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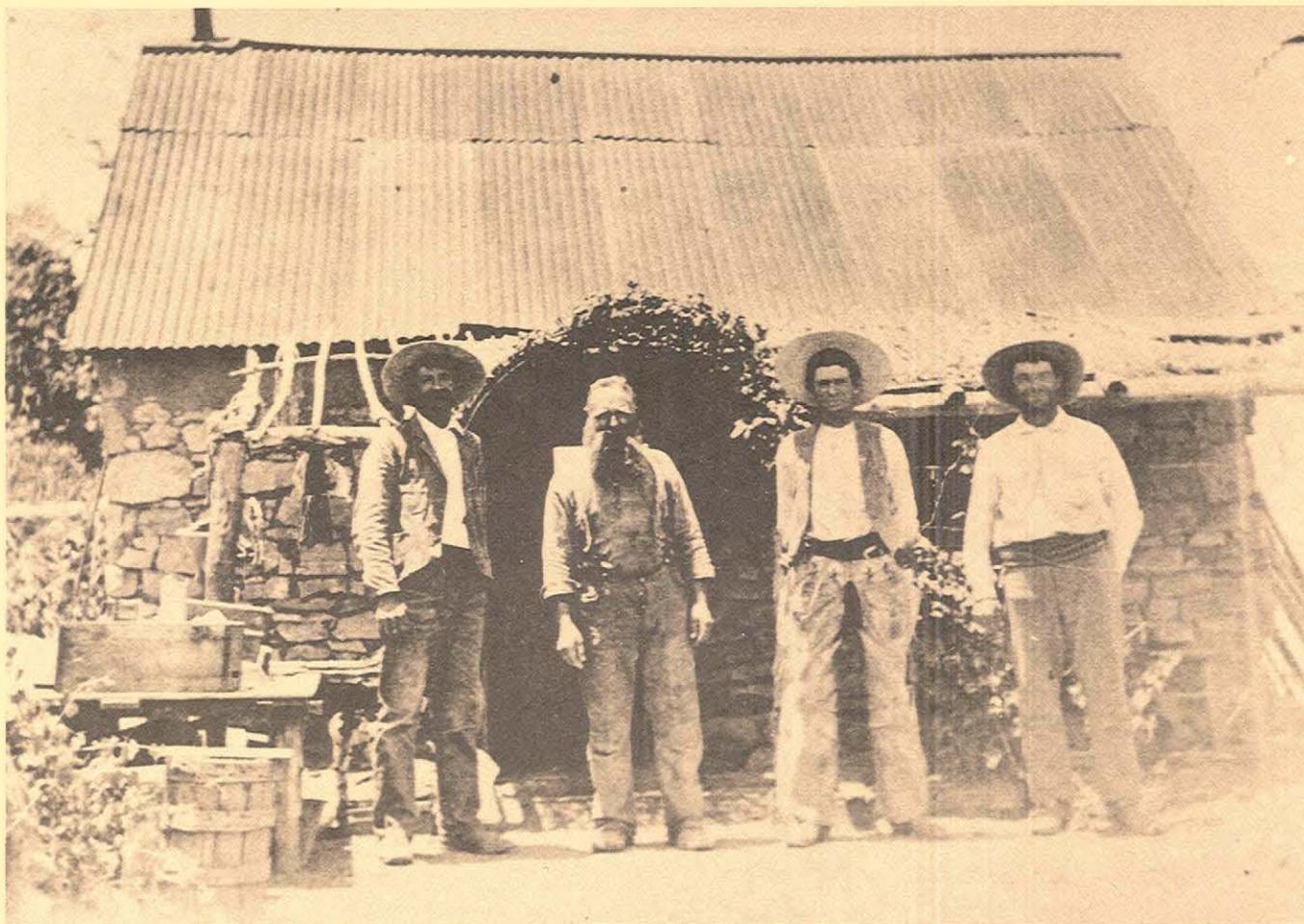
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Land Use History of the San Rafael Valley, Arizona (1540–1960)

Diana Hadley
Thomas E. Sheridan



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Abstract

Interest in the new philosophy of ecosystem management led the Forest Service to sponsor a study of past land use in The Lone Mountain/San Rafael Valley Ecosystem Project Area, part of the Sierra Vista Ranger District of Coronado National Forest in southern Arizona. To better understand the cumulative impacts on the study area, the agency requested an historical chronology of human occupation of the area, with a focus on natural resource use and an analysis of the impacts of historic land use. This document describes that use over the period from Euroamerican contact to the 20th century.

Keywords: Arizona, environmental history, Spanish-Mexican settlement, Anglo-American settlement, grazing, mining, wood cutting, homesteading

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U.S. Department of Agriculture
Fort Collins, Colorado

PREFACE

Interest in the new philosophy of ecosystem management led the Forest Service to sponsor a study of past land use in the Lone Mountain/San Rafael Valley Ecosystem Project Area, part of the Sierra Vista Ranger District of Coronado National Forest in southern Arizona. In order to better understand the cumulative impacts on the project area, the agency requested an historical chronology of human occupation of the area, with a focus on natural resource use and an analysis of the impacts of historic land use, over the period from Euroamerican contact to the twentieth century. For a more complete picture of the project area's ecosystem, the Forest Service simultaneously funded studies of the project area's vegetation, soil types, climate, and fire history.

Ecosystem management, a new management strategy, attempts to maintain healthy conditions within an entire ecosystem and to ensure that the ecosystem remains viable indefinitely. This type of management has several specific goals, including the maintenance of soil productivity; conservation of genes; biodiversity; landscape patterns; and the full array of ecological processes. Since proponents of ecosystem management believe that even the best ecological approaches cannot sustain ecosystems unless they are integrated into the human context, they recognize that the approach is a largely political undertaking. In order to work, the proponents believe, ecosystem management requires the integration of social and economic considerations into ecological planning, with collaboration from ecologists, social scientists, policy makers, and above all the residents of the ecosystem.

Policy analysts at the University of Arizona's Water Resources Research Center define ecosystem management as "a management philosophy which focuses on desired conditions, rather than system outputs, and which recognizes the need to protect or restore critical ecological components, functions, and

structures in order to sustain resources in perpetuity" (Cortner et al, 1994:6). The analysts have identified five general principles that apply to ecosystem management. (1) Ecosystem management is a socially defined process. Desired future condition and the means by which it can be achieved are social values. (2) Recognizing ecosystems as open, changing, complex systems, ecosystem management uses a holistic approach and attempts to conserve biodiversity from the genetic to the community level, stressing the dynamic interrelations of systems components. (3) Although in general ecosystem management requires management on larger spatial and longer temporal scales, specific management for each system will be determined individually. (4) Successful ecosystem management requires sensitivity to the mandates of both agencies and landowners, along with cooperation and open communication among scientists, resource management agencies, and private interests. (5) Institutions for ecosystem management must reflect its experimental nature. Management practices, organizations, laws, and policies must be flexible and adaptable to changes in social values, environmental conditions, political pressures, and available knowledge.

As writers of this report, we believe that if ecosystem management is to work, the available knowledge must include an understanding of the past land use practices within the ecosystem in question. Formulating a "desired future condition" and a plan for achieving that condition requires an understanding of how the ecosystem came to be in its present condition. The causes for the present condition and the degree to which the present condition diverges from the state of the land before intense impacts were imposed upon it is an equally important component for a full understanding of ecosystem history. Wise future management can only benefit from knowledge of the cumulative impacts and the uses of the past.

ACKNOWLEDGMENTS

Without the cooperation and interest of the informants for this study, the report would be colorless and lifeless. Interviews with informants, even those conducted by telephone, have been a great pleasure to the researchers. As researchers, we recognize the importance of doing interviews on site and greatly appreciate the opportunities we have had to accompany several informants on visits to the study area. Without these visits, we would not have been able to identify specific locations or assess specific impacts. We also wish to thank our informants for their generous hospitality, for sharing family albums and memorabilia, and for many hours of pleasant conversation. Many thanks to Helen Ashburn, Bud Bercich, Ramón de la Ossa, Katie Goodwin, Cuco Granillo, Ruth and Norman Hale, Judge James Hathaway, Vera Parker Hopkins, Richard Harris, Tom Hunt, Biff Lamma, Robert Lenon, Blaine Lewis, Sunny and Nancy Macuistion, Jim and Ann Patton, Larry Robbins, Sam Sedgwick, and Jack Turner.

The writers also wish to recognize the excellent assistance they have had from researchers and editorial assistants: Alfredo Gonzales; Art MacWilliams; Cassandra Nelson; Byron Pearson; Nancy Pontius; and Christina Seger. Tony and Martha Burgess and

Peter Warshall have analyzed documents and historical photographs and have assisted in relocating the sites of historic photographs. Beau Burge, Rachel Sheridan, and Chris Szuter enlivened our field visits. We appreciate the cooperation and assistance of Forest Service personnel, particularly Pat Spoor, Jim McDonald, Bill Gillespie, and project director John Tainter. Working on this project has been a pleasure. Thanks to all of you.

Finally, we are pleased to mention the Cultural Heritage Research Work Unit of Rocky Mountain Forest and Range Experiment Station, which funded the study as part of a larger research program.

Cartographer: Susan Martin

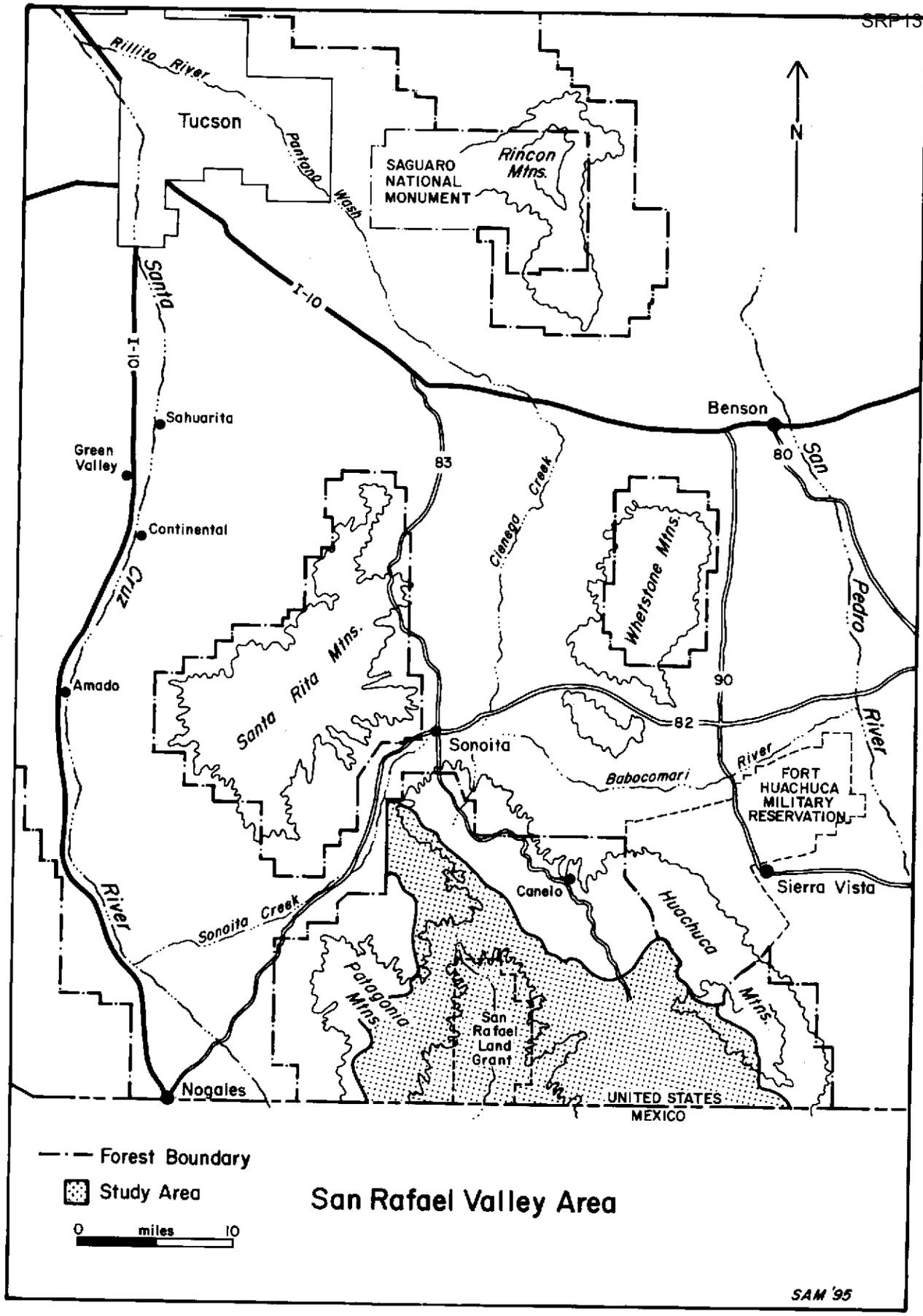
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Chapter 1



San Rafael Valley Area

--- Forest Boundary
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Figure 1

Chapter 1

Introduction

OVERVIEW

This Lone Mountain/San Rafael land use history is an attempt to understand the complex interplay between the land and the people who've occupied it. The report is primarily a cultural history of the San Rafael Valley and its surrounding mountains over four centuries. During three of the centuries land use was intermittent. Between 1860 and 1960, however, land use was intense. The report presents a chronological record of social and economic development in the study area, with a focus on the discovery, abundance, and allocation of available resources. As participants in the larger political economy, residents of the study area have felt the impact of outside capital, new technology, corporate investment, state and national political events, the creation of new governmental agencies, and the imposition of unaccustomed regulations. We have attempted to assess the degree to which these external forces have affected the lives of study area residents and to determine whether residents invited, welcomed, or resisted social and economic change.

The central issue examined in this report, however, is the nature and intensity of human impacts upon the natural environment. Our key questions concern the way in which residents used the land and how their uses have affected it. We have attempted to determine the periods at which particular impacts were most intense and which groups of users were responsible. In attempting to interpret the complex interactions between different human groups, and between humans and the land, the report documents the cumulative impacts of human land-use practices and delineates specific changes within particular portions of the ecosystem resulting from those uses.

If the report succeeds in answering any of these questions, it should provide future managers with a greater time-depth and a clearer perception of the complex intertwining of human and natural history in this small portion of the borderlands. Wise future management of the ecosystem requires an understanding of cumulative impacts and past land-use decisions. Hopefully, future policy makers can benefit from knowledge of the past.

THE STUDY AREA

The Lone Mountain/San Rafael Valley consists of approximately 331 square miles, straddling Santa Cruz and Cochise counties in southern Arizona (Fig. 1). It includes all or portions of Townships 21 through 24 South, Ranges 16 through 20 East. The core of the study area is the San Rafael Valley, but it includes the eastern slopes of the Patagonia Mountains, the western slopes of the Huachuca Mountains, along with the mesa and canyon country dominated by Lone Mountain, an isolated spur south of the Huachucas. The study area extends from the crest of the Huachucas in the east (approximately 110° 15' longitude) to the crest of the Patagonias in the west (approximately 110° 41' longitude) and from the Canelo Hills and Red Rock area in the north (approximately 34° 86.5' latitude) to the international boundary with Mexico (approximately 31° 20' latitude) in the south. The highest elevation on the east is Miller Peak in the Huachucas at 9,466 feet and on the west Mount Washington in the Patagonias at 7,221 feet. The lowest elevation is 4,500 feet in the center of the San Rafael Valley, at the point where the Santa Cruz River crosses the international border. The study area abruptly stops at the international boundary between Mexico and the United States, an arbitrary political division that does not reflect the area's geomorphology and that contradicts its unified natural and human history.

At first glance, the study area appears to consist of a tidily contained valley, surrounded on three sides by mountains, and drained by dozens of small tributaries which empty into the Santa Cruz River. Closer examination reveals a more complex geomorphology of many small watersheds. In the central watershed of the upper Santa Cruz, for example, the headwaters arise below the southern edge of a triple divide in the Canelo Hills at approximately 5,800 feet of elevation, sending waters in three directions: southwest directly into the Santa Cruz; northward into Sonoita Creek, which empties into the Santa Cruz River near its midpoint; and eastward into the Babocómari, a tributary to the San Pedro, which constitutes an entirely separate watershed.

Only Red Rock Canyon at the northern end of the study area is a tributary to the middle reach of the Santa Cruz after it has made its loop into Mexico and returned into the United States. Red Rock Canyon, which receives the waters of Lampshire Canyon, is bounded by the northern Canelo Hills on the west, the ill-defined Saddle Mountain on the south, and the northernmost Patagonia Hills on the east.

All other watercourses in the study area are tributaries to the uppermost portion of the Santa Cruz River, entering it either in the San Rafael Valley or shortly after the river crosses the boundary of Mexico. Of all the tributaries to the Santa Cruz, in fact, only Meadow Valley/Mowry Wash, Chino Draw, Sheep Ranch Canyon, and Dove Draw run their course and join the river north of the Mexican border. The arbitrary line at the international boundary cuts off all the major eastside drainages, including Parker Canyon, Scotia/Bodie Wash, Joaquin Canyon, School Canyon, Cave Canyon, and Copper Canyon, all of which enter the Santa Cruz south of the border in Mexico. The border intercepts the study area's largest tributary to the Santa Cruz, the Merritt/Collins/Parker Canyon drainage, where Parker Canyon Dam creates the largest in-channel impact. On the west side, the border intercepts Washington Gulch/Duquesne Wash, and San Antonio Canyon. Therefore, the assessments provided in this report cover only a portion of the upper Santa Cruz watershed and do not address the entire physiographic area.

In addition to the complicated nesting of distinct tributary watersheds, differing elevations and soil types within the study area are represented by a variety of separate physiographic regions, including high desert grassland, grassland savanna, pine/oak woodland, and a small amount of ponderosa pine and mixed conifer forest. Major vegetation zones include plains grassland at 4,500-6,000 feet at the center of the valley; mixed cottonwood riparian habitat along the Santa Cruz River and major tributaries at 4,500 to 5,500 feet; evergreen woodland (mainly in the foothills) from 4,500 to 7,000 feet; and the ponderosa pine and mixed-conifer forests of the higher mountains at 7,000 to 9,500 feet.

The appearance of this gently rolling, well-watered valley bounded by rugged mountains presents a striking contrast to the dryer and lower landscapes of the surrounding area. The study area has been blessed with thick clay soils and heavier stands of native grasses than are found in neighboring areas. The mountains surrounding the valley are situated

in a way that allows them to intercept storms, resulting in greater annual precipitation and a more regular and timely arrival of the summer monsoon than is found in other portions of southern Arizona. Slopes of the Huachuca and Patagonia mountains and the Canelo Hills conveniently direct runoff toward the center of the valley, providing more abundant surface water than is found in other arid lands and a water table that is conveniently near the surface. In the center of the valley, stretches of the Santa Cruz, dotted with towering cottonwoods, still have a perennial flow and the remnants of former *ciénegas* (marshes) can still be detected. Visitors have found the valley with its encompassing mountains to be a place of stunning beauty.

SCOPE AND CONTENTS OF THE REPORT

The human history contained in this study begins with the Early Contact period of contact and extends through the mid-20th century when the intense human impacts of the late 1800s and early 1900s decreased. After three centuries of minimal, intermittent land use, intensive impacts began during the 1860s and steadily increased through the early years of the 20th century, when mining and ranching in the study area reached their peak. Beginning in the second decade of the century, exploitation and settlement steadily declined. By 1960 most of the significant industrial activities of the study area had ceased and population had decreased to a small percentage of the 1910 high. During the 1960s, the area's remaining schools, post offices, and stores closed down and many of the area's multi-generational families moved elsewhere to seek employment. Mining within the study area had all but ceased by the 1960s. Relatively large modern ranches with fewer operators had replaced the multitude of small cattle operations. Our study stops at this point, when the human impacts responsible for the most significant landscape changes in the study area appear to have stabilized.

In terms of human history and exploitation, the study area separates neatly into five roughly bounded separate zones or sub-regions. Although these sub-regions contain some characteristics of physiographic unity, they are based more on a continuity of human uses and impacts. At the very center of the study area is (1) the San Rafael de la Zanja land grant, a distinct ranch unit which was managed separately during most of the period of the study. North of the grant is the (2) Northern Valley area,

which includes the headwaters of the Santa Cruz, Meadow Valley, and into the Lampshire/Red Rock Canyon area. In this sub-region a number of distinct ranches and small homesteads developed. The (3) east facing slopes of the Patagonia Mountains, where the most intensive mining took place, make up the westernmost zone of the study area. This zone extends south of the San Rafael grant along the southern boundary of the study area to the point at which the Santa Cruz River crosses the international line. Immediately east of the river crossing the (4) Parker Canyon/Sunnyside sub-region begins. This zone includes the southwestern slopes of the Huachucas and the Canelo Hills and extends from the Mexican border on the south to the area between Collins Canyon and Turkey Creek on the north, and from the grant on the west to Sunnyside on the east. The most easterly zone is (5) the Lone Mountain/Miller Peak sub-region, which extends from the boundary of the Fort Huachuca Military Reservation south of the international boundary and from Montezuma Pass west to School Canyon.

The two most heavily impacted vegetative zones are the plains grassland (4,500-6,000 feet), which covered the valley, and the evergreen woodland (4,500-7,000 feet), which covered most of the Patagonias and Canelo Hills and the lower slopes of the Huachucas. Grazing was the primary activity on the grasslands, while mining and fuelwood cutting were the major activities affecting the evergreen woodlands. Most of the wood that fueled the mines and warmed the homes of the region's settlers was oak, followed by juniper and pinyon. The Huachucas were logged, but logging was not a major activity in the portion of the Huachucas within the study area. In the Patagonias, however, the scattered stands of timber were all but logged out by the early 20th century.

As the following chapters reveal, O'odham, Apaches, Spaniards, Mexicans, and Anglo-Americans have exploited resources within the study area from the Early Contact period to the present. Nonetheless, intensive settlement of the region did not begin until the second half of the 19th century, when mining and stock raising became important occupations. The most intense human settlement occurred in the Patagonias, where the major mining camps of Duquesne, Washington, and Mowry developed, and along the Santa Cruz and in the bottomlands of the major canyons draining into the river. (The town of Harshaw, which had a major impact upon the study area, lies outside it.) The river itself was an intermittent stream, a "disappearing river" as the early set-

tlers called it, with hidden water not far below the surface. Because there was relatively little permanent flowing water in the area, the scarcity of surface water for irrigation was a major limiting factor on agriculture in the region. Homesteaders tried dry farming in the late 19th and early 20th centuries, but by World War II, the dry farming experiment had failed. Thereafter, agriculture was largely a supplementary and subsidiary activity of stock raising. Most fields were irrigated, either from the surface water of the Santa Cruz and its major tributaries or from pump-powered wells. Nonetheless, grazing continued to be a major activity long after agriculture had diminished. The major forms of land use, in descending order of importance, include mining and associated woodcutting, stock raising (primarily cattle ranching), irrigated agriculture, dry farming, *cieneqa* drainage, timber cutting, predator control, commercial hunting, and recreational activity.

ORGANIZATION OF THE REPORT

The eight chapters of this report analyze the scope and intensity of human impact upon the study area by O'odham, Apache, Spanish, Mexican, and Anglo-American populations. Chapter 2 describes American Indian land uses. Chapter 3 describes impacts that occurred during the Spanish and Mexican periods. Chapter 4 presents the earliest detailed descriptions of the landscape in the study area and of particular physical features of the valley and the surrounding mountains. Chapter 5 discusses the history of ranching on the San Rafael de la Zanja grant during the early territorial period. Chapter 6 assesses the impact of Apache raiding on mining and settlement in the study area and describes the mining and population boom between the 1880s and the 1950s. Chapter 7 discusses the territorial and statehood periods of ranching and the impacts of the creation of the Forest Reserves on ranching throughout the study area. Chapter 8 describes agriculture, wood cutting, and other land uses. Chapter 9, the final chapter, contains our conclusions, synthesizing previous information and assessing human impacts upon the specific subregions we have identified, with an emphasis on impacts to vegetation zones and animal populations. A brief assessment of nonhuman climatological factors upon the study area through time, based upon rainfall and dendrochronological records, is included in the final chapter. Consideration of these two factors allows us to explore the interplay between

human occupation, regional and global climatic patterns, and the local ecosystems themselves.

METHODOLOGY

To trace the development of human settlement and to capture the interactions between humans and the ecosystems that supported them, we relied upon documentary research from a wide variety of sources supplemented by oral histories, historic photographs, and field reconnaissance. Researchers for this study area are blessed by an exceptional wealth of documentary sources. The U.S. Forest Service has kept many of the documents from the assessments made during the early years of operation in the area. All regional and local offices of the Forest Service should preserve these priceless historic resources; the Tucson office of the Coronado National Forest is exemplary for keeping early records and making them available for present research. The sources for mining history in the study area are overwhelming and are sufficient to produce a full, book-length study on mining alone.

