>(Coyote, Gallina Prospect Region, Jarosa, Mesa Alta Mining Mountain, Youngsville)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerro Pedernal (P and S)</td>
<td>Rio Arriba</td>
<td></td>
</tr>
<tr>
<td>Hopewell (A)</td>
<td>Rio Arriba</td>
<td>Gold, silver, lead, copper, zinc</td>
</tr>
<tr>
<td>(Eureka, Good Hope, Headstone, Tres Piedras)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ojo Caliente No. 1 (A)</td>
<td>Rio Arriba</td>
<td>Mica</td>
</tr>
<tr>
<td>(Ojo Caliente)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(A) = Anglo (1846–1945)  
continued on next page
Table 43—Major mining areas/activities, 1600 to 1945 (continued).

<table>
<thead>
<tr>
<th>Mining district</th>
<th>County</th>
<th>Materials mined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petaca (S and A)</td>
<td>Rio Arriba</td>
<td>Gold, silver, lead, copper</td>
</tr>
<tr>
<td>(Alamos, Cribbenville, La Madera, Las Tablas, Ojo Caliente, Paloma Canyon Prospect, Servillita, Tres Piedras, Vallecitos)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mora (A)</td>
<td>Mora</td>
<td>Gold</td>
</tr>
<tr>
<td>Rociana (A)</td>
<td>Mora -</td>
<td>Copper, gold, lead, silver, zinc</td>
</tr>
<tr>
<td>(Hadley, San Carlos, Upper Rociana)</td>
<td>San Miguel</td>
<td></td>
</tr>
<tr>
<td>Elk Mountain (A)</td>
<td>San Miguel</td>
<td>Mica</td>
</tr>
<tr>
<td>(Bull Creek, Cow Creek, Elk Creek, Las Vegas, Rio de la Vaca)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>El Porvenir (A)</td>
<td>San Miguel</td>
<td>Copper</td>
</tr>
<tr>
<td>(Hermit Mountain, Mineral Hill, Porvenir)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tecolote (A)</td>
<td>San Miguel</td>
<td>Copper</td>
</tr>
<tr>
<td>(Las Vegas, Las Vegas Mines, Mineral Hill (?), Ribera, Ribera Copper Prospects, Rivera, Salitre, San Miguel, San Pablo)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Willow Creek (A)</td>
<td>San Miguel</td>
<td>Zinc, lead, copper, gold, silver</td>
</tr>
<tr>
<td>(Cooper, Cowles, Hamilton, Pecos, Pecos River, Tererro, Valley Ranch)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspen Mountain (A)</td>
<td>Santa Fe</td>
<td>Gold, silver, copper, lead, zinc</td>
</tr>
<tr>
<td>(Aspen Ranch)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerrillos (P, S, and A)</td>
<td>Santa Fe</td>
<td>Turquoise, zinc, lead, silver, copper, gold, clay</td>
</tr>
<tr>
<td>(Bonanza City, Carbonateville, Cerrillos, Galisteo Creek, Hungry Gulch, Los Cerrillos, Los Cerrillos, Mountain Chalchihuitil, Turquesa, Turquesa(e), Turquoise City, Turquoise Hill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerrillos Coal Field (A)</td>
<td>Santa Fe</td>
<td>Coal—anthracite and bituminous</td>
</tr>
<tr>
<td>Glorieta (P and A)</td>
<td>Santa Fe</td>
<td>Copper, mineral paint (ocher)</td>
</tr>
<tr>
<td>(Glorieta, Glorieta Mesa, Mailleuchet Mesa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nambe (A)</td>
<td>Santa Fe</td>
<td>Mica</td>
</tr>
<tr>
<td>(Chimayo, Cordova, Santa Fe Mountains, Truchas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Placers (S and A)</td>
<td>Santa Fe</td>
<td>Copper, silver, gold</td>
</tr>
<tr>
<td>(Alamillo, Camahan Golden, Golden Placers, Lazarus Gulch, Nero Placers (?), Placer Mountains, San Isidro (?), San Lazar, San Lazarus Placers, San Pedro, San Pedro Mountain(s), Santa Fe, San Ysidro Mountains, San Zaro, Silver Butte(s), Tuerto Mountain(s), Tuertos Range)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old Placers (S and A)</td>
<td>Santa Fe</td>
<td>Gold, copper</td>
</tr>
<tr>
<td>(Cunningham Gulch, Dolores, El Real de Dolores, Lone Mountain, Ortiz, Ortiz Mountains, Rio Galisteo, San Lazar (?), San Zaro (?), Sierra del Oro, Silver Butte(s))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Santa Fe (S and A)</td>
<td>Santa Fe</td>
<td>Copper, silver, gold, clay, limestone</td>
</tr>
<tr>
<td>(Dalton–Maho, Mailleuchet (?), Mikado, Montezuma, Penacho Peak Prospects, Santa Fe Mountains, Tencaho)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cochiti (A)</td>
<td>Sandoval</td>
<td>Gold, silver, lead, copper</td>
</tr>
<tr>
<td>(Albemarle, Bland, Peralta Canyon)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hagan Coal (A)</td>
<td>Sandoval</td>
<td>Coal</td>
</tr>
<tr>
<td>(Hagan, Una del Gato)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jemez Springs (S and A)</td>
<td>Sandoval</td>
<td>Copper</td>
</tr>
<tr>
<td>(Jemas, Jemes, Jemez Mountain, Jemez Plateau, Jemez Pueblo, Spanish Queen)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(S) Spanish (1699–1846); (P) Pueblo (1450–1945)  
continued on next page
Table 43—Major mining areas/activities, 1600 to 1945 (continued).

<table>
<thead>
<tr>
<th>Mining district</th>
<th>County</th>
<th>Materials mined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nacimiento Mountains (A)</td>
<td>Sandoval</td>
<td>Copper, silver</td>
</tr>
<tr>
<td>(Copper City, Cuba, Eureka Mine, Nacimiento, San Francesca, San Miguel, San Miguel Mine, Senorita, Senorito, Sierra Nacimiento)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placitas (P, S, and A)</td>
<td>Sandoval</td>
<td>Lead, copper</td>
</tr>
<tr>
<td>(Algodones, Bernalillo, Capulin Peak, Juan Tabo, La Luz, La Luz Mine, La Madera, Las Placitas, Montezuma, New Placers (?), Placitas-Montezuma, Sandia, Sandia Mountains, Sandia-North Manzano Prospect Region, Sandia No. 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tijeras (S? and A)</td>
<td>Bernalillo</td>
<td>Gold, silver, copper, iron</td>
</tr>
<tr>
<td>Laguna (A)</td>
<td>Cibola</td>
<td>Uranium, fluor spar, pumice, scoria</td>
</tr>
<tr>
<td>scorla</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants (A)</td>
<td>Cibola</td>
<td>Uranium, fluor spar, pumice,</td>
</tr>
<tr>
<td>scorla</td>
<td></td>
<td>scoria</td>
</tr>
<tr>
<td>Zuni Mountains (A)</td>
<td>Cibola</td>
<td>Uranium, fluor spar, pumice,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>scoria</td>
</tr>
<tr>
<td>Scholle (A)</td>
<td>Torrance</td>
<td>Copper, uranium</td>
</tr>
<tr>
<td>Cat Mountain (A)</td>
<td>Socorro</td>
<td>Gold</td>
</tr>
<tr>
<td>Chupadera (A)</td>
<td>Socorro</td>
<td>Copper, lead</td>
</tr>
<tr>
<td>Council Rock (A)</td>
<td>Socorro</td>
<td>Silver, lead</td>
</tr>
<tr>
<td>Hansonburg (A)</td>
<td>Socorro</td>
<td>Copper, lead</td>
</tr>
<tr>
<td>(Carthage)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hop Canyon (A)</td>
<td>Socorro</td>
<td>Gold</td>
</tr>
<tr>
<td>Iron Mountain (A)</td>
<td>Socorro</td>
<td>Iron, tungsten, beryllium</td>
</tr>
<tr>
<td>Jones Camp (A)</td>
<td>Socorro</td>
<td>Iron</td>
</tr>
<tr>
<td>Joyita Hills (A)</td>
<td>Socorro</td>
<td>Lead</td>
</tr>
<tr>
<td>(Canoncito)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ladron Mountains (A)</td>
<td>Socorro</td>
<td>Lead, zinc, manganese, uranium</td>
</tr>
<tr>
<td>uranium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lemitar Mountains (A)</td>
<td>Socorro</td>
<td>Lead, zinc, uranium</td>
</tr>
<tr>
<td>Luis Lopez (A)</td>
<td>Socorro</td>
<td>Manganese</td>
</tr>
<tr>
<td>Magdalena (A)</td>
<td>Socorro</td>
<td>Gold, silver, zinc, lead,</td>
</tr>
<tr>
<td>copper, manganese, vanadium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magdalena Mountains (A)</td>
<td>Socorro</td>
<td>Gold, silver, copper, zinc</td>
</tr>
<tr>
<td>manganese, zinc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mill Canyon (A)</td>
<td>Socorro</td>
<td>Gold, copper</td>
</tr>
<tr>
<td>North Magdalena (A)</td>
<td>Socorro</td>
<td>Copper</td>
</tr>
<tr>
<td>Ojo Caliente (A)</td>
<td>Socorro</td>
<td>Copper, lead</td>
</tr>
<tr>
<td>Rayo (A)</td>
<td>Socorro</td>
<td>Copper</td>
</tr>
</tbody>
</table>

continued on next page
Table 43—Major mining areas/activities, 1600 to 1945 (continued).

<table>
<thead>
<tr>
<th>Mining district</th>
<th>County</th>
<th>Materials mined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosedale (A)</td>
<td>Socorro</td>
<td>Gold</td>
</tr>
<tr>
<td>Mockingbird Gap (A)</td>
<td>Socorro</td>
<td>Copper, lead, zinc</td>
</tr>
<tr>
<td>San Jose (A)</td>
<td>Socorro</td>
<td>Gold, silver</td>
</tr>
<tr>
<td>(Nogal, San Mateo)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Lorenzo (A)</td>
<td>Socorro</td>
<td>Copper, uranium</td>
</tr>
<tr>
<td>(San Acacia)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholle (A)</td>
<td>Socorro</td>
<td>Silver, copper, uranium</td>
</tr>
<tr>
<td>Socorro Peak (A)</td>
<td>Socorro</td>
<td>Silver, lead</td>
</tr>
<tr>
<td>Water Canyon (A)</td>
<td>Socorro</td>
<td>Gold, silver, copper</td>
</tr>
</tbody>
</table>

Socorro-Magdalena (silver, lead, 1881–90s) (Fig. 38), and Carthage (coal, 1880s–90s) (Christiansen 1974: 35–70). The locations of these and other mining sites, and rocks or minerals mined, are shown in Figure 39 and Table 43.

Military Resources
The establishment and garrisoning of military posts throughout the region with several thousand troops and many more draft animals from 1861 to the late 1800s created a new demand for other local resources such as horses, mules, oxen, beef, mutton, agricultural products (mainly wheat and corn), salt, native “hay,” and lumber (Frazer 1983; Miller 1989). With rapid growth of livestock generated not only by the demands of the army, but also by a rapidly increasing emigrant and settler population, lowland grasslands were quickly depleted, and demand for native hay (gramas, galleta, tobosa, bluestems, etc.) increased accordingly. Army horses usually received a daily ration of 14 pounds of hay; 4,950 tons of hay were consumed in 1870. These hay grasses had to be hand cut, usually with sickles and scythes, in mountain meadows such as the Valle Grande, or in valleys such as those of the Rio Puerco and Santa Fe River. By 1885 most hay for regional posts was freighted from Kansas, even though local farmers were raising substantial amounts of alfalfa by this time. Horses, as well as mules and oxen, also required a large amount of corn, grains, and fodder. Horses received 12 pounds of grain daily (Frazer 1983: 50; Keleher 1982: 43; McNitt 1972: 184–185; Meketa 1986: 205–206; Miller 1989: 92–95, 99, 104).

One contractor promised 200,000 pounds of corn for livestock and military men in 1870. For that year, some 77,854 bushels of corn were contracted from local growers by the army. Flour was also procured by the military for soldiers to consume. Flour from grist millers totalled 1.5 million pounds in 1861. About 161,000 pounds of beans were provided by 10 local farmers to regional posts in 1866 (Frazer 1983: 50, 179; Miller 1989: 57–58, 92, 145, 151; Perrigo 1982: 15).

Healing and Hot Springs
Throughout the historic period, Native Americans and Hispanics utilized hot springs in the region for treating various ailments. Ojo Caliente, San Antonio, Jemez Springs, Montezuma, and Coyote Canyon were favorites of later Anglo residents. Some of these springs became sites of health resorts and remain so today (Cahill 1988: 39–45, 55–57, 77).

With the arrival of the first railroad in 1879–80, New Mexico’s reputation as a place to recuperate from certain illnesses and to live a long life began to grow. This belief was based primarily on the sunny, dry climate, relatively mild temperatures, scenic landscape, clean air, and hot and cold mineral springs. All of these were important elements of the territory’s image as a curative environment, and along with Arizona, it became known as the “well country.” Persons suffering from consumption, or tuberculosis, were especially attracted to the region. Tour boosters and railroad officials began to promote the region, and sanitoria resorts were established at Las Vegas, Ojo Caliente, Santa Fe, Jemez Springs, Albuquerque, Coyote Springs, and Socorro. At the end of the century the military built large hospitals and sanatoria at several posts in the region (Williams and Fox 1986).

SUMMARY
Native Americans in the region viewed the landscape, including the Rio Grande, as “sacred.” Their relationship with the environment was meant to be based on harmony with physical and biological elements maintained through ritual and ceremony. This world view, combined with low-level technology, produced impacts on the environment that were considerably less than those of later Euro-American populations.

Major Pueblo villages were generally on or near the edge of floodplains. Seasonal hunting, gathering, or farming camps were usually near the target resource, close to water, as well as to the indigenous human populations of the basin. Prior to Spanish arrival, abandonment of villages due to drought or other factors was relatively common. The outer limits of Pueblo settlement within the
region was shrinking in the late prehistoric period, with populations concentrating in large villages at or close to dependable water sources, such as the Rio Grande.

When the Spanish arrived, they settled at or near Pueblo villages and forced the residents to assist them in farming, livestock raising, and maintaining households and mission churches. New field configurations, irrigation systems (including diversion dams and gates), and crops were introduced. Sheep, goats, cattle, horses, wheeled vehicles, metal tools, firearms, and metal-tipped plows were introduced. These innovations, along with new infectious diseases, brought dramatic changes in Native American populations, lifeways, and landscape. Spanish policies and disease forced even more abandonments and consolidation, with each extant pueblo eventually receiving a grant of four square leagues as its exclusive use area. This represented a much smaller resource area than previously used, but this was offset to some degree by significant declines in population due to European diseases, warfare, famines, and severe droughts.

With acquisition of the horse from the Spanish, nomadic Indian groups extended their range of resource exploitation, including raiding for livestock and agricultural produce. Sheep and cattle provided a more dependable supply of meat than game animals for these groups. Spanish sheep and their husbandry were adopted by the Pueblos, who in turn passed this resource and associated management skills to the Navajo. Sheep not only provided meat but also wool for weaving. Navajo flocks increased over time, while Pueblo sheep raising generally declined, especially over the last 100 years, except at Laguna and Acoma. Grazing around settlements and camps was intensive.

The Pueblos practiced floodwater farming and limited irrigation at the time of early Spanish contact. Through association with these Europeans, the first technique was virtually abandoned for a more intensive and effective diversion-structure-ditch based agricultural system. As production of introduced wheat and traditional corn, beans, squash, and so forth increased, there was less dependence on gathering of wild plant foods.

Although hunting and gathering were no longer as important to the Pueblos as they were in the prehistoric period, these activities remained significant to the Navajo, Apache, and Southern Ute in the region. A variety of mammals and birds provided food, hides, sinew, tool material, skins, and feathers. Wild plants provided food, medicine, shelter, fuel, and arts-crafts materials. Several hundred indigenous species were used by these Indian groups as well as the Pueblos in the study region.

The region also provided an array of rocks and minerals used by Native Americans in the manufacture of tools, weapons, jewelry, pottery, and so forth. Chalcedony, obsidian, jet, galena, malachite, hematite, and turquoise were some of the more important minerals collected and used. Clays from a number of locations were used in making pottery, the most important art-craft endeavor of the Pueblo. Sandstones and limestones were used by groups as tool and building materials.

If one or more of the above resources were not available within a group’s area, they were obtained through trade with another group. Some of the more common materials or goods traded were buffalo and other animal hides, agricultural produce, livestock, pinyon nuts, shell, turquoise, woven items, and minerals.

The Spanish brought an array of new settlement and resource use strategies and technologies, and new attitudes toward the environment. Unlike Native Americans, Spaniards saw themselves as having dominion over nature and superior to the indigenous peoples.

Redistribution of Pueblo lands and distribution of other lands to Spanish settlers were accomplished through land grants. Some of these grants were made to private individuals as encomiendas (17th century) and grazing use (18th–19th centuries). After 1694, most were communal grants made to families who were subsistence farmers and livestock raisers. Water, arable soils, grass, and woodland or forest resources were environmental determinants in selecting and making these grants. Encroachment by Spaniards on Pueblo lands was a continuing problem.

By the mid 1700s most of the best farmlands along the Rio Grande and major tributaries were under irrigation. Adjacent grasslands were supporting more than 135,000 head of sheep, goats, cattle, and horses, not counting those animals herded by the Navajo and Apache. Some one million sheep were being exported annually to Mexican states to the south. By the mid 1800s there were probably three million sheep in New Mexico.

Indigenous woody plants were used locally by the Spanish for house construction, furniture, tools, carts, and fuelwood, to name just a few examples. Wild plants were used as food, medicine, and arts and crafts; these uses were primarily learned from the Pueblos and other Native American groups. Bosque and upland woodlands and forests were sometimes burned to create pastures or meadows. Owing to the limitations of available weapons, hunting was not a major subsistence activity among Hispanics, except for the fall buffalo hunts to the east of the study region. Hides and meat of various other mammals, as well as bison, were commonly obtained through trade with Native Americans.

Although the Spanish made intensive forays in search of mineral wealth, there were few mining operations in the colonial period. Deposits mined by the Pueblo for a considerable time, such as the lead and turquoise, were exploited by Hispanics in the Cerrillos-Las Huertas area. Limited amounts of gold and silver were extracted from lodes in various mountain ranges, the best known being in the Ortiz Mountains. Mica, for window coverings, and copper, made into containers and utensils, were mined on a limited scale. Salt was commonly collected in the Salinas Province and at the confluence of the Chama River and Rio Grande.
Furs and trade over the Santa Fe Trail attracted the first wave of Anglos to the basins beginning in the early 1820s. This marked the beginning of intensive exploitation of beaver and otter, populations of which were decimated or extirpated. The second wave of Anglos began in 1846 with occupation of New Mexico by U.S. troops. Subsequent settlement was generally concentrated in and around existing communities. These soldiers and settlers, like the trappers-traders, brought an environmental view and technology quite different from those of Native Americans and Hispanics; resources were to be exploited for monetary gain. Besides more efficient weapons and steel traps, Anglos introduced steel plows, machine-made fabrics, new cultigens, large numbers of cattle, and new modes of transportation. By 1880, the first railroad had been constructed along the Middle Rio Grande, and intensive settlement on newly surveyed public domain and mining of an array of minerals followed. Several other railroads were completed over the next 3 decades, and extensive forest areas were logged on old grant lands and national forests for construction materials. New mining technologies made extraction more economically efficient but more environmentally destructive. A new judicial system and some unscrupulous lawyers took hundreds of thousands of acres of grant land claimed by Hispanos, much of which ended up under U.S. Government control as public lands in national forest preserves.

A rapidly growing population placed added pressures on resources such as water, grass, timber, fauna, and farmland. When major environmental problems began to appear at the turn of the century, a conservation movement at the federal and territorial (later state) levels began. Depletion of in-stream flows, soil erosion due to overgrazing and clear-cutting, and extirpation of a number of wild animals continued into the early part of this century. During this time the Pueblos and their supporters were engaged in several legislative and judicial “battles” to keep their land base.

Grazing permits and restrictions on logging of public lands followed in the early 1900s and marked the beginning of some environmental recovery. Subsequently, more resource management agencies and regulations were established, especially during and following the 1930s–50s droughts and the environmental movement of the mid-1960s–early 1970s. Major concerns since then have focused on establishing wilderness, endangered species, grazing on public lands, logging, water quantity and quality, and mitigation or preservation of eco-cultural resources (see chapters 4 and 5).

**CHRONOLOGY**

1490–1525  Tonque Pueblo produced virtually all of the lead-glazed pottery used in the Pueblo region (Snow 1981: 363).

1400s–1500s  Pueblos mined and collected turquoise and lead for paint from the Cerrillos area, fibrolite for axes from the southern Sangre de Cristo Mountains, obsidian for tools and weapons from the Jemez Mountains, malachite and azurite for jewelry from various northern mountain ranges, travertine for jewelry (?) from the Los Lunas area, salt for food seasoning and preservation from the Estancia Basin, and Pedernal chert for tools and weapons from the Chama Valley (Snow 1981: 364).

1400s–1680  San Marcos Pueblo, called “Turquoise Pueblo Ruin” by later Tewas, was so-named due to its proximity to Mount Chalchhihuitl, or “Place of Turquoise.” Turquoise, as well as lead, and probably copper were mined here by the Pueblos (Schroeder 1977: 21–23).

1400s– Based on archeological evidence, 54 species of birds were used at Las Humanas and Pueblo del Encierro for meat, feathers, and personal adornment (Snow 1981: 364).

1500–50  A group of mines and quarries along the Cuchillo de San Francisco in the Placitas mining district were worked by Pueblos. Various tools and Rio Grande glaze-paint sherds are associated (Warren and Weber 1979: 10).

1539–40  At first European contact, the Pueblos were growing corn, squash, beans, amaranth, pumpkins, and sunflowers. Corn varieties included flint, dent, flour, sweet, and popcorn (Sando 1992: 43).

1540  (pre) Some Pueblos, who were inhabiting mesa tops, maintained catchment reservoirs. In some instances these were filled by rolling large snowballs into them during winter (DuMars et al. 1984: 7).

1540  (pre) European diseases may have spread north from Mexico to New Mexico via trade routes. By the end of the 16th century these maladies had severely impacted Pueblo and other Native American populations and had caused a decline in trade (Riley 1987: 325).

1540  (pre) The Pueblo Indians used an ancient trail along the Rio Grande, between Taos and El Paso, for travel and trade. This later became the upper Camino Real (Riley 1993: 13–14).

1540  (late October) The main body of the Coronado expedition found a “horn — six feet long and thick at the base as a man’s thigh. It seemed to be more like the horn of a goat than of any other animal” on a river in east-central Arizona (Hodge 1946: 305–306).

1540 fall  Coronado’s livestock caused serious damage to Tiguex Pueblo fields and crops (Flint and Flint 1992: 135).
1540 (fall to 1541) Castaneda reported a large number of cranes (probably sandhill), wild geese, crows, and “starlings” (probably a species of blackbird) in the Tiguex Province. He also noted that there were “a great many native fowl in these provinces, and cocks with great hanging chins” (wild turkey) (Hodge 1946: 353–354).

1540 (December-January 1541) Under siege by Coronado’s troops for 50 days, residents of a Tiguex pueblo dug a well, or cistern, in the village, but the walls collapsed before they found water. Some 30 Pueblos were killed in the cave-in (Hodge 1946: 322).

1540 Castaneda, one of the chroniclers of the Coronado expedition, reported an abundance of turquoise near Pecos. This location was probably the long-exploited deposits at Cerrillos (Northrop 1975: 8).

1540 Alvarado, another one of Coronado’s chroniclers, wrote this description of the Tiguex Province (Isleta to near San Felipe): “This river of Nuestra Senora flows through a broad valley planted with fields of maize and dotted with cottonwood groves. There are twelve pueblos, whose houses are built of mud and are two stories high. They have a food supply of maize, beans, melons and turkeys in great abundance” (Bolton 1964: 184; Hammond and Rey 1940: 183, 255–256). Cotton was being grown by the Tiguex Pueblo (Riley 1987: 234).

1540 The Pueblos gathered “large quantities of herbs ...” (Hammond and Rey 1940: 256).

1540 From first European contact and throughout the historic period, the main items traded by the Pueblos to other Native American groups were corn flour, pollen, and husks; pinyon nuts; turquoise; salt; feathers of eagles, hawks, turkeys, and a number of small birds; and woven baskets and pottery (Sando 1992: 37, 44).

1540–83 Regional pueblos were involved in the manufacture, procurement, and trade of turquoise, cotton blankets, feather blankets, various animal hides, fibrolite axes, lead-glazed ceramics, copper, obsidian, malachite, azurite, and iron ores. The Pueblos were receiving considerable amounts of buffalo meat and hides from the Southern Plains Indians in trade (Riley 1987: 237–243).

1540–94 Spanish explorers noted the abundance, utility, and trade value of furs and skins (Weber 1971: 14).

1540 (ca.) Some 20,000–25,000 acres of land in the Middle Rio Grande Valley were in cultivation by Pueblo villagers (Hedke 1925: 9).