The documentary sources for this report include (1) Coronado National Forest records (grazing allotment forms, range surveys, etc.); (2) Spanish colonial documents on microfilm at the Documentary Relations of the Southwest, Arizona State Museum (ASM), University of Arizona (UA); (3) documents concerning the San Rafael de la Zanja land grant from the Surveyor General's "Journal of Private Land Grants" on microfilm at the UA Main Library; (4) the San Rafael Cattle Company Papers and the Cananea Cattle Company Papers, UA Special Collections; (5) water rights, the Arizona Department of Water Resources, Phoenix; (6) land alienations, including homesteads, from the General Land Office Records, Bureau of Land Management, Phoenix; (7) mining records from the Arizona Bureau of Geology and Mineral Technology; (8) the Biographical Files of the Arizona Historical Society, Tucson; (9) the ASM Archaeological Site File System; (10) the archives of the Pimería Alta Historical Society; (11) surveyors' field notes contained in the Bureau of Land Management Public Room in Phoenix; (12) various southern Arizona newspapers; archives of the Bancroft Library at the University of California, Berkeley; and the archives of the Huntington Library, San Marino, California. A more detailed description of these sources appears in the Bibliography.

One of our most important sources has been the collection of oral histories from long term residents

of the study area and from the children and grandchildren of early settlers. We have conducted interviews with almost 20 individuals concerning their recollections of local history and their perceptions of ecological change within the study area. An inherent danger of the method is the collection of misinformation. There can be many causes for the collection of incorrect information, including the failure of informants' memory, idealization of the past, intentional distortion or obfuscation of facts, or selective recollection in which the informant allows self-interest to shape the story. The researchers have attempted to avoid these obvious pitfalls of oral history by cross-checking stories with those of other informants and substantiating oral information with documentary records. The group of informants who came forward for this study, however, were exceptional, both for their willing cooperation and their accurate memories.

Many descendants of the San Rafael's "old timers," some of them now "old timers" themselves, have taken a strong interest in family history. They have collected newspaper articles and have carefully recorded the old stories passed down by elder family members. Two members of the Parker family wrote a detailed recollection of their father's years in Parker Canyon. Another information-packed, book-length memoir was written by a member of the Harrison/Hathaway family. Biff Lamma, author of an extremely useful recollection of the Sunnyside area, has enough information to publish another book. Informants for this report include Helen Ashburn, Bud Bercich, Ramón de la Ossa, Cuco Granillo, Ruth and Norman Hale, Judge James Hathaway, Vera Parker Hopkins, Richard Harris, Tom Hunt, Biff Lamma, Robert Lenon, Blaine Lewis, Sunny and Nancy Macuistian, Jim and Ann Patton, Larry Robbins, Sam Sedgwick, and Jack Turner.

The final two elements of our research methodology include historic photographs and field visits. Although we were surprised to find fewer early photographs than we had anticipated, those that did come to light were extremely useful. The principal investigators made several field visits to the study area accompanied on some occasions by current residents and on other occasions by ecologists and/or Forest Service personnel. By taking old photographs with us to particular locations, we were able to graphically assess environmental changes. This process is very useful, particularly when combined with documentary and anecdotal information concerning the locations in question.

Chapter 2

Chapter 2

Chapter 2

Early Contact Period: American Indian Occupation (1500–1680)

Until the late 19th century, the San Rafael Valley was a frontier in the most basic sense of the term—a zone of conflict where neither American Indians, Hispanics, nor Anglo-Americans held uncontested sway. It was also peripheral to the major areas of settlement among these groups in Arizona and northern Mexico. As we shall see in Chapter 3, the nearest missionized O'odham settlement was Santa María Suamca, just south of the study area along the Santa Cruz River. The Hispanic community of Santa Cruz later developed during the 1780s after the mission was abandoned following an Apache attack in 1768. No attempt was made by Hispanics during the Spanish colonial period to establish a permanent settlement in the San Rafael Valley. The land grant of San Rafael de la Zanja was issued after Mexico won its independence from Spain.

American Indian occupation of the study area was just as tenuous. The first European who indisputably passed through the San Rafael Valley was Padre Eusebio Francisco Kino, the great Jesuit missionary of the Pimería Alta. Kino visited the Pima community of Santa María Suamca (also called Bugata) south of the study area in Sonora early in 1690, when he and Father Visitor Juan María Salvatierra made a circuit through the Pimería Alta. Kino and Salvatierra spent five days in Santa María baptizing infants and preaching to the adults. But apparently they ventured no farther north. In late August 1692, however, Kino left his mission headquarters of Dolores and visited the Sobaipuri Pimas, who lived along the Santa Cruz and San Pedro rivers. The route took him from Cócospa to Guevavi and Bac along the middle Santa Cruz and then to the settlement of Quiburi on the San Pedro. From Quiburi, he turned southwest, visiting the Sobaipuri *ranchería* of Huachuca (Guachuca) along the Babocómari River. From there he must have crossed the Canelo Hills and descended the San Rafael Valley, passing through a settlement that historian Herbert Eugene Bolton (1936:269) misidentifies as Bacadéguache before reaching Santa María. On Kino's 1695–1696 map, "Teatro de los Trabajos Apostólicos," however, the settlement is called Beradeuguachi. Beradeuguachi also appears

on Kino's 1696–1697 map illustrating the martyrdom of Padre Francisco Xavier Saeta. According to those maps, the community must have been located on the west bank of the Santa Cruz River a few miles upriver from Santa María. Unfortunately, both maps are too crude to determine whether or not Beradeuguachi was located in the study area or south of the international border.

Kino returned to the San Rafael Valley in December 1696, when he left Dolores and headed directly for Quiburi via Santa María and Santa Cruz de Gaybanipitea on the Babocómari River. He may have passed that way again on another trip to Quiburi in March and April 1697. Later that year, his frequent traveling companion, Captain Juan Mateo Manje, accompanied him on a more ambitious expedition to the ruins of Casa Grande in November and December. Kino and Manje arrived in Santa María on November 5, where Manje counted 200 Pimas and commented favorably about the agricultural fertility of the valley and the abundant grasslands surrounding it. He also noted that the inhabitants of Santa María wore clothing of cotton and animal skins (*gamuzas*). A faithful journal keeper, Manje made no mention of Beradeuguachi. Instead, he stated that after leaving Santa María on November 6, they journeyed to the "ranchería of San Juachín de Basosuca," 14 leagues to the northwest. There the inhabitants had built a "casa de terrado" for the priests with "petates" on the floor. Manje counted 12 houses and 60 "almas" (souls) in the ranchería. The next morning, they headed east six leagues to the ranchería of Santa Cruz de Jauanipicta, or Gaybanipitea on the Babocómari. It is possible, then, that by 1697, Beradeuguachi had been abandoned.

Such a pattern was not uncommon among the Pimans. According to archaeologist Deni Seymour (1989), who surveyed Sobaipuri sites along the San Pedro River, Sobaipuris frequently abandoned sites and shifted the location of their settlements. They also aggregated themselves into fewer but larger communities. Seymour acknowledges that such changes in settlement patterns may have been in response to attacks by Janos, Jocomes, Sumas, and Apaches.

Nonetheless, she also points out that "there is some indication that the pattern of population movement was a characteristic indigenous trait." In Seymour's words (1989:220), "Archaeological evidence in favor of this position includes the extremely low density of artifacts, the lack of deep stratification, and the insubstantial nature of the architecture on all known Sobaipuri and Upper Piman sites throughout southern Arizona." Kino and Manje encountered more than 2,000 Sobaipuris living along the San Pedro between modern Fairbank and Winkelman, but different Sobaipuri communities fought with one another as well as with Uto-Aztecan and Athapaskan raiders. Long-term settlement apparently was not a Sobaipuri cultural trait.

Comparatively little archaeology has been done in the San Rafael Valley, particularly along the Santa Cruz. In 1941, however, archaeologist Edward Danson (1946) carried out a survey along the Santa Cruz River from its headwaters to Tubac. No excavations were conducted, and Danson failed to compile a map showing the location of the sites he located. Nonetheless, several sites, particularly EE:10:25 and EE:10:29, are intriguing. Both were located south of the border but north of the pueblo of Santa Cruz (formerly Suamca). Both contained trash mounds, compounds, house rings, pithouse depressions, rock walls, polychrome pottery, and rock-lined depressions or ditches transecting the sites. Danson described EE:10:25 as "the largest site in the Santa Cruz Valley." Danson argued that these sites were Salado sites dating between 1250 and 1400 A.D. It would be interesting to try to relocate these sites and determine if any of their remains might date to the Protohistoric period or represent Piman/Sobaipuri occupations.

Just how long Pimans may have inhabited the San Rafael Valley is problematic, however. Archaeologists have long speculated about the relationships between the Hohokam civilization and the Piman peoples who occupied Hohokam territory when the first Europeans arrived. Some of these speculations, in turn, have tried to grapple with the so-called "Tepiman connection" between the Greater Southwest and Mesoamerica. David Wilcox (1986), for example, contends that the corridor of Tepiman speakers extending from northern Jalisco in western Mexico to the Salt and Gila river valleys in central Arizona was the principal route over which elements of Mesoamerican civilization diffused into the Southwest.

By Tepiman (Tepehuan-Piman), Wilcox and others mean the groups identified as Tepecano (northern Jalisco), Southern Tepehuan (Durango), Northern Tepehuan (Durango and Chihuahua), Mountain Piman (Sonora-Chihuahua), Lower Piman (Sonora), and Upper Piman (Sonora-Arizona) who identified themselves as Odami, Ootoma, O'odaam, or O'odham. According to linguists Kenneth Hale and David Harris (1979:176), "It is somewhat misleading to speak of time-depth within Piman; it is more probable that, until very recent times, Piman represented a more or less continuous chain of dialects belonging to a single language." Linguistic anthropologists Jane Hill and David Shaul (personal communication) note that the various Tepiman languages share cognate densities of 74.4 percent to 86.4 percent, suggesting that they split from one another roughly 1,000 years ago or less. The relationships between Hohokam and Pima in Arizona, then, have to be viewed in a much larger framework, one that encompasses a broken chain of Tepiman speakers extending more than a thousand miles to the south.

It is beyond the scope of this chapter, or this report, to analyze the various theories about those relationships in any depth. Nonetheless, at least three major hypotheses have emerged, all of which suggest somewhat different interpretations about what was happening in the San Rafael Valley between 1450 and 1700 A.D. The most widely held hypothesis is the Hohokam-Piman continuum, which argues that the Pimans are descendants of the Hohokam (Haury 1945, 1950, 1976; Gumerman and Haury 1979; Doyel 1979, 1991b; Reff 1991; Hayden 1970; Ezell 1963). The archaeologists and ethnohistorians who advance this hypothesis argue that after Hohokam civilization collapsed because of social conflict, environmental degradation, or the devastation of Old World epidemic diseases, the Pimans were the remnants who survived. Charles DiPeso (1956, 1979) and Randall McGuire (1991), on the other hand, contend that O'odham have been living in the northern Sonoran Desert for two millennia, and that the Hohokam intruded upon, and partially displaced, this ancient desert culture. And finally, ethnohistorian Bernard Fontana (1976) and ethnobiologist Amadeo Rea (in press) believe that Pimans are relatively recent newcomers to the river valleys of southern and central Arizona, moving into the region as or soon after Hohokam civilization collapsed.

In our opinion, the second and third hypotheses merit more attention than they have received from

Archaeologists. Rea (in press) recently has presented provocative evidence that challenges the Hohokam-Pima continuum. First of all, he notes that in the earliest Hispanic and Anglo accounts of the Akimel O'odham (Pimans living along the Salt and Gila rivers), the Akimel O'odham "unequivocally disassociated themselves" from the people who built Casa Grande and other notable ruins in the region. Secondly, he analyzes the Akimel O'odham Creation Story, which relates how O'odham ancestors emerged out of the earth somewhere in the east and destroyed eight to 10 settlements ruled by powerful chieftains with magical powers known as *siivañ(i)* along the Salt and Gila beginning with Casa Grande. Rea also cites the research of physical anthropologist Christy Turner, who compared the skeletal morphology of both pre-Classic and Classic Hohokam with living Pimas and Hopis. Turner (1993) concluded that pre-Classic and Classic Hohokam were not closely linked and that Hopis are "three times more like the Classic Period Hohokam than are the Pima." Turner and Irish (1989) also analyzed Pima and Hohokam dentition and found that "The Pima and Hohokam are not sufficiently similar to favor hypothesizing an ancestral-descendant relationship between them."

Rea himself believes that "sometime between A.D. 1400 and the arrival of Fr. Kino in A.D. 1694, a group or perhaps several groups of Piman people wandered out of the lowlands of Pima country on a generally northward exodus. These people came from the desert or thornforest lowlands of northwestern Mexico, not from the sierra, where the language (Mountain Pima and Northern Tepehuan) is most differentiated. These were a ranchería people who had been living by hunting, fishing, gathering, and farming along the streams in the tierra caliente." According to Rea, "They traveled leisurely, hunting being their essential mode of support. The travel took years. It is likely that they entered Arizona by way of the San Pedro, as the tradition of arriving on the Gila from the east is well-established. Southeastern Arizona may have been uninhabited. The Sobaipuri may well have been part of this invading army."

When they arrived, they did not practice irrigation agriculture. On the contrary, various versions of the Creation Story note their attempts to shift from "raising crops from the rains" to irrigating crops via canals. Nonetheless, the wild plants and animals they encountered in the northern Sonoran Desert were similar or identical to the wild crops and animals they exploited in the south. "My list of some 350 Pima

Bajo plant ethnotaxa from the middle Río Yaqui Névome is amazingly parallel to the 240 identified Gileño folk taxa contained in this work," Rea observes. "With few exceptions, the major animal foods from the south were found on the Gila as well. . . . Both linguistically and culturally, Piman invaders from the south would have been preadapted to their new territory."

Linguistic anthropologists Jane Hill and David Shaul and linguist Ofelia Zepeda (personal communication), on the other hand, present evidence that the center of maximum linguistic diversity in Tepiman is in the north, suggesting that Proto-Tepiman may have originated there. They also examine lexical borrowing between Yuman languages and Tepiman languages. The Proto-Tepiman word for water, **suu-dagi*, for example, is found in some form in all Tepiman languages, even though the Proto-Uto-Aztecan root for water is ***pa-*. The Tepiman languages retain the root as **va-* in many combining forms (e.g., *wa:k* "reedy place" in Tohono O'odham), but the words for water itself probably derive from Yuman words for "blue, green" including the sequence */vasú/* (e.g. Mohave *havasú*). Because some form of the element *-su* is found in all Tepiman languages, the borrowing from Proto-Yuman to Proto-Tepiman must have occurred where the two groups were in contact, i.e., in the northern Sonoran Desert. The linguistic evidence therefore lends a certain amount of support for DiPeso's hypothesis about the antiquity of Piman speakers in the north, at least in lowland desert areas.

When all of this admittedly fragmentary linguistic, archaeological, and documentary evidence is taken into account, one possible scenario emerges concerning the study area. Sometime between 1450 and 1700 A.D., after or at a time when so-called Classic Hohokam civilization was disappearing in southern Arizona, Piman peoples occupied—or reoccupied—the riverine oases of the Santa Cruz, San Pedro, Salt, and Gila river valleys. Whether they were newcomers from the south moving into Arizona or the descendants of ancient Piman populations who had long occupied the Sonoran Desert west and south of those valleys remains to be determined. It seems less and less likely, however, that the Upper Pimans—Tohono O'odham, Akimel O'odham, or "Sobaipuri"—were biological or cultural descendants of the Hohokam. Their rudimentary architecture, their pottery types, their burial practices of inhumation rather than cremation, and their reliance upon small-

scale rather than massive irrigation systems—at least until the 19th century when Akimel O’odham canals grew larger in response to Mexican and Anglo market demand—all suggest that the Upper Pimans, including the Sobaipuri, were very different from the Hohokam (Masse 1981).

We therefore contend that the Sobaipuri who occupied the upper Santa Cruz and San Pedro river valleys, including the study area, were probably frontier populations colonizing new territory in the 15th, 16th, and 17th centuries. In all likelihood, their ancestors were Sonoran Desert dwellers who relied more upon wild plant and animal foods than upon field crops. As both the archaeological evidence and the Spanish documentary evidence make clear, they lived in scattered *rancherías* rather than compact pueblos (see Felger, Nabhan, and Sheridan 1976 for a description of Pimans in the Dolores river valley to the southwest). Their oval-shaped homes were constructed of brush rather than adobe. They had little or no substantial public architecture—no walled compounds with platform mounds (except for the village of Quiburi along the San Pedro), no ballcourts, no major canal systems. And even though Manje described extensive fields of corn, beans, squash, and cotton watered by earthen *acequias* (canals), archaeologist Bruce Masse (1981) points out a possible disjunction between the documentary and archaeological evidence. In his words (1981:46), “Ground stone is weakly represented at Sobaipuri village sites, as are domesticated plant remains. The archaeological record suggests that agriculture played only a minor role in Sobaipuri subsistence, an observation that seems at variance with the documentary record.”

Regardless of their origins or the extent of their reliance upon agriculture, however, Sobaipuri Pimans occupied an extensive region of southern Arizona and northern Sonora encompassing the study area. The San Rafael Valley was a natural corridor of communication and transportation between the Piman communities of the Santa Cruz and those located along the San Pedro or its tributaries such as the Babocómari. Sobaipuris undoubtedly utilized the San Rafael Valley as well for certain subsistence pursuits, but their occupation does not seem to have been either extensive or intense. With the exception of Beradeuguachi, which may have been south of the study area, there is no documented Sobaipuri settlement in the San Rafael Valley at contact.

Given the environment of the study area, this apparent absence of occupation is not hard to under-

stand. Even though the upper Santa Cruz River contained numerous cienegas and stretches of shallow, flowing water, the comparatively high elevation of the valley (4,500 feet at its lowest elevation at the Mexican border) made the San Rafael less attractive to farmers than the middle Santa Cruz or San Pedro valleys, where frosts were less of a danger. It must be remembered that the Pimans, even though they were sophisticated farmers with numerous species of corn, beans, and squash well-adapted to arid and semiarid conditions, did not possess a major frost-tolerant food crop. In the San Rafael Valley, where frosts can fall from late September to late April, Piman farmers would have been restricted to one reliable crop a year instead of the spring and summer corn and bean crops that could have been planted at lower elevations. If southern Arizona was, indeed, a frontier with plenty of available riverine oases, permanent agricultural settlements would not have been established in agriculturally marginal areas such as the study area. As later chapters of this report demonstrate, agriculture has always been marginal in the area. Livestock raising, not farming, developed into the major agrarian pursuit.

Moreover, the vegetation of the study area—plains grassland rising to evergreen woodland—would have provided fewer wild plant resources for people whose culture and subsistence had been shaped by the Sonoran Desert. Emory oak acorns, native walnuts, certain species of agaves, yuccas, and beargrass were abundant, but the region supported fewer species of cacti, fewer and smaller mesquite and other leguminous trees and shrubs, fewer chollas, and a different array of annuals than the ones Pimans collected in lower desert areas.

In summary, then, the Sobaipuri undoubtedly utilized the study area for a wide range of subsistence activities, including the hunting of both large and small game and the gathering of agaves, yuccas, acorns, walnuts, beargrass, and other wild plants found in the plains grasslands and evergreen woodlands. Nevertheless, they preferred to locate their settlements at lower elevations in the Santa Cruz and San Pedro watersheds where the number of frost-free days was greater, where mesquite *bosques* (forests) were more extensive, where stands of prickly pear and cholla were denser, and where important ceremonial plants such as the saguaro were closer. If Sobaipuri population had continued to grow, their range might have expanded and they might have adapted their agriculture and wild plant gathering

practices in order to permanently occupy the San Rafael Valley. But the increasing intensity of warfare with other Indian groups to the north and east halted Sobaipuri expansion and eventually drove them out of the San Pedro watershed altogether.

THE APACHES

By the late 17th century, when Kino and his companions first encountered them, the Sobaipuri already were battling Indians identified by the Spaniards as Janos, Jocomes, and Apaches. These people formed alliances with one another to raid Sobaipuri and Spanish settlements. On November 7, 1697, for example, Kino noted in his diary that the Pimans of San Pablo de Quiburi were "dancing over the scalps and spoils of fifteen enemies, Hacomes and Janos, whom they killed a few days before" (Bolton 1918 l:168-169). And Manje, arriving at the mission of Cócospa in 1701, mentioned that three years earlier "the Jocomes and Apache enemies" had attacked the community and burned its church and the house of its missionary, Padre Pedro Ruiz de Contreras, who "miraculously escaped" with his life (Burrus 1971:512). During the late 1600s and early 1700s, the region stretching from the San Pedro Valley to west Texas and northern Chihuahua was contested ground where the Sobaipuris and Spaniards encountered stiff resistance from groups who moved in and out of the historical record like wraiths, glimpsed but never grasped by the chroniclers of the time.

The Janos and Jocomes in particular elude our understanding. The Spaniards fought but never missionized or settled among them. By the early 18th century, most Janos and Jocomes had died out or been assimilated by the Apache bands moving into southeastern Arizona, northeastern Sonora, and southern New Mexico. Historian Jack Forbes (1960) even argued that the Janos, Jocomes, Sumas, Mansos, Cholomes, and Jumanos were the southernmost Athapaskan-speaking peoples in North America, basing his thesis on the cultural patterns of these groups as well as on their alliances with the Apaches themselves. Some Jumanos lived in agricultural settlements along the Conchos River in northern Chihuahua, but most Sumas, Mansos, Janos, and Jocomes were hunters, gatherers, or part-time farmers who frequently shifted residence, much as the Apaches did. Spicer (1962) agreed that the Janos and Jocomes were probably Athapaskans but argued that the Sumas were Uto-Aztecan speakers related to the Jumanos.

Since then, intriguing bits and pieces of evidence have chipped away at Forbes' sweeping assertion of Athapaskan identity even further. Historian Thomas Naylor (1981) analyzed the names of 43 Suma Indians executed for plotting a revolt at Casas Grandes in northwestern Chihuahua in 1685. He and the linguists he consulted concluded that the names were definitely not Athapaskan. On the contrary, Uto-Aztecan experts like Kenneth Hale informed Naylor that the names were probably Uto-Aztecan, a conclusion that supported the earlier assertions of anthropologist Alfred Kroeber (1934) and geographer Carl Sauer (1934), who identified the Sumas and Jumanos as Uto-Aztecan on the basis of four words from their languages, including the word for water. According to Naylor, the Sumas were not Athapaskans pushing southward but Uto-Aztecan moving north and west out of the Bolsón de Mapimí, that vast, dry interior drainage in eastern Chihuahua and western Coahuila. Naylor suspected that some of the other groups the Sumas were closely associated with, particularly the Jumanos, were Uto-Aztecan from the Bolsón de Mapimí as well. In his opinion, hunters and gatherers from the Bolsón drifted into the region after the collapse of the prehistoric trading center of Casas Grandes in the 1400s.

To further complicate matters, Hickerson (1988) claimed the Jumanos were Tiwa speakers closely related to the Tiwas of Piro Pueblo near modern Socorro. Confronted by such a welter of linguistic speculation wedded to such a paucity of ethnological and archaeological information, perhaps the safest conclusion to draw about the Janos and Jocomes is this: by the late 1600s, the Spaniards had enough accumulated experience in the greater Southwest to recognize Athapaskans, whom they usually identified as Apaches of a certain region (*apaches de xila*, *apaches de navajo*, etc.). It is unlikely, then, that the Janos and Jocomes were Athapaskan speakers. As ethnohistorian William Griffen (1983:330) notes: "The Jano and Jocomes (said to speak the same language) were to the north and west of the Suma and Manso, respectively. They have often been identified as Athapaskan and consequently forerunners of southern Apache groups in this area. However, there is no linguistic evidence for this, and in the 1750s they were still identified as distinct from Apaches in the parish records of the Janos presidio. It is true that their territory was later taken over by Athapaskan speakers, but so was that of many other groups as contacts and competition increased under the pressure of the northward extension of the Spanish colonial frontier."