1540–1700 Pueblos were mining lead in the Cerrillos area for use as lead-glaze paint decoration on pottery (Schroeder 1977: 21).

1541 (February 20-March 31) Coronado laid siege to Moho Pueblo in the Tiguex Province. After the snow stopped falling, the Pueblo inhabitants suffered from little or no water. They eventually abandoned their village, and some fought their way through the Spanish lines (Bolton 1964: 219–230).

1541 July Part of the Coronado expedition found a “great deal of food” and “many bowls full of a carefully selected shining metal with which they glazed the earthenware” in two Jemez villages (Hodge 1946: 340).

1541 (summer) One of Coronado’s contingents traveled up the Rio Grande to Taos on a food collecting trip. At this pueblo they found a wooden bridge of large, heavy, square pine timbers spanning the Taos River (Riley 1987: 225–226).

1549 The Spanish Crown deleted the “labor grant” from the encomienda but retained the right of the encomendero to demand tribute of goods or foodstuffs. Spaniards also had the right of repartimiento, that is, to use Indians for limited work time in fields, on ranches, and in mines (Jenkins 1987: 65).


1573 The Spanish Laws of Settlement called for the naming of geographic features and becoming familiar with the foods of an area. Early settlers learned the latter from the Pueblos (Schroeder and Matson 1965: 5). A royal ordinance specified that municipal governments of new settlements were responsible for protecting water supplies, keeping streets clean, and maintaining cemeteries (Simmons 1992: 223). Another ordinance set forth requirements for siting Spanish towns such as “healthful environment, clear atmosphere, pure air, and weather without extremes.” Also, the “land had to be suitable for farming and ranching; there had to be mountains and hills with an abundant supply of stone and wood for building materials and an adequate source of water for drinking and irrigation. Waters inside the town were to be held for the common benefit of the inhabitants, but the source of supply was to be common to all persons” (Engstrand 1978: 323). New laws promulgated by the Council of the Indies declared...
missionization as an important goal, and priests joined soldiers, miners, and settlers in expeditions to exploit human and natural resources (Riley 1987: 23). Guidelines as to how and to whom water and cropland were to be distributed were specified. A subsequent law specified that prior to allocating water for individual residents, the settlement itself should secure its own water needs (Meyer 1984: 29). To protect Indian agricultural fields and villages, Spanish law required that cattle and horse herds were to be no closer than a league and a half (about 4 miles) and farms for sheep and goats at a distance of half a league (1.3 miles) (Engstrand 1978: 323). Another ordinance gave nomadic Indians certain rights or reducciones (reservations) to arable land, water, and wood, and common land for livestock, separating them from Spanish herds (Jenkins 1987: 65).

1573 (December 1-October 1618) The Spanish government defined the areas and rights of the Pueblos (DuMars et al. 1984: 19).

1574 The Mesta, established earlier, was reorganized and passed laws regulating the branding of horses and cattle, the disposing of unbranded livestock, the regulating of slaughter houses, and other related activities. The Spanish government claimed ownership of wild horses and cattle (Dobie 1952: 95–96).

1576–79 The European-introduced plague decimated the Indian population in Mexico, causing a shortage of labor in agriculture and industry (Ringrose 1970: 47).

1581 (August 23) Members of the Chamuscado-Rodriguez expedition were given corn, beans, squash, cotton blankets, and tanned buffalo skins by Piro Pueblos near historic San Marcial. In return, the Spaniards gave the Indians “iron, sleigh bells, playing cards, and various trinkets . . .” (Hammond and Rey 1966: 142).

1581 (early September) At the south end of the southern Tiwa villages along the Rio Grande, the Chamuscado-Rodriguez expedition noted the crops of corn, beans, and squash; they also related that the Pueblos had extensive cotton fields. Also, every man had a pen of 100 turkeys and “small, shaggy dogs,” which they housed in “underground huts” (Hammond and Rey 1966: 83).

1581 (mid September) At the Galisteo pueblos Chamuscado and Rodriguez were told of Plains Apaches to the east who subsisted on buffalo meat in winter and harvested prickly pear and yucca fruit in summer. They lived in buffalo hide tipis and also traded hides, meat, and deerskins for corn and blankets at the Pueblo villages. The buffalo, they said, were “as numerous as the grains of sand in their hands, and there were many rivers, water holes, and marshes where the buffalo ranged.” The Pueblos also said that the buffalo seasonally came within 20–25 miles of their villages (Hammond and Rey 1966: 86–87).

1582 (early) Moving down the Rio Grande on their return to Mexico, the Chamuscado-Rodriguez expedition found “very good veins,” a reference to potential mining locales (Northrop 1975: 8).

1583 (January) Espejo reported “many cottonwood groves and some patches of white poplars four leagues wide” and “quantities of grapevines and Castilian walnut trees” as he traveled up the Rio Grande from the San Marcial area to the Keres pueblos (Hammond and Rey 1966: 219).

1583 (February 1) At the Piro village of San Felipe the Antonio de Espejo expedition recorded its
inhabitants as wearing cotton cloth and tanned deerskin clothing, buffalo hide moccasins, cotton blankets, and turkey feather robes. Espejo’s expedition found corn stubble in Piro fields, which he said “was the salvation of our horses” (Hammond and Rey 1966: 172).

1583 (February 10–12) The Salinas Pueblos had “abundant corn, turkeys, and other supplies” and wore clothes made from buffalo hides, cotton blankets, and “chamois skins.” Their villages were located on the west edge of the buffalo range (Hammond and Rey 1966: 222).

1583 (February) In the Isleta Pueblo area, Espejo found two villages stocked with abundant corn, beans, “green and sun-dried calabashes,” and other “dried vegetables” (Hammond and Rey 1966: 176, 178).

1583 (late February) Near Cochiti Pueblo the Espejo expedition gave inhabitants of the area sleigh (hawk?) bells and “iron articles” for tortillas, turkeys, pinoles, and buffalo hides (Hammond and Rey 1966: 179, 238).

1583 (late February) Espejo noted a magpie in a cage at a Keres pueblo (Hammond and Rey 1966: 223).

1583 (March 5–6) At Acoma, Espejo was given “blankets, tanned deerskins, turkeys, and a quantity of corn” (Hammond and Rey 1966: 182).

1583 (March 7) Luxan, with the Espejo expedition, described Acoma’s irrigated fields at the Rio San Jose: “We found many irrigated cornfields with canals and dams, built as if by Spaniards.” Espejo wrote “These people have their fields two leagues distant from the pueblo, near a medium-sized river, and irrigate their farms by little streams of water diverted from a marsh near the river” (Hammond and Rey 1966: 182, 224).

1583 (March 15–April 7) Espejo noted that the Zunis from Hawikuh were planting their fields. Showers, mainly in the form of snow, fell frequently. The expedition was provided with “plenty of hares and rabbits” (Hammond and Rey 1966: 184–185).

1583 (June) Cottonwoods were growing near Kuaua Pueblo (Riley 1987: 228).

1583 The Espejo expedition reported “antimony” (probably galena) along the Rio Grande Valley, possibly in the Manzano, Caballo, and Organ mountains. At Zia, Espejo was given copper ore from the Jemez Mountains (Northrop 1975: 8).

1591 (January 10–11) Explorer Castano de Sosa recorded that six northern pueblos, including Pecos, Pojoaque, and Nambe, had irrigation ditches. He also found an extensive irrigation system and wood-burning “ovens” at San Ildefonso Pueblo (Riley 1987: 235; Schroeder and Matson 1965: 116–117, 120).

1591 (March 7–16) Members of the Sosa expedition spent 17 days prospecting around San Marcos Pueblo, where they found evidence of silver. Pueblo Indians were mining turquoise and lead in the same area (Schroeder 1977: 22–23).

1591 (March 11) As Sosa approached, the Tiwa Pueblos abandoned their villages on the west side of the Rio Grande, but some could not cross the flooding river (Hammond and Rey 1966: 292).

1598 (pre) The Tewa Pueblo of San Juan had engaged in ditch irrigation of fields over the last 300 years (Ellis 1987: 17).

1598 (late May) North of the Jornada del Muerto, corn was procured from the Piro Pueblo of Qualacu, which helped alleviate the food shortage for the Juan de Onate expedition. Travel continued to be arduous due to the soft, deep sand. The wheels of the supply carts sank to their hubs. As the expedition moved northward, a rainstorm provided needed water, as well as substantially decreasing the air and ground temperature (Simmons 1991a: 105–106).

1598 (June 14) As the Onate expedition continued northward through Piro country, they found the pueblos deserted and the grain storerooms cleaned out by their residents. As the food shortage became more critical, the expedition found an occupied pueblo known as Pilabo on the west side of the river. After the expedition crossed the river, the Pueblos welcomed the Spaniards and gave them a large supply of corn. For this act, Onate named the Pueblo Socorro (aid, help) (Fugate and Fugate 1989: 66; Simmons 1991a: 106).

1598 (June) Onate, leading his army and colonists, marched north from Sevilleta Pueblo and passed many pueblos, mostly abandoned, and fields on both banks of the Rio Grande before reaching Isleta (Hammond and Rey 1953, I: 318–319).

1598 (July) Onate and some of his soldiers learned of Pueblo turquoise and lead mines near the San Marcos Pueblo (Simmons 1991a: 113).

1598 (August 11) Onate initiated the construction of an irrigation system at San Juan using 1,500 Pueblo Indians as laborers (Clark 1987: 13).

1598 (September) Onate learned of a promising
cluster of mines close to the El Tuerto Pueblo, located east of the Sandia Mountains (Simmons 1991a: 150).

1598 (early October) Onate led some of his soldiers southeastward from San Juan along the east side of the Sandia and Manzano mountains to the saline lakes in the Estancia Valley. Besides salt, Onate was also searching for precious minerals in these mountains (Simmons 1991a: 125).

1598 Onate recorded deposits of sulfur and alum, perhaps calcareous tufa, in the Jemez Hot Springs area. One of his commanders, Marcos Farfunn, was sent to explore the Zuni Salt Lake, which he described as having extensive deposits of superior quality (Northrop 1975: 9).

1598 The rotation of crops, common in medieval Europe, was not practiced by the Spanish in New Mexico (Beck 1962: 263).

1598–99 Onate and the Spanish colonists brought churro sheep to northern New Mexico. This breed was small with limited, coarse, long-staple wool, but they were selected over Merino because the churro’s meat was better, its fleece more suited to hand processing, and it could survive drought better than cattle (Baxter 1987: 20). A grass native to Eurasia, sheep fescue (*Festuca ovina*), may have been introduced to New Mexico via the fleece and droppings of these sheep (deBuys 1985: 225).

1598–99 Onate’s colonists complained about living in Pueblo rooms which they found poorly ventilated and infested with bedbugs and other biting insects (Ellis 1987: 19).

1598–99 Chile, tomato, and cultivated tobacco were introduced from Mexico (Simmons 1991a: 66–67).

1598–1608 Reports of silver lode and limited silver mining by various Spaniards were recorded for the Cerrillos-San Pedro Mountains area (Schroeder 1977: 23).

1598–1610 Loss of arable land and food reserves to the Spanish resulted in accelerated development of irrigation agriculture by the Pueblos. Movement of villages to new, more productive sites was almost precluded by the Spanish presence. Some residents of Taos, Picuris, and Santa Clara did temporarily move onto the plains of eastern New Mexico (Snow 1981: 366).

1598–1630 By growing winter wheat brought by the Spanish, the Pueblos extended the farming season, and by adopting livestock, they had to hunt less for meat and hides. The use of cow dung for firing pottery and heating homes may have begun during this period (Schroeder 1975: 53).

1599 (early) Onate moved his headquarters and capital from San Juan to the west side of the Rio Grande to San Gabriel Pueblo. Most of the Pueblo inhabitants left, but some remained to haul water and fuelwood for the Spaniards (Simmons 1991a: 148–149).

1599 (late October) Juan de Onate described the Rio Puerco-of-the-West in the Cabezon Peak area as having many cottonwoods and fairly deep water where he crossed the stream. He named the river “La Torriente de los Alamos” and described the valley as “lush, rich, and fertile” (Lopez 1980: 71, 77).

1599–1600 (late) Onate and his men continued their search for gold and silver. Low-grade silver was found near San Marcos Pueblo and at several locales near the El Tuerto Pueblo close to the east side of the Sandia Mountains (Simmons 1991a: 150).

1599–1680 New Mexico’s governors dominated the export trade in furs and skins, such as buffalo, antelope, elk, and deer (Weber 1971: 18–19).

1600 (post) The area along the east side of the Rio Grande between Alameda Pueblo lands and the Mexia “swamps” was called “Bosque Grande” (Adams and Chavez 1956: 145).

1600–1634 Spanish livestock herds nearly doubled every 15 months (Gutierrez 1991: 57).

1600–1650 The Spanish conquistadores and military officers brought mastiffs and large greyhounds to New Mexico. These “war dogs” were used in combat, which terrorized Native Americans. They were also used in hunting, especially the greyhound (Simmons 1991b: 36).

1600–80 Disputes over land and water rights between the church and state were common during this period (Scholes 1935: 109).

1600–80 The Spanish mined lead for making rifle ball ammunition in the Cerrillos area (Warren and Weber 1979: 8–9).

1600–80 The granting of lands around Pueblo villages and the encroachment of ranches on their land precluded migration as a traditional option in mitigating environmental stress (Snow 1981: 366).

1600–80 About 48,000 acres of irrigated land were brought into production by the Spanish in the Middle Rio Grande Valley (Hedke 1925: 23).
Food shortages continued to cause suffering among the colonists at San Gabriel. Some of the soldiers and settlers began to protest their plight. The priests also spoke out about the maltreatment of the Pueblos (Simmons 1991a: 165–167).

By this year the Spanish colonists in the San Gabriel area had consumed all of the food reserves that nearby pueblos had stored prior to the Spanish arrival in 1598. Both cultural groups were forced to venture greater distances to procure food (Hammond and Rey 1953: 680–688, 693).

The Council of the Indies set encomienda as either a manta or a hide and a fanega (1-bushels) of corn per year for each household (Jenkins 1987: 67).

Spanish carpenters trained Pecos Pueblo men in woodworking skills. The accessibility and diversity of woodlands and forests in the area provided the basis for a vigorous craft over the next 150 years. Carved corbels and vigas, doors, window frames, and furniture were crafted to meet local and regional demands (Kessell 1979: 132–133).

Each resident of Santa Fe received “two lots for a house and garden, two suertes (field lots) for a vegetable garden, and four caballerias (each 100 to 125 acres) for grazing” (Jones 1987: 147).

The supply service caravans, known as conductas, began operating over the Rio Grande route opened by Chamuscado-Rodriguez, Espejo, and Onate expeditions. Known as the Camino Real, this road connected the central and northern Mexico settlements with Santa Fe. Much-needed supplies were brought up this road every 3–7 seven years, usually in 32 wagons escorted by 12–14 soldiers and a herd of livestock and spare draft animals (Moorhead 1958: 28–33).

(early) Under the encomienda system, Spaniards took Pueblo lands for grazing of livestock. Overgrazing and soil erosion resulted. Water was also directed to Spanish fields, causing a shortage for Pueblo crops (Sando 1992: 60).

(early) By this time the Spanish had so disrupted Pueblo agriculture and trade with other Native American groups that they were starving. One Franciscan priest claimed that Pueblos were surviving by eating tree bark and leaves or by mixing dirt and ashes with a little corn (Kenner 1969: 12).

(early–1680) Pueblo residents were forced to collect firewood, salt, and pinyon nuts in large quantities, to prepare hides, and to manufacture cotton blankets, causing stress among the villagers (Snow 1981: 368).

(early–1680) Life expectancy, disease rate, and decrease in stature were all experienced by Pueblo people in the Salinas Province due, in part, to drought and European diseases (Tainter and Levine 1987: 56, 72).

(early–1680) Items exported south from New Mexico included sheep, raw wool, hides (buffalo, deer, and antelope), pinyon nuts, salt, Indian blankets, and El Paso brandy (Moorhead 1958: 49).

Fray Benavides wrote “the abundance of game appears infinite.” He noted that wolves, mountain lions, wildcats, jackrabbits, and cottontail rabbits were numerous. Bighorn sheep were common in the uplands (Ayer 1965: 37).

By this year encomenderos were levying tributes on their Indian charges, usually corn, cotton cloth, or animal hides (Westphall 1983: 4).

(pre) Benavides recorded the destruction of crops by rabbits. The Tewa Pueblos were experiencing famine due to insufficient irrigation water (Hodge, Hammond, and Rey 1945: 39, 69).

The mission supply caravan had four dozen chickens for New Mexico missionaries among its cargo (Schroeder 1972: 55).

Fathers Salmeron and Benavides reported various mineral deposits in north and central New Mexico, including silver, copper, lead, alum, sulfur, turquoise, garnet, and salt (Northrop 1975: 10).

Missionaries successfully cultivated vineyards in the Socorro district. Wines produced included red and white; brandy was also manufactured (Simmons 1991b: 72).

An extensive stand of cottonwoods was found along the Rio Grande in the Albuquerque area. It was known as the Bosque
Grande de San Francisco Xavier. South of this woodland were the open wetlands called Esteros de Mejia (Simmons 1982: 40).


1631 A conducta from Mexico to New Mexico carried 48 domesticated hens for food for those who became ill on the trip (Schroeder 1968: 106).

1630s (early) Grasshoppers and rabbits destroyed crops at various Rio Grande pueblos (Schroeder 1972: 5).

1633 Spanish settlers were establishing farms in Pueblo fields, impacting arable lands by constructing houses, outbuildings, and corrals and introducing livestock (Hackett 1937: 127–131).

1635–37 Governor Francisco Martinez de Baeza forced converted Indians to collect and pack large quantities of pinyon nuts for shipment down the Camino Real (Kessell 1979: 155–156).

1638 A widespread outbreak of European diseases struck Native Americans (Palkovich 1985: 417).

1639 Governor Rosas shipped 122 painted buffalo hides and 198 “chamois” skins south on the mission supply caravan (Weber 1971: 20).

1639–40 Raiding Apaches attacked Rio Grande settlements and burned some 52,000 bushels of Pueblo corn (Gutierrez 1991: 112; Vivian 1964: 25).

1641 Thousands of Native Americans died from smallpox (Horgan 1954; I: 261).

1650–60 Spaniards began mining silver, copper, and lead in the Tecolote area at the north end of the Sandia Mountains (Scurlock 1983: 12).

1600s (mid) Prairie chickens were found in the Salinas Province (Schroeder 1968: 102).

1659 Several Tewa Pueblos complained to the Spanish governor about damage to their crops caused by an encomendero’s livestock (Anderson 1985: 363).

1659 Some priests traded with various Indian groups for pronghorn skins (Weber 1971: 19).

1660 The annual trade caravan, which passed by Tome Hill, included 10 new carts, at least 160 oxen, and more than 60 pack mules. Among the cargo were 1,350 deerskins, buffalo hides, 600 pairs woolen stockings, 300 fanegas of pinyon nuts, salt, and quantities of clothing (Minge 1979: 11).

1660 Governor Mendizabel received a shipment of 23 fanegas of pinyon nuts from Pecos Pueblo (Kessell 1979: 156).

1660 Governor Lopez de Mendizabel shipped 1,350 deer skins and hides to Parral to market. He sent two other large shipments of skins during his term. Some 1,200 pronghorn skins and four bundles of elk skins were found at his property in Santa Fe (Weber 1971: 20–21).

1661 Some 60 Pueblo laborers from Quarai were conscripted by the Spanish to harvest and transport loads of pinyon nuts. Some 40 Indians of Jemez Pueblo were forced by the Spanish to transport pinyon nuts to “deposits” at Santa Fe, Cochiti, and San Felipe. Nineteen Indians from Abo worked for 6 days carrying maize from Tabira and Las Humanas pueblos to the house of Captain Nicolas de Aguilar in the Rio Abajo (Scholes 1937: 394–395).

1661 Pueblos from Tabira harvested salt from a nearby “salt marsh” and transported it to the estancia of Sargento Mayor Francisco Gomez in the Middle Rio Grande. Sixty-three Pueblos carried salt from the east bank of the Rio Grande to Socorro Pueblo (Scholes 1937: 394–395).

1661 An organ for the church at Abo was purchased with money made by selling pinyon nuts (Toulouse 1949: 4).

1662 Encomienda system payments made by Indians at Pecos included 66 pronghorn skins, 21 white buckskins, 16 buckskins, and 18 buffalo hides (Weber 1971: 18).

1663–66 There were 14 estancias in the Isleta-Sandia Pueblo area (Oppenheimer 1962: 12).

1664 Governor Penalosa decreed that “enemy” Indians, even though at peace, would no longer be allowed to enter into the pueblos to trade. This exacerbated significantly Apache food shortages, which led to accelerated hostilities between them and the Pueblos and Spanish (Forbes 1960: 158–159).

1667 Locusts devastated crops, especially at Santo Domingo Pueblo (Kessell 1979: 218).

1660s Lead ores continued to be mined by the Spanish at the north end of the Sandia Mountains in the Tecolote-Las Huertas valley areas (Scurlock 1983: 12).
1671 An unidentified epidemic disease virtually struck every Indian group in the province (Forbes 1960: 166).

1672–79 Tajique, Chilili, Abo, Quarai, and Las Humanas pueblos were abandoned due to drought, which caused loss of crops and interrelated Apache raids (Tainter and Levine 1987: 86–87).

1675–1710 The pueblo and later land grant of Alameda was located on the west side of the Rio Grande. Sometime after this, and before 1769, the river shifted westward, leaving the village of Alameda on the west side of the Rio Grande (Sargeant 1987: 38–40).

1680 (pre) On the east side of the Rio Grande, now part of Albuquerque’s Barelas-South Valley area, there was an area of cienegas and charcos known as the Esteros de Mejia (Simmons 1982: 40).

1680 (pre) The father of Roque Madrid reportedly worked a lead mine near Santa Fe (Schroeder 1977: 24).

1680 A collapse in the Chalchihuitl turquoise mine killed a number of Indian slaves. This may have been a factor causing the Pueblo Revolt later in the year (Tyler 1964: 184).

1680 (August 10) The Pueblo Revolt, caused partly by food shortages due to drought and interrelated raiding by nomadic groups, began (Sando 1979: 195).

1680 (post August 10) Reportedly, Pueblo Indians in the area sealed the gold mine known as the Montezuma Mine during the revolt (Batchen 1972: 36).

1680 (September 13) The Pueblos, who had attacked and skirmished with Otermin’s troops trying to hold the provincial capital, diverted the Santa Fe River away from the Spaniards for 2 days and a night. This loss of water supply was a factor in Otermin’s decision to retreat southward (Hackett and Shelby 1942, I: lxiii-lxiv).

1681 (pre-December) Owing to lack of rain, the northern Pueblos experienced famine and abandoned their villages (Hackett and Shelby 1942, I: cxxxvii).

1681 Governor Otermin discovered that the Pueblos had kept part of the sheep flocks and cattle herds following the revolt of the previous year. This suggested that they had acquired a taste for mutton and beef and that wool had replaced cotton as the preferred material used in weaving (Baxter 1987: 13).

1681 There were domesticated chickens at Puaray and Alameda pueblos (Schroeder 1968a: 106).

1687 (June 4) The Spanish royal cedula defined the areas of land granted to the Indians (DuMars et al. 1984: 19).

1692 (September 4) The Spanish army of the reconquest, led by Diego de Vargas, rested at the abandoned rancho of Felipe Romero near the abandoned Sevilleta Pueblo. This site was selected for its excellent grasses and adequate water (Espinosa and Chavez n.d.: 22).

1692 (late October) Diego de Vargas, who crossed the Rio Puerco west of later Albuquerque, with his reconquest command, noted that the water was so deep that the soldiers had to carry provisions and equipment on their shoulders (Lopez 1980: 71; Twitchell 1963, I: 381).

1692–93 The Esteros de Mejia, which extended along the east side of the Rio Grande from the present Central Bridge to the Barelas Bridge, was the site of a hacienda on the Camino Real. Made up of charcos (small lakes) and cienegas (marshes), which supported lush grasses, sedges, and other forage plants, the esteros was utilized by legal and trespass livestock ranchers. This led to a near fatal altercation among several individuals (Simmons 1982: 10, 40, 87, 112).

1692 (to early 1700) The Pueblo population declined as much as 50 percent due to war and disease (Thornton 1987: 77).

1692 (post) The Pueblo Indians had chickens (Schroeder 1968a: 102).

1693 There was no late summer-fall harvest because of worms and grasshoppers at Santa Ana, San Felipe, and Zia pueblos (Bailey 1940: 95–98).

1693 (late) Governor Diego de Vargas led his reconquest army and more than 800 settlers up the Rio Grande from El Paso to the Middle and Upper Rio Grande settlements (Kessell et al. 1995: 383–387).

1694 (May) Plains Apaches visited Governor Vargas at Pecos Pueblo and presented him three buffalo hides and an elk-hide camp tent as gifts. They promised to bring buffalo, elk, and deer hides to trade in the fall (Weber 1971: 22).

1694 (June) Sixty-four more families from Mexico arrived in northern New Mexico, and their presence exacerbated the troublesome food shortage. Vargas deemed it necessary to raid the pueblos for food, which caused more bitter battles and sieges (Sonnichsen 1968: 71).

1694 (summer) Vargas destroyed the Jemez villages of Astiolakwa and Pebulikwa and collected...
more than 500 bushels of stored corn. Most of the corn was given to the Keresans who had helped the Spanish campaign (Sando 1992: 72).

1694–1700 During the reconquest, or in the first few years following, the Spanish commandeered the lead-ore mines in the Cerrillos Hills for use in making musket balls and perhaps other items. Without lead for making their glaze-decorated pottery, the Pueblos were forced to revert to their old tradition of making mineral pigment paint for decoration (Peckham 1990: 122).

1695 (July 12) The Spanish royal cedula amended the 1687 act by reducing areas granted the Indians (DuMars et al. 1984: 19).

1695 (summer) An infestation of worms ate most of the crops, which contributed to a famine in the following year (Twitchell 1963, 1: 409).

1695 Crops failed at San Juan Pueblo (Whitman 1940: 392).

1695 Two years after resettlement, Spanish families had been reduced to 328 due to an epidemic, hostilities with Native Americans, and desertions (Reeve 1961, I: 302).

1695 A grant of one fanega of planting land and pasture for 200 sheep and 20 cattle at La Cieneguilla was made to Joachim Anaya de Almayor (Wozniak 1987).

1695 (post) A Spanish cart-wagon road, which extended southeast from the Bernalillo area along the west base of the Manzanos, linking springs along a fault line, crossed Abo Pass to the Salinas villages (Simmons 1973a: 148).

1695–1748 Spanish colonists settled on abandoned Sandia Pueblo lands along the Rio Grande, which were fertile and well watered. Most of these settlers were on the west side of the river across from the old pueblo. Following resettlement by the Sandia Indians in 1748 on the east side of the river, the Spanish on the opposite side retained their lands (Clark 1987: 22).

1696 The famine impacted Pueblo and Hispanic settlements. Various wild animals and plants from the valleys and the mountains were eaten (Twitchell 1963, 1: 409).

1696 Under the direction of Vargas, a silver mining camp was established at the former Los Cerrillos settlement, and it was named Cerro de San Marcos. Three mines were worked at this location, located near the deserted pueblo of San Marcos (Schroeder 1977: 24).

1690s Owing to concerns that there were not adequate unclaimed lands and waters to meet the needs of new Hispanic settlements, farms, and ranches, new regulations on the granting and use of these resources were put in place (Bayer et al. 1994: 75–76).

1600s The Spanish mined turquoise on Mount Chalchiuitl, site of prehistoric Pueblo mines (Christiansen 1974: 17).

1600s The Camino Real caravans carried 500 pounds of tallow to lubricate wheels and axles of carts and wagons (Moorhead 1958: 33).

1600s The Jicarilla Apache believed that the bighorn sheep of northern New Mexico were driven from their valley habitat into the mountains by the guns of the Spaniards (Tiller 1992: 22).

1600s Bones of the smallmouth buffalo (fish) were found in archeological sites dating to this period along the northern Rio Grande drainage (Sublette et al. 1990: 222).

1600s (late) Four smelters were operated in the New Placers district by area Pueblos to produce lead glaze for ceramics. Spanish materials for mining and smelting of this ore occurred in the nearby San Pedro Mountains (Warren and Weber 1979).

1600s (late) Obregón wrote that the Rio Grande was “swift and beautiful, surrounded by numerous meadows and farms...” (Hammond and Rey 1927: 291).

1600s (late) Rafts were used to cross the Rio Grande to reach the pueblo of San Felipe located on the west bank of the Rio Grande (Strong 1979a: 392).

1600s (late) The market for buffalo hides in Mexico sharply increased demand. Spanish traders by-passed the Pueblo middlemen and dealt directly with Plains Indians for the hides. Colonists and government agents exerted pressure on the Pueblos to procure even more hides, causing more stress among the villages (Snow 1981: 367–368).

1700 (May 24) Jose Trujillo took possession of a grazing grant on the uplands between Santa Cruz de la Canada and San Ildefonso. Some farmland along the lower Arroyo Seco was also included in the grant (Wozniak 1987).

1700 By this year the Rio Grande-Galisteo Pueblos ceased mining, smelting, and using lead to decorate their pottery. This may have been a result of the Spanish requiring so much lead for ammunition during the reconquest and conflicts with various Native American groups in the 18th century (Schroeder 1977: 24, 31).

1700–1800 About 27,000 new acres were put into cultivation by the Spanish in the Middle Rio Grande Valley (Hedke 1925: 23).
1700–1800  By 1700, there were an estimated 62 acequia madres, and some 102 more were constructed by the end of the period (Clark 1987: 16).

1700 (post) Pueblo agriculture flourished, especially the cultivation of wheat, corn, and other vegetables. Santo Domingo and Cochiti regularly supplied chile, lettuce, and garlic to Spanish villages. Acoma, Laguna, and Zuni had large flocks of sheep (Simmons 1979a: 190).

1703  A grant of arable and grazing lands in the Rio Grande Valley above San Juan Pueblo was taken by Sebastian and Antonio Martin. An acequia madre from the river to their floodplain fields was constructed (Wozniak 1987).

1704–76  The acequia madre at San Ildefonso was constructed of terrones, with the grassy side facing the water. This ditch fed a pool from which the Pueblos irrigated their kitchen gardens (Adams and Chavez 1956: 59).

1706  April  The area settled by the new residents of Albuquerque was known as the Bosque Grande de San Francisco Xavier, which extended along the valley from Old Town to Alameda. The Esteros de Mexico, located just south of Old Town, was avoided by the Mejia settlers (Oppenheimer 1962: 15). The site of Albuquerque was chosen for the availability of good water, tillable land, good grazing grasses, and fuelwood. This location was also selected owing to its being on slightly elevated ground and on the Camino Real and having a good, close ford over the Rio Grande (Simmons 1982: 81–82).

1706  The east bank of the Rio Grande was heavily wooded from modern Ranchos de Albuquerque to below Central Avenue (Simmons 1980: 202).

1709–39  The channel of the Rio Grande between Algodones and Bernalillo shifted westward. The church and several homes at colonial Bernalillo (near present Llanito) were washed away in 1735 or 1736 (Snow 1976: 172–175). Santa Ana Pueblo purchased lands from Spanish settlers at Ranchitos, located on the east side of the Rio Grande, along the north boundary of the Bernalillo Grant. Some of the land was used for irrigation farming, and the remainder was used for livestock grazing. The latter area was covered with cottonwood trees (White 1942: 27).

1710 (January 27) Montes Vigil was given possession of a land grant on the west side of the Rio Grande opposite Sandia Pueblo. Following his failure to settle the grant, Vigil conveyed the land to Captain Juan Gonzalez on July 18, 1712. Vigil began to raise cattle (Adams and Chavez 1956: 152; Eisenstadt 1980: 2–3).

1710  The earliest mine registered in the region was the San Miguel, located about 38 miles south of Santa Fe (Warren and Weber 1979: 9). (post) The Rio Grande, then located east of Alameda, began shifting westward. By 1768 the channel had moved to its present location, placing the village of Alameda on the west side of the river (Sargeant 1987: 38–39).

1700s  (early) Because of continuing flood damage to their agricultural fields, Santa Ana Pueblos began buying land along the Rio Grande where they established ranchos. They moved to these new settlements from spring planting to fall harvest and then returned to the old pueblo for the winter. Later, in the next century, these Keresans established permanent residence at the Ranchos de Santa Ana and returned to their Jemez River pueblos only for ceremonies (Kessell 1980: 168).

1700s  (early) The Rio Grande shifted its channel and at times ran east of Bernalillo, Alameda, and Albuquerque. After 1720 the Bernalillo church was washed away by a flood (Chavez 1957: 3).

1700s  (early) Overgrazing had become a problem around the older plazas such as Atrisco, Albuquerque, and Corrales (Baxter 1987: 24).

1700s  (early) Grasses and other wetland vegetation were abundant in the cienega located in the eastern part of Santa Fe. This was a special use property, where these plants were “mowed” and fed to the horses of the presidial troops, who escorted town residents to the mountains, where they collected fuelwood or timber (Ebright 1994: 90).

1700s  (early) A decree by the governor declared that every Santa Fe area farmer had to allow livestock from the community to graze on crop stubble from just after harvest until spring planting (Ebright 1994: 90).

1700s  (early) The recently arrived Comanches raided Jicarilla, Lipan, and Mescalero Apache villages at or just after the fall harvest (Dobyns 1973: 17–18).

1700s  (early) The Pueblos, who became allies with the Spanish against the Apache, Navajo, and Comanche, performed as scouts, interpreters, and informants, as well as soldiers. They made reports to the Spanish commanders on weather, field food sources, water, and topography (Sando 1992: 80).
1700s (early to mid) The dispersed Spanish settlement in the Chama Valley was due in part to the topography, vegetative communities, and lack of adequate tools. Benchlands of pinyon-juniper above the river could not be cleared easily, so cultivated lands were located on the narrow disjunct, floodplain plots (Swadesh 1974: 133–134).

1712–14 Spanish settlers took possession of agricultural land on the lower Chama River, which was planted in corn. The town of Chameta (Chamita) was founded here (Wozniak 1987).

1712–76 Albuquerque was a string of farms along the east side of the Rio Grande, from Alameda to south of the village plaza (Simmons 1980: 203–204).

1713 A mine in the Sierra de San Lazora in present Rio Arriba County was registered with the governor (Northrop 1975: 13).

1714 The Neustra Senora de los Reyes Linares mine was registered to Miguel de Coca. It was located on the San Lazaro Mountain at El Tuerto (Warren and Weber 1979: 9).

1716 Spanish resettlement of the Valencia area began. Antonia Sandoval y Manzanares received a grant of land that had been the encomienda of Juan de Valencia before the Pueblo Revolt. Apparently, Valencia had transferred the title to his estancia-encomienda to Sandoval’s husband before the revolt. This grant included the Pueblo of San Clemente, later the site of Los Lunas (Espinosa and Chavez n.d.: 30, 53; Wiseman 1988: 17).

1716 A grant of grazing and agricultural lands was made near the abandoned pueblo of San Clemente, south of Isleta Pueblo. Another grant in the area, located on the west side of the Rio Grande, was made to Antonio Gutierrez, who farmed and ran livestock on the lands (Wozniak 1987).

1717 A grant was made for a lead mine located five leagues from Santa Fe between Cienega and La Cieneguilla. This mine may have been located at the late 19th century mining camp of Bonanza (Schroeder 1977: 24–25).

1718 (May) Diego de Padilla received a land grant located east of the Rio Grande and south of Isleta lands. Padilla grazed sheep here until 1751. This was the later site of Peralta and the Juan Antonio Otero home (Espinosa and Chavez n.d.: 64; Taylor 1989: 4–5).

1718 Spanish livestock encroached on fields belonging to San Juan Pueblo. The governor ordered ranchers to remove their stock from the Indian land. The Leyes Reales specifically forbade such trespass (Baxter 1987: 23–24).

1719 Localized smallpox epidemics occurred (Thornton 1987: 79).

1720 (ca.) Santa Ana Pueblo potters began to use fine river sand as a substitute temper for crushed basaltic rock used at nearby Zia (Frank and Harlow 1990: 101–102).

1720–30s Settlement of grazing and farming lands along the Rio Chama, upstream from Chamita, occurred (Wozniak 1987).

1722 Captain Antonio Cobian Busto reported “From the city of San Felipe el Real [Chihuahua] to Santa Fe in New Mexico...there are innumerable valleys, streams, and plains, very rich and suitable for breeding cattle and sheep, and sowing wheat, corn, and other foodstuffs...” (Baxter 1987: 19).

1722 Gold was mined at La Mina del Tiro in the Cerrillos Mountains (Christiansen 1974: 17; Northrop 1959: 46).

1726 Pedro de Rivera visited the Valencia area noting spacious, fertile valley land with extensive cottonwood bosques. He passed several ruined ranches in the Valencia area that were still uninhabited following the Pueblo Revolt (Rivera 1946: 51).

1726 A measles epidemic struck Zia, Jemez, and Santa Ana pueblos. This may have been a factor in the rebellion of residents, who fled to nearby mesa tops (Swadesh 1978: 42).

1727 The Tafoya family received a grazing lands grant along the Canada de Santa Clara, above the Pueblo of Santa Clara. Over much of the rest of the century there were disputes between the settlers and the Pueblos over water rights to the Rio Santa Clara (Wozniak 1987).

1727 (December) Measles killed 109 Jemez Pueblo Indians (Stockel 1993: 34).


1728 Comanches “discovered” a better route over the Sangre de Cristo Mountains from the Arkansas River Valley to Taos. This trail followed a branch of the Huerfano River to the Sangre de Cristo Pass, down Sangre de Cristo
to the San Luis Valley, and south to Taos (Lecompte 1978: 57).

1731
(January) Bernardino de Sena and Luis Lopez took possession of grazing land at the abandoned pueblo of Cuyamungue (Wozniak 1987).

1731
Taos leaders lodged a complaint against Spanish settlers, who had encroached on Pueblo lands and were using their brands on Indian livestock (Gunnerson 1974: 216).

1731–35
Settlers in the lower Chama River Valley and the Santa Cruz area, facing shortages of farm and grazing lands, as well as water, petitioned for and received grants higher up the Chama (MacCameron 1994: 29).

1730s
(early) Jose de Riano obtained rights to grazing lands in the Piedra Lumbre Valley (Wozniak 1987).

1733
Localized smallpox epidemics occurred (Thornton 1987: 79).

1734
(May 30) Ten settlers took possession of a grant of agricultural lands along the Rio Chama at Abiquiu (Wozniak 1987).

1735
Various settlers received land grants for farming and grazing in the Abiquiu-Piedra Lumbre area (Wozniak 1987).

1735
The Galvan ranch, located near Zia Pueblo, had 700 sheep, 18 cattle, and an unknown number of horses (Swadesh 1978: 43).

1736
(early) Five Albuquerque farmers requested that the alcalde allow them to move their livestock back to the Isleta area, where better grazing conditions existed (Baxter 1987: 24).

1738
Smallpox killed 26 young children in 18 weeks at Pecos Pueblo (Kessell 1979: 378).

1739
(July 30) A grant of about 122,000 acres was made to petitioners from Albuquerque, who said they had a scarcity of wood, water, and pasture and could not extend their farmlands or livestock range “on account of the many footpaths encroaching upon us” (Ellis 1955: 9; Espinosa and Chavez n.d.: 29, 92; Twitchell 1914: 285). The boundaries of the Tome grant were the Rio Grande on the west, Los Tres Alamos on the south, the “main ridge” of the Manzano Mountains on the east, and a cienega on the north side of Cerro de Tome (Ellis 1955: 92).

1739
Vicente Duran y Armijo claimed he suffered crop failure along the Santa Fe River due to a scarcity of water (Wozniak 1987).

1739
Nicolas Duran y Chavez received a grant of grazing land between the Rio Grande and the Rio Puerco, south of the Gutierrez grant (Wozniak 1987).

1739
(post) Along a fault line at the west base of the Manzano Mountains were three communal springs—Los Ojuelos, Ojo de Alamita, and Ojo de los Barrendos. Livestock owned by Tome residents watered here, and a small acequia carried water from these springs to watering tanks constructed some distance to the west on the bajada (Ellis 1955: 103).

1730s
(to early 1742) Pedro Sanchez claimed that wolves attacked and bit his shepherders on the Ramon Vigil grant and caused him to remove his sheep (Ebright 1994: 229).

1740
(November 15) The governor granted land to settlers who founded Belen, Jarales, and other area communities. Ditches from the Rio Grande to fields were dug with palas de palo (wooden shovels). The uplands along the Rio Puerco-of-the-East and the Manzano Mountains were common lands for grazing livestock, collecting fuelwood, and hunting (Espinosa and Chavez n.d.: 33–36, 75–78).

1742
Due at least in part to the drought of the previous decade, all of the Rio Grande Pueblo refugees (except residents of Hano) fled the Hopi area and returned to their former villages on the river (Adams 1981: 326).

1742
Nicolas Ortiz received the Caja del Rio grant of grazing lands on the east side of the Rio Grande and along the lower reaches of the Santa Fe River (Wozniak 1987).

1742
Several grants of agricultural lands along the middle Santa Fe River were made (Wozniak 1987).

1743
(September) Four residents of Chimayo received grants of arable and grazing lands near Cundiyo (Wozniak 1987).

1743
Land grant settlements of farm and grazing lands were made along the lower Rito de Ojo Caliente (Wozniak 1987).

1744
A grant of agricultural and grazing lands, north of Cochiti Pueblo, on the west side of the Rio Grande was made to Juan Jose Moreno (Wozniak 1987).

1744
Albuquerque experienced an infestation of moths, which were eating large stores of raw wool. Fortunately, a buyer from Mexico City arrived and purchased the wool before the insects destroyed very much (Simmons 1982: 114–115).

1744
Valley cottonwoods extended more than 10 miles along the Rio Grande around Alameda (Galvin 1972: 58).

1744
Several mines near Picuris Pueblo were registered with the governor (Northrop 1975: 15). Abundant irrigation water produced good

1747 (August) All settlements west of the Rio Grande were attacked by nomadic Indians (Swadesh 1974: 35).

1747 Localized smallpox epidemics occurred (Thornton 1987: 79).

1748 (April 5) A grant was made to Sandia Pueblo by the Spanish governor. The grant was bounded on the west by the Rio Grande and on the east by the “ridge of the Sandia Mountains” (Brayer 1938: 68–69).

1748–71 Almost 4,000 Spaniards and Pueblos were killed by Apaches, Navajos, and Comanches in New Mexico (Thomas 1932: 6).

1748–1846 Sandia Pueblo lost a significant portion of its lands to Hispanics owing to its fertility and available water (Clark 1987: 22).

1749–54 Gold was mined in the Cerrillos area southwest of Santa Fe (Workers of the Writers’ Program 1940: 71).

1740s Comanches, Apaches, and Utes frequently raided villages, fields, and livestock herds in the study region. The eastern frontier north of Albuquerque was depopulated (Sonichsen 1968: 77).

1750 (pre) Santa Ana Pueblos began acquiring better farmlands along the Rio Grande because their fields near the pueblo were periodically destroyed by Jemez River floods (Kessell 1980: 168).

1750 By this year Albuquerque and nearby communities were experiencing some pressures of overpopulation. Suitable agricultural land was taken, and livestock overgrazed some pastures and outlying rangelands. Outmigration to “new” lands, such as the Rio Puerco-of-the-East, began (Simmons 1982: 106–107). The bajada between Albuquerque and the Sandia-Manzano mountains was virtually denuded of grass by livestock (Simmons 1988: 7).

1750–1820 Problems due to overgrazing in the Upper and Middle Rio Grande basins were exacerbated by “hostile,” nomadic Indians and denial of land grant petitions by government officials (MacCameron 1994: 22–23).

1700s (mid) Intensive livestock grazing and fuelwood cutting led to decimation of vegetative cover and soil erosion along Abiquiu Creek. Water from the stream tasted and smelled like cattle manure (McDonald 1985: 120).

1700s (mid) The Jicarilla Apache were confined to the northern mountains by the Comanches and other Plains Indians. As a result, the Apache were unable to hunt buffalo and large game on the plains to the east. Game in the mountains became increasingly scarce due to Indian and Spanish hunting pressure. At the same time, arable land in mountain valleys was increasingly occupied by Spanish settlers (Gunnerson 1974: 237).

1751 Governor Velez Cachupin noted that because of overpopulation of Santa Fe, some town farmers had no agricultural land or water for irrigation. To help remedy this problem, he approved the Las Trampas grant to the north of Santa Fe (Ebright 1994: 146).

1752 Juan de Gabaldon received a grant of arable land on the Rio Tesuque. He had been unable to find farmland near Santa Fe because of a scarcity of irrigation water (Wozniak 1987).

1753 (October 21) Several Albuquerque families, seeking adequate grazing for their livestock, petitioned the governor for a grazing grant on the Rio Puerco (Simmons 1982: 106–107).

1753 A ranch near Zia Pueblo had 330 goats and sheep, 42 cows and calves, 38 heifers and steers, 3 bulls, 6 oxen, 31 mares and stallions, a jenny, and a jack mule (Swadesh 1978: 43).

1753 Governor Cachupin ordered Spanish settlers near Taos to fence their farms to keep their stock off of traditional Pueblo grazing lands (Baxter 1987: 24).

1754 Faraon Apaches raided the Albuquerque area from the Sandia Mountains and via the Bocas de Abo at the south end of the Manzano Mountains (Thomas 1940: 143).

1754 A priest reported that there were “fine melon patches” and fields that produce several “fanegas of wheat and one cuartilla of corn” at Cochiti Pueblo (Lange 1959: 86).


1757 There were 112,182 sheep and goats, 16,157 cattle, and 7,356 horses in Spanish New Mexico (Baxter 1987: 42).

1758 A Spanish government decree required landholders to provide proof of title to retain land and water rights to their property (Clark 1987: 12).

1750s (to 1760) Major Spanish settlement of lands along the middle and upper Rio Puerco and on the south and west sides of the San Mateo Mountains occurred (Wozniak 1987).
1750s (to 1760s) Clemente Gutierrez, a wealthy trader and rancher, suffered heavy sheep losses on lands along the Rio Puerco-of-the-East. These losses were due to a parasitic skin disease of sheep known as scab (lepe), as well as Navajo raids, which intensified into the 1770s (Baxter 1987: 48).

1760 Bishop Tamaron, with all of the people in his entourage, and the livestock, were ferried across the Rio Grande at El Paso on a raft pulled by Indian swimmers (Jones 1979: 144).

1760–61 Residents of the Belen grant claimed to “have suffered many hardships in order to drive the enemy away from this frontier [such as] eating rats, badgers, and wild herbs” (Ebright 1994: 7–8).

1761 (May 4) The Los Quelites, or San Francisco del Valle, grant was made. This land bordered the Tome grant (Pearce 1965: 92).

1763 (July) Santa Ana Pueblo paid “more than 67 cows and calves, 8 bulls, 29 oxen, 50 sheep, 74 goats, 8 horses, 3 mules, 1 mare, 1 colt, 2 new bridles, 4 blankets, and 1 pot” to Bernalillo residents for a tract of land lying between the river and the base of the Sandia Mountains (Bayer et al. 1994: 80).

1763–64 Two grants for silver mines in the Cerrillos area were made; one was known as Nuestra Senora de los Dolores (Schroeder 1977: 25).

1764 (October) The town council of El Paso and the Suma Indians of San Lorenzo had a dispute over the latter’s common woodlands south of the villa of El Paso. Hispanics had used the land in gathering building materials (latias and vigas), fuelwood, and willows used to construct diversion dams. Additionally, Spanish sheepherders were grazing their flocks on Suma land and were setting fire to trees and shrubs to produce better grazing ranges. The governor ordered the El Pasoans to stop their use of the land and to plant trees and willows, graze their livestock, and gather firewood on their own common lands (Ebright 1994: 5).

1765 Eight residents of the Los Quelites grant on the Puerco and San Jose rivers requested Governor Capuchin’s permission to withdraw from the grant, claiming that there was insufficient and salty water in the two streams. Water from springs and a cistern were used for watering their corn, chile, and cotton (Ebright 1994: 10).

1766 (August 15–16) Lafora continued to travel north up the east bank of the Rio Grande. His expedition reached Las Nutrias, then Tome, passing over “a good level road.” The population of Tome was given as 70 Spanish residents. Lafora noted that “all kinds of grain abound, as well as sheep, and there is plenty of good pasture everywhere in the vicinity.” On the next day he traveled 10 leagues north over “a plain extensively forested with poplar trees along the river’s edge” (Kinnaird 1967: 89–90).


1767–70 Governor Pedro Fermin de Mendinueta issued 15 land grants during his administration. He instructed the appropriate alcalde to survey the grant and place “permanent” markers on the boundaries, usually mounds of stone and mud. On the Paulin Montoya grant each family head was given 70 square varas of land for a house and corral and 300 square varas for planting. At the request of Santo Domingo and San Felipe pueblos, Mendinueta allotted each of them a league of land for cultivation between the grant lands of the two pueblos. He reserved the remaining land and water for use by both pueblos (Patrick 1976: 10–11, 13).

1768 (April) Residents of Atrisco received a grant of grazing lands to the west, along the Ceja de Puerco (Wozniak 1987).

1768 The Marques de Rabi recommended that new presidios be located at sites with adequate water and grazing land for the horses (Meyer 1984: 96).

1768 Six families were granted land on Vallecitos Creek in the Jemez Mountains. In 1776 the settlement was known as San Toribio del Vallecito, inhabited by 11 families (Adams and Chavez 1956: 181–182).

1768–72 Some 170 inhabitants were killed, and 7,000 horses and mules stolen, by raiding Indians in New Mexico (Thomas 1932: 5–6).

1773 Governor Meninueta reported that the Pueblos produced abundant crops, especially grains, which Spanish settlers and government officials could purchase when needed. The Pueblos were raising maize, wheat, and vegetables; Santo Domingo and Cochiti were also growing lettuce, chili, and garlic. They were supplying Spanish residents in the area with these and other garden crops. Also, the western Pueblos were successful sheep raisers and wove fine...
woolen blankets. The governor repeatedly warned Spanish residents to keep cattle and horses at least 3 leagues (about 8 miles) from Pueblo fields, but the rule was commonly violated, and their farmland was constantly damaged by untended livestock (Simmons 1979a: 190).