Whether the Janos and Jocomes were Uto-Aztecs, on the other hand, cannot be determined at present. If they, like the Sumas and Jumanos, did indeed migrate out of the deserts of northern Mexico, they could have been Coahuiltecan speakers, a controversial linguistic family originally proposed by Swanton in 1915. Regardless of their linguistic affiliation, however, the possibility that the Janos and Jocomes ventured forth from the Bolsón de Mapimí is an intriguing one. Too dry to farm, the Bolsón was one of the great heartlands of hunters and gatherers in North America. During the colonial period, its high desert valleys and mountain ranges provided an enormous region of refuge for Indians who refused to submit to the Spanish yoke. Spanish documents yield hundreds of different names for the bands or tribes ranging across the region (Griffen 1969, 1979; Barnes et al 1981). During the late prehistoric period, when societies like Casas Grandes and the Hohokam were crumbling, people from the Bolsón may very well have penetrated lands formerly held by more sedentary farmers and traders. If so, those expanding frontiersmen and women may have run into the expanding frontier populations of Piman-speakers in the San Rafael and San Pedro valleys. The result of that collision was a century or more of bitter warfare.

The victors, at least in the 18th century, were the Apaches. Like the Sobaipuris, we know who the Apaches were, but we do not know exactly when they arrived in southeastern Arizona. As Wilcox (1981) points out, anthropologists have been debating when and by what route Athapaskan speakers entered the Southwest for more than a century. Wilcox himself argues that the Athapaskans migrated onto the Southern Plains from the Black Hills of South Dakota around 1450 A.D. In his words, they were "dog nomads, hunting the bison, and trading with sedentary neighbors to [the] south and west. Oñate called them "Vaquero Apache" (Wilcox 1981:219). Wilcox also believes that these were the same people Coronado identified as the Querechos in 1541. According to Wilcox's model, Athapaskans did not occupy either the Colorado Plateau or the mountains of eastern Arizona until the 1600s. He cites Fray Alonso de Benavides, the controversial Franciscan chronicler of New Mexico, who noted the "Apaches de Xila" living in a community 14 leagues west of the Piro Pueblo of Senecu near Socorro, New Mexico, in the late 1620s. Wilcox also accepts the Bolton-Sauer route of Coronado through eastern Arizona, which described the region that later became the heart of the Apachería as a "*despoblado*."

Anthropologist Richard Perry (1991) challenges the Plains route hypothesis. He believes that small groups of Athapaskan hunters and gatherers drifted south from Alaska and Canada along the Rocky Mountain chain. He also places Athapaskans in the northern Southwest a century earlier than Wilcox. Given the importance of mountains in Western and Chiricahua Apache culture, his interpretation deserves close attention. For the purposes of this study, however, these broader questions of Athapaskan prehistory do not affect the impact of the Apaches on the study area. Few authorities place the Apaches in southeastern Arizona or southwestern New Mexico before the late 1600s, when they began raiding Sonoran and Nueva Vizcayan settlements during the chaotic period following the 1680 Pueblo Revolt. When the Apaches first enter the Spanish historical record, they were clearly sharing a region with the non-Athapaskan groups mentioned above.

They were also in the process of displacing or assimilating those groups, a process that accelerated in the 18th century as the Comanches relentlessly drove the eastern Apaches—the Lipanes, Jicarillas, and Mescaleros—off the Southern Plains. The 17th and 18th centuries were periods of enormous political and demographic change as Spanish slave raids, missionization, and colonization further disrupted the tenuous balance of power in the Southwest—a region that was in the throes of great change even before the Spaniards arrived. It is possible, then, that the Athapaskans later identified as Western Apaches and Chiricahua Apaches were migrating into southeastern Arizona and southwestern New Mexico about the same time the Sobaipuris were pushing into the region from the southwest and the Janos and Jocomes were filtering into the region from the southeast.

We know very little about the cultural patterns of the Janos and Jocomes, but we can speculate about the ways in which the Apaches exploited the region, including the study area. In all likelihood, those people belonged to what later would become the central band of the Chiricahuas, who called themselves the Chokonens. By the 18th century, members of this band ranged across the Peloncillo, Dragoon, Dos Cabezas, Chiricahua, and probably the Huachuca mountains. The band was composed of local groups of extended families who shared a recognized portion of the band's territory and often camped together. Local groups, not bands, were the most important political units in Chiricahua society, living together, carrying out raids, and selecting one

of their members as "chief" of the group. According to anthropologist Morris Opler (1941, 1983), chieftainship was not hereditary, even though the sons of chiefs often succeeded their fathers. Members of the same local group frequently married one another, reinforcing group identity. Leadership above the local group level depended upon the charisma, ability, and supernatural "power" of individual local group chiefs. Members of different local groups, different bands, and different "tribal" subdivisions among the Apache themselves occasionally carried out raids together, but no formal band or tribal political structure existed. Apaches had survived their centuries-long trek from the Subarctic to the Southwest by breaking into small, flexible, and autonomous groups (Perry 1991). Those patterns did not change once they settled in the Apachería of Arizona and New Mexico.

Similar flexibility characterized their subsistence pursuits. Some Chiricahua families planted small plots of corn, melons, beans, and squash, but agriculture was less important to them than to the Western Apaches. Instead, they relied to an even greater extent upon hunting and gathering. The hunting of big game (deer, antelope, elk, bighorn sheep) was a masculine pursuit with strong sanctions against the participation of women. Men hunted deer alone or in small groups. They also stalked antelope with antelope-head masks, or, once they obtained horses, ran them down in relays until they collapsed from exhaustion. In addition, the Apaches apparently employed fire drives, a custom noted for the Northern Athapaskans as well (Dobyns 1981). Men, women, and children hunted or snared small game, including cottontail rabbits, wood rats, and squirrels. But the Chiricahuas, like most Apaches, abhorred snakes and refused to eat peccaries (javelina) or turkeys because those animals ate snakes. They also did not consume fish because their "slickness" appeared snakelike, or bears because they were evil animals whose contact caused sickness (Opler 1941, 1983).

Wild plant foods constituted the largest portion of the Chiricahua diet. Work parties of women from an extended family followed a seasonal round, dividing the year into six time periods that reflected the importance of wild plant cycles. Beginning with the period of "Many Leaves" (mid-spring to early summer), women gathered the buds, flowers, and tender stalks of various species of yucca, particularly *Yucca elata*. They then collected the stalks and caudices of different agaves (mescal), especially the so-called century plant (*Agave parryi*). Both yuccas and

agaves were baked in rock-lined pits, but the agave-roasting pits were considerably larger—"seven feet or more across and three or four feet deep," according to one of Opler's Central Chiricahua consultants. "When the stalks are just coming up and are going to blossom, we go to a place where the mescal is plentiful and dig a pit in about the center of the region in which we are going to get the plants," the Chiricahua told Opler (1941:357). "They are big and heavy, and we don't want to carry them farther than we have to. If men are along, they dig the pit while the women start bringing in the plants. There has to be plenty of wood too and some big flat rocks."

After baking, the agave was dried in the sun and stored for months. When eaten, it was rehydrated and often mixed with sumac berries, juniper berries, pinyon nuts, or walnuts. Opler considered it the Chiricahuas' most important food source.

Other foods of the "Many Leaves" period included locust blossoms, wild onions, and the little red berries of *Rhus microcarpa*, a sumac. They were followed by the period known as "Large Leaves," or midsummer, when women collected the berries of one-seeded juniper (*Juniperus monosperma*), the seeds of various plants, and raspberries, strawberries, and wild grapes. After "Many Leaves," the second most important harvest season—"Large Fruit" or "Thick With Fruit"—began in late summer, when women collected chokecherries, mulberries, wood sorrel (*Oxalis* sp.), wild potatoes (*Solanum jamesii*), walnuts, pinyon nuts, and a species of morning-glory (*Ipomea*) in the mountains and the fruits of prickly pear and other cactus in the lowlands. They also gathered the pods of mesquite and screwbean (*Prosopis pubescens*) and the large, fleshy fruits of datil or banana yucca (*Yucca baccata*). Some of the fruit was eaten ripe, but most was picked just before it ripened. In the words of one Chiricahua (Opler 1941:360):

The women gather a large amount. They roast it on the coals. When the fruits are black on top, they are taken off, and the burned outside is peeled off. They are split in two, and the seeds are taken out. The fruit is then put on a hide and pounded. Then they put it over a container in a basket and let the juice run down. They can drink this juice or pour it over the fruit again. It makes the yucca fruit soft and sticky. After that they spread the whole mass out to dry in the sun. If rain comes, they have to cover it up. It gets dry in the sun in two days. While it is drying, they

take sunflower blossoms and put them on to make it pretty. They pray while they do it. When it is dry, this fruit can be stored. It will keep like a cracker. During the fall the women put piles of it away for emergency or for the winter. When it is wanted, it is made ready for use by soaking and is then used alone or mixed with other things.

By early autumn, when "Large Fruit" was ending, women collected the acorns of various oaks, including Emory and Gambel. Some were stored in the shell like walnuts, while others were roasted, cracked, and made into a kind of pemmican by mixing them with jerked deer meat and fat. During the summer and fall, women also gathered greens such as lamb's quarter (*Chenopodium*) and the seeds of grasses and plants such as pigweed (*Amaranthus palmeri*), spurge, sunflower, and dropseed. In addition to agave and yucca, many of these seeds, nuts, and fruits, including prickly pear, were parched or dried and stored for the winter, which was known as "Ghost Face," a time when no plant foods ripened and a designation that may have reflected the Chiricahuas' Subarctic origins, where winter would have been far more dangerous. According to Opler (1941:364), "From early spring to the onset of winter, the woman gathers fruits and vegetables which grow at different elevations and in different areas. She does not keep at this task steadily, for she has many other duties. But she must be ready at the report of a good natural harvest to leave at once for the region where it is. Often it is nearby; but many times the site is so far distant, and the work ahead is so time-consuming, that the entire household or an extended family consisting of a number of households temporarily leaves the larger encampment or local group on such an errand."

Chiricahuas undoubtedly utilized the resources of the mountains surrounding the study area, including the Huachucas, the Patagonias, and the Canelo Hills. The Huachucas in particular must have offered relatively secure gathering sites and hidden springs where families could camp. Nonetheless, spring, summer, and autumn would have been the time of maximum vulnerability, when families intent on gathering would have made relatively easy targets for the revenge raids of their enemies. And while the Sobaipuris may not have ventured high into the mountains to collect montane resources favored by the Apaches, they may have competed with the Apaches—and probably the Janos and Jocomes—for resources found on lower slopes, particularly aga-

ves, yuccas, prickly pears, walnuts, and acorns. As archaeological research evolves in the study area, then, particular attention should be paid to such zones, where both Sobaipuri and Apache gathering camps and roasting pits may be discovered.

ENVIRONMENTAL IMPACT UPON THE STUDY AREA

At present, it is impossible to assess the environmental impact of the American Indian groups upon the study area during the protohistoric period with any rigor. The San Rafael Valley and the surrounding mountains did not support large populations of Sobaipuris, Janos, Jocomes, or Apaches, yet all four groups undoubtedly hunted game and gathered wild plants across the region. If the intensity of that exploitation is ever going to be determined, however, more archaeological research needs to be done, including zooarchaeological and palynological recovery and analysis. Szuter (1991) has demonstrated that Hohokam communities did have significant local impacts upon game populations through their hunting practices and their alteration of surrounding vegetation because of wood-gathering and the clearing of land for fields. At present, however, our knowledge of Sobaipuri and Apache archaeology in southeastern Arizona is rudimentary at best. It is possible that sustained hunting may have affected deer and particularly antelope populations in the study area, but only further archaeological research can determine whether those questions can be addressed, much less answered. It is also possible that frequent fire drives may have suppressed shrubs and maintained the grasslands of the San Rafael Valley. Dobyns (1981) cites a report by Captain Antonio Comadurán, captain of the Tucson presidio, who noted the use of fire by Western Apaches in Aravaipa Canyon. Dobyns argues that fire drives were commonly used as an Apache hunting technique and that, contrary to Hastings and Turner (1965), those fires did indeed prevent mesquite and other shrubs from invading southern Arizona grasslands. Dobyns also points out that Northern Pimans used fire as a battle tactic. During the 17th and 18th centuries, human-set fires may very well have been employed in the study area with significant results.

The impact of protohistoric agriculture upon the upper Santa Cruz and its tributaries probably was not extensive. The location of Beradeuguachi needs to be determined, and the watercourses should be

Surveyed to identify agricultural settlement patterns in the valley. As mentioned previously, however, the drainage's high altitude relative to sur-

rounding riverine oases makes it unlikely that the study area was the site of sustained or intensive agriculture during the period between 1450 and 1700 A.D.

Chapter 3

Chapter 3

The Spanish and Mexican Periods

During the Spanish colonial period, there was no permanent Hispanic settlement in the San Rafael Valley. Nonetheless, Spanish ranchers and Sobaipuris living in surrounding communities undoubtedly utilized the study area, particularly for livestock grazing. The only way to understand the valley during the colonial period, then, is to understand its relation to those surrounding settlements, particularly the mission of Santa María Suamca, which later became the *presidio* (military garrison) of Santa Cruz.

THE CORONADO ENTRADA

Before discussing the history of those settlements, however, it is necessary to say a few obligatory words about the route of Francisco Vázquez de Coronado's expedition through Arizona. Excited by the tales of Franciscan explorer Fray Marcos de Niza, who claimed to have seen the fabled city of Cibola (a Zuni village) in northern New Mexico, the viceroy of New Spain, Antonio de Mendoza, authorized the governor of Nueva Galicia, Vázquez de Coronado, to mount a major expedition to visit Cibola, which Marcos de Niza described as "bigger than the city of Mexico." Coronado assembled an enormous party of more than 300 Spaniards, over 1,000 Indian allies, and about 1,500 horses and pack animals, which headed north from Compostela up the west coast of Mexico. Given the number of men, women (at least three Spanish women accompanied the expedition), and animals, Coronado's expedition was a major logistical undertaking—one that had to follow a route with plenty of food, pasturage, and water.

The exact nature of that route has remained a matter of dispute for decades. As historian John Wilson (1987:22) notes, "A number of attempts to reconstruct Coronado's route have resulted in almost as many interpretations." Geographer Carl Sauer (1932) advanced the most widely accepted reconstruction, whereby Coronado and his followers marched up the drainage of the Sonora River in central Sonora to Ispa, which Sauer identifies as the valley of Arizpe. From there, the expedition proceeded to the Valley of Suya, which Sauer places near the community of Bacoachi in the headwaters of the Río Sonora. After leaving Suya, the Spaniards and their Indian allies crossed a

despoblado, or deserted country, for four days until they came to the Río Nexpa. Sauer believes Nexpa was the San Pedro River.

Wilson challenges that route. In his words (1987:22), "The Spaniards entered southern Arizona by way of the upper Santa Cruz River, passed north across the San Rafael Valley and continued over the Canelo Hills into the Upper Babocómari River Valley, then followed the Babocómari downstream to its junction with the San Pedro River." Wilson (1987:22–23) goes on to say: "The San Rafael Valley with its excellent grasslands plus the springs in the Canelo Hills and on the flanks of the Huachuca Mountains, made this the desirable route for a horse-borne army with thousands of head of livestock. The upper San Pedro in contrast was by 1850 and presumably long before a narrow stream flowing between steep banks eight to ten feet in height, difficult of access for livestock, its valley filled with mesquite. This was altogether a poor choice."

Wilson's reconstruction is an intriguing one and deserves closer attention. Nonetheless, we feel he jumps too quickly to the conclusion that Coronado passed through the San Rafael. Wilson (1987:27) concludes that prior to reaching the Valley of Suya, which he thinks is along the Babocómari, the expedition "probably marched north via the San Miguel Valley or the Río Sonora in northern Sonora—the only valleys that in 1540 would have allowed them to remain among natives speaking the same language through Sonora into the Valley of Suya in southern Arizona." Based upon our knowledge of the topography of the San Miguel watershed, we believe that the San Miguel Valley would *not* have offered a suitable avenue of transport for such a large aggregation of people and animals (Sheridan 1988a). As Felger, Nabhan, and Sheridan (1976:13) note, "The San Miguel Valley is simply too narrow to permit easy north-south travel along the floodplain."

In the 17th century, when Spaniards first settled in the watershed, the San Miguel was divided into three ethnic and cultural segments that reflected the geographic segmentation of the drainage. Lower Pimas (Pimas Bajos) occupied the lower portion of the drainage from its junction with the Río Sonora just north of modern Hermosillo to the community of Nacameri

(modern Rayón). Hegues (Eudeves, linguistic relatives of the Opatas) dominated the riverine oases of the middle section from Opodepe to Cucurpe. North of Cucurpe, along the Río Dolores and the Río Saracachi, the two major tributaries of the San Miguel River, the Spaniards encountered Upper Pimas they called Himeris (Imuris). In the words of Felger, Nabhan, and Sheridan (1976), "The San Miguel was not a self-contained sociogeographic unit oriented north-south along the riverbed. Rather, various stretches of the watershed were populated by human groups culturally and linguistically affiliated with people east or west of them in other Sonoran river valleys."

Based on these topographic and cultural characteristics, the much wider and more fertile Sonora River Valley, dominated by Opatas-speakers, would have been far more attractive to Coronado and his men. And if you examine a map of northern Sonora, you realize that the headwaters of the Sonora split into two tributaries—the Río Bacanuchi to the northwest and the Río Bacoachi to the northeast. Following the Río Bacoachi would have brought Coronado and his men within a few miles from the headwaters of the San Pedro. To pass from the Sonora to the San Rafael Valley, on the other hand, the expedition would have had to swing northwest along the Bacanuchi at least 50 miles before reaching the bend of the Santa Cruz. The Spaniards also would have had to cross a series of low but rugged mountains between the two drainages. We therefore believe that unless further archaeological research reveals a Coronado site in or near the study area, such as Corazones III along the Babocómari River as Wilson suggests, in or near the study area, Sauer's original route from the Sonora to the San Pedro watersheds makes more geographic and cultural sense.

EARLY STOCK RAISING

Regardless of where Coronado went, however, the expedition's impact upon southern Arizona was negligible. None of the expedition's chroniclers mentioned significant encounters with Indians in the area, and the Spaniards were interested only in moving on to the Seven Cities and their shimmering promise of gold. Spaniards did not begin to settle in the region until 140 years later, when a few Spanish ranchers and miners pushed beyond the Opatas heartland of central and eastern Sonora and established isolated ranches and mines in Upper Pima territory.

The first was Pedro Perea Ibarra, the son of Captain Pedro de Perea, who colonized Sonora and established a mine near Tuape in the San Miguel Valley. Beginning in the 1640s, Perea Ibarra ran his stock on the mesquite and oak grasslands of the Bacanuchi Valley along a northern tributary of the Río Sonora. By 1685, there were six ranches in the Bacanuchi Valley and four in the Teuricache Valley to the northeast.

Perhaps the most important of these pioneers was José Romo de Vivar, who was identified as a wheat farmer along the Bacanuchi River during the 1670s. He was also the highest colonial official in the region, serving as *teniente alcalde mayor* (lieutenant or deputy *alcalde mayor*; at the time, Sonora was an *alcaldía mayor* in the province of Nueva Vizcaya) with the Piman rancherías of Cananea, Cocóspera, and Huachuca under his jurisdiction. Those duties must have frequently taken him through the San Rafael Valley on his way to Huachuca on the Babocómari, and he could not have failed to notice the valley's possibilities. By 1680, Romo de Vivar had a ranch at San Lázaro at the bend of the river in the upper Santa Cruz Valley and was running stock around Cananea and the south slopes of the Huachuca Mountains as well (Kessell 1970; Officer 1987). Some of those cattle and horses undoubtedly grazed the lush grasses of the San Rafael Valley, making Romo de Vivar the first stockman in the study area.

Stock raising intensified after silver was discovered in the mountains paralleling the Bacanuchi Valley in 1678. Romo de Vivar and others founded the *real*, or royal mining community, of Bacanuchi there, and Bacanuchi soon developed into one of the most important mining centers on the northwestern frontier (West 1993). By 1684, when northern New Spain was threatened by a series of Indian rebellions beginning with the Pueblo Revolt of 1680, 62 men of Spanish descent responded to a call to arms in Bacanuchi alone, nearly twice as many as any other community in the area, including the mining center of San Juan Bautista to the south. Miners needed hides and tallow as well as meat, milk, and cheese, so a version of the "mine-ranch complex" geographer Robert West (1949) described for the Parral district of Nueva Vizcaya developed in northern Sonora as well. Cattle, mules, and horses flourished on the open range of northern Sonora, where, by the 1660s, they were so abundant the governor of Nueva Vizcaya said they sold for next to nothing ("*casi no tienen precio*"). By the early 1700s, ranchers in the region were even driving thousands of animals across

the Sierra Madre to sell in Parral and other mining centers of Nueva Vizcaya (West 1993). Other stockmen probably followed Romo de Vivar's lead and turned their animals loose in the San Rafael Valley. Cattle, horses, and mules from the valley must have also entered Sonoran and Nueva Vizcayan markets, at least until Apache attacks grew too intense later in the century.

EARLY MILITARY EXPEDITIONS

Relations between the Spaniards and the Pimas of northern Sonora were ambivalent during those early years. During the late 17th century, Spanish abuses in New Mexico, Nueva Vizcaya, and Sonora triggered a wave of Indian rebellions that convulsed the region, driving the Spaniards out of northern New Mexico in 1680. A revolt by the Sumas in 1684 soon followed, flaring across northern Chihuahua from Casas Grandes to El Paso. Alliances between Sumas, Mansos, Janos, Jocomes, Chinarras, and Apaches took shape, threatening communities on both sides of the Sierra Madre. As a result, the Spanish crown created four new presidios of 50 soldiers each to protect the northern frontier. One of those presidios was established at Janos in northwestern Chihuahua, where it protected three strategic passes—Guadalupe, Pulpito, and Carretas—across the northern Sierra Madre. Janos was to play a key role in the military and political struggles of the northern frontier for nearly two more centuries.

Then, in 1688, Captain Nicolás de Higuera of the presidio of Sinaloa attacked the Upper Pima ranchería of Mototicachi along the Río Bacoachi tributary of the Río Sonora and killed seven of its inhabitants. When the rest of the Pimas resisted, he executed 42 more. Enraged by his assault, the Pimas rose in revolt and killed nine Indians working in the mines of Tepetates. Hostilities spread as far north as the Huachuca Mountains, where they must have involved Sobaipuris living in or around the San Rafael Valley. Several stock ranches, including Romo de Vivar's San Lázaro at the bend of the Santa Cruz, were abandoned. Higuera himself was condemned to death but escaped and later rejoined his presidial company, where he apparently was demoted to corporal (*cabo*) but continued to serve as company commander (Naylor and Polzer 1986).

Because of the outrage at Mototicachi, Spanish-Upper Pima relations hung in the balance during the early 1690s. On the one hand, Jesuit missionary

Eusebio Francisco Kino was establishing a string of missions among the Himeris Pimas of the Río Dolores and the Pimas and Sobas of the Magdalena-Altar-Concepción river system. On the other, many Spanish settlers continued to view the O'odham as allies of and spies for the Apaches, Janos, and Jocomes. In the fall of 1692, Indians ran off the horses and mules of Bacanuchi, Chinapa, and other frontier communities. Rumors flew that the Sobaipuris had participated in this raid, so in 1693, Captain Francisco Ramírez de Salazar, commander of the *Compañía Volante* (Flying Company) of Sonora, visited the Sobaipuri villages along the San Pedro and made peace with them. He also led a delegation of their headmen back to Kino's mission headquarters at Dolores. Apparently, his negotiations with the Sobaipuris brought them firmly into the Spanish camp and ended any alliance with the Indian enemies of the Spaniards. In the words of Jesuit Father Visitor Luis Velarde: "In past years, before there were priests and when all were gentiles, the Sobaipuris farthest away [along the San Pedro] were in communication with the Apaches of the Chiricahua Mountains (*sierra de Chiguicagui*). But since Captain Ramírez with great tact and without bloodshed broke them apart, the Sobaipuris have become implacable enemies of the Apaches for the great good of this province of Sonora. Ever since the Indian named Coro with his Sobaipuris from the ranchería of Santa Cruz killed 168 warriors and many other Apaches, Jocomes, Sumas, and Janos who had joined together and were causing harm throughout the region, the enemies have not been seen in any pueblo of this province" (translated from Burrus 1971:654).

The Sobaipuri-Spanish alliance persisted for the next century despite rebellions among the Upper Pimas in 1695 and 1751. The Sobaipuris campaigned against the Apaches alone and with the Spaniards, serving as the first line of defense for Spanish Sonora and the Pimería Alta. Ultimately, however, they paid a high price for their loyalty. In 1698, Coro and the Sobaipuris achieved their great victory over the Apaches and Jocomes mentioned by Padre Velarde above. But that same year, Coro and 500 or 600 of his followers abandoned the San Pedro and moved west to a site along Sonoita Creek near modern Patagonia, which the Jesuits christened Los Reyes. Seven years later, Coro and his people returned to the San Pedro, but no missionary ever resided among them. The only attempt to do so occurred in 1756, when Padre Ignaz Keller of Soamca brought Padres Francisco

Hlava and Miguel Gerstner to them. The Sobaipuris rejected the new priests. They told Keller and his Spanish escort that they would remain allies of the Spaniards but would kill any missionary who tried to settle among them. Keller was their missionary. His church was their church. "In a word, they want to be baptized, but to live as they wish, to be Christians only in name," one missionary wrote (Kessell 1970:146).