1775 (June 23) A major Comanche raid on Sandia Pueblo destroyed all of the crops and livestock and resulted in the death of 32 residents (Chavez 1957: 3). These Comanches also raided Alameda, then fled eastward to the Galisteo area. They took refuge in a narrow canyon with a trench filled with trees and rocks. Behind this fortification were more smaller trenches, concentrically arranged with a dug well in the center. Here the Comanches held off a Spanish-led contingent, which withdrew from the conflict (Thomas 1940: 181–182).

1775 Comanches attacked Belen and other settlements (Espinosa and Chavez n.d.: 93).

1775 So many mares were stolen by nomadic Indians that the Spanish could not breed more horses (Loomis and Nasatir 1967: 17).

1776 Bernardo Miera y Pacheco, an officer of the Royal Garrison at Santa Fe, made the first detailed map of New Mexico (Espinosa and Chavez n.d.: 37).

1776 (pre) There were “good orchards of fruits such as pears, grapes, peaches, and others that had resisted the cold...” at Santa Cruz. Beans and chile were not being raised at Picuris Pueblo owing to the short growing season; also, corn was sometimes killed by the cold. There were three agricultural fields in which wheat, green vegetables, and corn at Nambe Pueblo were planted. San Juan Pueblo maintained “fertile” agricultural fields on both banks of the Rio Grande for a league above and a league below the village. The pueblo usually harvested 60 fanegas of wheat, about 30 of maize, and some legumes. Five small fields at Santa Clara Pueblo yielded a fanega of wheat in each, or an almund of corn. Three other small plots produced “legumes.” At San Ildefonso Pueblo there were five fields, which usually yielded 30 fanegas each of wheat, maize, and legumes. Water was carried in a ditch from “a little swamp” to a “great pool,” water from which was used to water a garden and a small field. Wheat, corn, legumes, green vegetables, melon, watermelons, and apricots were cultivated at Santa Fe. Agricultural fields at Cochiti Pueblo were productive, especially those along the east side of the Rio Grande, downstream from the village (Adams and Chavez 1956: 41, 55–56, 69, 83, 88, 90, 98, 103, 117, 142, 157, 159, 163, 165).

1776 (pre) The mission at San Felipe Pueblo had fields on both sides of the river, a league upstream and a league downstream from the church, and a large “kitchen garden” across the Rio Grande. They had yielded “many good crops” (Adams and Chavez 1956: 163, 165). The apricots, peaches, and grapes at Sandia Pueblo were killed by frosts in most years.

1776 The altar screen at San Gerónimo de Taos church was “painted with earth as iridescent as cinnabar and flowered with mica” (Adams and Chavez 1956: 103).

1776 The Galisteo Pueblo and mission had about a square league of farmlands, and almost all was dry farmed. One plot of land to the west of the village was irrigated by water from the Nieto spring. The drought and Comanche raids had caused many of the residents to flee. Those who remained were eating the “hides of cows, oxen, horses, etc., in a sort of fried cracklings, and when they do not find this quickly they strip the vellum from the saddle trees or toast old shoes. They do not have one cow; there is not a single horse.” Jemez Pueblo grew wheat and corn, raised hogs, and fed their livestock corn stubble and husks. Their harvests were normally 60 fanegas of wheat and 40 of maize. Bernalillo, located about 2 leagues north of Sandia Pueblo, consisted of scattered ranchos and “not very good lands” irrigated by water from the Rio Grande. Across the river, to the west, was upper Corrales, and it too was made up of scattered ranchos and relatively poor lands. Agricultural fields of Sandia Pueblo extended along the east side of the river, a league above and a league below the village. The upper fields, which were sandy, were not as productive as the lower fields. Crops were watered by irrigation ditches from the Rio Grande. The mission at Albuquerque had fields that yielded 100 fanegas of maize, 50 of wheat, 16 of beans, 16 of other legumes, 30 strings of chile, and a cartload of onions. Good crops were harvested from the fields of the village and from the orchards of apricot, peach, apple, and pear and from the vineyards. The village was located “about two musket shots” from the Rio del Norte. Owing to the sandy soil, the fields at Atrisco were not productive, although they yielded “reasonable
crops” because of the intensive efforts of resident farmers. Farmlands and crops at Isleta were similar to those at Atrisco and Albuquerque. The Isleta Pueblo were farming the entire floodplain a league upstream and a league downstream from the village. These fields produced “very copious crops.” There were also “many orchards of fruit trees as well as vinestocks, and they usually make a little wine.” Peaches, wheat, corn, and cotton were also raised. Father Dominguez noted that Valencia was the place of the 17th century hacienda of Francisco de Valencia. A settlement of ranchos totalling 17 families, some 90 persons in all, was situated on a “meadow.” Belen had good, irrigated farmlands that yielded “copious crops.” According to Dominguez, the farmlands at Sabinal were better than those at Belen (Adams and Chavez 1956: 103, 142–144, 151, 153, 154, 179, 205, 207–208, 217, 312–313).


1777 (summer) A Comanche raid on Sandia Pueblo killed 32 residents and destroyed all of their crops and livestock (Chavez 1957).

1777 Twenty-three persons were killed in an Indian raid on Valencia (Taylor 1989: 3).

1778 An Apache raid on Tome killed 30 people. Isleta Pueblos came to their rescue and prevented destruction of the town. Surviving residents took refuge in the church (Espinosa and Chavez n.d.: 17; Taylor 1989: 3).

1778 The lands at El Sabinal were so fertile that the citizens of Belen requested permission from Governor Mendinueta to begin farming there (Simmons 1977a: 35).

1778 Genizaros commonly hunted deer for their subsistence meat (Simmons 1977a: 34).

1779 There were 69,366 sheep, 7,676 cattle, and 1,773 oxen in the province (Simmons 1988: 7).

1770s Spanish livestock, left untended, caused constant damage to Pueblo fields (Simmons 1979a: 190).

1770s Domesticated chickens were well established in New Mexico (Schroeder 1968: 107).

1780–81 A smallpox epidemic struck New Mexico following the drought of the previous 3 years. This disease and the resulting famine resulted in the death of 5,025 Pueblo Indians, which constituted more than a quarter of New Mexico’s population (Kessell 1979: 348; Simmons 1966: 79; Workers of the Writers’ Program 1940: 69). As a result of the smallpox epidemic, eight Spanish missions were reduced to visitas (Bloom 1913b: 135). Some 500 Indians died in a 2-month epidemic of smallpox at Santa Clara and San Juan (Arnon and Hill 1979: 296). About one-third of the residents of San Juan Pueblo died during the smallpox epidemic (Ortiz 1979: 281). Smallpox killed 142 residents of Santa Fe (Stockel 1993: 34). A smallpox epidemic struck Galisteo, causing abandonment of the pueblo. Most survivors emigrated to Santo Domingo; some appeared at Pecos Pueblo in the 1790s (Kessell 1979: 543). More than 250 residents of Santo Domingo died of smallpox (Stockel 1993: 34). There were 130 deaths recorded at San Felipe Pueblo; almost all of these were smallpox related (Simmons 1966: 322). Following the decimation of Santa Ana’s population during the severe outbreak, the pueblo was reduced to a visita of the Zia mission (White 1942: 28). A severe smallpox epidemic killed a number of Spanish settlers at Bernalillo (Chavez 1957). Albuquerque lost 31 citizens to the disease, and San Felipe recorded 130 deaths (Simmons 1966: 322). The epidemic swept across Navajo country, causing a noticeable decrease in the Navajo population. This disease was perhaps a factor in the abandonment of portions of the Navajo region (Brugge 1968, 1986: 142).

1781 (February 23) The Spanish government issued a decree expressly prohibiting the unlicensed sales of real property by Indians (DuMars et al. 1984: 19).

1782 Residents of Santa Fe received a grant of grazing lands along the Galisteo River (Wozniak 1987).

1782 Fray Morfi reported that Santo Domingo Pueblos cultivated cotton (Thomas 1932: 99).

1782 Albuquerque was described as a rancheria-style settlement extending along the Rio Grande Valley for about 2.5 miles. Agricultural fields extended for almost 20 miles along the banks of the Rio Grande. Much of the farmland was fallow because of Indian raids. Scarcity of wood forced residents to use horse manure for fuel (Thomas 1932: 101).

1782 Fray Morfi reported that “a long time ago large haciendas” existed at the spring of El Espiritu Santo but were subsequently deserted (Thomas 1932: 100).

1782 A Spanish trader brought a parrot into New Mexico for the Indian trade (Thomas 1932: 113).

1782 Santa Fe had plenty of farm and range lands, but the river was “poor and can only fertilize some fields” (Thomas 1932: 92).
1782–94  Galisteo Pueblo, resettled by Tanos after the Pueblo revolt, was abandoned for the final time due to disease and raids by Comanches and Plains Apaches (Dozier 1983: 64).

1785  Eight residents of the Los Quelites grant on the Puerco and San Jose rivers requested Governor Capuchin’s permission to withdraw from the grant, claiming that there was insufficient and salty water in the two streams. Water from springs and a cistern were used for watering their corn, chile, and cotton (Ebright 1994: 10).

1788  A grant of agricultural lands at the confluence of the Rio Jemez and Rio Guadalupe was made (Wozniak 1987).

1788–89  A smallpox epidemic caused Pueblo population losses up to 50 percent (Thornton 1987: 7).

1789  Governor Concha believed that the range in northern New Mexico would support more sheep, so he prohibited the slaughter or exportation of ewes to increase flocks. A rapid increase in the number of sheep between that year and the early 1800s occurred as a result (Bailey 1980: 111).

1790  New land grants were made in the Santa Fe area and along the Rio Jemez (Wozniak 1987).

1790  There were some 927 farmers, 113 persons associated with livestock raising, and a few hunters in the province (Jones 1979: 133–134).

1790  There were 120 households in Tome. Occupations listed in the census included, in order of importance, farmers, livestock raisers, carpenters, and shepherders. Seven weavers, two tailors, two carders, and a silversmith were also listed. Some woven goods were shipped south over the Chihuahua Trail for trade (Espinosa and Chavez n.d.: 95; Minge 1979: 21).

1790  Two residents of Santa Fe were listed as lumbermen (Olmstead 1975: 68, 75).

1791  Twenty-four adults and 21 children died from smallpox at Nambe Pueblo (Stockel 1993: 54).

1791  (post) A bridge was constructed at Belen using sacks filled with heavy rocks and sunk in the Rio Grande. Vigas, hauled to the site by oxen, were laid on the sacks to form the superstructure (Jones 1979: 144).

1793–1846  Periodic epidemics of infectious diseases accounted for 30 percent of all Catholic deaths recorded in the Tome parish. All of the deaths were children under the age of 13 (Baca and Baca 1994: 5).

1794  The San Miguel del Vado land grant was approved by Governor Chacon; he also distributed irrigated tracts to 48 Spanish heads of families (Hall 1984: 4–5).

1795  (February) Twenty Spanish families took possession of agricultural lands at Cieneguilla on the Rio Grande above Embudo (Wozniak 1987).

1796  Grants of land were made to settlers at Santa Barbara, La Canada, and San Fernando de Taos (Wozniak 1987).

1798  Spanish settlers living in the San Diego and Guadalupe canyons received a grant north of Jemez Pueblo. Later, 110,000 acres were confirmed by the Surveyor-General of New Mexico (Leonard 1970: 110).

1799  (November to March 1800) Smallpox epidemics struck north and central New Mexico (Stockel 1993: 35).

1799  (post) Mestizos and genizaros from the Belen area moved to San Miguel del Vado in search of good farmland (Jones 1979: 116–117).

1700s  (late) Settlers on community land grants employed more intensive use of land near streams for agriculture and homes. Less intensive exploitation of resources, such as livestock grazing, was practiced away from these water courses onto the common lands. Encroachment of livestock onto crop fields was a fairly common problem (Ebright 1994: 26).

1700s  (late) Animal hides and tallow were frequently shipped down the Camino Real to Chihuahua and Durango (Weber 1971: 21).

1700s  (late) Santa Ana residents were using “boats made of logs from the Jemez Mountains tied with rawhide and sealed with a mixture of pinyon pitch and crushed bark” to cross the Rio Grande between their village and agricultural fields east of the river. These craft were tied to “huge cottonwood trees on the east bank of the Rio Grande.” Near these fields the “farmers built small huts of cottonwood, in which they stored their tools and supplies” (Bayer et al. 1994: 81).

1700s  Ranchers and farmers traditionally raised sheep rather than cattle because nomadic raiders could more easily and quickly drive the latter away in their escape. Also, when attacked, herders would scatter the sheep to reduce losses. Goats were raised in areas where the grazing terrain was rougher, such as those in the Sandia Mountains (Montoya 1983; Simmons 1982: 114).

1700s  Owing to poor soils, the pueblos of Santa Ana, Zia, and Jemez experienced little land encroachment by Spaniards (Clark 1987: 22).
By this year, an estimated 164 acequias madres were in use (Clark 1987: 16).

By this year Bernalillo farmers were known for their abundant produce, especially grapes (Chavez 1957).

A grant at a mine location known as San Pedro in the San Pedro Mountains was made (Schroeder 1977: 25).

New Mexico sheep raisers annually drove about 30,000 sheep south for sale in Nueva Vizcaya, Sonora, and Sinaloa (Coues 1987, 2: 739).

About 25,000 new acres were placed in cultivation in the Middle Rio Grande Valley (Hedke 1925: 23).

The first Merino sheep were brought into New Mexico (Baxter 1987: 21).

Cultivated tobacco was smoked or dipped as snuff. Dipping was practiced by most of the clergy (Simmons 1991b: 165).

Mica and gypsum were being used for window coverings. The latter was used in making a whitewash for walls (Simmons 1991b: 167).

The new smallpox vaccine was brought from Chihuahua City to New Mexico. Because refrigeration was unavailable at the time, the vaccine was transported to New Mexico via small children who had been inoculated (Kessell 1979: 456; McDonald 1992: 9–10).

An estimated 3,610 Spanish and Pueblo children were inoculated against smallpox (Jones 1979: 140).

An epidemic of measles struck Cochiti Pueblo (Stockel 1993: 35).

Unrest among Spanish citizens, to the point of near rebellion, was due to the government’s limiting what goods could be taken on the annual caravan to Chihuahua, prohibiting the selling of sheep to the Navajo, and collecting of grain from the poor citizens of the Rio Arriba to feed the Santa Fe garrison (Kessell 1979: 435).

(early) Eight residents of Abiquiu, which lacked sufficient arable land, cleared 2,000 varas of land in the Canon de los Pedernales. They received a grant of this land about a year later (Wozniak 1987).

Abiquiu residents complained about livestock from Vallecito de San Antonio damaging their crops. The alcalde ordered residents of both settlements to fence their fields and to keep their livestock from wandering (Swadesh 1974: 49).

Zebulon Pike noted that there were “numerous heads of goats, sheep, and asses” in the valley around Santo Domingo Pueblo (Coues 1987, II: 616).

(March) A grant of agricultural lands at the Canon del Rio Chama was made to 26 Spanish settlers (Wozniak 1987).

(January 5) The Spanish government issued a decree protecting the Indians in “their person and real property” (DuMars et al. 1984: 19).

(February 9) The Spanish government issued a decree guaranteeing full political equality for the Indians of New Mexico (DuMars et al. 1984: 19).

The following items were woven in New Mexico: “heavy baize, serge, blankets (bed covers), serapes (panchos), regular baize, sack cloth, coarse carpeting, cotton stockings, and table coverings” (Bustamante and Simmons 1995: 16).

Several grants of arable lands were made to settlers of Arroyo Hondo and the San Cristobal drainage (Wozniak 1987).

(December) Eighteen adults died from smallpox at Pecos (Kessell 1979: 457).

A group of Spaniards occupied lands at Arroyo Seco and began irrigating with water from the arroyo and Rio Lucero. Taos Pueblos protested, as they depended on the same water for farming. Eight years later the ayuntamiento upheld the prior right of the Indians (Clark 1987: 21).

(spring) A smallpox epidemic struck San Juan Pueblo (Stockel 1993: 35).

(September) The Zia Pueblo governor complained about a Spanish rancher’s cattle trespassing on the pueblo’s corn fields, causing extensive damage (Swadesh 1978: 45).

(pre) A Taos resident mined copper near the town and manufactured the metal into kitchen utensils (Moquin and Van Doren 1972: 170).

With the passing of the Apache threat east of the settlement, a group of Albuquerque citizens applied for a land grant to resettle Carnue, just inside the mouth of Tijeras Pass (Simmons 1982: 111).

Government officials ordered that lead should be extracted from deposits near Las Huertas, north of Placitas, for the making of musket balls (Schroeder 1977: 24).

Governor Melgares appealed for the donation of woven goods to the military posts. Residents of Belen, Tome, and probably Valencia contributed serapes and sheep (Minge 1979: 20).
1819 (January-February) Twenty settlers from Albuquerque reoccupied and received possession of the Carnue grant at the mouth of Tijeras Canyon (Wozniak 1987).

1819 (February 25–26) The village of San Antonio de Padua was founded on the new Carnue land grant close to Tijeras Canyon. Some 24 families built their homes, a church, and irrigation ditches and cleared fields for 3 miles along the valley (Quintana and Kayser 1980a: 46).

1819 Don Bartolome Baca was granted 1,282,000 acres of land in the Estancia Valley (Towne and Wentworth 1945: 63).

1819 Pedro Armendaris took possession of a large grazing grant on the east side of the Rio Grande, at the north end of the Jornada del Muerto. The governor made the grant to facilitate travel and livestock drives across the Jornada (Wozniak 1987).

1820–30 Ranchers in the Belen-Tome area owned an average of 1,000 sheep (Minge 1979: 23).

1820–46 New Mexican Hispanic traders carried the hides of elk, pronghorn, bear, mountain lion, and beaver to Mexico for trade. Native Americans collected many of these hides (Minge 1979: 25).

1820–30s A number of grants of grazing and farm lands located on the east sides of the Sangre de Cristo, Sandia, and Manzano mountains were made (Wozniak 1987).

1800s (early) Settlers at San Jose de las Huertas were running goats in the area. Nomadic Indians sometimes raided the herds and drove the animals away (Batchen 1972: 83).

1800s (early) As the Pueblo population decreased in northern Rio Grande villages, irrigated lands were abandoned. Spanish residents in the area began to acquire these fields from the Pueblo largely through exchanges of livestock, agricultural products, and goods (Carlson 1979: 30).

1800s (early) Hispanics of the northern frontier began to herd sheep eastward toward St. Louis for trade (Swadesh 1974: 63).

1800s (early) to (1825) Bartolome Baca established a ranch in the Belen area. He acquired huge land holdings in the Estancia Valley, where he pastured large herds of sheep, cattle, and horses. Baca became alcalde of Tome and Belen, captain of the Rio Abajo militia, and governor (Espinosa y Chavez n.d.: 95).

1800s (early to mid) H.S. “Harry” Buckman opened a sawmill and began timbering operations on the Petaca grant, near Tierra Amarilla. In 1886 he established a sawmill below Espanola and began cutting on the Pajarito Plateau (Rothman 1989: 203).

1800s (early to mid) There was a smelter at Cienega for processing metal ores (Boyd 1974: 268, 270–271).

1821 (August 24) The new, independent Mexican Congress adopted the Plan of Iguala, which in part made it legal for non-Indians to buy, lease, or use Indian lands as collateral. Unscrupulous bureaucrats and politicians produced phony titles to Indian land and overlooked Mexican encroachment (Sando 1989: 71).

1821 (November 16) The first Anglo-American traders from Missouri reached Santa Fe with their goods, opening the Santa Fe Trail and linking with the Chihuahua Trail. New American markets became available for New Mexico merchants, and residents had access to a whole new range of U.S. manufactured goods (Minge 1979: 24–27; Moorhead 1958: 7–8).

1821 The Comanches made widespread raids across New Mexico, probably due in part to the drought (Bancroft 1889: 302; Denevan 1967: 701).

1821–46 Sometime during this period the Mexican government gave four metal axes to Santa Clara Pueblo. These were used in turn by families as needed (Hill 1982: 42).

1821–46 The Mexican administration in Santa Fe provided less protection for Pueblo land and water rights, and the expanding Hispanic population put more pressure on available farmland and trespassed more on Indian lands (Simmons 1979b: 207).

1821–50 Most Pueblo populations continued to decline, due mainly to diseases (Minge 1976: 44).

1821 (post) Hispanic authorities of the now independent Mexico retained control of trapping, hunting, and trading through licensing (Weber 1971: 29).

1821 (post) The opening of trade with the United States was a major cause of the increasing stratification of New Mexico society (Swadesh 1974: 59).

1821 (post) A dispute over certain islands in the
Rio Grande claimed by Tome and Belen broke out between the two communities (de la Vega 1976: 28).

1822 (January-June) A party of some 22 Anglo trappers took fur-bearing animals around Taos (Connor and Skaggs 1977: 32–33).

1822 James Baird came back to New Mexico and within 3 years was operating a distillery near Taos. In 1826 he moved to El Paso and began to trap beaver. Subsequently, he complained about Anglo trappers wiping out the beaver populations, taking pelts worth $100,000 over a year-and-a-half period of trapping (Sonnichsen 1968: 102).

1822 Arroyo Hondo villagers protested the construction of a ditch by Arroyo Seco residents, claiming that it usurped irrigation water needed for their fields (Wozniak 1987).

1822 The area around Albuquerque, a 38-mile-long and 8-mile-wide tract, was under the administration of the town’s ayuntamiento. This land was used primarily for livestock grazing and fuelwood collecting (Simmons 1982: 129).

1822–24 The first area within the study region to be intensively trapped was the southern Sangre de Cristo Mountains between Santa Fe and Taos (deBuys 1985: 93).

1823 (September) Some 43 residents of Manzano received a grant of farm and grazing lands between Tome and the abandoned settlement of Las Nutrias (Wozniak 1987).

1823 The governor ordered the settlers of San Jose de las Huertas to abandon their village “to save them from Navajo raids” (Batchen 1972: 31).

1824 (June 26) An official in Mexico City directed the governor of New Mexico to prohibit foreigners from trapping in the territory. This regulation was virtually ignored, and trapping by Americans continued (Weber 1971: 66–67).

1824 Several Anglo Americans began operations distilling “Taos Lightning” for trade with Hispanics and Native Americans (Muldoon 1987: 69–70).

1824 Santa Fe Trail traders began to carry their goods south to Chihuahua (Walker 1966: 140).

1824 Some 2,000 pelts and furs that went back east over the Santa Fe Trail were valued at about $15,000 (deBuys 1985: 97).

1824 Grants of farmlands were made in the Chama Valley at Vallecito de Lovato, near Rito Colorado, at Las Casas del Riano, above Canones, and at Vallecito (Wozniak 1987).

1824 A provincial law decreed that cattle owners would pay two reales per head of livestock that wandered onto agricultural fields and any damages they inflicted on farmland (Simmons 1988: 7).

1824–46 Numerous small grants of Sandia Pueblo land were made to non-Indians, including settlers of present Bernalillo (Brayer 1938: 71).

1825 Native cotton was still being grown at Valencia and Belen, but this crop soon went out of production (Minge 1979: 24).

1826 Some Hispanic families settled on a grant in the Manzano area on the east side of the Manzano Mountains. This grant and settlement were under the jurisdiction of Tome (Ellis 1955: 97).

1826 By this year, Taos trappers virtually took all of the beaver in the Sangre de Cristo and Jemez mountains (Flores 1992: 8). Although the official policy of the Mexican government was to prohibit trapping by foreigners, Governor Narbona allowed Americans to continue trapping in New Mexico (Weber 1971: 111–115).

1827 Over 1,100 beaver skins taken by Ewing Young and associated trappers were confiscated by government officials in Santa Fe. The pelts were threatened with deterioration when “a great rain” saturated them. To save their value, the pelts were sold (Cleland 1950: 217, 220, 224).

1827 Anglo trappers harvested beaver on float trips down the Rio Grande from Cochiti Pueblo to El Paso. At El Paso, they dismantled their rafts and sold the “lumber” and logs to local residents. The trappers then turned eastward to the Anglo frontier, thus avoiding payment of export fees (Weber 1971: 157).

1827 Anglo and Franco-American trappers had harvested virtually all of the beaver in the Sangre de Cristo Range by this date (Ungnade 1972: 48).

1827 Antonio Sandoval constructed an acequia along the foothills on a land grant near Las Lagunitas and south of Las Barelitas (Wozniak 1987).

1827 Some 293,000 head of Mexican livestock were in northern New Mexico (Oppenheimer 1962: 20).

1827 There were about 240,000 sheep and goats, 5,000 cattle, and 3,000 horses and mules in the Santa Fe-Albuquerque area. Locally, ranges were being overgrazed, and an erosion cycle was started. Overall, the rangelands in New Mexico remained in relatively good condition.
Taos was the most important market for the fur trade in the southern Rocky Mountains (Weber 1971: 192, 204, 225–227).

Placer gold was reportedly discovered by a sheepherder at the Old Placers site in the Ortiz Mountains. Mule trains loaded with gold reportedly made trips south down the Chihuahua Trail to Ciudad Chihuahua (Northrop 1975: 16, 32).

(December to 1832) Grants of arable and grazing lands were made to Spanish settlers at Canada de las Mestanas near Rito San Cristobal and on the upper Rio del Pueblo south of Taos (Wozniak 1987).