As long as they remained on the San Pedro, then, the Sobaipuris had to fend for themselves even though the Spanish crown established the presidio of Santa Cruz de Terrenate along the river's headwaters in 1742. In 1746, after Apache attacks and epidemics devastated their populations, Padre Visitador Carlos Roxas resettled the Himeris Pimas of Dolores and Remedios and the Sobaipuris of Guachuca at Cócospa, which became a *visita* (visiting station) of Soamca (Donohue 1969). Then, nearly two decades later in 1762, the Spaniards forced all the Sobaipuris to abandon their communities along the San Pedro in order to reinforce Piman missions in the Santa Cruz Valley, including Bac, Guevavi, and Soamca (Kessell 1970). That decision undoubtedly left the San Rafael Valley more exposed to Apache raids and made stock raising there, however sporadic it might have been earlier in the 18th century, an even more dangerous and precarious occupation.

THE MISSION OF SANTA MARIA SOAMCA

All of these population shifts undoubtedly affected the study area. But the greatest impact upon the San Rafael Valley during the 18th century came from the Piman community of Santa María Soamca, which Kino called Santa María de Bugota. Kino declared Santa María a Jesuit mission *cabecera*, or headquarters, in 1698. During Kino's lifetime, however, Soamca never received a resident missionary. Missionaries were sent to the other two missions of Bac and Guevavi along the Santa Cruz in 1701, but both of those Jesuits had to leave because of illness within two years. From 1703 until 1732, the Jesuits were unable to restaff the Santa Cruz missions, and Sobaipuris there remained outside missionary supervision except for occasional visits from priests farther south, particularly Padre Agustín de Campos of San Ignacio del Cabórica.

Nonetheless, Kino did introduce herds of horses, cattle, sheep, and goats to O'odham throughout the Pimería Alta, including San Xavier del Bac, Nuestra

Señora del Pilar y Santiago de Cócospa, San José de Ymuris, San Cayetano de Tumacácori, San Lázaro, San Gabriel de Guevavi, his mission headquarters of Nuestra Señora de los Dolores, and Santa Ana de Quiburi on the San Pedro. In addition to the Dolores herd, Kino also ran stock operations at San Luis Bacoancos along the Santa Cruz south of Guevavi and at San Simón y San Judás de Síboda (Cíbota) south of modern Nogales. By 1701, Síboda supported a large herd of horses and more than 1,000 head of cattle, while San Luis Bacoancos had a herd of 300 cattle (Officer 1993). Both of those operations, especially Síboda, were located some distance from the nearest missions. That pattern persisted throughout the Jesuit and Franciscan mission periods whenever Apache hostilities waned.

Kino apparently did not give livestock to the Pimas of Soamca, which he called Santa María Bugota. On November 5, 1697, when he and Manje passed through the community, Manje noted that the community had "pastures full of extensive stretches of grama grass for the raising of large numbers of cattle and horseherds" ("*dehesas apastadas de extendidos gramadales para criar gran número de ganados y caballadas*") (translated from Burrus 1971:335). In other words, the grass was there, but not the livestock. Thirty-five years later, when Padre Ignaz Keller arrived to take over Soamca, stock raising still had not established itself there. Gruff and unimpressed by his new charges, the tall, stiff-necked German from Moravia wrote: "All I received were uncivilized and scattered Indians. I had the winds to breathe, with nothing more for sustenance. I had the open country in which to sleep, with no cover but the heavens. ... My neophytes had no oxen, nor did they know how to plow, until two years later when I acquired four. ... Because of the lack of provisions I was not able to go ahead with the building of a church, not even a house. Thus I persevered living for years in a straw-thatched hut like the natives, sustaining myself and them on the alms I would go out to beg for, and devoting to them the annual stipend with which His Majesty (whom God guard) favors us" (Kessell 1970:52).

Along the bend of the Santa Cruz to the south, however, numerous Spaniards and their mixed-blood descendants had resettled the cottonwood-lined stretch of the river they called the San Luis Valley. Romo de Vivar and others had fled the valley in the 1690s, but Nicolás Romero and other *gente de razón* ("people of reason"; non-Indians) had reoccupied those fertile lands during the 1720s (Kessell 1970).

Some of their livestock may have grazed the San Rafael Valley as well. In 1780, for example, royal engineer Geronimo de la Rocha y Figueroa kept a diary of the inspection of presidios he made with Jacobo Ugarte y Loyola, the military governor of Sonora. On June 11, Rocha and a detachment of soldiers camped at "the ancient ranch of San Lázaro." The next day, they rode three and a half leagues (9.1 miles) to the north to the "ruined pueblo of Santa María Suanca," which was destroyed by Apaches in 1768. From Suamca, the party traveled another league and a half (3.9 miles) to the north northwest to the "Ojo del Agua de San Antonio, the source of the Santa María River, which contains much water." Rocha noted that "one league to the southeast of the Ojo de San Antonio was the large pasturage or ranch of Torreón." Those distances would have placed both the spring of San Antonio and the Torreón ranch south of the international border, but not by much. The presence of a large ranch so close to the study area strongly suggests that Spanish herds may have periodically occupied the southern margins of the San Rafael Valley between the 1720s and the 1760s, when Apache hostilities drove settlers out of the upper Santa Cruz drainage once again.

At Soamca, however, the mission's poverty continued despite the presence of Keller and nearby ranchers. According to the 1745 *Memorial* signed by Padre Cristóbal Escobar y Llamas, provincial of the Jesuits in New Spain, the mission *cabecera* suffered repeated Apache attacks and few Indians lived there, while its *visitas* of San Lázaro and San Luis Bacoancos supported 800 Pimas because of their more protected locations. Escobar proposed that the presidio of Santa Cruz de Terrenate be moved there to protect the mission, a transfer that did not take place until 1787, two decades after Soamca had been destroyed by an Apache attack in 1768 (Donohue 1969).

Nonetheless, Keller continued to reside at the mission until his death in 1759. Only Padre Agustín de Campos served at a single mission—San Ignacio—for a longer period of time. During his 27 years there, Keller won a reputation for arrogance among the Pimas that contributed to the outbreak of the most widespread Pima revolt in 1751. That year, Pima war leader Luis Oapicagigua of Sáric arrived in Soamca after being entertained at Guevavi. Oapicagigua, who had led 443 Pima auxiliaries during Governor Diego Ortiz Parrilla's invasion of Tiburón Island in 1750, was a favorite of the governor, who appointed him captain-general of the Pima nation (Sheridan 1979). When he rode into Keller's mission dressed

and armed as Spanish officer, Keller verbally assaulted him, "calling him a Chichimec dog whose proper attire was a coyote skin and a loincloth and whose proper pastime was chasing rabbits and rodents in the hills" (Kessell 1970:103). Less than two months later, Luis mounted a rebellion that swept through the Pimería Alta. One of Luis's conditions for surrender was the removal of Keller from Soamca. Keller was sent to Mexico City before being allowed to return to his post.

But the 1751 Pima revolt was just one of the many convulsions that wracked Sonora in the mid-18th century. The rebellions began among the Yaquis and Mayos in 1740 and continued among the Upper and Lower Pimas and the Seris until the 1770s. And as those mission Indians rose up against the Spaniards, Apache raiding intensified. The missions and ranches of the Santa Cruz Valley became favorite targets. In 1763, Spanish settlers in the San Luis Valley petitioned Captain Juan Bautista de Anza, captain of Fronteras presidio, to be allowed to leave their ranches and move downstream, closer to the presidio of Tubac. From the 1720s until then, "more than a hundred [settlers] with a great number of all kinds of stock" had inhabited the valley (Kessell 1970:168). By the end of the year, the ranches of San Luis, Buenavista, and Santa Bárbara were deserted.

The end for Soamca itself came on November 19, 1768. That year, a young Franciscan named Francisco Roche had taken over the mission after the Jesuits had been expelled from all Spanish dominions the year before. Roche hated his new post, whining to his superiors that "I would rather live on chili and tortillas and work in a sweatshop than continue with things as they are now" (Kessell 1976:44). He soon got his wish when Apaches, "now on horseback, now on foot," set fire to the homes of the 13 Pima families living there as well as the mission storerooms and Roche's *convento*, or quarters. The Apaches also punched a hole in the wall of the church itself with a crowbar and "committed the sacrilegious outrage of throwing down the images, pulling off their heads and arms, and stripping them of the finery they wore" (Kessell 1976:49). Two months earlier, the Apaches had run off 180 head of cattle and 37 oxen from the mission, but this time they were determined to destroy Soamca itself.

THE PRESIDIO OF SANTA CRUZ

Only five Pimas were wounded during the fighting, but the boldness of the attack caused the

O'odham families to abandon Santa María and retreat to safer locations. The site was not reoccupied until presidial troops stationed at Las Nutrias along the headwaters of the San Pedro were transferred there in 1787. Because the original name of the presidio, founded in 1775, was Santa Cruz de Terrenate, that name accompanied the soldiers when they established their garrison at Santa María. The old Santa María designation persisted as late as the 1820s, but eventually both the presidio and the community that developed in association with it came to be known as Santa Cruz. By the 1820s, if not earlier, the settlement was surrounded by a defensive wall (Williams 1991). In 1819, Antonio Narbona, military commander of Sonora, even transferred some of the Apache Mansos (Tame Apaches) living at the *establecimiento de paz* (peace settlement) in Tucson to Santa Cruz. Like most settlements along the northwestern frontier, Santa Cruz developed into a multi-ethnic community of Hispanics, Apaches, and Pimans. In 1817, an Oyata Indian named José Soto even rose to the rank of lieutenant in the presidial company, serving as second-in-command to Captain Simón Elías González (Officer 1987).

The presence of a military garrison at Santa Cruz undoubtedly turned the San Rafael Valley into a major avenue of raiding for the Apaches and retaliation by the Spaniards and Mexicans. During the late 1780s, after Governor of New Mexico, Juan Bautista de Anza, drove a wedge between the Navajos and Western Apaches and concluded a peace treaty with the Comanches, the Spaniards began a series of coordinated offensive campaigns into the Apachería itself (Thomas 1932; Moorhead 1968; John 1975). From the very beginning of its existence, the Santa Cruz garrison participated in these forays. In January 1788, for example, Captain Manuel de Echeagaray led his troops against Chiricahuas fleeing forces commanded by Captain Antonio Cordero and Captain Domingo Vergara. That fall, he and his men campaigned relentlessly against the Apaches from the Pinaleno Mountains (Sierra de la Florida) of southeastern Arizona to the Mogollon Mountains of western New Mexico. By late November, Echeagaray's soldiers had killed 54 Apaches and captured 125 others. Fifty-five other Apaches voluntarily surrendered (Moorhead 1968).

For the next three decades, Apache raids gradually declined as Spanish campaigns took their toll and more than 2,000 Apaches settled in eight peace settlements across the northwestern frontier, includ-

ing Bacoachi, Fronteras, and Tucson in Sonora. During this period of relative peace, settlers at Santa Cruz must have expanded their herds, and some of those animals probably grazed the San Rafael Valley.

THE LAND GRANT OF SAN RAFAEL DE LA ZANJA

Formal and legal occupation of the valley began on July 19, 1821, when Manuel Bustillo, "a resident of the presidio of Santa Cruz," petitioned the intendant of Sonora and Sinaloa, Antonio Cordero, for "four *sitios* of land for the raising of large livestock [*ganado mayor*—cattle, horses, mules—vs. *ganado menor*—sheep and goats] at a place named La Zanja, located within the jurisdiction of this presidio." Bustillo added that he owned "a considerable number of both horses and cattle" and needed the additional land "to maintain and provide for them." Despite the War for Independence being fought farther south, 1821 was a good year for the settlers of northern Sonora—a year when they were expanding into new areas or reoccupying areas that had been abandoned in the past.

Cordero admitted the petition and commissioned Captain Simón Elías González, commander of the presidio of Santa Cruz, to measure the land and conduct the public auction that had to be held. Elías González then appointed four residents of Santa Cruz—José Antonio Calvo, Tomás Gauna, Felipe Jaramillo, and Leandro Romero—to carry out the survey. Three of the *sitios* (a *sitio* was equal to one square league; 5,000 square *varas*; 4,316 acres) Bustillo requested were located north of the presidio, within its jurisdiction but "on the edge and outside the boundaries they wish to assign to it" ("*a remate y fuera de las medidas que le quieran asignar*"). The other was a place called Cajoncito east of the presidio, where Bustillo wanted to establish an *estancia*, or ranch. Because Cajoncito fell within the "*egidos*" (common lands) of the presidio, however, Bustillo asked that another *sitio* be added to the three north of Santa Cruz. Elías González granted the substitution and the survey proceeded.

The survey began on October 5, 1821, at a place called San Rafael in the center of the grant. In the presence of Elías González, the four men carrying out the survey used a "hempen cord, well twisted and stretched." On that cord, they marked out a length of 50 *varas* (a *vara* is equivalent to about 33 inches) using a "Castilian *vara*"—an official standard

measurement. Stakes were then attached at each end of the 50-vara cord. The surveyors first marked off 200 cordlengths to the north, fixing the northern boundary "on a mesa along the banks of an arroyo that runs toward a rock outcrop at the foot of an oak tree" (*en una mesa a orillas de un arroyo que corre para el peñasco al pie de una bellota*). The surveyors carved a cross into the trunk of the oak and erected a large pile of rocks as a boundary marker (*mojonera*).

They then returned to the center and marked off 200 cordlengths to the south, fixing the southern boundary at the mouth of the Cañada del Potrero, where the boundary marker of the presidio's common lands was found. Once again, from the center, they measured 200 cordlengths to the east, which brought them "past the said Cañada del Potrero to an adjacent mesa" (*pasada la citada Cañada del Potrero, en una mesa contiguo*), where they erected another boundary marker of stones. They concluded the survey by heading west from the center, but they were only able to mark off 133 cordlengths because of the roughness of the terrain. They therefore estimated that the remaining 67 cordlengths ended at the summit of a tall peak in the Sierra de la Plomoso, "just southwest of a hill known as el Caloso ['Porous Hill']" (*casí entre sur y poniente del cerrito conocido por el Caloso*).

The next day, Elías González and the surveyors squared off the grant and established its corners. They started at the northern marker and estimated 200 cordlengths to the east and 200 cordlengths to the west because of the roughness of the country. The northeastern corner was located at "the point of the Copper Range above a waterhole known as el Cancillo" (*a la punta de la Sierra del Cobre sobre un aguaje, conocido por le Cancillo.*) The northwest corner was fixed "at the foot of a red hill, which was discovered in a gap between a rocky outcrop and Sonoita Hill" (*al pie de un cerro colorado que se descubre en un claro que medea entre el peñasco y cerro de Sonoita*). From there, Elías González and the surveyors estimated a point "400 cordlengths to the south along the Sierra de la Plomosa to a point beyond the pass of San Antonio near two small hills which form the western corner of the common lands of this Presidio" (*al sur por la Sierra de la Plomosa cuatrocientos cordelas hasta pasado al puerto de San Antonio sobre dos cerritos desde que hace esquina para la parte del poniente a los egidos de este presidio*). Finally, the surveying party located the southeastern corner by marking off 200 cordlengths from the southern

boundary fixed the day before. That boundary ended near a place called Jaralito. Bustillo accepted the boundaries and was told to erect boundary markers of lime and stone at the corners.

Elías González then asked Alejo Bedoya and Tomás Gauna to assess the value of the land. They concluded that the three *sitios* with permanent water were worth 60 pesos apieces while the one without permanent water was worth 30 pesos because it "could only be improved through wells" (*solo susceptible del beneficio de noria*). Elías González therefore put the land up for public auction for a minimum of 210 pesos. After 30 days, no other bidders had offered more for the land, so Elías González solicited the testimony of three witnesses, who swore that Bustillo had sufficient means to stock the land. Nonetheless, the *promoter fiscal* (attorney general) of the intendancy of Sonora and Sinaloa examined the case and instructed Elías González to put the land up for public auction three more times.

On January 8, 1822, the first offering was made. Ramón Romero, acting on behalf of himself and the other residents of the *presidio* of Santa Cruz, bid 10 pesos more than the assessed value. That triggered a bidding war with Bustillo that lasted until Romero offered 1,200 pesos for the land. The second and third offerings were held on the ninth and 10th of that month, but no one exceeded Romero's bid. On January 11, Romero paid the 1,200 pesos plus an additional 97 pesos, 6 *reales*, and 5 *granos* in taxes and costs. More than three years later, on May 15, 1825, the Republic of Mexico granted "Don Ramón Romero and other associated residents of the same military post" (*Don Ramón Romero y demás vecinos interesados del propio puesto militar*):

four square leagues of land for the raising of cattle at the place called San Rafael de la Zanja, located within the jurisdiction of the *presidio* of Santa Cruz, granting and adjudicating to them the said land, as a sale and under the conditions prescribed by the laws, for themselves, their children, heirs, and successors, together with all its rights, uses, customs, obligations, timber, woods, pastures, waters, springs, watering places, and other things, thereto belonging, on the positive and understood condition, that they are to settle and occupy said lands, without permitting them to be unoccupied for any length of time; with the express understanding, that if said lands remain unoccupied during one entire year, and

should be denounced by any other person, they shall, after due examination of the matter, be granted to the highest bidder, excepting, of course, as is but just, those cases in which the abandonments are caused by the invasion of hostile Apaches. Don Ramón Romero, and the residents of Santa Cruz, are required to confine themselves within their respective limits, which are to be designated by monuments of stone and lime.

When the Court of Private Land Claims was hearing the case to determine the validity of the grant in the 1880s and 1890s, no other documents from the Mexican period were presented. Nonetheless, John Wasson, U.S. Surveyor General for the territory of Arizona, recorded the testimony of five residents of Santa Cruz in 1880. Those residents were José María Montoya, Concepción Elías, Alejandro Apadaco, Jesús Domínguez, and Javier Domínguez. Together they sketch the portrait of a ranch run according to many of the same principles as a modern Mexican grazing *ejido*. The *parcioneros*, or shareholders, in the land grant utilized the four *sitios*—and, undoubtedly, the surrounding lands—as open range. There was no barbed wire to subdivide the range into individual pastures. The danger of Apache attack forced the *parcioneros* to work closely together. Later, after the San Rafael Valley became a part of the United States in 1854, the *parcioneros* paid taxes to the U.S. government in proportion to the number of stock they grazed on the grant. The testimony of the five witnesses therefore provides a brief but tantalizing glimpse at a way of holding and working land in common with roots that extended back to medieval Spain.

The first witness in the case was Jesús María Montoya, who gave the most complete testimony. His terse but vivid recollections trace San Rafael de la Zanja's history as the old colonial order disintegrated and the northern frontier entered a period even more chaotic than the mid-18th century: Don José María Montoya, a witness introduced by claimants being duly sworn by the Surveyor General testified as follows:

Questions by Claimants' Attorney Lindley.

Ques. 1: What is your name, age, occupation, and place of residence?

Ans: My name is José María Montoya, age 58 years. [I] reside in Santa Cruz, Sonora, and by occupation

am a *ranchero*. I was born and always resided in Santa Cruz.

Ques. 2: Do you know the rancho of San Rafael de la Sanja?

Ans: Yes, Sir, and it is situated north and adjoining the Pueblo of Santa Cruz on the head of the Santa Cruz river.

Ques. 3: Did you know the *parcioneros* mentioned in the grant or many of them?

Ans: I know some of them but not all and the list of the *parcioneros* has been lost or destroyed. I think there were some 20 or 30 *parcioneros*.

Ques. 4: What part of the purchase money did each of the *parcioneros* pay to the Mexican government?

Ans: I do not know the portion each paid. My father and two grandfathers were *parcioneros*. I know that all the *parcioneros* paid something but I do not know how much.

Ques. 5: State what you know or recollect about the first occupation of the grant by the grantees, and how much stock, if any, were placed upon the ranch by them?

Ans: I know that the ranch was well occupied by the grantees in 1834 with much stock, as many as several thousand cattle and many horses, corrals, houses, and residents. And this stock was driven off by the Apaches, and by the year 1843 all stock was driven away or killed by them. And I also know that many of the *rancheros* were killed, as many as 30 having been killed at one time, at a place called "La Boca de la Noria" near the southern boundary of the rancho.

Ques. 6: How many buildings are now on the rancho, which were placed there by the grantees and their heirs?

Ans: There are now six buildings occupied and habitable and the ruins of many others, all of which were built by the grantees and their heirs.

Ques. 7: About what was the number of hostile Indians ranging along the frontier in the region of country within the jurisdiction of Santa Cruz from 1834 to 1843?

Ans: I cannot say just how many but from time to time Santa Cruz was attacked by from 50 to several hundred and that the number ranging through that region was from 300 to 6,000.

Ques. 8: Was it ever safe for families to establish themselves and reside upon said San Rafael rancho after 1834 on account of Indian invasions?

Ans: It was not safe at any time after 1834.

Ques. 9: Were the massacres of San Rafael, Babacómari, Terrenate, Santa Bárbara, San Lázaro,

prospera, and Patagonia part of the same general Indian war in that section of country?

Ans: They were.

Ques. 10: Do you know where the place called "La Noria" is particularly situated in the grant?

Ans: It is situated on the southern part of the rancho, near the international boundary line, a little more than a mile west of the Santa Cruz River.

Ques. 11: Do you know the place described as the centre of said rancho and called "la Sanja" and, if so, where is it?

Ans: It is on the river in the center of the valley, and in the field of Slaven and Fleming, and the point at which the water first rises in the river.

Ques. 12: Do you know the centre monument on the south line of the grant?

Ans: I do know it and it is at La Boca, Cañada del Potrero, and I have known it always and it has always been recognized as such, and I also know the corner monuments.

Ques. 13: How much of the distance over the rancho from the centre to the south line is there running water and over how much of it is there no running water?

Ans: The water rises and sinks at different places and more than half the distance in the aggregate there is no running water.

Questions by the Surveyor General.

Ques. 1: Do you know whether there are mines or minerals on the said Rancho of San Rafael de la Sanja?

Ans: There are mines and minerals in the western part of the rancho, I think, including the Patagonia, Duquesne, Harshaw, Washington and San Antonio.

José Montoya

Sworn and subscribed to before me this 20th day of April, 1880, as witness my hand and seal of office.

John Wasson

U.S. Surveyor General

The second witness was Concepción Elías, a 49-year-old native of Santa Cruz who had always lived there "except when the Apaches had possession and during the two years when I was a prisoner with the Apaches." When asked about the parcioneros, Elías said there were "some 18 altogether." He recalled the grant being occupied in 1833 "with a great many head of stock, possibly 5,000 head of cattle and many horses. All the cattle were driven off by the Indians

and many of the people were killed." He also remembered a large corral located at La Noria. Elías was taken prisoner in 1845 but did not know how many Apaches "ranged over the country." When asked whether it was "safe for families to establish themselves upon the rancho after 1834," he replied, "They could not so establish themselves after that year." In response to the Surveyor General's question about mines, Elías answered that mines were "situated at Durazno, Patagonia, Washington Camp, and San Antonio."

Alejandro Apadaco was the third witness. He was a 47-year-old farmer and lived in Santa Cruz. The lawyer of the claimants asked him "if the heirs of the parcioneros not named in the grant and Romero and his heirs have united in the general administration of the property." He said, "They have acted in harmony in the administration of said property." He also said that the parcioneros had paid \$1,194.54 in taxes on the ranch to the U.S. government. Apadaco's father was one of the original parcioneros, as was Ignacio Telles, who was "said to be the only surviving one, who is now about 90 years of age." Apadaco also replied that there were mines at "Patagonia, Durazno, Washington, and San Antonio." When asked how many leagues of the grant contained running water, he answered, "I cannot say. Perhaps the half more or less."

The fourth witness was Jesús Domínguez, who was a 41-year-old farmer born and raised in Santa Cruz. Domínguez was an heir of the grant because his grandfather was one of the original *parcioneros*. His father and one of his brothers were killed the same day by the Apaches and another brother was wounded by an arrow. When asked if he remembered the "massacre at the said San Rafael ranch near the mouth of la Noria," Domínguez replied that he did not remember the year but did recall the "bodies brought to the Pueblo." He said, "Father Aldie was among the murdered in this massacre."

The final witness was Javier Domínguez, 47 years old, a lifetime resident of Santa Cruz, and a farmer. He was an heir because his grandfather had been one of the original parcioneros. When asked how far back in time he could remember the grant, he answered, "I can remember since the year 1843, and in that year there were 2,000 head of animals on it, but at that time they had diminished very much because of the hostilities of the Indians." He also remembered the massacre, which took place in 1843. The attorney for the claimant then asked, "In the general management of the San Rafael ranch, had each of the parcioneros

the right to place stock on the ranch in common with the other *parcioneros*, and if so, did they so place their stock?"

"They did have such right and did so place them," Domínguez replied.

"Was there, from your earliest recollection, a harmonious use of said ranch to common by all the *parcioneros* in the manner above stated?" Domínguez was asked.

"They did so occupy it from my earliest recollection," he answered, "and there was no differences among them. They had to live like a family of brothers, among other reasons because the Apaches were so hostile. They paid their taxes on the ranch in proportion to the amount of stock each had upon said rancho."

ENVIRONMENTAL IMPACT UPON THE STUDY AREA

We will probably never know in any detail how intensively Spaniards, Mexicans, O'odham, and Apaches exploited the study area during the colonial and Mexican periods. The documentary record may contain additional information, but most of it is probably impressionistic, consisting of scattered observations but not the kind of systematic, quantitative recording encountered in more settled areas. Nonetheless, a few tentative conclusions can be drawn. First of all, Spanish and Mexican stockraisers in all likelihood utilized at least the southern reaches of the study area during three periods: the 1670s to the late 1680s, when the O'odham of Mototicachi rebelled; the 1720s until the early 1760s, when Apache attacks grew too intense; and the late 1780s until the 1840s, when the massacre at La Noria drove the

parcioneros of San Rafael de la Zanja back to the confines of Santa Cruz presidio. The number of stock pastured in the area cannot be determined for the earlier areas. Between 1825 and 1843, however, the *parcioneros* ran from 2,000 to 5,000 head of cattle and numerous horses on their grant.

There are bits of evidence that they may have made several improvements on the grant, including the construction of canals and the digging of wells. The name of the grant itself—San Rafael de la Zanja—is an interesting one. The term *zanja* can mean "gully" in Spanish, but it can also mean "ditch." Did the term refer to a natural arroyo carved by the headwaters of the Santa Cruz River or to an irrigation or interception canal excavated by settlers? Or was the gully the unintentional result of human impact upon the upper Santa Cruz watershed? It may be impossible to answer that question, but it presents a number of intriguing possibilities for further research.

It is also clear that Spanish and Mexican prospectors were familiar with the study area, particularly the highly mineralized Patagonia Mountains. Whether or not any mines actually operated in those mountains remains to be determined. Nevertheless, the promise was there.

The study area also undoubtedly felt sporadic pressure from the Apaches, who passed through it to raid, to escape from pursuers, and to exploit the wild plant and animal resources of the grasslands, the oak woodlands, and the pine forests of the Huachucas. Unfortunately, frontier areas, by the very tenuousness of their occupation, do not lend themselves to systematic written observation. Once again, historical archaeology may hold whatever key there is to understanding the study area better between 1700 and the mid-19th century.

Chapter 4

Chapter 4

Early Descriptions of the San Rafael Valley

Although Spaniards wrote the earliest descriptions of the long empty stretches of grassland and desert of the area that is now southern Arizona and northern Sonora, the most detailed observations were penned by American travelers on their way to California during the 1840s and 1850s, newcomers to the borderlands. Travel by Americans over what became known as the southern route to California began during the Mexican War when Lieutenant Philip St. George Cooke, commander of the Mormon Battalion, accomplished the task the war department had given him and opened a wagon road to California. What Cooke actually did was to search for and establish for American use an ancient Spanish and Mexican road, a portion of the former *camino real*, which connected presidios and settlements in Chihuahua and Sonora with California ports. After Cooke's journey during the winter of 1846, the route was used by American army troops leaving Mexico for California. During the gold rush, an estimated 9,000 Forty-niners reached California by the southern route. In subsequent years, herds of cattle from Texas and points east traveled over the trail. Members of three international boundary survey parties used this route to establish the Mexican border. The route actually consisted of a series of trails and wagon roads, variously known as the Southern Overland Trail, the Gila Trail, Cooke's Wagon Road, or the California Road.

The trails and roads that made up the southern route crossed the largely uninhabited northern portion of the Mexican states of Chihuahua and Sonora. Much of the area through which the road passed was incorporated into the United States after the 1853 Gadsden Purchase, although some 30 to 40 miles of the road that went by the town of Santa Cruz remained part of Sonora, Mexico. For most emigrant parties, finding settlements where provisions could be purchased became a major goal. Since Santa Cruz was one of the few inhabited towns between El Paso and Tucson, it became an important destination on the trail, and the presence of this last bastion against Apache attacks brought many travelers through the adjacent San Rafael Valley.

The peak of travel and the majority of descriptions date from the California gold rush. However, dur-

ing the 1850s, 1860s, and 1870s, mining, military activity, and travel between Tucson and Mexico continued to bring visitors into the study area. After the establishment of the San Antonio and San Diego semi-monthly stage line in 1857 and the subsequent semi-weekly Butterfield Overland stage line in August 1858, the majority of east-west traffic moved away from the road through Santa Cruz to a more northerly route entirely within the southern part of Arizona Territory, a road that roughly paralleled present Interstate 10. Although east-west travel through the study area diminished after the late 1850s, north-south travel between Tucson and locations in Mexico beyond Santa Cruz became more common. Despite this shift in travel patterns, all of the roads in use during the 1840s remained in use and travel over newer roads, notably the road connecting the Sonoita Creek area with the Mowry Mine and the town of Santa Cruz, increased considerably.

Researchers are fortunate that several members of military expeditions, many Forty-niners, and a number of subsequent travelers kept diaries of their westward journeys. Although the diaries reflect a great variation in individual powers of observation and levels of detail and accuracy, they provide descriptions of the study area during the end of the Mexican period and the early Territorial period that can be used to establish a generalized picture of the study area prior to the period of most intensive human use. They provide a baseline from which change can be measured. The descriptions are useful for establishing the number and route of trails and wagon roads through the Huachuca and Patagonia mountains, the Canelo Hills, and the San Rafael Valley. The diaries offer insights into the extent and nature of settlement, mining development, and ranching during the Mexican and Territorial periods. They give indications of vegetation types and condition and describe the quantity and type of wildlife in the study area.

THE MILITARY EXPEDITIONS AND THE FORTY-NINERS

For the purposes of this report, the descriptions from diaries written between 1848 and 1850 are summarized below according to the type of information

they contain concerning the extent and nature of human impacts between the 1840s and the early 1870s.

Descriptions of the Route

The majority of California-bound emigrants followed the route known as Cooke's Wagon Road as far as the San Pedro River. When emigrants on this road arrived at the San Pedro River, they had traveled west across present southern New Mexico from the Rio Grande to the Mimbres River to the Animas Valley, through Guadalupe Pass and on to the springs at the deserted San Bernardino ranch, 18 miles west of present Douglas, Arizona. After another day's journey they reached the San Pedro where they had a choice between continuing on Cooke's route to Tucson that followed the San Pedro downstream or taking a longer but more commonly used wagon road west to Santa Cruz, Sonora. Most emigrants chose to take the Santa Cruz road, which had been pioneered for Americans by Major Lawrence P. Graham in October 1848. From Santa Cruz they followed the Santa Cruz River downstream to Tucson.

First Lieutenant Cave Johnson Coutts, an officer who served under the inebriated Major Graham during the difficult march from Mexico to Los Angeles, wrote the first detailed account of the Santa Cruz portion of the route, which soon became known as "Major Graham's road." Coutts also produced a set of maps of the journey. On reaching the San Pedro River, Graham followed it to Terrenate and then continued on some eight miles to the ruins of a "deserted ranch." From there the party attempted to ascend some dry branches of a stream until the wagons were stopped by the steep ascent of an "old he mountain." The troopers retreated back to the ruins of the ranch. At this point Graham wisely sent a messenger to Santa Cruz to obtain guides, who arrived the following morning and easily led the Americans over the currently used wagon road to Santa Cruz (Dobyns 1961: 55-62).

The circuitous route of this wagon road, which subsequently became the main road to California, is the subject of some dispute. Some of the confusion results from the fact that the Spanish military moved the presidio of Terrenate several times. The garrison was stationed on the headwaters of the San Pedro from the 1740s until 1776, at which time it was briefly relocated near the Babocómari River and the later American settlement at Fairbank, Arizona. During

the 1780s, the garrison returned to Las Nutrias, a site very close to its original location on the San Pedro, where it remained until its later relocation to Santa Cruz. Larry Christiansen (1990) interpreted Graham's route based on the assumption that the "Terrenate" that appeared on the Coutts map was the site of the presidio near Fairbank. He believed that the road went downstream on the San Pedro to the Babocómari, up that small river, then north and east back toward the San Pedro, then north to a pass between the Mustang and Whetstone mountains, close to the boundary of present Pima County, and continued south crossing the Canelo Hills midway in the range at their lowest point, and from the pass to the headwaters of the Santa Cruz River downstream to the town of Santa Cruz. This was the old Spanish wagon road that had been used since at least the 1820s to carry supplies between Santa Cruz and the Babocómari Ranch (Christiansen 1990:4).

However, it is more likely that Graham remained on the Mexican side of the present international boundary, following a route more directly west from the point at which the troop crossed the San Pedro near two of the sites of the presidio of Terrenate (the original site and the 1780s site at Las Nutrias) and then followed a route which became the wagon road between Santa Cruz and Cananea. This road is on a natural grade (Bercich 1994) and would logically have been developed as a route for wagons. The tracks left by Graham's wagons, which passed over the road during heavy October rains, were deeply embedded in the mud. For almost a year, the ruts clearly marked "Graham's road" for future travelers and the more level route through Santa Cruz was adopted by the majority of California emigrants.

A shorter, more direct route, mainly used by pack trains, connected the San Pedro with Santa Cruz. This route eliminated the northerly curve paralleling the railroad tracks through the now abandoned station at La Bota and shortened the journey by several miles. On approaching the present international boundary north of the town of Santa Cruz, travelers were presented with still another choice. Here they could take a short-cut across the Patagonia/San Antonio Mountains, three miles north of Santa Cruz, which saved about 10 miles. However, most emigrants chose to enter the town and then follow the river to Tucson (Fig. 2).

Within a few months of Graham's trip, Forty-niners began to use his "road." In early May 1849, when John E. Durivage, a correspondent for the New Or-

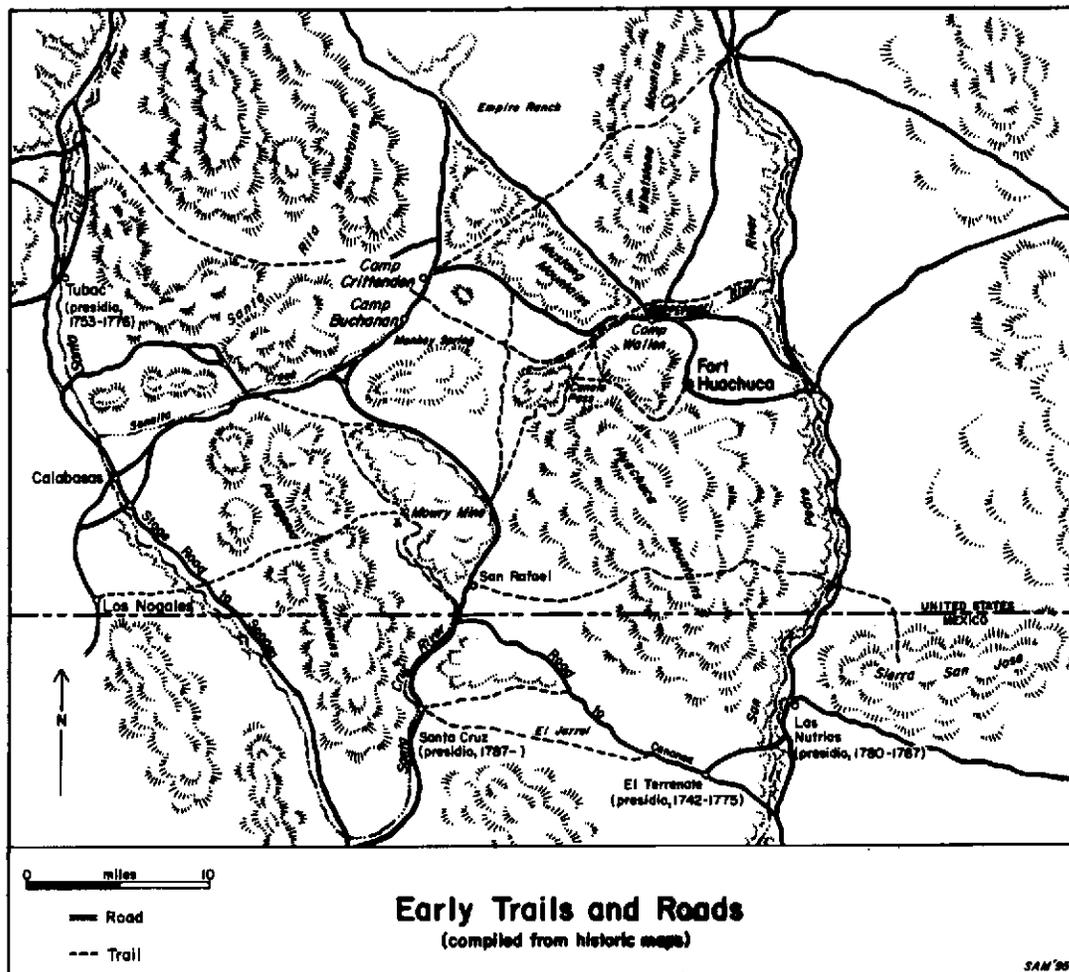


Figure 2

leans *Daily Picayune*, went to Santa Cruz, Major Graham's tracks were still fresh. Durivage's party followed Graham's mistaken first attempt to find a route over the steep slopes until they reached the place where "it was evident that Major Graham had turned back" (Bieber 1937:206). His party also turned back, subsequently found the wagon road, and reached Santa Cruz with ease.

On August 12, after a heavy rain, George W. B. Evans and the Ohio Company took the shorter route to Santa Cruz. They departed from Colonel Cooke's trail and made what Evans described as a "very steep" ascent up a rocky road into unnamed mountains. On the descent, his party had gone only two miles when they were forced to camp near the highest peak of the mountains. Departing from this camp in the morning, they reached Santa Cruz by 3:00 p.m., stopping to repair a broken wheel en route. After reaching Santa Cruz by the shorter, steeper trail, several members of the Ohio Company abandoned their wagons and continued to California as a pack train (Dumke 1945:145-46).

In early September, John Robert Forsyth of the Peoria Company took the shorter route to Santa Cruz. He noted that the road began at "three deserted Ranches some of the walls still in a good state of preservation & at one of them large piles of melted metal resembling lead or silver" [Terrenate or Las Nutrias]. The descent of the road into the southern portion of the San Rafael Valley passed through a canyon where "there was not six Inches more room than was required by the Wagons." He noted that the rocks on this portion of the road were 300 to 400 feet perpendicular and overhung the valley below. The road continued through a "fine rich valley" which had the appearance of an "English Landscape" (Forsyth ms:69-70). Charles Pancoast, who traveled with the same company, recalled a "steep descent of about fifty feet where we had to lower our wagons with ropes" (Hannum 1930:233). Since Pancoast wrote his memoir many years after his journey, his recollections are unreliable. However, it is possible that the descent required braking with ropes. Although these two diarists do not state which trail they had taken, it is

likely from the difficulty they describe that they took the shorter pack trail.

By late September, when William Hunter traveled over the wagon road, frequent use and small improvements in the roadbed had converted it into what he considered to be an excellent level road "with abundant wood, water, and grass." Near the summit of "the pass of Santa Cruz," Hunter stopped at "one of the finest and purest springs I ever saw," located by the side of the road, "walled in by huge perpendicular rocks, nearly in a square, its breadth about 12 feet and some 3 to 5 feet deep its waters so limpid that the objects at its bottom seem scarcely beneath its surface" (Hunter ms:112).

Also traveling in late September, H.M.T. Powell of the Illinois Company used Cooke's journal and several maps to determine the route. A meticulous diarist and record keeper, Powell took frequent compass readings, made unusually explicit observations and carefully noted his frequent corrections of Colonel Cooke's published account of the route. Powell's party crossed the San Pedro and continued "due west up a narrow and beautiful valley," which "gave way to little side vales and gentle slopes; at some spots at the South side they rise to over 100 feet." On this portion of their journey, they passed an extensive old rancho (Terrenate or Las Nutrias), which he estimated had been deserted for 20 years. On leaving the rancho they followed an old *acequia* "for Miles." Powell's party experienced a severe storm accompanied by hail and some flooding while crossing the mountain range that appeared on his map as the Santa Cruz Mountains. Like many other Forty-niners, Powell could not understand why his wagon train had decided to go through Santa Cruz. Both of the routes through Santa Cruz, either pack trail or wagon road, were longer in mileage and time than Colonel Cooke's road directly down the San Pedro. Although the direct pack trail to Santa Cruz was obstructed by mountains, Powell found it annoying that his party selected the "circuitous route" that took them north before turning west toward their destination.

It apparently took approximately three times longer to travel from the San Pedro to Santa Cruz by the wagon road than it took to go by way of the pack trail. In August, George Evan's party reached Santa Cruz by the pack trail in approximately one day despite recent heavy rains. It took Powell's party with loaded wagons three full days to reach Santa Cruz on the more level wagon road (Watson 1931:130-32).

Even as late as December 1849, travelers still confused the two routes from the San Pedro to Santa

Cruz with Cooke's wagon road. Judge Benjamin Hayes' party intended to take Cooke's road to Tucson but found themselves on a different road which they followed because "it bore more indications of wagon traffic." They unintentionally traveled what they estimated to be an extra 30 miles to Santa Cruz.

After reaching Santa Cruz, travelers again had a choice of routes, "one over the mountains for packs, the other round by the river, for wagons" (Hayes 1929:42-43). Most of the diarists described following the Santa Cruz on its southerly loop past the deserted ranches of San Lázaro and Santa Bárbara. This was by far the easiest route and was used by wagon trains. Only groups that traveled without wagons chose the shorter route across the Patagonia Mountains that connected with the Santa Cruz River north of present Nogales, Arizona.

Descriptions of the Town of Santa Cruz

One of the few inhabited towns on the route where provisions could be purchased, Santa Cruz became an important destination for Forty-niners. Although recollections focus on the supplies that could be obtained in the town, descriptions of Santa Cruz and its inhabitants provide us with information on the extent and type of settlement in the valley during the late Mexican period. The discussions of Santa Cruz also reveal a persistent set of American preconceptions and prejudices concerning Mexico and Mexican citizens.

During his 1848 trip, Lieutenant Coutts had described Santa Cruz as "an old and compact ranche," garrisoned by a company of Mexican state troopers. The American dragoons were happy to be able to trade sugar for hominy corn and to purchase pigs and chickens. After four days of rest, the troopers continued their march to Tucson, following the Santa Cruz, where abandoned houses were "thick" along the river banks for the first 10 miles (Dobyns 1961:53-56). The majority of Forty-niner descriptions are similar to that of Coutts. Many of the emigrants, who stopped in Santa Cruz briefly, traded for some food and left quickly, expressed considerable contempt for the town, scorning it as a nearly deserted adobe village, old and dilapidated, whose inhabitants were extremely impoverished (Hannum, Evans, Durivage).

However, some diarists were more sympathetic and went into greater detail. Judge Benjamin Hayes (1929:42) noted that the town was walled, had a plaza, and a large church, the facade of which had been

defaced. Several diarists commented on the presence of several grist mills (Martin 1926:143-44), one of which had been constructed by a nameless Yankee who had moved on to California (Clarke 1852:81-82). John Forsyth of the Peoria Company penned one of the more detailed descriptions of the town. The church, "a large old Gothic building going to decay," was the largest structure in town, while the rest of the buildings were small one story adobes. "The town at a distance presented the appearance of small patches of wheat nearly ripe as each house top was covered with a good crop of grass now getting rather yellow, but still it was better than on the surrounding Commons as the goats, sheep, and Pig could not conveniently reach it. . ." Forsyth listed the shops and "manufactories" of Santa Cruz, which included among others a saddlery, a blacksmith, three or four shoemakers, and several stores (Forsyth ms:70-73) (See Appendix 5.1.).

All of the Forty-niner diarists recognized that continual Apache attacks were responsible for the dilapidated and partially abandoned appearance of Santa Cruz. Many remarked that the town was in a state of continual siege, noting that all of the ranches outside the immediate area had been abandoned. The garrison of Mexican soldiers at Santa Cruz was in a "state of helplessness" when Graham's dragoons passed through in 1848 because almost all of their horses and clothing had been carried off by a party of Apaches (Dobyns 1961:53-56). In late July 1849, the Little Rock Company arrived in Santa Cruz while the townspeople were conducting a solemn procession, led by priests, in honor of children who had been stolen by Apaches (Etter 1986:65). In late September, when H.M.T. Powell's party arrived, 150 soldiers were stationed in the town, garrisoned in two churches. Powell reported that a few months prior to his visit, the Apaches had stolen all the livestock belonging to the citizens of Santa Cruz, except for a few sheep and goats, including "all mules, horses and beef cattle, amounting to 3,700 [head]" (Watson 1931:136).

The number of soldiers garrisoned at Santa Cruz varied, depending on the frequency of expeditions into the surrounding area. Several Forty-niners thought that the soldiers were garrisoned in an abandoned church; others noted that they had their own barracks and even considered it to be a "fort" (Hayes 1929:42). John Forsyth examined the garrison and the soldiers' equipment with some care. At the time of his visit, the town had about 30 soldiers to protect it,

"rather Suspicious, Seedy looking fellows but their muskets were bright but from their antiquated appearance I should think rather useless in the days of revolvers etc. The ones I examined bears the date of 1617 Tower so of course they are old English pieces" (Forsyth ms:70). The soldiers received a daily allowance of corn meal, which appeared to have been carried a long distance packed in skins. Forsyth assumed this to have been their only ration. When Benjamin Hayes came through Santa Cruz in December it had a garrison of 40 soldiers, who had at their disposal one small cannon and six carbines. A sentinel, stationed on one of the roofs, provided some protection from the approach of Apaches (Hayes 1929:42).

Forty-niner estimates of the town's population varied from 300 to 1,000 inhabitants. Indeed, during the years covered by the American observations, Santa Cruz's population may have fluctuated considerably according to the current Apache situation and the military protection provided by the Mexican government. Impressions of the condition and status of the townspeople were equally divergent. Some Forty-niners considered them "peons" (Martin 1926:143-44) or "miserable looking Mexicans, commonly termed Greasers," (Hannum 1930:233) while John Forsyth (ms:70) thought the people in Santa Cruz were better dressed than in any other Mexican town through which he had passed. H.M.T. Powell considered the townspeople to "look better than those I saw in New Mexico. . . with a brighter and more intelligent look" (Watson 1931:136). Most Forty-niners, however, agreed that the people of Santa Cruz looked unhealthy and noted that they were subject to illness, "chiefly fever and ague" (Hayes 1929:43; Watson 1931:136). In December of 1849, Benjamin Hayes noted that the residents included one American, a "singular character" whom he thought was named Dr. Lemon (Hayes 1929:43).

Despite frequent Apache attacks, fairly extensive agriculture was still practiced in the immediate vicinity of the town, with corn, wheat, chile, garden vegetables, and fruit trees comprising the majority of cultivated crops. John Forsyth estimated that 500 to 600 acres were under cultivation. The fields were enclosed by what most Forty-niners considered to be an inadequate brush fence. However, one set of fields near the town had an ingenious fence which impressed several diarists. It was made from a "fine row of large old cottonwood trees planted closely round and interwoven with brush" (Forsyth ms:70). In order to create the fence, the trees had been inten-

tionally planted equidistant from the next, and were wattled with brush and tree limbs. William Hunter described the same fence, but although he considered it substantial and beautiful, thought that it was not durable and would last only "till the twigs began to decay" (Hunter ms:114).