Farmers at Sabinal, with a population of 207, raised some 700 bundles of tobacco, 18 bushels of cotton, corn, beans, chile, wheat, and onions. Residents owned 309 sheep and some cattle (Minge 1979: 27).

Fur trappers and early freighters came to rely on the mule rather than the horse for transportation. The latter “could not keep up its strength over a long period of time on a diet of nothing but buffalo grass, and grain was not readily available.” Horses were also subject to a number of diseases, and they were not as resistant to the “rigors of prairie heat, cold, and dust” as mules. Mules had a working life of about 18 years and required one-third less food than oxen (Walker 1966: 102–103).

Santa Fe Trail caravans would usually stock up with beef, in case the buffalo were scarce or absent on the Southern Plains (Gregg 1966, I: 97).

Goods produced locally for export included sheep, wool, and woven goods and buffalo, pronghorn, antelope, bear, and elk hides. Pinyon nuts and salt were also collected for trade (Minge 1979: 25).

At the Los Ojitos de Zia, or Los Ojitos Hervidores as they were also known, Pueblo and Hispano residents and travelers in the area drank the water from these springs for medicinal purposes. These coldwater springs were also a popular bathing site (Swadesh 1978: 19–20).

(early to late) Fewer beaver were taken as a result of population reduction due to trapping and falling pelt prices. The taking of buffalo robes increased due to demand and rising prices (Weber 1971: 208–210, 215).

(early) (to 1840) Three grants of farmlands in the Chama Valley were made to Spanish settlers (Wozniak 1987).

Abiquiu residents were mining copper in the area and “fashioned certain kitchen utensils by hammer [from it]” (Potash 1949: 339).

There were 250,000 cattle in New Mexico (Williams 1986a: 120).


Francisco Sandoval of San Ysidro owned the Spanish Queen Copper Mine in San Diego Canyon. A smelting furnace was located near the mine, and up to 250 pounds of copper ore were extracted by one miner. Some gold was associated with the copper-bearing veins (Swadesh 1978: 47).

Nerio Antonio Montoya of Valencia petitioned the ayuntamiento of Tome for one-half league of land in a canyon near Manzano. He took possession of the land in December and built a three-room wood house, constructed an acequia system, and planted a vineyard and orchard of peach and apple trees over the next few years (Tainter and Levine 1987: 103).

William Sublette, a Santa Fe Trail trader, exchanged his merchandise for 55 packs (1,705) of beaver pelts and 800 buffalo robes, which he took back to Missouri (Weber 1971: 147).

Cotton was being cultivated in El Paso, Tome, and Bernalillo (Potash 1949: 336).

Trading and trapping by Anglos and Hispanos resulted in the shipment of a substantial amount of beaver pelts east over the Santa Fe Trail (Weber 1971: 206).

About 90 packs (2,790) of beaver pelts went east over the Santa Fe Trail (Weber 1971: 206).

Pablo Salazar, from Tome, drove two flocks of wethers to northern New Mexico (Baxter 1987: 103).

Father Martinez complained to the provincial government that the liquor being illegally traded to Southern Plains tribes was resulting in “these Indian nations [becoming] extremely demoralized and were prompted to greater destruction of buffaloes in order to satisfy their appetites for strong drink, which
they obtained in exchange. They also made raids in New Mexico, in order to steal cattle which were bought off them by the proprietors of these forts” (Lavender 1954: 229–230).

1832 (post) Stock raisers from Abiquiu periodically grazed their flocks of sheep in the Tierra Amarilla area (Wozniak 1987).

1833 The governor authorized local residents to use the water from Ojo del Oso for machinery at the Ortiz mine (Tyler 1991: 299).

1834 Each caravan from Santa Fe took $15,000 worth of beaver pelts and 50 packs of buffalo robes back to Missouri (Weber 1971: 218).

1835 A short distance north of the Ortiz Mountains near lake Madrid, coal mining developed in response to the need for smelting ores at Old and New Placers. The coal was used to fuel the adobe smelting furnaces (Christiansen 1974: 26).

1830s (mid) The popularity of buffalo hides as sleigh lap robes and floor rugs was growing in the eastern United States. As a result, the price of robes increased (Barnness 1985: 93).

1836 A Santa Fe trader took 1,000 beaver pelts and 1,000 buffalo robes to Missouri (Weber 1971: 219).

1837 Another Santa Fe trader carried 200 buffalo robes and two packs of beaver pelts to Missouri (Weber 1971: 219).

1837 Over 40,000 sheep were driven down the Chihuahua Trail to northern and central Mexico. Most of these came from the Rio Abajo, especially the Valencia-Belen area (Baxter 1987: 105).

1837 Rumors circulated among New Mexico residents that new Governor Perez would tax them by taking half of a family’s property and the water, wood, and pasture of the common lands (Lecompte 1985: 18).

1837 Smallpox killed about 10 percent of New Mexico’s population (Bayer et al. 1994: 115).

1837–40 An epidemic of typhoid, followed by an outbreak of smallpox, resulted in the death of 10 percent of the province’s residents (Gregg 1966, I: 147).

1838 (July 5) The U.S. Corps of Topographical Engineers was created by congressional act (Goetzmann 1991: 6).

1838 A band of French trappers went into the Sangre de Cristo Mountains above Mora, but due to prior trapping along area streams, they caught no beaver (deBuys 1985: 159).

1839 Another gold rush began in the San Pedro Mountains, located southwest of the Ortiz grant. The site of this new discovery became known as the New Placers to differentiate it from the Old Placers near Dolores, and a mining camp, known as Tuerto, was founded (Northrop 1975: 17; Schroeder 1977: 25). Lack of water was a problem that limited production. Most of the mining occurred in the winter, when snow melt water was used. At other times of the year, water was transported in at exorbitant prices (Meketa 1986: 70).

1839–46 Spades and shovels made from the wood of white fir, pinyon, and ponderosa pine were used by Hispanic miners at the El Tuerto and Dolores mines. Sometimes, when available, iron blades were attached to replace wooden ones that had broken off. A kind of crowbar or pry rod was fashioned from oak wood. The mines also manufactured spoons of wood and deer antler (Meketa 1986: 71). A new medical belief, that a change of climate could result in miraculous recoveries of one’s health, began to evolve. Josiah Gregg began his Santa Fe Trail adventures as a successful cure for his poor health (O’Connor and Skaggs 1977: 89–90).

1830s In dry grasslands, shepherds drove their flocks to water once every 2 or 3 days, or they loaded gourds filled with water and transported them on burros to the flocks for drinking. Gregg noted that goats were “found in great abundance” in New Mexico, and their milk was commonly consumed. Domestic turkeys and pigeons were few in number (Gregg 1966, I: 188, 191). Gregg recorded the following cultivated crops: corn, beans, chile, wheat, apples, peaches, apricots, and grapes. Wild plants gathered and eaten included pinyon nuts and prickly pear tuna (fruit) (Gregg 1966, I: 157–158).

1830s Gregg wrote that the only successful mine in New Mexico was El Real de Dolores or El Placer. He reported that gold was discovered at this location by a mule herder in 1828 (Gregg 1966, I: 166–167). The lakes, Las Salinas, near Abo and Gran Quivira, were important sources of salt, according to Gregg. He described their significance as “an inexhaustible supply of this indispensable commodity, not only for the consumption of this province, but for portions of the adjoining departments.” He also described a causeway that had been constructed across the middle of the “principal lake,” which afforded access to the salt deposits. Gregg stated that the dry season, when the lakes were low, was the best collecting time (Gregg 1966, I: 175–176).
1830s Most of the buffalo robes collected by Hispanos went down the Chihuahua Trail to interior Mexican states, where they were exchanged for manufactured goods. Smaller numbers of elk, deer, and bear skins were also shipped south (Weber 1971: 217–218).

1830s The various ojos calientes were popular bathing sites for Hispanics suffering from “rheumatisms and other chronic diseases.” Those with sulphur content were especially known for their efficacy (Gregg 1966, I: 176–177).

1830s Gregg observed that the Santa Fe wagon trains were especially welcomed in the capital during droughts because they brought relief to area residents. Some Hispanics thought the Americans brought rain, but Gregg remarked that this was a “superstition” as the traders arrived in the rainy season of July and August (Gregg 1966, I: 148).

1830s–40s New Mexicans were forbidden to sell punche, a locally grown tobacco, to Santa Fe traders (Walker 1966: 138).

1830s–70s Hispanic residents from the Las Huertas Valley were running goats in the Sandia Mountains (Batchen 1972: 42–46).

1840 (spring) An epidemic of “fever” struck adults, and smallpox struck children at San Juan Pueblo (Stockel 1993: 35).

1840–41 A fatal typhoid epidemic, followed by a smallpox epidemic, may have killed 10 percent of New Mexico’s population (Meketa 1986: 77, 366–367).

1841 (January 8) The Maxwell land grant included sacred mountains, streams, and forests of Taos Pueblo (Wood 1989: 61).

1841 (March 20) Santiago Padilla and 26 other heads of households received a tract of 41,481 acres known as the Chilili grant (Eastman and Gray 1987: 78).

1841 (July-September) Botanist William Gambel came over the Santa Fe Trail and collected plants in the Sangre de Cristo Mountains and the nearby Rio Grande Valley. His specimen of Quercus gambelli was later named in his honor (Dickerman 1985: 163–164).

1841 Julian and Antonio Donaldson obtained a grant of land with hot springs just north of Las Vegas, and some 5 years later they constructed a bathhouse, which could be used by the public for a fee (Perrigo 1982: 22).

1841–43 A number of American traders and trappers were using “Taos lightning,” a whiskey made locally in northern New Mexico, in trade with Native Americans for hides. Its sale or exchange was illegal in Indian territory, but the traffic of liquor for furs continued in the region (Weber 1971: 225–226). The consumption of liquor was a detrimental factor for the Southern Cheyenne (Berthrong 1963: 90).

1843 Taos Pueblo lost some of its sacred land when Governor Armijo, ignoring protests of the Indian villagers, granted a huge tract of sacred mountain land to two Mexican citizens (Simmons 1979b: 207).

1843 (ca.) Sixteen families from the Algodones area, seeking adequate farmland and water, had settled Placitas near the Ojo del Oso (Batchen 1972: 2).
1843–45 Gold production at the Old and New Placers remained high (Northrop 1975: 18).

1844 Publication of Commerce of the Prairies by Josiah Gregg boosted travel on the Santa Fe Trail as a means in regaining one’s health (Barbour 1990: 47).

1845 Governor Manuel Armijo made a grant of almost one-half million acres in the middle of the 1819 grant to Don Bartolome Baca (Towne and Wentworth 1945: 63).

1845 Don Juan Otero petitioned the Mexican government for a land grant including the Ojo de la Cabra, located northeast of Isleta and claimed by its residents. The grant was authorized, but later this decision was reversed by the U.S. Court of private Land Claims. Otero used this land for grazing livestock (Brayer 1938: 59–60; Reeve 1961, II: 430).

1846 (March 7) A grant of land, the Bosque del Apache, was made to a sheep raiser and farmer (Wozniak 1987).

1846 (May) Captain Donaciano Vigil noted that Anglo trappers were shipping $200,000 worth of beaver skins annually from Abiquiu and Taos (Cleland 1963: 153).

1846 (July 10) Water had to be hauled into the New Placer mine, south of Santa Fe, for the “gold washing” (Wislizenus 1969: 31).

1846 (July 11) There was a small Indian pueblo 10 miles north of San Antonio on the east side of the Sandia Mountains. The residents were practicing irrigation farming (Wislizenus 1969: 33).

1846 (July 15) Part of the north-south main road (Chihuahua Trail) in the valley near Albuquerque was nearly impassable due to rain. Wislizenus (1969: 34) took the “upper eastern road, which was sandy, and difficult to traverse. Artemisia and similar shrubbery, but without grass,” was the dominant vegetation along his route.

1846 (July 18-August 8) Frederick Adolphus Wislizenus, a physician from St. Louis, accompanied Santa Fe trader Albert Speyer on a trip to New Mexico and northern Mexico. A keen observer and botanist, Wislizenus and his party passed through Peralta, Valencia, and Tome recording observations on the natural environment, towns, and residents of the area (Wislizenus 1969: 5, 14–40).

1846 (July 26) Wislizenus (1969: 36) noted the occurrence of mesquite and narrow-leaf yucca, or amole, south of La Joya de Sevilleta.

1846 (August-September) Lt. William Emory collected plants along the Rio Grande Valley from Santa Fe to present Elephant Butte dam and west to the Gila River. An oak species and a mesquite species were subsequently named for him by John Torrey. Emory also found a new genus of sunflower (Baileya) and nine new species of wildflowers (Dickerman 1985: 167–168).

1846 (September 4–5) Corn was the major crop at San Felipe Pueblo and Algodones. Grapes and wine were found at Bernalillo. At Alameda there were “grapes, melons, and eggs”; nearby were “swarms of wild geese and sand cranes” (Calvin 1968: 67–69).

1846 (September 28) Several kinds of meat, eggs, cheese, pinyon nuts, chile, onions, watermelons, corn husks, tobacco, peaches, and grapes were for sale at the Santa Fe plaza (Abert 1962: 46).

1846 (September 30) Residents of Tuerto were running “large flocks of sheep” in the upper Pecos River valley (Abert 1962: 51).

1846 (October 1) Emory (Calvin 1968: 82) observed that below Tome, to Belen, the width of the valley increased, and the crops were better than those upriver.

1846 (October 1) Abert (1962: 51) visited copper, lead, and gold mines in the San Pedro Mountains.

1846 (October 2) Abert (1962: 54) found the water at Cienega “delicious.”

1846 (October 7) Abert (1962: 60–62), traveling from Taos to Santa Fe, noted that there was “no grass.” At Embudo, a village of 300 or 400 ranchers, there were herds of sheep and goats, but only a small number of horses and cattle owing to the shortage of grass. At San Juan Pueblo he saw “very fine fields of corn” and “orchards of peach and plum trees.”

1846 (October 9) In the Santa Fe River valley Lt. Abert (1962: 65) observed numerous flocks of sheep and goats. Also seen were “some large grullas [sandhill cranes], blue cranes
1607 [great blue herons?], in the low grounds, and several flocks of wild geese.”

1846 (October 14) Abert (1962: 73) saw a herd of 4,000 sheep and goats at Atrisco.

1846 (October 21) Abert’s (1962: 82, 87) contingent traveled south to Acoma Pueblo. Along the road they met a Hispanic pack train carrying “peaches, water melons, and dried fruit,” which they had purchased at Acoma. A new species of yucca (baccata) was observed, as was juniper mistletoe. “Many flocks of sheep grazing” were also passed, as were Pueblos with burros laden with peaches. Abert (1962: 88) camped below Acoma and beside some wells dug into a drainage. There were “large flocks of sheep, herds of cattle, and droves of horses” on the surrounding plain.

1846 (October 25) Navajos ran off 5,000 to 6,000 sheep owned by Don Antonio Jose Otero, who lived at Valencia and had a ranch nearby. Two sheepherders were killed in the raid (McNitt 1972: 101).

1846 (October 26) Abert (1962: 96–97) learned that Navajos had taken 50,000 sheep only a few miles south of Atrisco. Trying to cross Tijeras Arroyo on the east side of the river, some of his animals were nearly mired in “treacherous quicksand.”

1846 (October 29) Moving down the west bank of the Rio Grande, Abert (1962: 99–100) reached Isleta Pueblo. He noted “extensive vineyards” and some Pueblos making wine. Crossing the river here, and moving south, the contingent reached Peralta, located at the “south skirt of a large round grove of cottonwood trees.” There were several flour mills in the area. Abert returned to Isleta, where buffalo robes were offered as trade goods. Grapes and melons were common produce among the residents.

1846 (November 3) Lt. Abert described a grist mill and a dam-reservoir to create water power for the molino at Manzano. The dam was constructed of logs, stones, and earth; the small reservoir was drying up, and there was not enough water power to turn the stone (Abert 1962: 107–108).

1846 (November 3–4) Abert (1962: 108–110) met Don Pedro Baca, “who was in charge of the silver mines.” He said there were mines “of silver, copper and iron” in the Manzano Mountains. An employee of Baca brought Abert “numerous specimens of silver ore.” Abert led his men to Quarai to visit the church and pueblo ruins. Later in the afternoon they reached the ruins of Abo, where camp was made.

1846 (November 11–14) Abert (1962: 121–125) turned east to the Rio Grande Valley and crossed the river to Socorro, where he learned that gold, silver, copper, and lead were found in the nearby mountains. Continuing down the east bank of the river, more sand hills were encountered. The first night’s camp was made in “some large cottonwood trees, overgrown with bunches of mistletoe,” a half-mile south of Bosquequito. Navajos had been raiding sheep herds; one flock of 3,000 was taken. Abert continued south to San Pedro, then farther on reached the Bosque del Apache, where he and his men camped. Near there, he killed “two large swans.”

1846 (November 19–20) Ruxton was told that drinking water from the Rio del Norte prevented kidney diseases and stones. He also noted that various “medicinal herbs of great value,” found in the Organ Mountains, were sometimes brought to El Paso by Apaches to sell or trade (Hafen 1950: 166).

1846 (November 28–30) There were 2 days of drizzling rain, which hampered construction of temporary quarters for Abert’s (1962: 128–129) men at Valverde. Two unarmed soldiers were killed by Navajos with “reed arrows” [Phragmites?] nearby.

1846 (December 16–19) Abert (1962: 135–137) and his command continued north through Socorro and on to Lemitar, where some residents had mules for sale. He bought two of the animals.

1846 (fall) The army at Santa Fe procured firewood from local Hispanics, who cut and transported the fuel from the foothills and higher slopes of the Sangre de Cristo Mountains above the town (Frazer 1983: 11).
1846 (fall) (to 1849) Mules as mounts and draft animals were purchased from local owners by the U.S. military (Frazer 1983: 249).

1846 (fall-winter) Owing to the large amount of local food crops consumed by Kearny’s Army of the West, there was a near famine in the Middle Valley over the winter (Sunseri 1979: 22).

1846 A grant of agricultural lands along the Rito Lama, between the Rito San Cristobal and Rio Colorado, was made (Wozniak 1987).

1846 A Hispanic couple opened a small bathhouse at the Montezuma Hot Springs, but within 10 years poor management ended their business. Reopened by an Anglo in 1864, the waters were proclaimed as a cure of “syphilitic and kindred diseases, Scrofula, Cutaneous diseases, Rheumatism, etc.” (Perrigo 1982: 22).

1846 Santa Ana farmers, using walking plows, hand sickles, and hand-threshing, spent 50 to 60 hours producing only 20 bushels of wheat (Bayer et al. 1994: 229).

1846 There were about 54,000 Hispanics in the Middle Rio Grande Valley. The Pueblo population was 7,000 to 8,000 (Harper et al. 1943: 57).

1846 Jose Leandro Perea of Bernalillo owned 200,000 sheep, which were divided into 2,500 flocks, or 80 in each flock (Ortiz 1980: 80).

1846 Large caravans from Santa Fe annually travelled in the “dry season” to the salt lakes east of the Manzano Mountains (Wislizenus 1969: 25).

1846–50 Whiskey for the men and “wild marsh grass” for the livestock were delivered by local Hispanics to the U.S. military in Santa Fe (Dickey 1970: 15).

1846–50 Some 453,292 sheep and 31,581 cattle were taken by various Indian raiders (Simmons 1988: 8).

1847 (September-December) The soldiers stationed at Santa Fe were struck by an epidemic of typhoid fever, ten men died (Stockel 1993: 44).

1847 (December) The first sawmill in New Mexico was erected at Santa Fe, on the river of the same name (Workers of the Writers’ Program 1940: 429).

1847–61 The army set up a number of sawmills across the region. Some lumber was contracted from private sources, but soldiers cut and sawed most of the lumber used in construction (Frazer 1983: 187).

1847–67 The army contracted with local sheep raisers for mutton. Flocks of sheep often accompanied troops on campaigns into Indian country as a moving commissary (Frazer 1983: 9, 51; Miller 1989: 187).

1848–51 The placement of a detachment of cavalry in Las Vegas and the establishment of Fort Union east of Mora bolstered local economies. The army needed flour, corn, and beef, and ranchers and farmers increased their production of these resources and also built several gristmills in the area. Freighting on the Santa Fe Trail and feeder roads boomed as well (Perrigo 1982: 15).

1848–65 James L. Hubbell of Pajarito was freighting cut grama grass in 48 oxen-drawn wagons to regional military and civilians (Moyer 1989: 187).

1849 Manuel Otero and Antonio and Jesus Luna from the Rio Abajo drove 25,000 sheep to California (Carlson 1969: 28).

1849 Hay was scarce in Santa Fe; it cost $60 a ton (Keleher 1982: 43).

1849 (August 20) Lt. Simpson visited the abandoned Spanish Queen copper mine, located just below Jemez Springs. He was told that the springs would cure “cutaneous or rheumatic” illnesses (McNitt 1964: 15–17).

1849 Emigrants to the California gold fields made demands for food at the Pueblo villages. One party of forty-niners kidnapped the governor of Laguna Pueblo when he refused their demand for sheep. He was tied and taken to Zuni before his kidnappers released him (Simmons 1979b: 209).

1849–54 Salt from the Salinas lakes in the Estancia Basin was delivered by contractors to military posts in the region. Some 600 bushels sold for $4.50 per unit (Frazer 1983: 109, 156).

1849–50s It was recommended that wagons pulled by mules depending on native grasses for feed should not exceed a 2,000-pound load. If the mules were fed transported grain, the load could exceed this weight (Marcy 1988: 27).

1849 Some 30,000 to 40,000 sheep were driven south annually from New Mexico to Mexico (Weber 1982: 139).

1849–50s After the crop harvests, many farmers in the area of the Placer or Real de Dolores set up “cafes” to feed the large number of miners and others who came to the mine in the late fall and winter (Meketa 1986: 70).

1849–70s Each year the men from Placitas traveled to the Salinas area to collect salt (Batchen 1972: 19).

1850 Based on an estimated 100,000 acres in cultivation in the Middle Rio Grande Valley, the
1850 net area demand for river water was 2.75 acre-feet per acre (Hedke 1924: 15).

1850 Brevet Lieutenant Colonel George A. McCall reported that “the hillsides and the plains that were in days past covered with sheep and cattle are now bare in many parts of the state, yet the work of the plunder still goes on” (McCall 1851: 5).

1850 There were 185,000 sheep in Bernalillo County (Dortignac 1960: 47)

1850 The number of sheep in the territory declined to an estimated 377,000 (Gonzalez 1969: 48).

1850 The U.S. Census Bureau recorded 61,547 persons in the New Mexico Territory, which included present Arizona and a small portion of Colorado’s San Luis Valley (Workers of the Writers’ Program 1940: 429). There were more than 30,000 Indians in the territory (Bancroft 1889: 459).

1850 (post) Hispanics cut poles and timber in the less accessible parts of Pino Canyon on the west side of the Sandia Mountains (Baisan 1994: 2).

1800s (mid) Family sheep flocks at Laguna Pueblo commonly numbered 50 to 100 head. A few families managed herds of 500 to more than 1,000 head (Eastman and Gray 1987: 95).

1800s (mid) The Oteros of the Los Lunas area were grazing their livestock in the Estancia Basin and New Plains areas (Espinosa and Chavez n.d.: 75–78).

1800s (mid) A priest in northern New Mexico reported that other priests were prospecting and mining gold in the Pecos District of the Santa Fe National Forest. A “Father Tafoya” supposedly recovered enough gold to buy land in the Picacho area (Barker 1953: 158).

1800s (mid) Hispanic women of the village of Tejon carried water in tinajas from a spring 2.5 miles away (Batchen 1972: 12).

1800s (mid to late) A Hispanic Taos trader, who also raised sheep, grew grain and collected hides, would periodically transport these products to the Rio Abajo. There he traded for chile, fruit, and other agricultural produce (Brown 1978: 72).

1851 (summer) The Territorial Legislature passed legislation empowering owners of tillable lands to take water from the most convenient source and move it across the properties of others, assessing damages on owners of livestock that trespassed onto another’s fields, making the creation of a footpath across a field punishable by reprimand or fine, forbidding the building of any structures, such as mills, that would interfere with irrigating crops, and providing that “the course of ditches or acequias already established shall not be disturbed” (Clark 1987: 25).

1851 The army contracted with Domingo Baca of Santa Ana County to deliver 20,000 arrobas (507,200 pounds) of grass and fodder to four locations along the old road between Albuquerque and Santa Fe (Frazer 1983: 50).


1851 The Territorial Assembly passed a memorial requesting the U.S. Congress to reserve all salt lakes, mines, and springs and to prevent them from passing into private ownership. Also, all fuelwood and timber in the mountain should be reserved for the common use of the people (Clark 1987: 32).

1851 Residents of the territory were raising wheat, oats, corn, melons, onions, grapes, and several other fruits (Dillon 1970: 62).

1851 A territorial statute regulating the property procured in war against Plains Indians was passed. Encouraging Hispanics to participate in the hostilities, the law stipulated that all captured property, including captives, would be divided equally among the members of any war party (Sunseri 1979: 62).

1852 (January 7) The territorial assembly enacted legislation that detailed the administration of community acequias (Clark 1987: 25).

1852 (May or June) Suffering from rheumatism, Franz Huning went to the hot springs north of Las Vegas. At the springs he described a two-story log cabin with a “bathing tub in each of the two rooms below....” In front of the cabin “was a swamp place full of warm springs and always green.” He tied his mule on the edge of this cienega to feed on the grasses, but the animal “ventured too far and sank down to his belly” (Browne 1973: 53).


1853 (October) Lt. A.W. Whipple commented on the valley between Bernalillo and Albuquerque: “... but between Bernardillo [sic] and this place are the finest ranchos and vineyards to be found in the Territory” (Foreman 1941: 111).

1853 Lt. A.W. Whipple (Foreman 1941: 119) crossed the Puerco near present Interstate 40W and described the river as “quite wide” and “contained pools of water.” He observed that the streambed was 18 feet below the valley floor (Rittenhouse 1965: 27–28).
1854 (spring) Much of the valley above and below Bernalillo was in cultivation; vineyards were common, and two varieties of grape vines were thriving (Davis 1982: 349–350).

1854 (July 22) Congress passed the Donation Act, providing for the appointment of a State Surveyor-General and gave every citizen over the age of 21 and residing in New Mexico before 1853, or settling in the territory prior to 1858, a donation of 160 acres. These donations were made to promote the military strength of settlements exposed to attacks by Indians. William Pelham was appointed the first Surveyor-General (Westphall 1965: 1, 37).

1854 (December) The first U.S. Surveyor-General arrived in the territory to begin the public land surveys. The policy of his office was to only survey arable or agricultural land (Westphall 1965: 1, 17).

1854 W.H.H. Davis visited a warm spring in the foothills above Socorro. He described the pool at the spring as “some twenty feet long by fifteen wide, and eighteen inches deep. The temperature of the water is about that of new milk, and it is said to possess some medicinal qualities that render bathing in it conducive to health” (Davis 1982: 369–370).

1854–59 Sorghum crop varieties from China and African countries were introduced into the Southwest (Ryerson 1976: 251).

1855 (mid) By this time most baled hay for New Mexico military posts was imported from Kansas, even though local farmers were growing substantial amounts of alfalfa for hay (Miller 1989: 104).

1855 (July) The U.S. military was operating a ferry at or near the Barelas ford 3 miles south of Albuquerque. A “rickety old scow that could accommodate but one wagon at a time” constituted the ferry. This dugout was made from a cottonwood log (Davis 1982: 361, 390).

1855 (July) Davis (1982: 390) purchased eggs, three chickens, and a log for use as fuel at one of the Atrisco plazas on the west side of the Rio Grande.

1855 During a dry period, survey of the principal meridian south of the base line near Socorro was discontinued due to the high price of water (75 cents/gallon) for the survey crew and their mules. Work did not resume “until the rains came” (Westphall 1965: 10).

1855–70 (winters) Jose Leandro Perea of La Ventana ran 50,000 to 150,000 sheep on the Espiritu Santo land grant (Bayer et al. 1994: 158).

1856 A smallpox epidemic resulted in the death of 110 individuals, nearly half of them infants, in Mora Parish (deBuys 1985: 139–140). The Donaldsons built a six-room, log bathhouse at Montezuma hot springs (Perrigo 1982: 22).

1858 (December 22) The U.S. Congress confirmed the land grants made to the Pueblos by Governor Cruzate in 1689, and 8 years later the General Land Office issued patents (Brayer 1938: 21; Sando 1992: 110, 112). The San Ildefonso Pueblo grant of 15,413 acres was confirmed by Congress (Aberle 1948: 78).

1858–59 The U.S. Topographical Engineers constructed a road along the route of the old Camino Real from Santa Fe to Dona Ana (Jackson 1952: 109–111, 116–117).

1858–1913 Fr. John Baptist Ralliere was priest at Tome and a leader in agriculture—introducing grapevines, better seeds, and farming methods. He established one of the first parish schools, which was coeducational (Valencia Co. Historical Society 1982: 17).

1859 A survey by the Surveyor General’s Office placed the east boundary of Isleta Pueblo land along the base of the Manzano Mountains, rather than the highest points in the range. The Pueblos were deprived of 21,415 acres of grazing, fuelwood and timber, and hunting lands. A 1918 resurvey set the east boundary along the “backbone” of the Manzanos, restoring the claimed acreage (Brayer 1938: 58–59).

1859–65 Some gold dust was being recovered by Hispano and Anglo miners panning in the Arroyo Hondo (Pearson 1986: 4).

1850s The reports of railroad surveys stated that the shortage of surface water was a major drawback to establishing a route along the 32nd parallel (Clark 1987: 73).

1850s U.S. Army personnel stationed at forts in the Socorro area mined coal at Carthage. Three decades later Carthage coal was used in smelters in the same area (Christiansen 1974: 69).

1850s Anglo prospectors ripped out beaver dams in search of gold in streams in the Abiquiu area (McDonald 1985: 121).
1850s Sometime during this decade the first public bath cabins were built at Jemez Springs (Browne 1973: 63–64).

1850s (late) to 1860) More Hispanic settlers from Alameda settled at Placitas and helped construct an irrigation system, including a large reservoir called El Tanque de la Ciruela, located just to the east of the village (Batchen 1972: 2–3).

1860 (March 12) The U.S. Congress passed the Preemption bill, giving free land to individuals in New Mexico and adjoining territories (Brown 1970: 13).

1860 The U.S. Census Bureau counted 93,516 persons in New Mexico Territory, which included present Arizona and a small portion of Colorado’s San Luis Valley (Workers of the Writers’ Program 1940: 329).

1860 There were 830,000 cattle in the territory (Williams 1986a: 120).

1860 There were 306,000 sheep in Bernalillo County (Dortignac 1960: 47).

1860 The heirs of Luis Maria Baca received a grant of 100,000 acres, which included the Valle Grande in the Jemez Mountains (Scurlock 1981a: 138).

1860–70 Due to the demand at army posts, corn production in Valencia County increased from 53,587 to 77,854 bushels, even though the population decreased from 11,321 to 9,093 (Miller 1989: 57).

1861 (March) The commander of the Union troops in Santa Fe said that the town could not be defended “because it was commanded on all sides by hills” (Keleher 1982: 176).

1861 Some 1.5 million pounds of flour, 1,098 head of beef, and 1,400 bushels of beans were contracted from local suppliers by the U.S. Army (Frazer 1983: 179).

1861 U.S. troops from Fort Craig found coal on the site that was later named the Carthage coal field (Christiansen 1974: 39).

1862 (spring) The Confederate invasion from Texas resulted in depletion of livestock, crops, and food reserves along the Rio Grande Valley (Christiansen 1974: 32).

1862 (spring–summer) Mining operations were reduced sharply in New Mexico during the Confederate invasion (Christiansen 1974: 31–32).

1862 (summer) At the military post of Los Valles de la Sierra de San Ildefonso in the Jemez Mountains, soldiers dug out a hot and a cold artesian spring, which were used for bathing and drinking, respectively (Meketa 1986: 207).

1862 (winter) Because so many men had been serving in the Union Army to stop the advance of Confederate troops, and because much of the livestock, fodder, and foodstuffs had been consumed, stolen, or burned by the Confederates, the general populace of New Mexico experienced hardships (Meketa 1986: 187).

1862 Military personnel were cutting “hay” (native bunch grasses) in the Valle Grande. Some 400 tons of hay were cut around the headwaters of the East Fork of the Jemez, Santa Rosa, and San Antonio rivers (Meketa 1986: 205–206).

1862 The Homestead Act was passed by Congress, allowing a settler to take out a homestead of 160 acres on public lands. A patent to the land could then be obtained either by living on it for 5 years or by commuting it through payment of cash in 6 months (Westphall 1965: 43).

1862 A hill in the Valle Grande, Jemez Mountains, was a source of obsidian, which the penitentes in the area fashioned into sajadas, blades used to make incisions (Meketa 1986: 206).


1863 Ordinances related to animal and traffic control, sanitation, public works, and zoning were passed by Albuquerque’s board of aldermen (Simmons 1992: 24).

1863 The first significant discovery of silver in the territorial period was made at Pueblo Springs, near Magdalena (Northrop 1975: 23).

1863 U.S. troops from the military post of Los Pinos pursued unidentified Indians who had stolen cattle from near Valencia. The army captured about 100 head of cattle near Abo pass but saw no Indians (Stanley 1966: 13).

1864 (November 1) A patent for the Sandia Pueblo grant of 24,034 acres was issued. The east boundary was at the “top of the Sandia Mountains” (Brayer 1938: 72).

1864 President Lincoln issued patents to all of the Pueblos who had grants confirmed in 1858 (Sando 1992: 112).

1864–66 Estanislao Montoya of San Antonio farmed a large tract of land above Fort Craig, raising corn, barley, and oats (Miller 1989: 40).

1864–79 A new owner acquired the Montezuma hot springs and constructed the Adobe Hotel on the site. In 1879 the Santa Fe Railroad built a two-story stone bathhouse (Perrigo 1982: 22).

1864 (post) Following subjugation of the Navajo by the U.S. Army, and consequently fearing no more raids by this group, Laguna Pueblo livestock herders expanded onto distant range-
lands. The governor assigned herding areas for a year’s use; this was “a conservation area designed to preserve the grass” (Ellis 1979: 442).

1865 (January 18) The Territorial Mining Act was passed. It opened public lands to mining claims, provided the basis for patenting lode claims, and set forth a provision recognizing and protecting water rights (Christiansen 1974: 87–89).

1865 (May 25) Miners met and organized the Chama Mining District and adopted laws to regulate mining. These affected placer and lode claims and water rights (Christiansen 1974: 86–87).

1865 Gold was discovered near Nogal (Northrop 1975: 21).

1865–66 (winter) Fort Craig used bituminous coal from mines south and east of Socorro for heating fuel (Miller 1989: 120–121).

1866 (April 1) The Congress overrode President Johnson’s veto of the Civil Rights bill, which gave equal rights to every person born in the United States except Native Americans (Brown 1970: 121).


1866 (late July) James Meline’s party, passing through San Felipe Pueblo fields, saw another traveler turn his livestock to forage in a corn patch (Meline 1966: 152–153).

1866 (August 4) Meline described the Santa Fe plaza as “some three hundred and fifty feet square, was an open space of mud and dust...” and noted that some Americans had planted cottonwoods on the north side of the plaza. It had been more recently planted with a “rich carpet of alfalfa (known in some parts of the United States as chili clover) growing three feet high and bearing a purple blossom...” (Meline 1966: 152–153).

1866 (late fall) The new settlers of San Francisco Xavier on the Rio Puerco used cottonwood along the stream to construct their houses and outbuildings. This new town was located at a spring, El Ojito del Rio Puerco (Lopez 1980: 72–76).

1866 Some 161,000 pounds of beans were provided to territory posts by 10 local farmers (Miller 1989: 145).

1866 Salvador Armijo had manure hauled from his sheep corrals and spread on his agricultural fields around Albuquerque. Up to 2,000 wagon loads were used in a year (Armstrong 1984: 5).

1866 Some of the major mines in the territory included Old and New Placers for gold, Cerrillos for silver, San Adelia and Stevenson in the Organ Mountains for lead, Santa Rita and Hanover for copper, Pinos Altos and Stone Corral for lead, Taos for silver, Jemez for copper, and Estancia Basin for salt (Meline 1966: 171, 173–177).

1866 Lead-silver ores were discovered at Magdalena (Northrop 1975: 22).

1866 Rio Grande Pueblos were cultivating corn, chile, tobacco, onions, melons, peaches, apricots, plum, and grapes. They also were gathering pinon nuts for food and trade. Hispanics were cultivating wheat, corn, oats, beans, pumpkins, melons, tomatoes, cabbages, onions, chiles, and beets along the Rio Grande. About 250 square miles were in cultivation in the territory. Manure was rarely used as fertilizer (Meline 1966: 156, 160, 162–163).

1866 An outbreak of scurvy occurred at military posts (Miller 1989: 43).

1867–83 Government forage agencies were established at Belen and Los Lunas. These civilian agents furnished forage such as hay, corn, oats, and barley for military animals, as well as water and corrals. They also prepared meals for express men and supplied fuel to army teamsters and small detachments of soldiers (Jensen and Miller 1986: 142–143).

1868 (June 1) The U.S. treaty with the Navajo was signed. A large reservation was to be established in their old homeland, farm implements and seeds were to be given to every head of a family who selected 160 acres of land as a home and began farming, and sheep and goats were to be distributed to families. Also, Navajos could hunt on lands contiguous to the reservation (Dale 1949: 61).

1868–75 Oak, pinon, juniper, and mesquite (roots) were the primary fuelwoods supplied by contractors to the army (Miller 1989: 122).

1869 Mesquite and pinyon were replacing coal as the heating fuel at military posts (Miller 1989: 121).

1869 The army paid Tomas Valencia for use of a bridge that he had constructed over the Rio Puerco on the road between Albuquerque and Socorro (Miller 1989: 311).

1869 Governor William A. Pile sold about three-quarters of the Spanish archives in Santa Fe for waste paper (Hill 1982: 10).
1869–73 The Navajo suffered crop failures (Dale 1949: 62).

1869–81 All of the salt supplied to military posts in the territory came from local sources (Miller 1989: 143).

1869 (to ca. 1900) Water from the La Constancia mill fell “20 feet onto a bed of volcanic boulders spread out over the fields and an orchard below” (Ellis 1955: 105).

1860s Lead ore was mined in the Sandia foothills east of the Las Huertas Valley to make rifle balls (Batchen 1972: 57).

1860s–70s A relatively large influx of new Spanish settlers to the upper Rio Pueblo valley led to over-grazing and scarcity of irrigated cropland (Carlson 1990: 34).

1860s–70s Most of the hay cut for the military by private contractors was harvested with hand sickles and scythes. Hoe-cut hay was frequently refused because large amounts of dirt and roots were mixed with the grass. In times of scarcity, however, it was sometimes accepted. The preferred grama grass hay was usually cut in the fall, while “bottom grass” was cut in June and July. “Inferior grasses” (such as vega and sacaton) were sometimes accepted. Army horses usually received a daily ration of 14 pounds of hay and 12 pounds of grain. The hay was cut native grasses. In 1870 some 4,950 tons of hay were contracted to private residents. It was believed that early frosts destroyed the nutritional content of native hay (Miller 1989: 92–95).

1870 The estimated number of acres of farmland under irrigation in the territory was 57,200, an increase of 2,700 acres over that of 1860 (Clark 1887: 29). Eighty-five percent of the farms in New Mexico were less than 50 acres. Contractor Jacob Schwartz promised the army 200,000 pounds of corn from fields near Tome. Thirty-six gristmills were operating in the territory; 30 were powered by water, four by steam, and two by horses. Some 55,000 pounds of flour provided to the army by Socorro mill owner Manuel Vigil were unfit for use. The army fed its work animals and cavalry horses more than 4,950 tons of hay and grain during the year (Miller 1989: 58, 81, 92, 132, 151).

1870 It was reported that there were 60 million acres of public land that could be cultivated in the territory, a requirement for pre-emption. This total exceeded the available public lands (Westphall 1965: 70).

1870 By this year Mariano Otero and Pedro Perea had established their headquarters for sheep operations on the Rio Puerco and Espiritu Santo grant lands (Bayer et al. 1994: 158). Jose L. Perea and Otero ran over 24,000 sheep in the Cabezon-Bernalillo area (Maes and Fisher 1937: 11).

1870 At Camp Apache, the army, using Apache workers, cut 15 tons of hay and 30 cords of firewood per day (Worcester 1979: 129).

1870 The invention of the refrigerated rail car spurred the growth of the cattle industry in the region. This expansion was partially financed by British capitalists (Ortiz 1980: 100).

1870 The U.S. Census Bureau counted 91,874 persons in New Mexico (Workers of the Writers' Program 1940: 431).

1870 There were 435,000 sheep and 14,000 cattle in the Middle and Upper Rio Grande basins (Harper et al. 1943: 49).

1870 There were 57,000 cattle in the territory (Williams 1986a: 120).

1870–73 A Hispanic individual was living at Espiritu Santo Spring. The land grant of the same name had been used for grazing since 1766.

other indigenous species, to protect the crop from insects and worms and to stimulate growth. Ashes were sometimes sprinkled around pumpkin plants as an insecticide (Hill 1982: 26–29).

(7) The Placer Mining Act, an amendment to the 1866 Act, providing for the patenting of placers, was passed by Congress (Christiansen 1974: 88).

1870 Malarial fevers, diarrhea, dysentery, and venereal diseases were common illnesses among the military (Miller 1989: 43).

1870 (pre) Agricultural fields at Santa Clara Pueblo were primarily located in the vicinity of Santa Clara Creek. Subsequently, when the Rio Grande ditch was constructed, field locations were moved closer to the river (Hill 1982: 26).

1870 (pre) Santa Clara Pueblos traded cornmeal, wheat, barley flour, and foodstuffs made from these to Plains Indians for buffalo robes, jerked meat, buckskins, buckskin clothing, and horses (Hill 1982: 63–65).

1870 (to early 1900s) Santa Clara farmers selected field sites of sandy loam. Alkaline or clayey soils were avoided. New fields were cleared of rocks and smaller trees, and weeds were pulled or burned. Large trees and boulders were left in the fields. Santa Clara farmers treated their agricultural seeds with “blue stone,” a wild plant ground and mixed with

1870–80s (early) Some of the best grass stands cut for hay were located near forts Union, Craig, and Santa Fe (Miller 1989: 99).

1871 (fall) Some 150 residents of Galisteo and Agua Fria harvested hay (Miller 1989: 101). Nathan Bibo of Cebolleta contracted to deliver 100,000 pounds of corn to Fort Wingate (Miller 1989: 57).

1872 (December 3) Four members of the Christian Brothers arrived in Bernalillo to open a school. They also established vineyards and a winery (Olson 1976: 42–43).

1872 Cabezon was founded on the old trail from Santa Ana Pueblo, across the Espiritu Santo land grant, and on to Fort Wingate. The Star Line Mail and Transportation Co. established a stage line operation along this route in 1875 (Bayer et al. 1994: 171, 173).

1872 The Mining Act passed this year updated the 1866 federal law. Both the earlier law and this piece of legislation were based on the view that mining “was the most important, if not the only reasonable, use of public land.” Under the acts, any person could enter unreserved public domain and much of national forests to prospect and stake out as many claims as he wanted. The placer or lode claim remained valid as long as the miner recovered a minimum of $100 income from working the claim. A patent was obtained if the miner complied with surveying and other provisions of the Mining Law and then paid either $2.50 or $5.00 per acre for the claim (Clawson 1971: 123–124).

1872–78 Silver, gold, copper, and lead were discovered in the Raton Basin (Murray 1979: 79).

1870s (early) New Mexico farmers were raising more hogs owing to the abundance of corn grown the previous 2 years (Miller 1989: 135).

1873 Pedro Armijo of Albuquerque drove 12,000 sheep to the central Colorado gold mines to sell as meat (Towne and Wentworth 1945: 65).

1873 New Mexico Surveyor-General Proudfoot openly supported the cattle industry in the territory (Westphall 1965: 65).

1873 A gristmill was operating at Isleta pueblo. It was abandoned and a second mill built, but it fell into disuse before 1893 (Poore 1894: 113).

1873 The Timber Culture Act, which allowed an individual to acquire a quarter-section of land through planting, protecting, and maintaining 40 acres of timber, was passed. Five years later the act was amended to reduce the acquired area to 10 acres. The act was a failure in New Mexico because the planting and cultivating of trees was not feasible without irrigation, and irrigated land was more valuable if farmed for crops and not trees (Baydo 1970: 156; Westphall 1965: 72).

1873–79 This was the first year that all military posts procured fuelwood from private contractors. Wood delivered included ponderosa pine, pinyon, juniper, oak, and mesquite (roots); prices ranged up to $1 a cord (Miller 1989: 122–125). The Pueblo population was about 7,000 (Larson 1968: 116).


1875 Territorial officials considered Indian lands to be disposable property, and as such, they could be purchased by non-Indians. The Supreme Court ruled that the Pueblos had undisputed title to their lands and could dispose of them as they saw fit. The Court also declared that they would not be protected by the Federal Government. Thus, their lands were subject to usurpation by dishonest non-Indians (Simmons 1979b: 214).

1876 (March 3) Congress passed the Desert Land Act, which “extended the doctrine of prior appropriation to water used in the reclamation of arid public lands by irrigation” (Clark 1987: 38). The purpose of the act was to stimulate irrigation through individual enterprise. A settler could buy up to a section of land for $1.25 an acre if the claimant irrigated the acreage within 3 years (Buchanan 1988: 29; Westphall 1981a: 138).

1876 The Territorial Assembly restated the traditional rights of travelers to free access to natural waters for themselves and their animals but excluded persons traveling with a large number of animals. Persons with migratory herds could not use the water of any natural spring or lake without obtaining permission from the owner and assuming responsibility for any damage done to his fields or private property (Clark 1987: 50).

1877 (post) A homesteader established a turbine-powered sawmill at Battleship Rock on the Jemez River. He logged the surrounding mountain slopes, hills, and mesa tops (Scurlock 1981a: 138).

1877 (March 3) Smallpox struck Las Vegas, and 82 deaths were recorded. Work in Old Town halted until the outbreak subsided (Perrigo 1982: 78).
Smallpox killed about 20 men and 100 boys at Santo Domingo Pueblo (Lange and Riley 1966: 93).

1877 (to late 1890s) Santa Ana, Zia, San Felipe, and Santo Domingo pueblos reported numerous squatters and livestock trespass (Bayer et al. 1994: 177–178).

1877–78 An outbreak of smallpox struck the Arroyo Hondo Mining District, and most mining operations were halted (Pearson 1986: 10).

1870s Excellent quality sheet mica was mined in the Petaca district and sold as window “panes” at Espanola and Santa Fe (Christiansen 1974: 53).

1878 Under the Organic Act, any timber cut on public lands and exported from the territory was liable to seizure by the U.S. Government (Ritch 1968: 43).

1878 The Timber and Stone Act was passed by Congress. Under this act, settlers and miners could buy up to 160 acres of land with potential timber or mineral resources for $2.50 an acre (Oakes 1983: 27).

1879 The first planing mill in New Mexico was established near Las Vegas (Bunting 1964: 11).

1879 New strikes of gold and silver-lead ores in the Cerrillos area led to the founding of Carbonatesville, Bonanza City, Turquoise City, Golden, and Cerrillos (Christiansen 1974: 62).

1879 The Alary family moved to Corrales from France and began cultivation of various crops and operation of a winery. The family also fished and caught frogs for food (Eisenstadt 1980: 12, 14).

1879 The U.S. Geological Survey was created by an act of Congress (Swift 1958: 45).

1879 (to August 1880) A Boston company purchased the Hot Springs property and built a stone, two-story bathhouse, walled up 20 of the 40 springs, and pumped hot water into the 14 bathrooms. The company also constructed a three-story hotel (Perrigo 1982: 22).

1879–82 Homestead certificates in northern New Mexico increased from 3 to 263 (Perrigo 1982: 107).

1879–82 The construction of the Southern Pacific and the Santa Fe railroads opened markets for working mines and brought in new prospectors (Northrop 1959: 26).

1879–80s Lack of adequate water hampered mining in the Cerrillos-San Pedro area. Wells and a 13-mile-long pipeline were basically unsuccessful ventures (Christiansen 1974: 63).

1879–89 Gas, electric lights, and telephone service became available at Las Vegas (Perrigo 1982: 30–31).

1879–91 Some 24,550 acres were taken by railroads from the public domain in the territory. By 1891, 622,684 acres of public land were granted to individuals under the land laws (Westphall 1965: 93–95).

1870s The Perea family had a “fine vineyard” in Bernalillo. Nathan Bibo had a store and prospected for gold in the area (Olson 1976: 187–188).

1870s (late) Mariano Otero bought 25,000 to 30,000 pounds of corn annually at Cabezon (Maes and Fisher 1937: 14).

1870s–80s Hispanic farmers, would-be colonists, and Anglo miners from Pena Blanca and La Jara moved onto the Espiritu Santo land grant, hoping to use water from the Rio Puerco to irrigate their crops (Bayer et al. 1994: 158–159).

1870s–80s Truck gardens in the North Valley of Albuquerque, especially the one operated by Herman Blueher, which was located at the site of present Tiguex Park, furnished much of the produce for Albuquerque and surrounding communities. Some was shipped by train to the eastern United States. (Simmons 1982: 246, 273–274).

1880 (pre) Crude furnaces built of stone or adobe were used to roast or smelt gold and silver ores. A variety of fuels were used in New Mexico, but green pinyon or pinyon charcoal was preferred. Sometimes, manure from horses or other livestock was added to the fuelwood (Christiansen 1974: 95).

1880 (February 12) A general act provided that “every person who shall foul the water of any stream in the Territory of New Mexico, or throw into any ditch, river or spring of flowing water any dead or pestiferous animal or other filth, dirty vessels or other impurities that might injure the health of the inhabitants of any town or settlement of this Territory, on conviction thereof would be fined not less than one nor more than ten dollars” (Clark 1987: 31).

1880 (April 15) The Territorial Bureau of Immigration was organized. “Valuable mines of gold and silver” and grasslands “capable of producing sheep for the million” were extolled (Bureau of Immigration 1881: 7–8, 53).