It was obvious that the extent of agriculture and stock raising had been much greater at a previous period. Both before arriving in the town and after leaving it, Forty-niners commented on the number of deserted ranches and farms throughout the valley. Adobe ruins dotted the banks of the Santa Cruz, from its headwaters north of the present international boundary, along the bend of the river in present Sonora, almost as far as the abandoned town of Calabasas. According to Lorenzo Aldrich, "the whole valley was formerly occupied, but in consequence of the hostilities and incursions of the Indians, had been deserted" (Aldrich 1851:29). John Forsyth stated that "complete desolation" ruled in the valley, with deserted, roofless "rancherías" every few hundred yards (Forsyth ms:70). The Forty-niners who passed through the valley during the warm months were able to benefit from the fruit in the abandoned orchards and many camped in or near the rancho ruins. Downstream from Santa Cruz the Cox party passed a deserted ranch (San Lázaro) where they feasted on an "exceptional abundance of peaches of the finest kind, and other fruits including apples, pears, quinces and pomegranates" (Martin 1926:143-44).

The extent of development and the architectural quality of the structures at two particular ranches downstream from Santa Cruz impressed the Americans. Most likely these were the abandoned ranches at San Lázaro and Santa Bárbara. William Hunter considered the largest of the deserted ranchos (San Lázaro) to be "opulent, with porticoes, baths, cisterns, etc." The proprietor, he noted, was now living in Santa Cruz, "having been driven from his fine residence by incessant attacks by the Apache, who drove off in one night over 1,000 head of horses, mules and cattle" (Hunter ms:114). H.M.T. Powell was similarly impressed with this elaborate ranch, which had a tower with gun holes, a lime kiln, a sugar mill, cemented cisterns, extensive orchards, and "a corral which could have held 1,000 head of cattle infinitely better than [the corral at the abandoned rancho of] San Bernardino" (Watson 1931:136). On the second day out of Santa Cruz, John Forsyth noted the ruins of a large deserted "smelting house," where lots of lead and silver "dross" lay about (Forsyth ms:71).

The major concern of most Forty-niners in Santa Cruz was the purchase of provisions, which they were able to do to a limited extent, depending on the season and the availability of desired goods. Flour and meat were available on occasion, while vegetables and fruit were abundant during the summer months. Members of Clarke's party purchased flour, pinole, and fresh meat which they jerked on the road (Clarke 1852:81-82). C.C. Cox's party purchased vegetables, eggs, and chickens (Martin 1926:143-44). Mrs. Louisiana Strentzel bought peaches, apples, quince, pomegranates, tender green corn, onions, and coarse unbolted flour. However, she was unable to purchase meat of any kind (Strentzel 1890:255). H.M.T. Powell's party, arriving later in the year, could not obtain flour or sugar, and found that beans and peas were scarce, although quinces, melons, and pumpkins were plentiful (Watson 1931:136).

In July, the members of the Little Rock Company employed the local Santa Cruz women to wash their clothes, paying for this service with salt. A member of this party, H. J. Thibault, noted that salt was in such short supply in Santa Cruz that some residents were in a state of physical desperation for it and would lick it from any source (Etter 1986:65).

Several Forty-niners had brought along manufactured items for sale along the way. Some engaged in a lively barter with the residents of Santa Cruz. On August 30, 1849, when William Beeching passed through the town, he found several women from New York selling dry goods from their large spring wagon to the local townspeople (Beeching ms). Beeching may have been in Santa Cruz the same day as Mrs. Louisiana Strentzel, whose letters from California casually mention having sold cloth to the delight of the women of Santa Cruz. "The articles that traded best were calicoes and white domestic," Strentzel noted. Forsyth's party sold needles, thread, and handkerchiefs to the inhabitants (Forsyth ms:71-72).

Two emigrant companies reported disagreements with government officials at Santa Cruz. In July 1849, a muleback party of Texans refused to surrender 25 head of branded Mexican cattle that they had recovered from Apaches to the alcalde of Santa Cruz. After a prolonged dispute, during which the rowdy Texans insulted the alcalde, the priest, and the citizens of the town, the few remaining animals that had not been slaughtered by the Texans were turned into the public corral (Harris 1963:75-77). In August, an anonymous Forty-niner diarist described an attempt by Sonoran officials to levy a tax of \$40.00 on each of the wagons in his train, an attempt that was success-

fully resisted by the company's captain (Anonymous [Casper Ricks] ms:30).

Descriptions of the San Rafael Valley

After passing over long stretches of less fertile grassland in present New Mexico and eastern Arizona, almost all of the Forty-niner diarists were impressed with the beauty and fertility of the San Rafael Valley and with the abundance of wood in the surrounding mountains. They were equally delighted to be traveling along a river. Many, like William Beeching, considered the San Rafael to be the most beautiful valley they had ever seen (Beeching ms) and the land in the valley exceedingly fertile (Bieber 1937:206).

John Forsyth admired the level quality of the valley. "For miles in some places it is as smooth as if rolled & the Grama Grass & wild oats form a magnificent meadow the best natural meadow I ever saw & the stream is fringed with large cotton wood. . ." (Forsyth ms:69-70). The grass remained of an excellent quality until well beyond Santa Cruz, only becoming thinner and less vigorous near San Lázaro. Although sunflowers were observed occasionally in the San Rafael Valley—some up to 12 feet tall (Watson 1931:137)—beyond Santa Cruz, where the soils became poorer, travelers first encountered large stands of sunflowers, some 15 to 18 feet high (Forsyth ms:69-70).

Descriptions of the portion of the Santa Cruz River in the San Rafael Valley vary according to the season and the quantity of recent rainfall. While it was still dry in May 1849, John Durivage described the Santa Cruz as an "arroyo full of springs" (Bieber 1937:206). A different view of the river was presented by Robert Brownlee, who crossed southern New Mexico and Arizona during July and early August. Brownlee's Little Rock Company had experienced great difficulty obtaining sufficient water for their livestock, more than 400 head of oxen and saddle horses. However, once they were on the Santa Cruz they found abundant water; even in the stretches where the flow sank into the sand, they were able to dig and find water of the very best quality" (Etter 1986:65). After heavy rains William Beeching's party camped eight miles north of the town, "close by a fancy ranch on the stream." Continuing down the Santa Cruz, they crossed the river 27 times in one day (Beeching ms). On September 27, 1849, William Hunter's party camped above Santa Cruz on the banks of the river, at a location where it was 12 to 15 feet wide and two

to three feet deep (Hunter ms). Many Forty-niners noted the presence of mica shimmering in the sand, which some of the gold seekers mistook for gold and attempted to wash out (Durivage; Evans; Watson). Most of the diarists expressed admiration for the cottonwoods which grew along the Santa Cruz, "in a string and remarkably tall" (Ricks). Exceptionally tall, abundant, and close together, the "fine towering cottonwoods mark the course of this river" (Dumke 1945:145-46).

Forty-niners also praised the size and abundance of the trees in the mountains surrounding the valley. The Canelo Hills were covered with timber of a "much better growth" than George Evans had previously observed, including several kinds of oak, gray ash, walnut, and willow. In the Canelo Hills, H.M.T. Powell noted that timber consisted of large mesquites, black walnuts, with only a few sycamores, except in the pass. "One oak we passed near the road spread its branches over 30 paces." Beyond Santa Cruz, Powell's party passed through a forest of mesquites of a larger growth than any he had seen before. "Some of the trees (for they are now trees instead of bushes) were two feet through" (Watson 1931:137-38). In late September, William Hunter described bushels of fallen fruits under the black walnut trees on the pass. In the San Rafael Valley, Hunter observed that oak groves grew "in beautiful clusters and these are evenly and regularly arranged as a well set orchard" (Hunter ms:114)

Of all the Forty-niners, H.M.T. Powell penned by far the best description of the vegetation and wildlife in the San Rafael Valley. Despite a severe storm, Powell found the climate delightful and the valley beautiful. "The trees in these valleys are ash, oak (a kind of Black Jack and Post, but all the oaks different in some respects from ours), sycamore, walnut, Cottonwood and some little cedars; Cottonwoods very large and some of the walnuts over 2 feet through. The soil is excellent, and fit for any kind of culture. I have no doubt that sugar, cotton and tobacco might be raised here with little trouble. The appearance of the country is beautiful. Gentle hills and dales. Trees scattered around singly and in clumps give it a park-like appearance. The grama and other grasses grow very luxuriantly; the grama being the most abundant. . . . At a distance, in all directions, rising above these undulating hills, we see the tall peaks of the Sierra peering over their tops and giving a beautiful finish to the picture. . ." Within five miles of the town (10 degrees East of South according to Powell's compass

reading) the wagon train began to follow the Santa Cruz River. On the west bank of the stream were "a thousand little swells and undulations; the timber growing sometimes in clumps, at places in the indentations and little ravines, at others over the tops like a comb or crest. The East bank is an escarpment and looks like filled works, or a fortification. The soil of the valley is rich and the grasses (grama and others) grow here luxuriantly" (Watson 1931:133).

Wildlife was abundant and included deer, antelope, bear, coyotes, and wolves (Martin; Watson; Clarke; Hunter). In May, members of Asa Clarke's party pursued a grizzly on the west side of the Santa Cruz in the San Rafael Valley. The hunters only succeeded in wounding the bear, whose blood they unsuccessfully tracked for some miles (Clarke 1852:81-82). Hunters with H.M.T. Powell's party shot antelope, deer, and wild horses in the valley and provided five mule loads of wild cattle meat for members of their wagon train (Watson 1931:134). Although somewhat unreliable, the reminiscences of Charles Pancoast mention lakes beyond the town of Santa Cruz, which were "the resort of numerous Ducks, which the Indians were shooting with Arrows" (Hannum 1930:233).

The collective picture of the San Rafael Valley that emerges from the Forty-niner descriptions is of a valley with luxuriant grass, abundant timber, rich bottom soils, and adequate water for settlements. Cottonwoods and oaks were of exceptional size and the valley had a park-like appearance with distinct groves of oaks scattered throughout the plain. Wildlife was abundant. Despite the valley's natural bounty, during the previous two decades the area had experienced a decline in settlement, with abandonment of most of the ranches and farms, as a result of Apache incursions. Forty-niners traveled through the area during this period following a sharp decline in population. The decrease in land use may have given the valley a temporary appearance of unusual fertility and abundance of resources. However, it is more likely that Forty-niners observed the study area in its prime condition.

Although the gold fever of 1849 and 1850 diminished within a few years, the Santa Cruz route continued to be the road of choice for the majority of California-bound travelers until the late 1850s. In 1859, the route through Santa Cruz was given a prominent place in Captain Randolph B. Marcy's *Prairie Traveler, A Guide for Overland Expeditions to California*. It appeared as Route XVI: "El Paso, New

Mexico to Fort Yuma, California via Santa Cruz," an alternate to the shorter more direct route through Mesilla, Cooke's Springs, and Apache Pass. As described in Marcy's guide book, the Santa Cruz itinerary passed farther south through the Mexican towns of Corralitos and Janos, then went through Guadalupe Pass and west to the San Pedro. From there it followed the Santa Cruz River to Tucson. Although it was longer by 112 miles, Marcy noted that this route rewarded the traveler with the possibility of reprovisioning in all the remaining populated towns (Marcy 1859: 294).

THE EARLY BOUNDARY SURVEYS

The Bartlett Survey

A different type of information on the San Rafael Valley and the Huachuca Mountains is recorded in the survey reports written by members of the two boundary commissions, who established the international boundary after the Mexican War and the Gadsden Purchase. The acquisition of new territory from Mexico required two surveys of the international boundary. The initial survey, conducted by Commissioner John Russell Bartlett, began in 1851 following the Treaty of Guadalupe Hidalgo in 1851 but terminated before it was completed with the acquisition of new territory through the Gadsden Purchase. Bartlett wrote a detailed, if somewhat romantic, travel narrative of his trips back and forth through the survey area. The new commissioner, Lieutenant William Emory, who had worked on the initial survey under Bartlett, conducted the survey of the additional territory acquired through the Gadsden Purchase and resurveyed large portions of the original boundary, which had come under question. Under Emory's direction the survey produced a remarkable two volume study of the border region, which included drawings, along with detailed descriptions of land formations, native plants and animals, and water sources. Emory's survey was recognized until 1893, when a resurvey was undertaken to correct any mistakes. The 1893 survey produced another remarkable two volume document, this time with photographs rather than drawings. In both of these government publications, the commentary of surveyors and scientists provides valuable information on landscape, rangeland condition, wildlife, and extent of development within the study area. The drawings and photographs contained in the survey reports

offer graphic evidence of environmental change during the 40-year period between the surveys. Information from Bartlett's travel diary and from the two boundary survey reports is treated separately.

Although both the town of Santa Cruz and the San Rafael Valley were well outside the area that he was to survey, Bartlett visited the area several times in his capacity of boundary commissioner. His first visit in October 1851 was made on a supply excursion from the Santa Rita del Cobre copper mines and the second in July 1852 was a rendezvous with the Mexican commission. Bartlett noted that by the time of the first visit, "the California road" through Santa Cruz was in frequent use by emigrant wagon trains. Despite this heavy traffic on both the pack trail and the wagon road between the San Pedro and Santa Cruz, Bartlett seemed to have a difficult time finding either of them. The survey party became lost and was forced to turn back until several Mexican horsemen found the Americans east of the San Pedro and led them over a "well marked trail" to Santa Cruz. The Mexicans took the survey party by the steeper trail as this more direct route had become the one most frequently used. Bartlett's party found this trail so densely wooded that overhanging limbs obstructed the passage of their large wagons.

On Bartlett's second trip eastbound through Santa Cruz the following year, his wagons were heavily loaded with supplies. Once again, his party experienced difficulty in determining the correct road, the tracks so faint they could no longer be traced. "Our only course, therefore, was to follow the valley which we knew must lead to the San Pedro. ... our course was again due east through a fine valley watered by a small stream; the western tributary or source of the San Pedro" (Bartlett II: 322). For this eastbound trip in 1852, he had selected the longer more circuitous route, first traveling east, then north and east again, passing the fortified deserted rancho described by Forty-niners, and camping 15 miles due east of the mountains beyond Santa Cruz. Bartlett estimated that the distance from Santa Cruz to the ruined village with the fortifications on the tributary to the San Pedro was 29 miles by the longer wagon road and 18 by the more direct but steeper trail (Bartlett II:324).

Bartlett observed that the Santa Cruz River rose in a series of springs about 10 miles north of the town, making the valley ideal for agriculture, particularly for wheat and chile colorado, which, he noted, was reputed to be best in the state of Sonora. On reaching the *puerta*, or pass, through the mountains,

Bartlett was stunned by his first view of the remarkably beautiful broad and open plain before him: "From the elevation where we first saw this valley, the prospect was exceedingly picturesque. Around us grew the maguay, the yucca, and various kinds of cacti, together with small oaks; while beneath us, the valley spread out from six to eight miles in width, and some twelve or fifteen in length. . . covered with the most luxuriant herbage, and thickly studded with live oaks; not like a forest, but rather resembling a cultivated park." (Bartlett I:401) Mr. Pratt, the official artist for the survey party, sketched the scene (Bartlett I:407-08). The following year, when Bartlett traveled eastward over the Santa Cruz road on his return from California, he was again impressed with the beauty of the valley: "The whole country here assumed a new aspect, resembling the hills and valleys of Vermont or New Hampshire, rather than Mexico. An occasional wolf sneaked across our path, or a herd of antelope bounded over the plain, reminding us that we were far from all human habitations" (Bartlett II:322).

Bartlett was impressed with the beauty of the San Rafael scenery, but he was decidedly unimpressed with the town of Santa Cruz and its inhabitants. Although it had been made the official rendezvous point for the Mexican and United States survey parties, Bartlett thought it was a dismal, unhealthy town full of thieves. He related that as one of the nine presidios on the frontier of Sonora, it was a place of former importance. However, most of its population of 1,500 had fled the town in fear of Apaches. Bartlett believed that Santa Cruz had suffered more than any other place on the frontier from the inroads of the Apaches, "it being on the principal route of communication with the interior from the north, as well as with the settlements of the civilized Indians" (Bartlett I:401)

Like the Forty-niners who had traveled the route before him, Bartlett was impressed by the incessant attacks of Apaches on the outpost of Santa Cruz. On the first trip, Bartlett's party returned Inez Gonzales, a young woman captive of the "Copper Mine" Apaches, to her family in Santa Cruz. The whole town celebrated Inez's restoration to her parents. The grateful townspeople told Bartlett that after Inez had been captured in September 1850, the entire town had been temporarily abandoned. However, General Carrasco had raised a brigade for the protection of the frontier and with the regarrisoning of Santa Cruz and other military posts, some of the inhabitants had returned (Bartlett I:401-409). On his second visit in 1852,

Bartlett stated that he thought the town would be abandoned again because of the incessant Apache incursions. Between San Lázaro and Santa Cruz, Bartlett observed many ruined ranchos; the valley "had not a single inhabitant beyond the walls of Santa Cruz" (Bartlett II:318).

The Emory Survey

Two and a half years after Bartlett's visit, Lieutenant William H. Emory began the boundary survey for the territory incorporated by the Gadsden Purchase Treaty of December 30, 1853. Emory's work began on December 4, 1854, and was completed by August 1855. The surveyors set up a series of temporary, mobile astronomical observatories, using a zenith telescope to determine location and moving the telescope with the survey party along the line. One of the temporary observatories was set up on the Santa Cruz River north of the town of Santa Cruz.

Lieutenant N. Michler, in charge of the party which worked eastward from California, conducted the survey through the San Rafael Valley. The survey party erected monuments of two classes along the line. First class monuments were of dressed stone, laid without mortar, while second class monuments contained round undressed stones piled up in simple mounds. The surveyors erected a first class boundary monument north of the town of Santa Cruz (Emory 1856:30-32).

The botanist and geologist who accompanied the party wrote a description of the country through which they passed:

From the head of the "Nutria" (southwest) branch of the San Pedro, up which our road passes, we commence the steep ascent of the mountain ridge lying between the Santa Cruz and the San Pedro valleys. The character of this range is exactly similar to what we have before described as pertaining to all the higher mountains passed over on our route, west of the Sierra Madre. The height of the pass leading to Santa Cruz is not less than 1,000 feet above the respective valleys on either side, being equally steep and rugged on either slope. The same ridge extending toward the south and southwest forms a continuous line of high mountains, lying between the San Pedro and Santa Cruz valleys; the preferable route for crossing is probably that taken by Col. Cooke in 1846. The up-

per route, being the one more commonly followed, strikes the Santa Cruz valley near its head source. The direction of this valley is at first nearly due south, giving the idea that its drainage is on the line of the rivers flowing south to the California Gulf. It is indeed so laid down on most of the maps of this region, but this is manifestly incorrect. About three miles south of the town of Santa Cruz the valley makes a sharp elbow; thence doubling on its former course, it continues north and northwest, being the same valley in which, lower down, are located the towns of Tubac and Tucson; thence leading toward (though probably hardly ever reaching) the Gila River, near the Pimo settlements. (Emory 1856: 18-19).

Dr. C.C. Parry, the medical doctor who accompanied both the Bartlett and Emory survey teams as botanist and geologist for the United States Biological Commission, described the area around Santa Cruz:

The situation of the town of Santa Cruz is highly picturesque, lying embosomed amid lofty wooded mountains. Its soil is fertile, abundantly watered, and susceptible of easy irrigation; its elevation gives it a cool temperature, suited to the production of northern fruits and cereal grains. A cut-off, over the mountain range intervening between the two courses of the river, leads by a distance of 18 miles, to a lower part of the valley, maintaining in the main the same general features, but showing a marked change in the climate. This latter fact becomes still more apparent in our progress downward, as shown by the comparative forwardness of vegetation. Thus a short journey of three days (or 80 miles) from Santa Cruz, between February 27th and March 1st, 1852, showed a difference in the advance of vegetation equal to a full month in time; so that while at Santa Cruz the cotton-wood trees were barely budding, the first day's journey displayed their loose catkins, the second the opening leaf, and the third the full leaf (Emory 1856:19).

In Chapter VI, "Sketch of Territory Acquired By Treaty of December 30, 1853," writing from his camp at Los Nogales, Emory described the major geographical features of the territory within the Gadsden Purchase. He presented the area near the headwa-

ters of the Santa Cruz as one of the most fertile in the new territory. To Emory, the "remains of spacious corrals, and. . . the numerous wild cattle and horses which still are seen in this country" were evidence of the area's "great capacity as a grazing country." Commenting on the area's mineral wealth, he "saw everywhere the remains of mining operations, conducted by the Spaniards, and more recently by the Mexicans. . . There are remains of mines. . . in the San Pedro mountains, between the San Pedro and Santa Cruz rivers, and on the Santa Cruz river a few miles north of the boundary, there are the remains of a mill for crushing gold quartz. . . . Gold had been found in placers in the new territory in small quantities. . . in the hills bordering the Santa Cruz river, between the boundary and the Calabasas ranch. . ." (Emory 1856:94-95).

Emory's notes are accompanied by a series of "views along the line," sketched by John E. Weys. The sketches of monument locations between the Rio Grande and the 11th meridian were made to document boundary markers, "in the event of the Indians removing the monuments erected on the ground" (Emory 1865:96).

The Emory survey demarcated the international boundary until 1893, when conventions between the United States and Mexico provided for a new survey to relocate the existing boundary west of the Rio Grande. Lieutenant Colonel J. W. Barlow of the Corps of Engineers headed the commission for the United States. The survey was accomplished between the early months of 1892 and June 1894. The scientific observations of the survey party were published in an 1899 two volume edition, which included photographic views of each monument along the line. An additional three photos taken at each monument were not included in the published work. Since the photographs from the 1893 survey were made at a later date, they graphically illustrate the landscape alterations that had occurred since the Emory survey and are discussed at the end of this chapter.

The Texas Western Railroad Survey, 1854

In 1854, the Texas Western Railroad undertook a survey for construction of a railroad along the 32nd Parallel. Asa B. Gray, who had been part of the boundary commission, supervised the railroad survey. Gray's party approached the study area from the northeast, where they camped at the ruins of the Babocómari ranch. The surveyors reached the Santa Cruz by "ascending the Rio Babacomeri, thence con-

tinuing westward by a gradual rise over delightful plains to the divide between that and the Sonoita or Clover creek, and along the later, until it loses itself in the porous earth, a mile from the Santa Cruz river." The previous year, Gray had explored the route from Cooke's road into the town of Santa Cruz. The surveyors found the route impracticable for a railway, "besides being partly in Mexico." Gray preferred the route up the Babocómari even though the summit elevation between that river and Sonoita Creek was greater than any they had examined in the mountains to the east (Gray in Bailey 1963: 77-78). Of the selected route, Gray noted "it passes through the most desirable region, with the hills and mountains for forty miles, containing inexhaustible quantities of timber. We noticed tall cedar and oaks of every description; one kind more interesting than the others, being a white oak from twenty to forty feet in the body. Pine and spruce, with superior white ash and walnut, were found, and the most gigantic cottonwoods, particularly on the Sonoita." Gray noted that the atmosphere in this vicinity was pure and healthy with the exception of the town of Santa Cruz, where there were swamps hemmed in by high mountains (Gray in Bailey 1963:78).

THE TEXAS-CALIFORNIA TRAIL DRIVES OF THE 1850s

During the 1850s, a number of Texas trail drives used the road through Santa Cruz to take thousands of head of livestock to California, where cattle and horses could sometimes be sold for profits of up to 100 percent. The first recorded trail drive from Texas to California left Fredericksburg, Texas, in March 1849 with three to four thousand head of horses and mules and numerous herds of cattle. Although the maximum size for efficient trailing was 2,000 head, larger herds being difficult to manage, the majority of drives had several hundred head. The cattle outfits, often made up of herds belonging to several different owners, waited until spring to leave for California, after grass had come up along the trail. The drives, which usually took about six months, normally passed over the Santa Cruz portion of the trail during the summer. Although some drives initiated as far east as Arkansas or Cherokee Territory, the majority of herds were from south Texas and assembled in San Antonio for the drive to California. Cattle drives from more southerly locations in Sonora also traveled the Santa Cruz road to California.

Fewer drives took place in 1849 and 1850, but as word of California's high livestock prices came back to Texas with disappointed prospectors, the number of cattle on the trail steadily increased. The California market for Texas cattle and horses stayed high through 1854, which was probably the high point of cattle importation over the southern route. After the market became glutted and the price dropped to \$6 to \$7 a head, the drives diminished and the Civil War brought them almost entirely to a halt.

At the peak of trail driving in 1854, herders estimated that a minimum of 15,000 to 20,000 head were driven to California prior to the month of August. In December 1854, at the Yuma crossing of the Colorado, drover William Bell was informed that 10,000 head of cattle had already crossed the river in the two previous months (Dillon 1984:25-26). Several diaries and newspaper accounts indicate the frequency of cattle drives over the Santa Cruz portion of the route. In early September 1854, trail herder Michael Erskine described several parties camped near the town of Santa Cruz: "Below Town is Franklin with 250 head cattle. Dunlap with 450. Briants company with a small herd and 11 families" (Haley 1979:77).

Herders still used the same roads described by Forty-niners. When Erskine arrived in Santa Cruz, he noted that the distance from the old ruins on the San Pedro to Santa Cruz was 23 miles (by the shorter route). He also noted the existence of a better road. "The Mexicans tell us there is a good road that turns to the right at San Pedro old ruins which runs around the Mountain leading to Santa Cruze" (Haley 1979:77). The following week, William Bell accompanied another herd over the southern trail, using Cooke's journal as a guide. Although encumbered by wagons, they chose to ascend the steep trail and got stuck for the night with their cattle on one side of the mountain and their wagons on the other.

The 1860s

In 1864, while the Civil War was still impeding the settlement of the young Arizona Territory, J. Ross Browne made a tour through the area with his friend Charles Poston, the newly appointed superintendent of Indian affairs for the reorganized territory. Browne traveled from Magdalena to Santa Cruz by way of the San Lázaro Canyon. At the time of his visit, the ranches at San Lázaro and Santa Bárbara were still deserted and Browne believed that Santa Cruz would

have been deserted as well, if it had not been for the sale of grain to the American operated mines at Mowry and San Antonio. Santa Cruz had continued its decline and no longer had a store, although a German Jew, named Apfel, sold mescal and a few dry goods and trinkets. Occasionally, flour, corn, and pinole could be obtained. Browne, who considered Santa Cruz to be the epitome of "filth, laziness, and inanity," declined to stay in the town and instead camped at the hacienda of San Antonio, seven miles north. The mine at San Antonio was being operated by an American named Yerkes, who occupied the old hacienda. The buildings, although not sumptuous, provided a "nucleus of American civilization," and included houses with fireplaces and some furniture. Yerkes had recently erected a mill, with smelting furnaces and a small engine for reducing ore six miles from the mine itself, in a spur of the Santa Cruz Mountains (Browne 1974:195).

Browne, who traveled over the east-west Santa Cruz road and also over the road northward to Mowry, described the San Rafael Valley in a way very similar to the descriptions written by Forty-niners some 15 years before. Browne admired the magnificent grazing lands of the valley and the abundant supply of fine oak timber on the foothills:

Groves of cotton-wood of gigantic size fringe the stream at intervals of every few miles; the grass is wonderfully luxuriant, covering the valley and hill-sides as far as the eye can reach with a rich gold-colored carpeting; the slopes of the hills and mountains are beautifully adorned with groves of oak, ash, hackberry, and various kinds of shrubbery, through the foliage of which the bright yellow grass glistens like a patchwork of gold. . . . Our camp for the night was under a fine grove of cotton-wood, where the grass, shaded from the crisping rays of the sun, grew up in luxuriant masses high over our heads. Here we cut and slashed at the tufts and burned out broad spaces for our fires, of which there was constant danger, till our camp was secure from conflagration. And then the venison and wild-ducks were quickly placed in the frying pans. . . . At sunset the scene was magnificent beyond description (Browne 1974:211-15).

The memoirs of pioneer Tucson educator John Spring include recollections of numerous trips through the San Rafael Valley in 1866. While he was

...serving as quartermaster and commissary sergeant at Camp Wallen, Spring made frequent visits to his friend Solomon Warner, who supplied most of the camp's grain from his farm near the town of Santa Cruz. In early October 1866, Spring left Camp Wallen on Babocómari Creek and followed the Wallen-Santa Cruz road through the "tortuous" 12-mile-long "Huachuca Pass" (Canelo Pass) to the abandoned San Rafael Ranch. Spring described the site as "the remnants of an old Mexican sheep rancho." Spring's party attempted to spend the night in the ruins of the old rancho, but were attacked by an "army corps" of vermin, mostly fleas and mosquitoes, which forced them to abandon the camp and continue on to Santa Cruz (Gustafson 1966:81-89).

Although Santa Cruz had remained a small town of one story adobes, it appeared to be more prosperous than at the time of Browne's visit two years before. Warner, the town's most prominent citizen, lived in a long adobe house with a portal surrounded by corrals. Married to a wealthy Mexican widow, Warner operated a store, mill, and freighting business, in addition to his ranch and farms. Warner evidently employed a large number of teamsters, herders, and farm laborers, and ran the store chiefly in order to supply them. His employees could make non-cash purchases through a system of vales, or IOUs, with which they could draw money or goods from the store in exchange for days or half days worked (Gustafson 1966:81-89).

In 1866, Spring attended the Santa Cruz San Juan's Day fiesta, as a guest of Don Solomon, whose household must have been fairly typical of the wealthy rural class in Sonora. The spacious adobe mansion had a large kitchen in which an entire wall was devoted to adobe cooking hearths. There was no cast iron stove. Several women were employed as cooks; a professional baker made biscochuelos and other breads in a beehive earthen oven. Tesguino, a fermented corn beer, was stored in large clay ollas. Another room was devoted to washing and ironing. Next to the large corral behind the house was a saddle room in which all types of horse equipment could be repaired. The festivities for San Juan's day included feasting, dances, and the carrera del gallo, or rooster race (Gustafson 1966:81-89).

In 1869, Captain Michael Box of the Texas Rangers made a trip through southern Arizona. He described the remains of ranches and stock farms everywhere on the old emigrant road to California. At Santa Cruz a garrison of 15 men was cultivating a ranch that had

been deserted because it was located directly on what had become "the great trail of the Apaches ..." (Box 1869:41). Box described the road from Santa Cruz to Fort Buchanan going north over a spur of the Santa Cruz Mountains. Fifteen miles away was Camp Jecker, the headquarters of the current survey of Sonora.

THE INITIATION OF ECOLOGICAL CHANGE

Descriptions provided by the Forty-niners, the Bartlett and Emory boundary surveys, and early visitors to the study area provide a baseline for measuring change. The descriptions above, dating from the 17-year period between 1849 and 1869, present a composite picture of the San Rafael Valley and surrounding mountains prior to intensive impacts from settlement, cattle grazing, mining development, and road construction. The landscape and ecological conditions of the study area during this early period differ in several important respects from the San Rafael Valley of today and even from the San Rafael Valley of the 1890s. The composite picture that emerges from the earliest descriptions is one of a wetter, more heavily wooded and grassier landscape, with an abundance of wildlife as well as remnant herds of wild cattle and horses. Each of the areas for which early descriptions give indications of change are discussed below.

Both Forty-niners and Bartlett indicate a wetter landscape, with marshes, or cienegas, more common than they are today. Early travelers described large cienegas north of Santa Cruz on the river, between Santa Cruz and San Lázaro, at the headwaters of the Santa Cruz River. Not far outside the study area, another large marsh was described at the headwaters of the San Pedro, where the name "Las Nutrias" indicates the presence of beaver, although none were described on the upper Santa Cruz itself. Malaria and other illnesses caused by insect infestations common to swampy areas were clearly a problem for both residents and travelers in the area. Bartlett believed that the very large marsh between Santa Cruz and San Lázaro was responsible for the sickliness and fevers of the residents of Santa Cruz (Bartlett II:317). None of the cienegas described above exist today, except as temporary marshes during periods of heavy rain. In addition, travelers devoted many pages of their diaries to complaints about boggy conditions on the roads and described some difficulty during rainy periods in crossing both the Santa Cruz and San Pedro rivers. After a heavy rain, Bartlett noted that

his party found it necessary to alter the banks at a crossing of the San Pedro in order to ford the river, a practice that eventually led to erosion (Bartlett II:324).

Early descriptions stress the abundance of timber in the surrounding mountains and the "park like" appearance of the valley, with distinct groves of oak scattered over the landscape, and extremely tall cottonwoods along the Santa Cruz River. Bartlett observed groves of large walnuts along the Santa Cruz (Bartlett II:322). William Hunter described bushels of fallen walnuts near the pass of the "Santa Cruz Mountains" (Hunter ms:113). In addition to more abundant walnuts, oaks and junipers of a size large enough to impress easterners as "immense" were present in the mountains on both sides of the valley.

However, impacts on timber within the study area began to take place even during the initial period of travel over the Santa Cruz road. On his July 1852 trip, Bartlett's party camped at Ash Creek, 25 miles east of Santa Cruz. Bartlett's guide, Antoine Leroux, a veteran of Cooke's 1846 expedition, noted that the ash trees for which the creek had been named had almost disappeared in that location because ash wood was desirable for making wagon repairs (Bartlett II:326). Within three years of the gold rush travel boom, continual passage of wagon trains over large portions of the southern route had begun to deplete supplies of firewood. In 1852, Bartlett noted that his party experienced difficulty finding fuelwood (Bartlett II:324).

Early travelers, dependent upon draft animals for their transportation, were keenly aware of both the quantity and the quality of grass along their routes. Despite the remnants of Spanish and Mexican cattle herds and the presence of wild horses in the study area (Bartlett II:321), early descriptions indicate that prior to the 1870s grass in the San Rafael Valley was both taller and denser than it is today. Forty-niners praised the study area's grasses, noting that grama was the most common. During the 1860s, J. Ross Browne described incidents in which Apaches were able to hide themselves for ambush in the large clumps of bunch grass near San Antonio Pass (Browne 1974:220). The large clumps of bunch grass and thick grass cover would have provided a sufficient fuel load to carry both lightning fires and fires accidentally initiated by humans. During the 1860s, grass was so tall and thick in the San Rafael Valley that J. Ross Browne took the precaution of burning it away from his camp site in order to avoid accidental fire (Browne 1974:111-18).

Apaches also used intentionally set fire as a tactic in warfare. Browne described an 1863 incident in which Apaches attacking Samuel Butterworth's party near the abandoned hacienda at Santa Bárbara twice set fire to the dense brush and large clumps of bunch grass near the road, creating a fire that spread "with fearful rapidity, compelling [Butterworth] to climb the tree for security" (Browne 1974:220). This vignette indicates that the fuel load was adequate to allow fire to catch and spread rapidly. The Apache method of attack under cover of fire is described in other engagements and was probably used with some frequency. Thus, intentionally set fire could have had a significant impact on grassland condition within the study area. As grass became depleted through the gradual increase of cattle during the 1870s and 1880s, the number of grass fires necessarily decreased in proportion to the depletion of grass itself. By the time of the 1893 boundary survey, it is evident from photographs that the quantity of grass had radically decreased.

The final major ecological change that becomes apparent by comparison with early descriptions is a marked decrease in wildlife. Early travelers considered wildlife within the study area to be exceptionally abundant. Most of the Forty-niner wagon trains sent out hunting parties that were able to shoot deer, antelope, and wild cattle. Even wild horses were consumed for meat. Hunters with H.M.T. Powell's party shot antelope, deer, and wild horses to provide meat for their wagon trains. The hunters reported that game was particularly abundant on the "Santa Cruz Mountain" (Patagonia Mountains) and observed herds of antelope in the San Rafael Valley (Watson 1931:137-38). Members of Asa Clarke's party pursued a grizzly on the west side of the Santa Cruz River in the San Rafael Valley, but succeeded only in wounding the bear (Clarke 1852:81-82). Despite this abundance of game, by 1900 antelope and grizzlies had been extirpated from the study area, wolves were seen much less frequently, waterfowl had decreased, and wild cattle and horses had been replaced by domestic herds.

John Spring considered the Huachuca Mountains "a paradise for hunters," and frequently participated in hunting expeditions. He shot a "cinnamon" bear in the San Rafael Valley and hunted for wild turkeys, which were abundant in the Huachuca and Patagonia mountains. Spring also fished in the Babocómari River where, using the spines of the *biznaga* (barrel cactus) for fish hooks, he could easily catch dace up

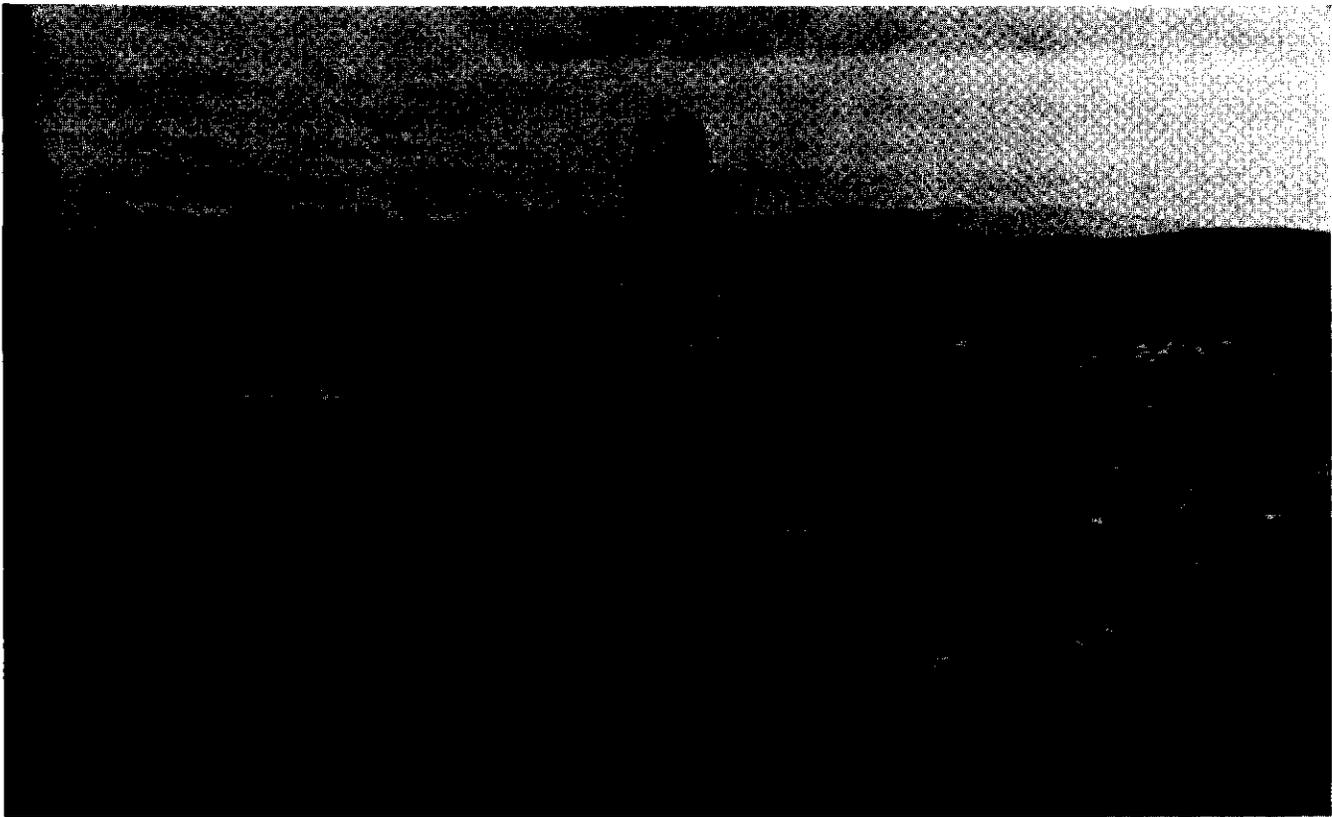


Figure 3. — San Rafael Valley during the drought of 1892–93. From the 1893 U.S. Border Report Survey.

to twelve inches in length, weighing from one to two pounds (Gustafson 1966:113). Fish of the same size are described by other army officers near Camp Wallen, who observed that deer and coyotes abounded on the plain between Wallen and Crittenden. Flocks of geese and ducks could be found at almost any time along the Santa Cruz River, where they particularly gathered in cornfields that were scattered along the river (Gustafson 1966:208).

The reflections of John Spring, written several decades after he was stationed at Camp Wallen, shed considerable light on the depletion of wildlife. His memoirs include several examples of hunting excesses. During the 1860s and 1870s, miners, wood haulers, and army personnel were easily able to supply their camps with wild meat. "The men in the wood camp were really not in any need of fresh meat, as they had killed several wild turkeys that very morning, and had game of some kind at all times" (Gustafson 1966: 113). Spring also gave examples of hunting practices which he thought injurious to population levels. For hunting the "numerous herds

of antelope" near the post, Spring described a method the Apache scouts had taught the troopers. It proved so successful that "before long the excitement of hunting them wore off, as it resembled more a deliberate butchery than the sport of the chase. . . ." Using the Apache technique, several army herders would circle around an antelope herd and drive them toward a ravine where the hunters were hiding next to a long pole driven into the ground with a handkerchief fastened to it. The antelope were attracted by the fluttering cloth and would move into shooting range and were quickly shot. This procedure could be repeated several times a day, without creating apprehension among the antelope. According to Spring, overhunting in combination with "the numerous cattle herded all over Arizona since the forced pacification of the Apaches" had made both deer and antelope scarce and those that remained had become very shy (Gustafson 1966:111–13).

During the two decades following Spring's description of the San Rafael Valley, the United States Army increased its presence in southern Arizona and



Figure 4. — Looking south into Mexico from La Noria. Camp of the U.S./Mexican survey teams. From the 1893 U.S. Border Report Survey.

attempted to settle the Chiricahua and other Apache groups on reservations. With the increased protection provided by the army, mining and settlement in the study area increased rapidly. Road building, commerce with Mexico, and the importation of large herds of cattle rapidly changed the landscape of the San Rafael Valley and the surrounding mountains. By the time the third boundary survey passed through the study area in the summer of 1893, significant ecosystem changes had taken place. Descriptions of the study area contained in the 1893 Report present a marked contrast to those of the earlier surveys.

The survey team experienced considerable difficulty finding Emory's monuments. The original Monuments 20 through 24 had marked the southern boundary of the study area, but many of the original monuments were in a state of ruin and some could not be found at all, leading the surveyors to assume they had been deliberately destroyed by hostile Indians. The team found the scattered remains of Monument 21 west of the Huachuca Mountains on "a broad open mesa, which extends several miles

along the boundary." Almost three miles farther west, they found the remains of Monument 22, another pile of stones, on the west side of a ravine "through which flows during the rainy season one of the sources of the Santa Cruz River." Monument 23, five and a half miles farther west, was situated on a ridge overlooking the main valley of the Santa Cruz, "a fine, grassy region . . . in which is located the small settlement of La Noria." The team could find no trace of Monument 24, which should have been located some five miles farther west on the summit of the Patagonia Mountains. After erecting new markers, Monuments 99 through 118, to replace those of the Emory survey, the survey team photographed their work, providing four views of each monument. The photographs, taken during the severe drought of 1892 and 1893, reveal the extent to which grazing and decreased rainfall had depleted the grasses of the San Rafael Valley (Report of the Boundary Commission 1899:177).

By the time of the 1893 survey, the valley had become a populated place with ranches, homesteads,

working mines, good wagon roads, a small town at La Noria, and other marks of occupation. A customs house had been established at La Noria. Twenty miles of wire fence had been installed east of La Noria marking the international line toward the Huachuca Mountains. The 1893 Report describes a "rough road" to Fort Crittenden, on the Arizona and New Mexico Railway, and a "good road" down the Santa Cruz Valley and around the Patagonia Mountains to Nogales, indicating the existence of army posts, new roads, and a railroad near the study area.

In addition to the signs of settlement, changes in the landscape itself had taken place. The source of the Santa Cruz River changed location according to season. In dry weather it was located only a short distance north of the boundary and no longer initiated in a swampy series of springs or cienegas several miles north in the center of the valley. Despite considerable timber cutting, surveyors described relatively heavy stands of oak in the mountains bordering the valley, in "the rough, oak-clad foothills of the Patagonia Mountains," north of San Antonio Pass, where the mountains were "quite picturesque, being heavily wooded, the growth consisting princi-

pally of oak, with a few conifers on the higher slopes. . . ." However, the survey report does not mention the oak groves scattered throughout the valley, which gave it its "park like" appearance during the previous decades. The surveyors noted that Emory's Monument 22 had been located on one of the sources of the Santa Cruz, which was normally a dry ravine. During July 1893, however, the surveyors experienced a flash flood, "which flooded the entire country and filled the usually dry ravines with torrents." The presence of dry ravines and flash floods in a formerly well-watered region with perennial streams are indications of both drought and the absence of adequate grass cover. The valley near La Noria, east of Monument 23, was the only location that the surveyors described as an area of "good grass." Yet the photograph of this monument and the view to the south into Mexico dispute this opinion. Indeed, the absence of grass cover in all of the boundary photographs is remarkable. The dense clumps of bunch grass taller than a person and the 12-foot sunflowers are gone. Instead, the survey photographs reveal a barren and denuded landscape, a remarkable change for a period of two decades (see Figs. 3 and 4 from the US Boundary Survey Report).

Chapter 5

Chapter 5

Mining and Settlement

Scattered throughout the mountainous parts of the study area are the remains of old mines, prospects, primitive adobe smelters, and timeworn slag piles. Mining has taken place within the study area since the Spanish and Mexican periods (see Appendix 5.2). However, impacts from mining and the many subsidiary activities associated with mining became intense during the late 1870s and lasted until the 1960s (see Appendix 5.3). The study area contains three significant mining areas: Mowry and Washington Camp/Duquesne in the Patagonia Mountains, and Sunnyside on the western slopes of the Huachucas (Fig. 5). Located slightly north of the study area is Harshaw, the largest of the nearby mining camps and the only location in this part of Santa Cruz County that experienced a true mining boom. Because of its

proximity to the study area and the important influences that its mining activity had on the study area, Harshaw is included in this report.

Although the activity of mining itself may be restricted to a specific location, subsidiary activities associated with mining produce a web of ecological impacts that extend far beyond the mining site itself. These associated activities include: road construction; fuelwood cutting, particularly during the period when smelting relied on charcoal and machinery operated from steam boilers; the development of mining camps and nearby towns; extraction of water from surface and underground water courses; the creation of waste dumps; chemical and mineral leakage from tailing and slag piles; removal and relocation of earth from mine shafts and workings; and the

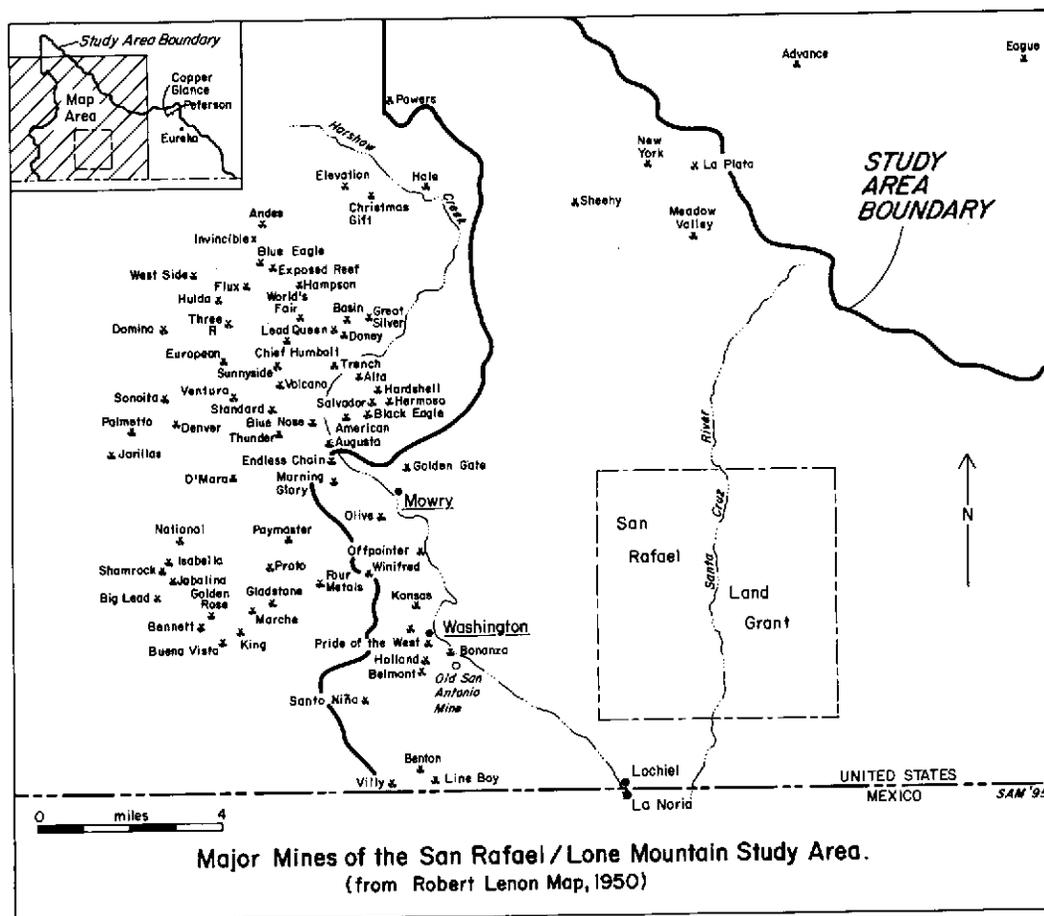


Figure 5

creation of a market for local products. Within the study area, each of the major mining districts developed an associated camp or town nearby. Unquestionably, the stimulus that mining provided to settlement constituted its single most important impact within the study area (see Appendixes 5.4 and 5.5).