1880 (spring-summer) There were some 10,000 acres under irrigation in the upper Rio Puerco valley (Cuba to Casa Salazar) (deBuys 1985: 217).
The Denver and Rio Grande Railway, commonly known as the Chili Line, was constructed from Alamosa into northern New Mexico. The route passed Conejos to the new railroad town of Antonito across the Rio Grande and to the terminus at the new railroad town of Espanola. Some 160,000 spruce or pine cross-ties were used in construction between Alamosa and the New Mexico state line (Chappell 1969: 3–7).

Mining activity in the Sandias and Manzanos increased sharply with the arrival of the railroad at Albuquerque. The Coyote Canyon and Hell Canyon mining districts were soon formed (Simmons 1982: 212, 238).

Construction of the Atchison, Topeka, and Santa Fe Railroad was completed to Albuquerque (Marshall 1945: 142–143).

New Mexico ranked fifth in wine production in the United States; 908,500 gallons were produced from 3,150 vineyards. In the following years the wine industry declined rapidly due to floods, drainage and salinization problems, frosts, and competition. Prohibition was the final blow to the business (Brown 1988: 8).

White wine and hand-cut hay were being sold at Cabezon (Rittenhouse 1965: 64).

One source reported 44,000 acres under irrigation in the Middle Rio Grande Valley (Wozniak 1987).

By this year the total of irrigated acres was 94,900 (Clark 1987: 29).

There were about 124,800 acres of land under irrigation in the Middle Rio Grande Valley (National Resources Committee 1938, pt. VI: 71).

There were 3,000,000 to 4,000,000 sheep and more than 350,000 cattle in the territory (Williams 1986a: 120). Between 2 and 5 million sheep and 400,000 cattle were in New Mexico (Carlson 1969: 33; Gonzalez 1969: 48; Simmons 1988: 12; Wentworth 1948: 242). There were 583,000 sheep in Bernalillo County (Dortignac 1960: 47).

A conservative group of Pueblos from Laguna left and established the village of Oraibi, southwest of Isleta (Dryeson 1975: 109).

The U.S. Census Bureau recorded 119,565 persons in New Mexico (Workers of the Writers’ Program 1940: 432).

There were 1,015 blacks in the territory (Bancroft 1889: 723).

(1880) This year marked the beginning of fire suppression in the ponderosa pine-pinyon-juniper-oak zones of the mountains. Intensive logging and fuelwood cutting also began at this time. Intensive grazing continued. All of these activities have produced many changes in these montane forests. Currently, they are represented by early or middle successional stages—oak-juniper thickets and young ponderosa stands (Dick-Peddie 1993: 69).

The mining of gold at The New Placers District developed, and pipelines to bring needed water from reservoirs and springs in the Sandia Mountains were under construction (Northrop 1975: 27).

Building stone was brought into Albuquerque on the train from the west. During the first 5 months of 1882, more than 5,000 tons of stone were shipped to the town (Oppenheimer 1962: 34).

Santa Fe Railroad tenders had a capacity of 2,000 to 4,000 gallons of water. They had to be refilled every 30 miles (Glover 1990).

The Las Vegas Land and Cattle Company expanded its land holdings where it grazed sheep and cut “hay.” Some of this land, on the old Las Vegas land grant, was in dispute (Perrigo 1982: 108–109).

Cattle in the territory increased from 347,000 to 1,630,000 head, while sheep increased to 5,000,000 head (Bayer et al. 1994: 174).

A decreasing supply of irrigation water due to increased upstream use contributed to a decrease in cultivated acreage in the Middle Rio Grande Valley (Hedke 1925: 10).

Narcisco Zamora was ferrying wagons across the Rio Grande at Bernalillo on his flatboat (Bayer et al. 1994: 174).

Several trading posts and a general store were operating in Cabezon, serving local residents, travelers on the Star Line Stage Route, Navajos, and area Pueblos. These Hispanic residents owned herds of 16,000 and 10,000 sheep. The first also owned 2,000 cattle. By 1891 the village residents owned enough sheep to fill 17 freight wagons with wool (Rittenhouse 1965: 16–17, 31, 33, 36–39, 64–67, 70, 79).

(1880–1900) Copper was mined in the foothills of the Sierra Nacimiento, a few miles northeast of La Ventana. Coal from the latter site was used to fire the boilers and the smelting furnaces at the copper mine (Glover 1990: 46).

Cattle from southern New Mexico were shipped north to grazing lands in Colorado’s forests (Gjevre 1969: 19).

(January 15) The Southwestern Stockmen’s Association was formed at Silver City (Baydo 1970: 113).
(November 2) Corn, onions, bread, cakes, pies, cantaloupe, watermelons, apples, and grapes were crops and prepared food items at Isleta Pueblo (Kessell 1980: 218).

The residents of Taos Pueblo were raising corn, wheat, pumpkins, melons, chile, beans, apples, plums, peaches, grapes, and apricots. The Taos valley was “noted for its large production of wheat” (Nims 1980: 92, 94).

Lt. John G. Bourke, visiting the Pojoaque Pueblo church, wrote “Within bowshot, is the orchard and vineyard of the pueblo and here growing in full luxuriance were apples, pears, peaches, apricots, plums, grapes, and different kinds of vegetables” (Kessell 1980: 72).

Franz Huning planted some 1,500 trees on his land in Albuquerque. He operated the Molino de la Glorieta near his home known as Huning’s Castle (Baxter 1885: 696).

The spring water at Ojo Caliente reportedly cured “rheumatism, skin diseases, derangement of the kidneys and bladder, and especially of all venereal diseases” (Nims 1980: 90).

Silver and placer gold were discovered in the Hopewell Mining District in Rio Arriba County (Christiansen 1974: 65).

Fired brick became a favorite building material for houses and commercial buildings, especially among Anglos. Two new brick-making companies furnished this newly available construction material (Sonichsen 1968: 232).

Construction of the Santa Fe rail line through Lemitar caused the Rio Grande channel to shift eastward. The elevated rail bed acted as a levee; sections were washed out in 1884 and 1886 (Scourlock 1982a: 13).

Mariano S. and Miguel Antonio Otero erected bathhouses and a hotel at Sulphur Springs just outside the west boundary of the Baca No. 1 grant (Otero 1935, I: 237–238, 241–277).

(early) The California Placer Company was erecting sawmills on the lower Red River to produce lumber for mining flumes (Pearson 1986: 15–16).

(April) The Montezuma Hotel opened under the management of Fred Harvey. Among the food imports for the dining room were green sea turtles (Perrigo 1982: 24).

(September 22) The New Mexico Mining Association was organized at Albuquerque (Northrop 1959: 30).

This may have been the last year that the Spanish scratch plow and oxen were used by Jemez Pueblo farmers (Poore 1894: 107).

Las Vegas was again struck by smallpox outbreaks; at least 28 people died (Perrigo 1982: 78–79). An outbreak of smallpox struck Chilili late in the year (Lange and Riley 1966: 383).

Copper and gold dust were being mined in the Tijeras District east of Albuquerque (Northrop 1959: 31).

Depot Park was established in Albuquerque but became an environmental problem according to a story in the local newspaper. In the article it was written “the privy of the depot gives [the park] a very disagreeable odor and should be looked after” (Oppenheimer 1962: 35).

There were an estimated 3 million head of livestock in the territory; horses and mules were not included. The average stocking rate was 20-animal-unit-years per section (Donart 1984: 1240).

Cattle in Socorro County increased from 9,000 head to 60,000. Severe overgrazing in some areas ensued (Gehlbach 1981: 110).

(early) The San Felipe de Neri church had “a beautiful garden in Albuquerque, with long alleys densely shaded by fruit and nut trees, and bordered with all sorts of small fruits” (Baxter 1885: 697).

(January) Smallpox was “raging” at Punta de Agua (Lange and Riley 1970: 14).

(March 24) The U.S. Supreme Court ruled that Indians by birth were aliens and dependents (Brown 1970: 391).

Cattlemen were pressing for lands with water to be surveyed by the General Land Office (Westphall 1965: 27).

Texas ranchers and their cattle forced Hispano and Pueblo livestock raisers off most of the Pajarito Plateau (Rothman 1992: 28).

Bernalillo County had 475,000 sheep and 41,700 cattle on rangelands (Bancroft 1889: 787; Bayer et al. 1994: 174).

A community water works began operating in Albuquerque (Simmons 1982: 228).

The territorial population was about 130,000, which included some 97,500 Hispanics and Native Americans (Westphall 1965: 27).

S.S. Farwell contracted with H.S. Buckman to cut 27 million board-feet on the Petaca grant. Crews employed by Buckman clearcut the Petaca land grant near Tierra Amarilla for railroad ties used in construction of the Chili line to Santa Fe. This cutting initiated an adverse cycle of environmental changes which is still evident today (Gjevre 1969: 27; Rothman 1989: 203).

Frank and George Bond acquired and logged
the Las Trampas land grant (deBuys 1985: 185–186).

1884 There were about 2.5 million sheep and 400,000 cattle in New Mexico (Carlson 1969: 37).

1884–86 Livestock associations attempted to control overgrazing (Baydo 1970: 125).

1885 Some unidentified Pueblos were using a canoe, alternately paddling and hauling it with a rope, to cross the Rio Grande at their villages (Lange et al. 1975: 394).

1885 The Santa Fe Railroad’s operation consumed 27,984 tons of coal per month (Glover 1990).

1885 (ca.) The priest at the San Juan Pueblo had planted currants, black cherries, and apricots in the garden of the church (Kessell 1980: 93).

1886 An estimated 5 million feet of timber were used in the region (Ensign 1888: 141). The Pecos Lumber Co., headquartered at Glorieta, cut and milled 60,000 feet of bridge timber used in construction of the Chili rail line (Chappell 1969: 19–20).

1886 Officers at Fort Wingate incorporated and purchased 40,000 acres of the best land, claimed by Zuni Pueblo, from the railroad. The commander of the garrison became president of the Cibola Land and Cattle Company, which placed 12,000 cattle on the Zuni River watershed (Hart 1991a: II/3).

1886 At the Otowi siding of the Denver and Rio Grande Railroad the company constructed a water tank for replenishing locomotives. In the process of developing and using this facility, a natural pool, fed by a spring, was destroyed. This was San Ildefonso Pueblo’s source of sacred water from the south (Hewett and Dutton 1945: 38–39).

1887 (pre) Anglo settlers had homesteaded and usurped the best lands, which became the Jicarilla Apache Reservation in north-central New Mexico. They had settled on arable land with control of water resources. Their livestock were overgrazing, so they cut grass for feed on other parts of the reservation. Jicarilla attempts to dry farm on poorer lands failed (Tiller 1983: 101–103, 453).

1887 (February 24) An act was passed by the Territorial Assembly authorizing the incorporation of companies to supply water for mining and milling as well as irrigation. They were granted right-of-way across territorial lands and the privilege of taking timber and stone from them (Clark 1987: 64, 132).

1887 The Santa Fe Railroad was completed from Albuquerque to Belen (New Mexico Historical Records Survey 1940: 24).

1888 (October 2) The New Mexico Legislative Assembly delayed immediate exploitation of the territory’s water resources by some irrigation developers (Clark 1983: 65).

1888 Congress passed legislation that provided for the withdrawal of irrigable land from entry. Under this act, some 39 reservoir sites amounting to 40,170 acres were selected in New Mexico (Westphall 1965: 84).

1888 Saw logs of ponderosa pine up to 4 feet in diameter were being removed from the Manzanos Mountains. An estimated 280 square miles constituted the well-timbered area of this range (Ensign 1888: 148).

1888 There were 3.5 million sheep and almost a million cattle, mostly from Texas, grazing New Mexico’s ranges (Flores 1992: 8).

1888–91 A total of 88 irrigation companies were incorporated, and their irrigated land represented 40 percent of the new irrigated acreage for the 1890s (Westphall 1965: 82).


1889 (January 31) The Territorial Legislature passed a law providing for the election of three commissioners to protect springs and build appropriate dams (Westphall 1965: 25).

1889 (March 1) The International Boundary Commission, United States and Mexico, was created. This commission determined the volume of water in the Rio Grande, its conservation and use, hydroelectric power generation, flood control, and sanitation and pollution (Clark 1987: 227).

1889 The New Mexico Territorial Assembly passed an act to prevent overstocking of ranges. A person or corporation could graze on public lands only so much livestock as could be supported by waters for which the person or company had title. Others entering the range had to have sufficient permanent, living, and unfenced water to take care of their stock (Clark 1987: 54).

1889 The New Mexico School of Mines was created by the Territorial Legislature. The college, located in Socorro, held its first classes in 1892 (Christiansen 1974: 70).

1889–90 Responding to threats to their traditional grazing lands by Anglo ranchers, Hispanos formed Las Gorras Blancas. They cut barbed wire fences and telegraph wires and burned ranches of Anglos or Hispano sympathizers (Rothman 1992: 33).

1880s The Territorial Legislature passed an ordinance that levied fines against anyone convicted of dumping trash in irrigation ditches or rivers (Carlson 1990: 37).

1880s Zia Pueblo had a meager supply of water because Jemez Pueblo and upstream Hispanic villages diverted most of the Jemez River water (White 1962: 85).

1880s The acreage in cultivation along the Middle Rio Grande continued to decrease due primarily to water-logging and increasing alkalinity (Scurlock 1988a: 136).

1880s Don Jose Leandro Perea of Bernalillo “had many flocks of sheep” in the Sandia Mountains area. A severe blizzard killed a large flock between Bernalillo and Placitas. Perea sent out the word to area residents that they could have the animals for their meat (Batchen 1972: 69).

1880s Anglo lumbermen established tie-cutting camps in the southern end of the Sangre de Cristo Mountains. Some of these were fenced and were located on traditional common lands of land grants (Perrigo 1982: 100, 108). Extensive cutting of trees in the hills around Lamy for the production of charcoal occurred (Bullock 1973: 38).

1880s Coal was mined at Monero and Amargo west of Chama (Christiansen 1974: 83–84).

1880s At Joseph’s Hot Springs at Ojo Caliente in Rio Arriba County, mineral water was marketed, and several thousand gallons were sold. Sales here and at other hot springs locales increased in the next decade (Christiansen 1974: 66).

1880s (to early 1900s) Lumberman H.S. Buckman, who made a practice of cutting timber on land grants that had fallen into Anglo ownership, clear-cut timber on the Petaca and Ramon Vigil land grants (Rothman 1992: 29–30).

1880s (to early 1900s) Cochiti Pueblo grew corn, wheat, oats, alfalfa, pinto beans, string beans, havas, garbanzas, peas, chile, onions, cabbages, beets, muskmelons, watermelons, peaches, apples, apricots, plums, cherries, grapes, tobacco, and cotton (Lange 1959: 93–100). At Ranchitos de Santa Ana, now known as Santa Ana No. 1, there were two villages a half-mile apart. Each was surrounded by peach, apple, and plum orchards and small vineyards. The corn crop was “one of the finest to be seen on the Rio Grande.” Some 750 acres were in cultivation, and other land was used for livestock grazing. Both fields and bosques-vegas were irrigated (Poore 1894: 432). Isleta Pueblo had 60 acres of peach, plum, and apricot trees. These fruits were eaten, dried for winter use, or sold (Ellis 1979: 356).

1880s–90s Railroads were granted almost 3,600,000 acres in New Mexico, which included usurpation of Hispanic and Pueblo grant lands (Westphall 1983: 144). Coal mined at Dawson was primarily used by the Santa Fe Railroad (Christiansen 1974: 83).

1880s–1908 The American Lumber Company, headquartered in Albuquerque, owned and logged 1.5 billion board-feet of virgin pine timber in the Zuni Mountains. Thirty to forty carloads of logs were shipped to the Duke City daily over 55 miles or rail line. By 1908 it was the largest manufacturing firm in the Southwest (Simmons 1982: 332).

1880s–1920s Hot springs were considered to be healant and therapeutic for rheumatism, eczema, psoriasis, and acne. Spas were developed at sites with hot springs over much of the state (Fox 1983: 218).

1890 An irrigation company in Tijeras Canyon failed because it selected land that was not suited to irrigation development (Westphall 1965: 82).

1890 By this year a total of 113 Hispanic land grants, totalling 5.4 million acres, were confirmed in the Upper and Middle Rio Grande basins (Dortignac 1956: 72).

1890 There were 1,517,000 sheep and 210,000 cattle in the Middle and Upper Rio Grande basins (Harper et al. 1943: 49).

1890 Cattle were grazing on the mesa above and to the west of San Felipe Pueblo. Horses were grazing on the floodplain around the village (Strong 1979a: 395).

1890 A 15-foot vein of lignite coal, as well as copper, gold, and silver, were discovered on or near the Rio Puerco on the Espiritu Santo grant (Bayer et al. 1994: 159).

1890 The U.S. Census Bureau counted 160,282 residents in New Mexico (Workers of the Writers’ Program 1940: 432).

1890 (ca.) An old Spanish coal mine was reopened near Las Huertas, north of Placitas. Santa Ana
Pueblo herders were grazing their stock in the area (Bayer et al. 1994: 174).

1890–1910 Santa Ana Pueblo had 600 horses, 150 burros, 2,000 cattle, as well as 30 yoke of work oxen and a large number of sheep and goats (Bayer et al. 1994: 170).

1890–1945 Hispanic residents from the Carnue grant grazed on Manzano Forest lands until the Forest Service closed it to grazing (Quintana and Kayser 1980a: 50).

1891 (March 2) The General Revision Act, passed by the U.S. Congress, authorized the President to “reserve any part of the public lands” and establish boundaries. Many lumbermen, ranchers, and miners protested vigorously (Athearn 1985: 129).

1891 The Forest Reservation Act was also passed by Congress, marking the beginning of the national forest system (Udall 1963: 104–105).

1891 The Territorial Assembly passed a statute requiring all persons, associations, or corporations who constructed or enlarged any ditch, canal, or reservoir taking waters from a natural stream to make a sworn written statement of such diversion, to be filed with the county probate court within 90 days after commencement of the work. Construction had to be completed within 5 years of commencement (Clark 1987: 117).

1891 The Timber Culture Act was repealed because of abuses and difficulty in successfully growing trees in the West (Walker 1977: 3).

1892 (January 11) The President created the Pecos Forest Reserve (Tucker 1982: 107; Workers of the Writers’ Program 1940: 432).

1892 (May 12) The capitol building burned in Santa Fe, destroying many public records and documents (Hill 1982: 10).

1892 A logging company purchased 300,000 acres of timbered lands in the Zuni Mountains (Hart 1991a: II/3).

1892–93 Jemez Pueblo grew 10,000 bushels of wheat and almost as much corn. The fields were fertilized with livestock manure from old corrals. Forty barrels of wine were made each year. (Poore 1894: 107).


1893 San Felipe Pueblo had more irrigable land than any other pueblo; grains were the major crops. Cattle and burros were grazed on the mesa above the village. A few years before, a foot bridge was built over the Rio Grande, but since that time floods had partially destroyed it. At Ranchitos de Santa Ana Pueblo there were two villages, each surrounded by peach, apple, and plum orchards and small vineyards. Their corn fields produced “one of the finest [crops] to be seen on the Rio Grande.” These and their pasture lands were irrigated. They had 2,000 cattle, 600 horses, 150 burros, and 30 yoke of oxen, which grazed on various tracts here and on the land grant. Zia Pueblo residents were cultivating only about 100 acres of wheat, corn, and chile. They complained that livestock from Santa Ana Pueblo had invaded and damaged their fields and irrigation ditches. Zia Pueblo’s lands totalled 17,515 acres. Jemez Pueblo was cultivating some 1,400 acres, mainly on the west side of the Jemez River. They were fertilizing their fields with livestock manure. About 10,000 bushels of wheat, almost as much corn, other vegetables, and various fruit, including grapes, constituted the major crops. Their livestock, with that of Zia and Santa Ana pueblos, were pastured on a tract of land 50 miles long and 12 miles wide. Isleta Pueblo was cultivating about 2,500 acres of floodplain land stretching north from the village and west of the Rio Grande for 2.5 miles. Wheat, corn, and fruit, including grapes, were grown. The Espiritu Santo land grant was grazed by livestock from Jemez, Zia, and Santa Ana pueblos, as well as animals belonging to Hispanic residents of San Ysidro and the U.S. Cavalry. Recently, lignite coal, copper, gold, and silver had been found in the Rio Puerco valley portion of the grant (Poore 1894: 107–110, 113, 160).

1893 Thomas Catron owned 2 million acres of land grants and served as attorney or part owner for some 4 million acres. He also held interests in 75 grants (Bayer et al. 1994: 160).

1893 Livestock herders at Zia Pueblo were taking woodrats and other small game for food with bows and arrows and clubs (Poore 1894: 108).

1893 The U.S.D.A. Division of Forestry reported “without forest management no national water management is possible” (Clark 1987: 71).
1893 An earthquake hit the Los Lunas area, and some 20 adobe buildings in that community were destroyed and many others damaged (Northrop 1976: 85).

1893–1912 Accidents killed 287 coal miners in New Mexico. Most (146) died because of rock and coal falls, while 72 were killed in explosions. These figures were considerably higher than the national averages (Whiteside 1989: 172).

1894 Oil began to replace coal as fuel in Santa Fe Railroad locomotives (Worley 1965: 24).

1894–1909 A store owner in Lamy operated several charcoal kilns to provide the fuel for broiling steaks that were served in dining cars of the Santa Fe Railroad (Rittenhouse 1965: 71).

1895 (pre) Native grasses, watered by overbank flooding of the upper Rio Puerco, were cut and dried for use as hay. Some of this hay was hauled to Albuquerque and sold (Bryan 1928a: 278).

1895 (February 28) The Territorial Assembly passed one of its most significant pieces of legislation. This measure defined the meaning of acequia, or community ditch, and detailed its legal status. These multiple-owner ditches were to be considered to be “corporations or bodies corporate, with power to sue and be sued as such” (Clark 1987: 30).

1895 The Surveyor-General’s Office surveyed Lot 1, small holding claim no. 869, owned by Vicente Lujan of Valencia. The land was described as being level with sandy loam soil. There were cottonwoods with willows along an acequia, and there were three houses, fences, stables, and cultivated lands, all valued at $1,400 (Sanslock 1990b).

1895–1925 Acreage for the raising of alfalfa and tree fruit decreased due to a reduction in available irrigation water in the Middle Rio Grande Valley (Hedke 1925: 35).

1890s (mid) A reservoir was built on the upper Santa Fe River, below the 1866 dam and reservoir. The new reservoir was far superior to the old one, but population growth eventually rendered it inadequate (Clark 1987: 33).

1896 By this year, irrigated acreage in the Middle Rio Grande Valley had decreased from an estimated 44,000 acres to 32,000 acres, primarily as a result of agricultural development in the San Luis Valley and the ongoing drought (Wozniak 1987).

1896 (July) Water at Taos Pueblo, usually adequate at this time, was scarce (Zubrow 1974: 18).

1896 There were about 105,000 acres of irrigated acreage in tributary drainages of the Rio Grande (Dortignac 1956: 30).

1896 There were 39 pre–1800 irrigation ditches, 9 pre–1850, 7 pre–1880, and 12 pre–1896 maintained by the Pueblos (Hedke 1925: 18).

1896 A few Santa Clara Pueblo families had chickens (Hill 1982: 37).

1896 Promotional pamphlets and brochures produced by the Territorial Bureau of Immigration proclaimed that gold, silver, copper, lead, iron, and coal deposits were inexhaustible (Northrop 1959: 31, 33).

1897 (February) President Grover Cleveland set aside more than 21 million acres of land in the western states as part of national forest preserves (Rothman 1992: 61).

1897 (June 4) Congress passed the Organic Act for National Forests, which embodied the concept of multiple-use of resources in conformity with state laws and federal rules and regulations (Clark 1987: 140). The act also authorized the Forest Service to manage grazing on public reserve lands. This soon resulted in the loss of free grazing for livestock owned by nearby land grant occupants in northern New Mexico (Brown 1978: 254).

1897 Otero gave out 60,000 sheep on a partido basis in the upper Rio Puerco basin (Maes and Fisher 1937: 14–15).

1897 The New Mexico Sheep Sanitary Board was created by the Territorial Legislature. Board inspectors had the power to quarantine infected sheep and to inspect all incoming and outgoing sheep as well. In 1904 the board ordered all sheep to be dipped to prevent the spread of rabies (Grubbs 1961: 287).

1897 Cochiti Pueblo built a bridge of wicker-woven basketry cribs, vertical wooden posts, and log planks across the Rio Grande (Lange 1959: 57–60).

1897 Cochiti farmers had constructed “summer huts,” or field houses, of usually a one-room adobe or brush. Some had “a little shelter of boughs in front: one or two have little dome or arched brush huts erected on the flat roof of the hut proper” (Lange 1959: 102).

1897 An epidemic of eye disease broke out at Zia Pueblo (White 1962: 60).

1897 (late) (to late 1898) Some 118 Catholics died of smallpox in the Tome parish. Most of these deaths were children under the age of 13 (Baca and Baca 1994: 6, 111).

1897 (June 21) The President signed the Fergusson Act, which in part, earmarked 500,000 acres in New Mexico for the establishment of permanent reservoirs for irrigation purposes. On March 16 of the next year the Territorial
Assembly responded by creating the office of Commissioner of Public Lands and a Board of Public Lands. They were responsible for leasing, selling, and managing the lands. Under the act, federal public lands were transferred to the territory for schools and certain other public institutions (Clark 1987: 84).

1898 Less than 26,750 acres of an estimated 115,000 acres of arable land, from Cochiti to Sandia pueblos, was in cultivation. Some 32,000 fallow acres had been abandoned due to alkali accumulation and the formation of marshes in the soil (Follett 1898: 87–88).

1898 Some 632 Pueblo Indians were infected with smallpox; 42 of these individuals died (Thornton 1987: 102).

1898–1903 The Raymond Vigil grant was leased to timberman H.S. “Harry” Buckman, who employed “tie-gangs” to begin clearcutting of the ponderosa on this part of the Pajarito Plateau. Buckman illegally cut trees that were less than 8 inches in diameter at the base. As part of his logging operation on the Pajarito Plateau, he built an access road with a bridge over the Rio Grande. This structure was taken out by floods each year (Rothman 1992: 32, 33, 179).

1898–1932 George Rinaldi developed a copper mine at La Bajada until about 1900, then moved to Bland, then Pena Blanca, where he began farming in 1904. He introduced cauliflower to the area. In 1918 he and his family moved to a ranch in Bernalillo. Rinaldi became involved in growing vineyards and orchards until his death in 1932 (Olson 1976: 201–203).

1899 (pre) The Indian agent reported that smallpox and diphtheria had severe effects at Zia Pueblo (White 1962: 101).

1899 The U.S. Congress declared it a misdemeanor to discharge refuse into any navigable streams or their tributaries, although the law did not apply to waste from properly supervised public works or waste in liquid state from streets or sewers (Clark 1987: 268).

1899 San Felipe Pueblo was located on both banks of the Rio Grande. The east bank settlement included numerous cultivated fields at the very edge of the river (Strong 1979a: 394).

1899 The cyanide process of ore reduction was first used in New Mexico at Albemarle in Colla Canyon in the Jemez Mountains (Scurlock 1981b: 51).

1890s–1902 The Zia Pueblo population grew from 92 to only 109 due to disease, inadequate water for farming, and poor crop harvests (White 1962: 101–102, 322).

1890s–1940s Louis Gross maintained large vineyards and fruit orchards in Bernalillo. Peaches and apples were his main tree fruit. Gross made wines from all three fruits and also sold them as produce (Olson 1976: 195–196).

1800s Residents of Adelino, across and down the river from Tome, would take a San Juan santo to the river to “look” at the dry sand in hopes he would bring rain (Ellis 1955: 106).

1800s Vegas near the Rio Grande in the Tome area were the source of terrones used in the construction of houses and buildings. The best cutter of terrones, reportedly, was an unidentified man who cut 1,000 blocks a day. Volcanic rock was hauled from Cerro Tome and used for low foundations of homes and other buildings in the area. These rocks helped protect the terron walls of structures against flood and marsh waters (Ellis 1955: 104).

1800s (late) Hispanic farmers in Frijoles Canyon re-used prehistoric irrigation ditches (Rothman 1992: 115).

1800s (late) There was an increasing shortage of Spanish cropland on the south side of the Pojoaque River (Carlson 1979: 32).

1800s (late) The average Santa Clara farm was 6 acres, including lowland and highland plots (Hill 1982: 27).

1800s (late) Farming at San Ildefonso began a decline that lasted into the early 1930s. This resulted from a population decrease and Anglo and Hispanic disregard for Pueblo land and water rights (Edelman 1979: 312).

1800s (late) As fenced rangelands became more common, cowboys spent less time chasing cattle and more time maintaining windmills, small irrigation ditches, and hay for winter feed (Murray 1979: 94).

1800s (late) A hotel and bathhouse were built at Ojo Caliente in Taos County. The five hot springs constituted a significant sacred place to the Tewa Pueblo (Hewett and Dutton 1945: 39–40).

1800s (late) Firewood wagons generally used the precursor of Highway 14 south of Tijeras. This old trail commonly gullied and became hard for wagons to negotiate (McDonald 1985: 21).

1800s (to early 1900s) There was coal mining activity in the Tijeras area (Quintana and Kayser 1980: 50).

1800s (to early 1900s) The Tewa Pueblo owned very few sheep, goats, and pigs. Each family
had a few head of cattle, including oxen; one or two residents of Santa Clara owned as many as 60 head of cattle. Dogs, rabbits, ducks, and deer fawns were kept as pets (Hill 1982: 37).

1800s (late) (to mid 1900s) Shepherders and other residents of the Tome area collected osha and other herbs in the Manzanos, especially at Osha Springs (Chavez 1972: 2–3, 21).

1900 (pre) “A good cover” of galleta, blue grama, and alkali sacaton grasses was found over much of the Rio Puerco watershed (Dortignac 1963: 508).

1900 (pre) Sorghum was grown at Santa Clara Pueblo; it was used in making syrup (Harrington et al. 1916: 110). Cotton was also grown at this pueblo (Hill 1982: 33).

1900 There were 3.5 million sheep and 843,000 cattle in the territory (Carlson 1969: 39).

1900 There were 1,732,000 sheep and 211,000 cattle in the Middle and Upper Rio Grande basins (Harper et al. 1943: 49).

1900 By this year the Upper Rio Grande “carried 533,000 animal units” (Bayer et al. 1994: 176).

1900 The U.S. General Land Office required ranchers to obtain permits to graze on public lands (Athearn 1985: 130).


1900 The U.S. Census Bureau counted 195,310 persons in New Mexico (Workers of the Writers’ Program 1940: 433).

1900 The populations of major Middle Valley towns were as follows: Santa Fe, 5,603; Albuquerque, 8,848; Belen, 673; and Socorro, 1,512 (Sayles 1987: 132).

1900 (ca.) At springs in Coyote Canyon at the west foot of the Manzano Mountains, water reportedly good for kidney and bladder problems was bottled and sold. Topham bottled 10,000 gallons in 1903; Harsch bottled 25,000 gallons (Jones 1904: 3303).

1900 (ca.) The Reliance Gold Mining Co. was organized to mine the placer gold in Hell Canyon in the Manzanos (Jones 1904: 192).

1900-04 The Pino family of La Cienega used Frijoles Canyon as a base for their shepherding. Some of the family members lived in prehistoric cavate rooms (Rothman 1992: 63).

1900–30 Loss of common lands, loss of access to those lands, and reduced surface water contributed to the decline of Hispanic villages in the Las Vegas area (Ferrigo 1982: 129–130).

1900–39 Spanish New Mexicans lost about 70 percent of their private or community land grants (Eastman and Gray 1987: 96).

1900–45 Alameda stock raisers were grazing their herds, primarily sheep, on common lands across the Rio Grande, west of the community, and on the east side of the railroad tracks (Gerow 1992: 49).

1901 (December 3) President Teddy Roosevelt delivered a message on the need for conservation of natural resources, the first such speech by the Nation’s leader. His emphasis was on reclamation and forest reserves (Clark 1987: 134).

1902 June Congress passed the Federal Reclamation Act to assist irrigation development in the western states. The U.S. Reclamation Service was also established. This agency’s major responsibility was to construct irrigation works for the reclamation of arid lands (New Mexico State Engineer Office 1967: 78, 81). The act authorized the Secretary of the Interior to construct irrigation projects in New Mexico and 15 other territories or states. Users of irrigation waters would repay the costs of construction over a 10-year period, and small farmers could irrigate 160 acres or less with water from federal irrigated projects (Clark 1987: 79–82; Wozniak 1987).

1902 (summer) In the upper Arroyo Hondo, new mine-related developments were underway. These included the erection of a four-story mill and smelter using fired bricks made onsite. Charcoal was also being made (Pearson 1986: 41).

1902 Theodore Roosevelt created the San Isabel Forest and San Juan Forest reserves in southern Colorado (Athearn 1985: 130).

1900s (early) Crop plants cultivated at Jemez Pueblo included corn, wheat, alfalfa, melons, gourds, chile, grapes, and cotton (for ceremonial use). Domesticated animals included the horse, burro, goat, dog, cat, turkey, and chicken. Crop plants cultivated at Laguna and Acoma included corn, wheat, alfalfa, beans, squash, pumpkins, melons, gourds, chile, cabbage, beets, and carrots. Livestock raised included sheep, goats, cattle, horses, mules, pigs, turkeys, and ducks (Bandelier and Hewett 1937: 97, 104).

1903 Valencia was a sheep-raising and farming community with a population of 900. Gurule Feliz and Jesus Sanchez were owners of general merchandise stores, and Sanchez was also postmaster (Ives 1903: 496).
1903 Margarito Romero of Las Vegas was cutting timber for railroad ties on the Pecos Forest Reserve and in Gallinas Canyon. He claimed the latter area was part of the Las Vegas land grant, and his family had rights to cut on the acreage (Perrigo 1982: 116).

1903 Prosperous gold mining in the Cochiti District was a factor in creating the new county of Sandoval, formerly the northern part of Bernalillo County (Northrop 1959: 35).

1904 There were 30,000 sheep owned by small operators grazing in the Cabezon-Cuba area. One sheep man in Cuba owned 32,000 animals, and another had 20,000 (Maes and Fisher 1937: 15, 18–19).

1904 The Las Vegas land grant board reserved all of the unoccupied grazing lands for use of residents and declared all common watering places were to be kept open and accessible to them. One person was limited to 4,000 sheep and 400 cattle, which could be grazed on the old grant (Perrigo 1982: 118–119).

1904 The wine and brandy produced in Valencia County was a highly regarded commodity (Gallegos 1970: 74).

1905 (July 29) The Santa Clara Reservation, some 33,044 acres, was created by executive order (Lange 1982: 2).

1905 (September 30) The crop harvest at Nambe Pueblo was reported as good (Kessell 1980: 66).

1905 (October 12) The Jemez Forest Reserve was created, precluding continuance of traditional grazing and other activities on this former ejido land. The period of fire suppression was also begun (Rothman 1989: 208–209; Tucker 1992: 107).

1905 (November 4) Father Ralliere of Tome collected “a large amount of grass [hay] from the Rinconada lands and from the swamps of Manuel and Julian Torres” (Ellis and Baca 1957: 21).

1905 The Legislative Assembly enacted a code that declared natural waters as belonging to the public, and all citizens had the right to appropriate them for beneficial use (Clark 1987: 117).

1905 The principal crops grown in Valencia County included wheat, barley, oats, alfalfa, corn, and grapes (Frost and Walter 1906: 375).

1905 (late) Edgar Hewett drafted an “Act for the Preservation of American Antiquities” and sent it to Congress, where it was passed. In early June of the next year, President Theodore Roosevelt signed it into law (Rothman 1992: 80).

1905-07 Ranchers, including Governor George, Miguel A. Otero, and Solomon Luna, “believed that federal land use regulations were detrimental and were administered with discrimination against ranchers.” Some of these ranchers considered the defeat of grazing regulations on public lands more important than securing New Mexico statehood (Richardson 1958: 278–280).

1905–10 Fire suppression became Forest Service policy; heavy stocking of the national forest reserves was thought to be desirable due to the resulting destruction of vegetation that might fuel a fire (Brown 1985: 124).

1905–25 The Jicarilla Apache population decreased from 815 to 635 due to tuberculosis and other diseases (Tiller 1983: 454).

1906 (January 1) A new regulation charging a grazing fee for livestock on national forest reserves went into effect (Rowley 1985: 60–63).

1906 (June 11) The Forest Homestead Act, which allowed individuals to file on any forest reserve land considered unfit for timber, was passed by Congress (Rothman 1992: 85).

1906 (June 25) The Fergusson Act was amended by permitting the Secretary of the Interior to approve grazing leases in excess of the 640-acre-limit. Following this enactment, grazing leases became the primary source of revenue from territorial lands (Clark 1987: 85).

1906 (November 5) The Magdalena and San Mateo national forest reserves were created by Presidential Proclamation (Baker et al. 1988: 25; Tucker 1992: 107).

1906 (November 6) The Manzano National Forest Reserve was created by Presidential Proclamation. Manzano became Cibola National Forest on December 3, 1931 (Tucker 1992: 107, 112).

1906 (November 7) The Taos Forest Reserve was created by President Theodore Roosevelt. Some 330,000 acres, including the Taos Blue Lake, composed the reserve land. Less than 2 years later this reserve was redesignated as the Carson National Forest (Baker et al. 1988: 25; Tucker 1992: 108; Wood 1989: 74).

1906 There were 5,875,000 sheep, 1,050,000 cattle, 225,000 goats, and 100 horses in the territory (Frost and Walter 1906: 376).

1906 There is some evidence that extensive logging of the Manzano and Gallinas administrative units of the present Cibola National Forest had occurred prior to its establishment date (Tainter and Levine 1987: 150). A timber operation was begun on the Jicarilla Apache Reservation (Tiller 1983: 453).
1906 Congress passed the Antiquities Act giving presidents the power to create “national monuments for the preservation of historic landmarks ... and other objects of historic or scientific interest” (Udall 1963: 132).

1907 The loss of traditional grazing lands on the old Las Vegas land grant caused 500 Hispanic villagers to seek redress (Perrigo 1982: 121).

1907 The Las Trampas Lumber Company purchased the grant of the same name from Frank Bond. In a subsequent agreement, the lumber company gave use-rights to Hispanic heirs on the grant for grazing, wood gathering, and cutting of unmerchantable timber. However, the company did not live up to the agreement. (Ebright 1994: 155, 158–160).

1907 A.B. McGaffey purchased 24,750 acres of the Santa Barbara land grant and 41,000 acres of the adjacent Mora grant not long afterward. Workers from his Santa Barbara Tie and Pole Company cut every tree to timberline that would make ties. Cutting continued until 1926 (deBuys 1985: 227).

1907 The Jicarilla Apache began to summer pasture their livestock in the higher, northern part of the reservation and to winter pasture them in the lower, summer part (Tiller 1983: 453).

1907 Construction on the railroad from Clovis to Belen was completed (Myrick 1970: 35–36).

1907-08 (summers) At Buckman’s, near Cochiti Pueblo, logs floated down the Rio Grande were being taken out of the river. It was also known as “The Boom,” and a camp for the workmen was located on the east bank of the river (Harrington 1916: 441).

1907-08 (winter-spring) Some 100,000 ties were cut in the Jicarilla Mountain Rio del Pueblo area. Spring runoff was too low to float the logs down the Rio Embudo to the Rio Grande until a thunderstorm created enough water to make this possible (Gjevre 1969: 37).

1908 (February 6) Congress passed a measure prohibiting the assignment of entries to corporations or associations, limiting them to individuals who were qualified desert entrymes under the Desert Land Act (Clark 1987: 136).

1908 (April 16) The Manzano National Forest was created from the forest reserve of the same name and also included the Mt. Taylor Forest Reserve (Tucker 1992: 112).

1908 (June 26) The Carson National Forest was created by combining the Taos National Forest with part of the Jemez National Forest (Tucker 1992: 109, 112, 114).

1908 (July 2) The Pecos River National Forest Reserve was designated a national forest (Tucker 1992: 113).

1908 The Ramon Land and Lumber Company purchased the Ramon Vigil grant and cut some $25,000 worth of timber. A large amount of this was seized by the Federal Government during a dispute over the north boundary of the grant (Ebright 1994: 243).

1908 A dozen different, independent mining operations were working in the Sandia Mountains (Northrop 1959: 36–37).

1908–09 (winter) Logging operations were begun on the Jicarilla reservation, and 80,000 board-feet of timber were cut. The sawmill produced railroad ties, primarily for the Rio Grande and Southwestern Railroad (Tiller 1992: 110–112).

1909 The Enlarged Homestead Act provided that 320 acres could be acquired when all provisions were met (Worster 1979: 87).

1909 The U.S. Bureau of Soils announced “The soil is the one indestructible, immutable asset that the nation possesses. It is the one resource that cannot be exhausted; that cannot be used up” (Worster 1993a: 73).

1909 Cuba sheepmen petitioned for the elimination of 150,000 acres from area national forests for their use as grazing lands (Richardson 1958: 281).

1909 The Territorial Legislature authorized two types of voluntary organizations; water users' associations and irrigation districts. For the latter, irrigation systems could be constructed for their members. The assembly also passed a provision for the drainage of seepage and other waters in unincorporated towns and villages by action of the county commissioners on petition of a majority of the residents and after investigation by the county surveyor (Clark 1987: 110, 112).

1909 William Howard Taft issued a Presidential Proclamation establishing Gran Quivira National Monument (Carroll et al. 1991: 1).

1909–18 F.J. Otero grazed up to 200,000 sheep and several thousand cattle on the Baca No. 1 location (Scurlock 1981a: 142).


1910 Hispanics and Native Americans in Albuquerque began to contract tuberculosis from incoming “lungers.” Most victims were female housekeepers (Simmons 1982: 345).

1910 A sawmill was established at the Jicarilla Apache agency. Two years later the Navajo

1910 The Peterson dam and reservoir were constructed on the Gallinas River to furnish Las Vegas with water. Water for the reservoir was supplied by a wooden flume extending from an upstream diversion dam (Perrigo 1982: 28).

A group of Santo Domingo residents, claiming "ownership" of the Chalchihuitl Mine, removed turquoise. At the time, the American Turquoise Company had title to the mine; the Tiffany's of New York were the principal stockholders (Tyler 1964: 185).

1910 The U.S. Census Bureau counted 327,301 persons in New Mexico (Workers of the Writers' Program 1940: 433).

1910 The populations of major Middle Valley towns were as follows: Santa Fe, 5,072; Albuquerque, 13,163; Belen, 1,733; and Socorro, 1,560 (Sayles 1986: 132).

1910–11 The Office of Grazing Studies was established by the U.S. Forest Service in 1910. Regional Offices of the OGS were organized at Denver and Albuquerque (Price 1976: 7).

1911 Congress passed the Weeks Law, calling for a cooperative fire protection plan between the Forest Service and participating states. The legislation also authorized funds for acquisition of forest lands to protect stream watersheds (Buchanan 1988: 30; Otis et al. 1986: 5).

1911 Measles killed 22 Catholic children in the Tome parish (Baca and Baca 1994: 6).

1912 On the 1-million-acre Carson National Forest there were 200,000 sheep, 7,000 cattle, and 600 homesteads (Flader 1978: 9).

1912 The State Legislature passed a mining law governing operators, supervisors, and miners. The basic ventilation standard to 100 cubic feet of air per man per minute and 300 cfm for each animal. "Gassy" mines had to be inspected daily (Whiteside 1989: 174).

1912 The Tonque Brick and Tile Company was established at the Tonque Pueblo site on the Tonque Arroyo, east of present I–25. "Large areas of the banks of Tonque Arroyo were processed for clay" until the operation closed in 1942 (Barnett 1969: 27).

1912–17 The Forest Service increased its effort to control grazing to protect rangelands, watersheds, and wildlife. Livestock numbers were reduced (Roberts 1963: 115–116).

1912–26 Timber for railroad ties was harvested from 65,000 acres in the Santa Barbara and Mora areas. More than 2 million ties were produced from ponderosa pine, spruce, and fir (Cook 1954: 36).

1913 The U.S. Supreme Court ruled in the Sandoval case that the Pueblos had no right to alienate their land, and consequently all titles to lands purchased from them were invalid. In the settlement of the Sandoval case, the Pueblos were recognized as Indian tribes under federal trusteeship. As a result, the imposition of various debts and liens against the Pueblos occurred. Irrigation works, drainage of land, and construction of bridges and roads were constructed by the Bureau of Indian Affairs. The Pueblos were charged for these services, even though some of the ditches were dug where there was no water. From this time to passage of the Pueblo Lands Act of 1924, non-Indian claimants evaded return of lands to the Pueblos (Brayer 1938: 26; Sando 1992: 120).

1913–33 New Mexico coal mine deaths for this period rose to 8.8 per thousand, with a total of 734 fatalities (Whiteside 1989: 174–175).

1914 (spring-summer) Excessive water in the Caribel Mine near Red River halted mining during this period (Pearson 1986: 120–121).

1914 A firm purchased logging rights to 117 million board feet of timber in the Carson National Forest. Ponderosa pine and Douglas fir were the two principal species harvested and sent to the company's sawmill at La Madera (Chappell 1971: 129–130).

1914 The Sherwin-Williams Paint Company financed mining of lead and zinc in the Magdalena Mountains (Fergusson 1951: 307).

1917–18 The worldwide influenza epidemic spread to the Tome area. This Spanish flu struck more than one-half the population of Belen (Melzer 1982: 216–228).

1918 The worldwide influenza epidemic spread to the Tome area. This Spanish flu struck more than one-half the population of Belen (Melzer 1982: 216–228).

1918 Some 47,007 acres of farmland were being irrigated in the Middle Rio Grande Valley (Hedke 1925: 20).

1918–45 Hundreds of burros that had been used by the military in World War I were released on rangeland west of Alameda, where they grazed until the population disappeared by the end of World War II (Gerow 1992: 49).

1920 The U.S. Census Bureau counted 360,350 persons in New Mexico (Workers of the Writers' Program 1940: 434).

1920 (ca.) The first wells were dug at Santa Clara Pueblo by the government. A well in the northwest plaza of the village was drilled and installed with a hand-pump, which was replaced by a windmill in 1925 (Hill 1982: 41).
1900s (early) Jemez Pueblos brought grapes to the Guadalupe area along the Rio Puerco, which they traded for other agricultural produce with Hispanic residents. The latter took their wheat to Jemez to be milled (Garcia 1992: 115, 121).

1900s (early) Good harvests of a variety of crops were common in the Guadalupe area in Sandoval County, including wheat, corn, beans, squash, cabbage, tomatoes, chile, pumpkins, and cantaloupes (Garcia 1992: 113, 121, 123).

1900s (early) The Santa Ana flour mill operated at Llanito, in Sandoval County (Olson 1976: 93).

1900s (early) The American Lumber Company was established in Albuquerque. Logs for the mill came from the Zuni and San Mateo mountains north of Grants (Balcomb 1980: 56).

1900s (early) Hispanic homesteaders in the Sandia Mountain foothills ran goats instead of sheep because of the rugged terrain (Davis 1986: 103–104, 109; Scurlock 1983: 14).

1900s (early) Coal from the Gallup and Madrid mines was a primary fuel used in Albuquerque. Wood collected by Spanish Americans from the Sandia Mountains was another principal heating and cooking fuel at this time (Balcomb 1980: 52–53).

1900s (early) Bear Canyon on the west flank of the Sandia Mountains was a favorite recreational area for residents of Albuquerque. The cold, pollution-free stream, lined by cottonwood and box elder, was the major attraction (Balcomb 1980: 63–64).

1900s (early) Diphtheria epidemics struck Lemitar, causing loss of life (Scurlock 1982: 14).

1923–24 Rancher Robert Thompson purchased the 55,000-acre Alameda land grant. The ranch headquarters was located on the north edge of Corrales. Some 3,000 to 5,000 herefords were grazed on the surrounding grasslands (Eisenstadt 1980: 21–22).

1926 The major crops in the Middle Rio Grande Valley included corn, alfalfa, grain, fruits, and truck garden vegetables. Some cotton was grown south of Albuquerque, and tobacco was being considered as a commercial crop (Rodey and Burkholder 1927: 3).

1926 The Atchison, Topeka, and Santa Fe Railroad contracted to provide 34,256 linear-feet of trestle piling, 237,498 board-feet of native pine bridge timber, 81,610 board-feet of native pine box culvert timber, and 60,000 native pine track ties for construction of the Cuba Extension rail line from San Ysidro to north of Cuba (Glover 1990: 48).

1926 Large-scale development of mining operations at Willow Creek was begun by the American Metal Company (Northrop 1959: 39).

1928 The Cleary coal mine produced 10,500 tons of coal during the year (Glover 1990: 51).

1930 By this year Frank Bond controlled the best grazing lands in the Jemez Mountains. He leased land for grazing his sheep from the Forest Service, and after 3 years of use, his forest grazing rights became permanent (Rothman 1990: 129).

1930 By this year the Cochiti reservation was completely fenced (Lange 1959: 219).

1930 The U.S. Census Bureau reported the population of New Mexico as 423,317 (Workers of the Writers’ Program 1940: 434).

1935 Two marijuana dealers were operating in Dixon. In addition to being smoked for its hallucinogenic properties, marijuana was used as a remedy for rheumatism and other maladies (Curtin 1965: 127; Weigle 1975: 185).

1935 (mid) Most of the residents from the middle Rio Puerco-of-the-East valley moved upstream to the higher Cuba area, where agriculture was still relatively reliable (Calkins 1937: 18–19).

1940 The U.S. Forest Service and Bureau of Land Management began to fence federal land in the Rio Puerco-of-the-East valley and traditional grazing lands on Mesa Prieta and the San Mateo Mountains, including Mount Taylor (Garcia 1992: 23).

1941–43 Each family on the Rio Puerco was permitted to graze 15 head of sheep in its grazing precinct by the Grazing Service. This number of livestock was considered below the minimum needed for subsistence (Forrest 1989: 159).

1942 There were 14,972 acres under cultivation in the Rio Puerco basin (Harper et al. 1943: 11).

1950 There were about 240,000 residents in the Middle Rio Grande Basin (Williams 1986b: 153).

1960 There were about 400,000 residents in the Middle Rio Grande Basin (Williams 1986b: 153).