MINING DURING THE SPANISH AND MEXICAN PERIODS (1700s–1854)

Many historians (Officer 1991; Polzer 1968) believe that reports of Spanish and Mexican mining activity and the associated tales of buried treasure are greatly exaggerated. Nevertheless, there is some evidence that mineral exploration and limited mining activity took place within the study area during the Mexican period and possibly at an earlier time under Spanish rule. The existence of Mexican or Spanish place names at locations that later became prosperous mines—Durazno (Harshaw), Corral Viejo (Mowry) and San Antonio (near Duquesne)—indicates that settlement and possibly some mining activity took place there. Although there is no proof that ore was extracted within the study area prior to the 1854 Gadsden Purchase, documented mining activity did take place near the study. Many American travelers observed José Romo de Vivar's smelting equipment and slag piles at the San Lázaro ranch on the road west of Santa Cruz, and ore extracted in the study area could easily have been transported to the site by way of San Antonio Pass. (See Chapter 4 for descriptions of the mining operation at San Lázaro.)

Elderly Hispanic residents of Santa Cruz had testified during Colin Cameron's 1892 "over plus" appeal that at least four mines had been in operation in the study area during the Mexican period (Cameron 1892). Lieutenant William H. Emory commented in his boundary survey report that he "saw everywhere the remains of mining operations, conducted by the Spaniards, and more recently by the Mexicans . . . There are remains of mines . . . in the San Pedro mountains, between the San Pedro and Santa Cruz rivers, and on the Santa Cruz river a few miles north of the boundary, there are the remains of a mill for crushing gold quartz [Guevavi?]" (Emory 1857 I:94–95). But subsequent promoters, eager to secure investments in their mining enterprises, exaggerated the more reliable reports such as Emory's. Only three years after Emory's survey, for example, Sylvester Mowry reported the existence of more than a hundred silver and gold mines in southern Arizona dating from the Spanish period (Mowry 1864:18–19).

In addition to the Forty-niners and early American explorers (Powell, Stephens, Bartlett, Gray) who believed that mining had taken place in or near the study area, American residents and visitors during the early territorial period reported smelter remains and slag heaps at La Noria, the Patagonia Mine (later Mowry), behind the main house at the San Rafael ranch, at the hacienda of the San Antonio Mine, and near Duquesne (Ashburn 1994). Unfortunately, it is not clear whether Spaniards, Mexicans, or unknown fellow Americans were responsible for these early mining activities. Early mining promoters reported several mines north of the study area. Raphael Pumpelly described lead mines in the "Santa Cruz Mountains" (Canelo Hills) south of Fort Buchanan, which appeared to have been excavated by Mexicans several years before his 1861 visit to the area (Mowry 1864:172). Mowry spun a tale around the romantic rediscovery of the Compadre Mines in the "Santa Cruz" (Patagonia) Mountains. "The present fortunate proprietors found them after a long and painful search. The shafts were found carefully concealed, partially filled with rubbish; and thirteen furnaces in tolerable preservation prove how extensively the mines were once worked by the Spaniards," Mowry claimed (Mowry 1864:27). When the first Americans entered the Gadsden Purchase, they found Mexicans working mines located near the site that later became the Trench Mill (Hinton 1878: 126). These may have been the Compadre Mines, described by Pumpelly, where argentiferous galena was smelted in adobe furnaces (Schrader 1915).

Spanish and Mexican technology employed *arrastras* (mule-powered circular crushing mills) to break up ore and small blast furnaces made of adobe bricks to smelt the ore. The inefficient adobe smelters burned charcoal, and at later periods coke or a combination of both, consuming large amounts of fuel. After a smelter had been fired the heat was intensified by means of a bellows. This type of primitive smelter could produce high-grade oxidized ores but could not effectively operate when the ore changed to sulphide, which was not uncommon (Dunning 1959: 31–32). As American miners became active in the study area, they adopted many of the traditional Spanish and Mexican mining practices that had been previously employed in the study area. After the Gadsden Purchase many small American-owned mines operated briefly within the study area. These small operations hired skilled Sonoran miners, smelter operators, and laborers, experienced

workers who naturally carried out the technical procedures of mining with which they were familiar. This makes it difficult to determine whether mines and smelters were operated during the Spanish, Mexican, or Territorial periods. Early records are equally unclear on exact dates of operations for early mines and smelters. Thus, the Spanish/Mexican style smelters may have been operated by either Spanish/Mexican miners or by American owners either before or after the Gadsden Purchase.

MINING 1854 TO 1880

During the Mexican period, Apache raiding had depopulated northern Sonora and caused the abandonment of many mines. After the Gadsden Purchase, despite the United States Army's many attempts to control Apache hostilities, raiding continued and military engagements and incidents with individuals occurred within the study area. The southernmost portion of Arizona received its first military protection in 1856 with the establishment of Camp Moore at Calabasas. The following year, the post, renamed Fort Buchanan, moved to a site between the present towns of Sonoita and Patagonia. After Confederate troops occupied Arizona Territory, Union soldiers abandoned and burned the fort, leaving southern Arizona without military protection until 1867, when Fort Crittenden was established at a healthier location on Sonoita Creek. This post remained active until 1872. Between 1866 and 1869, a smaller post operated at Camp Wallen on the Babocómari River.

Despite this military presence, Apaches traveled through the San Rafael Valley frequently on their way to Sonora. Many attacks took place in or near the study area, particularly on the Mowry-Santa Cruz road. Between 1861 and 1876, at least 10 incidents took place, in which Apaches killed or wounded American and Mexican citizens. Among those killed were one of the owners of the Mowry Mine, two mining engineers on their way to Mowry, Rafael Saavedra, owner of the San Rafael Ranch, and two cowboys who settled in Parker Canyon. (See Appendix 5.1 for a full discussion of these incidents.) During the Geronimo campaign in 1885-86, the army maintained two cavalry camps in the study area, one in Mowry to guard the passes over the Patagonia Mountains and a second one in the Huachucas, first at Copper Canyon and later at Cave Canyon. Despite these continual Apache hostilities, mining activity in the study area continued and long before the removal

of Geronimo's band to Florida, two major mining booms had taken place.

The establishment of the series of military posts, described above, facilitated mining exploration. (See Appendix 5.1.) Supplies and forage for both Camp Moore/Fort Buchanan, Fort Crittenden, and Camp Wallen were purchased in the town of Santa Cruz. The purchases necessitated frequent travel between the posts and the town and gave military personnel ample opportunity to observe mining activity within the study area. With the protection provided by the military, mining activity increased. Some sources imply that early mines were actually worked under direct protection of the military (Tenny 1927-29). Whether this was the case or not, American military personnel spent a lot of time prospecting throughout the area and were among the earliest investors and operators of local mines (Mowry 1864).

During the period between the Gadsden Purchase (1854) and the onset of the Civil War (1861), the Patagonia Mine was the largest of the area's operating mines. During this period, the Patagonia Mine had 12 "crude blast furnaces," providing smelting facilities that were adequate to treat ore from both the Patagonia Mine and from other mines in the area as well. The Patagonia Mine also had facilities to do cupelling (assaying) (Tenny 1927: 282, 296).

Other active mines in the area included the San Antonio Mine, just south of the site that later became Duquesne. Thomas Yerkes owned the mine. According to J. Ross Browne, who visited in 1863, Yerkes had made "considerable improvements" at the mine site prior to the Civil War (Browne 1950). The Empire or Montezuma Mine (Washington/Duquesne area), "located half way between the Mowry Mine and the town of Santa Cruz," was first owned by Thomas Gardner of La Noria in partnership with a man named Hopkins. During the Civil War, a New York company purchased the mine (F. Biertu in Mowry 1864: 78). The La Esperanza Mine, "five miles from the Patagonia mines almost on the Mexican border" (Washington/Duquesne) was in operation prior to the Civil War (Mowry 1864: 64). Ore from the Duquesne/Washington Camp area was taken across the border to be treated in arrastras (Schrader 1915: 322). By 1861, the Eagle Mine east of the Patagonia Mine was producing ore. Prior to the Civil War, there were adobe smelters at the site that became Washington Camp, at the Flux Mine, near the mouth of Alum Gulch (Tenny 1927: 309) and at the Jarilla Mine (Schrader 1915) outside the study area.

THE MOWRY MINE

During the Civil War, most of the mining activity in the study area ceased. Only the Patagonia (Mowry) Mine, under the ownership of Sylvester Mowry, continued comparatively large scale production, with several employees standing armed guard, since no other protection from Indian raids could be provided. Mining at other sites did not resume until the late 1860s when local military posts were reinstated. At that time, all of the mines mentioned above started work again.

During the 1870s, mining activity increased. The Belmont claim, located south of Duquesne, had an adobe smelter (Schrader 1915: 322). Near the study area, the Trench Mine increased production, and in 1875, 100 tons of argentiferous galena were smelted in nearby adobe furnaces (Schrader 1915). By 1877, claims had proved to be profitable in the Harshaw area.

Although there is little documentary information on mining prior to the 1880s, local recollections and observation shed some light on the extent of mining development in the area. William Heady, an early rancher in the San Rafael Valley, was told that French mining engineers had come into the study area during the 1870s and early 1880s to oversee the construction of smelters and other mining installations (Ashburn 1994). Early residents also observed extensive fuelwood cutting that they believed had taken place during this phase of mining. Settlers in the study area described the stumps of what they considered to have been "enormous" juniper trees. For example, large stumps were found in the back pastures of the San Antonio Ranch (Heady Ashburn) where junipers up to three feet in diameter had been cut (Ashburn 1994). Additional stumps were found throughout the Mowry and Duquesne/Washington Camp areas. Informants believe that the majority of the fuelwood cutting took place prior to the turn of the century, particularly during the 1860s and 1870s and continuing into the 1880s, when adobe smelters and steam powered boilers were most commonly used in mining procedures. Fuelwood cutting for both mining and domestic purposes during the early Territorial period will be further discussed in Chapter 8.

During the early 1880s the study area experienced several separate mining booms. Although the Apache threat acted as a temporary deterrent to development, it did not prevent either mining activity or settlement in the study area. The mining activity and the consequent settlement at each of the mining areas will be discussed separately.

The first mine in the area to achieve substantial production after the Gadsden Purchase was the Patagonia Mine. The area around the mine was called Corral Viejo by Mexicans (and possibly by Spaniards) and first named the Patagonia Mine by its early American owners. Schrader (1915:296) reported that the mine had been worked by Mexicans "in the usual primitive way" but that it had been "known to the Jesuits long before." Whatever the truth of its early history, in 1857, Captain Richard S. Ewell and several fellow officers from Fort Buchanan purchased the "old Patagonia mine" from a Mexican herder. Most of the shareholders were with the military and included Colonel J. W. Douglass, Lieutenant J. N. Moore, and three other owners named Randall, Lord, and Doss. With eastern capital, the officers developed the mine, installed a reduction plant, and employed experienced Sonoran miners. Ewell, who later became a brigadier-general in the Confederate army, was mine superintendent as well as principal stock holder. By the following year, the mine was producing considerable silver bullion. In 1858, some processing was done on site, with several "crude furnaces" for lead and silver in operation. However, Ewell became disillusioned with what he considered to be inefficient production methods and continual Indian problems. In either 1859 or 1860, he sold the mine to Elias Brevoort, the former sutler at Fort Buchanan, who had managed the mine for Ewell. During that same year, Brevoort sold out to Henry Titus, a former Nicaraguan filibuster, who quickly sold his interests to Lieutenant Sylvester Mowry. Mowry promptly renamed the mine for himself (Wehrman 1965: 21-25; Schrader 1915:296).

In February 1861, only a short time after Mowry had acquired the 500-acre property for \$25,000, F. Biertu, a metallurgist and mining engineer, visited the mine. Biertu had the impression that either Spaniards or Mexicans had worked the mines at Mowry and that they were of considerable age. He noted that "the first parcels of ore gathered by the Mexicans were taken, at the time of the late discovery, from shafts which had been sunk many years ago, and which had been abandoned." In a promotional vein, Biertu recounted the mine's many advantages. Twenty miles from Fort Buchanan and 14 from Santa Cruz, the mine was situated directly on the road to the port of Guaymas, only 280 miles away, placing Mowry in direct communication with San Francisco.

Freight from San Francisco, by way of Guaymas, cost no more than five cents per pound (later reduced to four) with return freight from the mines about two cents (Biertu in Mowry 1864: 74).

At the time of Biertu's visit, the little village of Commission, only one mile from the mine, had 15 houses "intended for the peons and laborers of the mines." The village was located on Commission Creek (Mowry Wash), "whose waters never dry up, and which are more than sufficient to run one or several mills." Biertu noted that in addition to the creek, "a spring of excellent water, which also never dries up" was located on the mine property itself. The buildings for residences, stores, and furnaces were located about halfway between the mine and the small village (Biertu in Mowry 1864: 76-78).

At the time of Biertu's visit, Charles Mowry, brother of the owner, was directing the operation. The Mowrys had many plans for expansion of the mine. They were about to install a 15- to 20-horse power steam-engine to operate the pumps and to run a saw mill. They planned to divert the water from Commission Creek (Mowry Wash) into reservoirs with dirt embankments 12 feet deep and to construct new offices, an assay laboratory, and housing for 70 to 80 additional Sonoran laborers. They also intended to build a railroad (Biertu in Mowry 1864: 76-78).

During the Civil War, shortly after troops were withdrawn from Arizona Territory, Apache hostilities brought most mining activity to a halt. However, at the Mowry Mine, work continued under protection of armed guards. Prior to the Civil War, freighters took most of the lead to Guaymas, Sonora, where it went to England for refining. However, the Civil War interrupted shipping. During the war more refining was done on site in the reduction plant, which consisted of 12 adobe smelters (Tenny 1927-29:290; Schrader 1915:296). Mowry smelted some of the silver in an English cupel furnace, molding it into bars worth from \$2 to \$300, which could be used as a circulating medium in the absence of specie (Schrader 1915:296). By 1862, the mine had a modern smelter with a 100-foot chimney "of genuine furnace-baked brick" with a band around the top stating "Mowry Silver Mine, T. Scheuner fecit, 1862" (Bigelow 1968:51). Mowry employed between 70 and 120 workers, mostly Mexican "peons" at a cost of 50 cents per day, paid chiefly in goods from the company store. The Mowry camp became the trading center of the area on both sides of the border (Tenny 1927-29: 291). Under Mowry's direction, estimated pro-

duction of the mine was 3,000,000 pounds of lead and 250,000 ounces of silver for a total value of \$485,000 (Tenny 1927-29).

Operation of the mine ended abruptly in June 1862, when Union General J. H. Carleton of the California Column arrested Mowry for treason. Mowry, who was thought to be a southern sympathizer, spent several months imprisoned at Fort Yuma for allegedly having supplied Confederate troops in Tucson with lead for ammunition (Wehrman 1965: 21-25). In 1864, J. Ross Browne inspected the Mowry Mine, which was being operated under direction of the Deputy Marshal of New Mexico, on behalf of the United States under the Confiscation Act. Browne wrote his impressions of the place and made some fairly detailed drawings of the mine, smelters and the mill. (See Browne's drawings of the Mowry Mine, Figs. 6 and 7.) "Cords of wood lay piled up on the wayside; the sound of the adze reverberated from hill to hill; the smoke of many charcoal pits filled the air, and teamsters, with heavily-laden wagons, were working their way over the rugged trails and by-paths." The mine had reduction works, store houses, "peon quarters," and a long row of smelting furnaces in the rear. "The broad, smooth plaza in front of the works was dotted with wagons and teams, discharging their freight of wood and ore. . . ." Browne was delighted to hear the sounds of civilization at the mine, the "hum of the steam-engine and fly-wheels" (Browne 1974: 203-210). During the period of government operation, however, the mine was evidently so poorly managed that when Mowry regained control in 1865, he found the equipment deteriorated and buildings vandalized (Wehrman 1965: 21-25).

Mowry died in London in 1871, attempting to raise capital. The mine continued to operate under a series of subsequent owners. In 1873, after a period of abandonment, claim jumpers, who obtained capital and equipment from army officers and merchants in Tucson, relocated the mine. Under their direction, an engine was installed and the mine produced some ore (Schrader 1915: 296; Tenny 1927-29: 291). During the early 1880s, Fish and Silverberg of Tucson acquired the mine by relocation and produced ore worth \$75,000. During the late 1880s, production at the mine itself stopped. Nonetheless, its smelters processed silver and lead ore from outside mines, particularly the Morning Glory Mine, a mile and a half west of Mowry, which had been located by David Neal and A. S. Henderson during the late 1880s (Schrader 1915: 306).

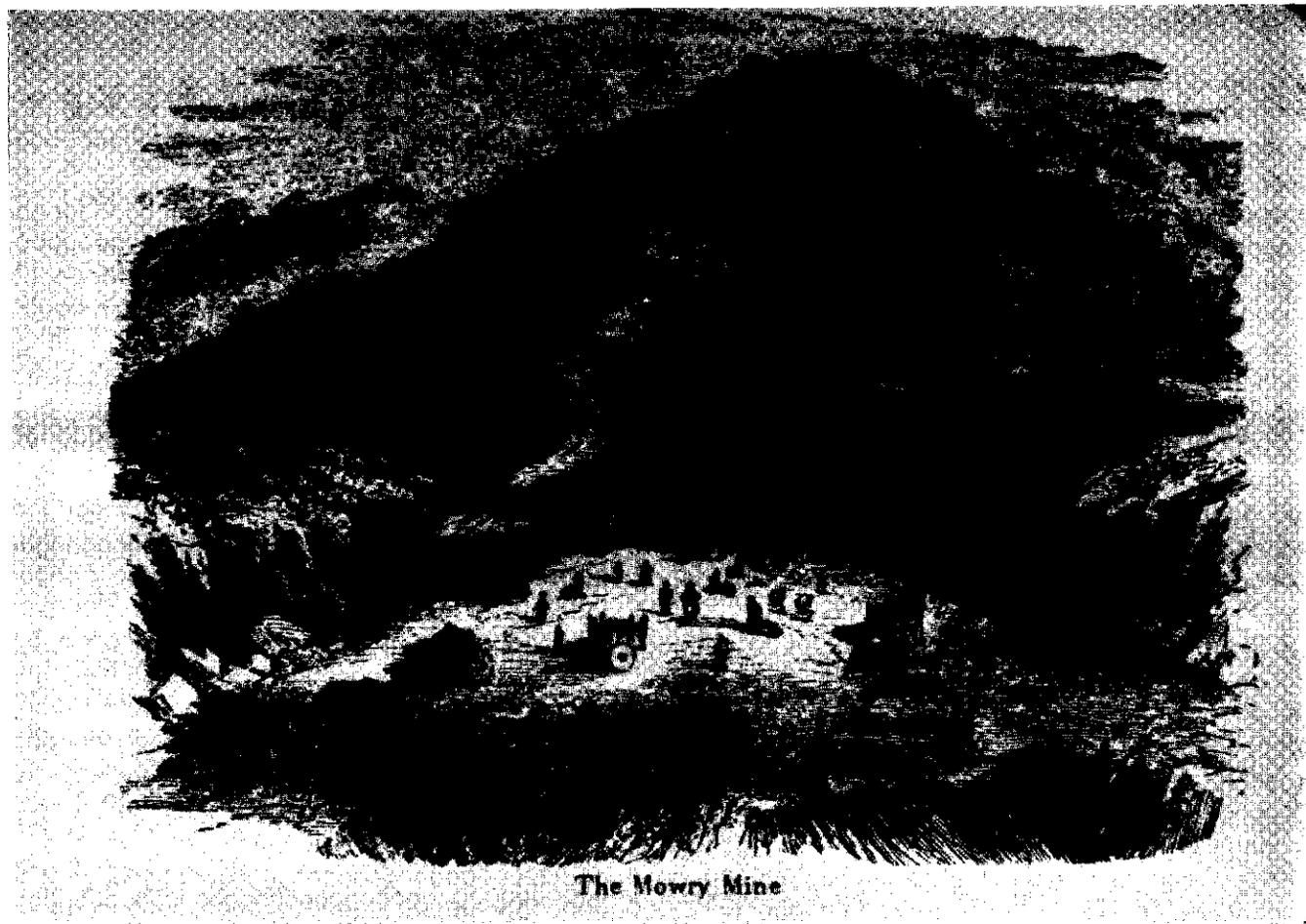


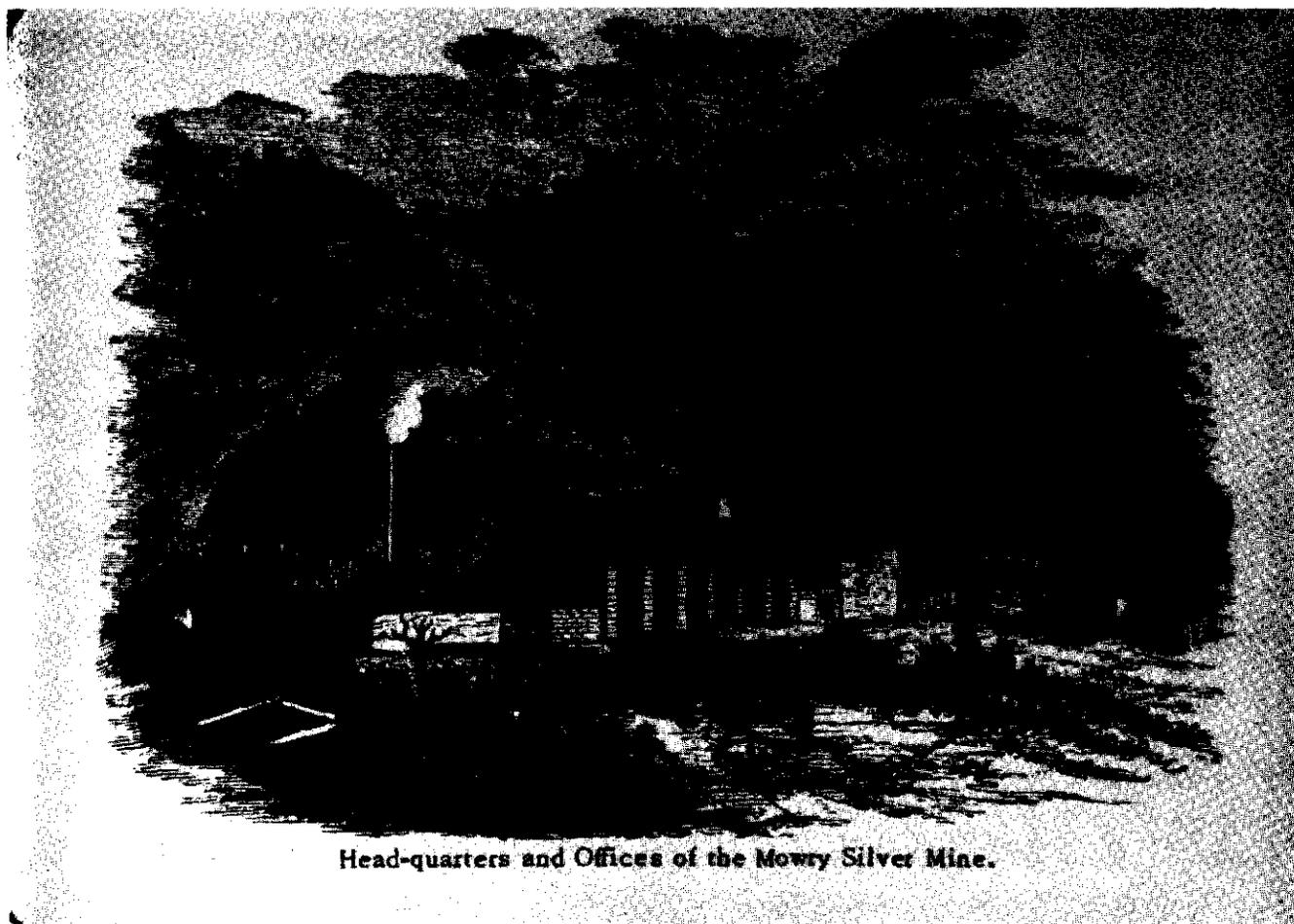
Figure 6—Drawing of the Mowry mine, 1864. J. Ross Browne.

While Lieutenant John Bigelow's troopers occupied the abandoned buildings at Mowry during the Geronimo Campaign (1885–86), Bigelow reported that all activity was suspended. Sometime during the 1880s, Tucson merchants Steinfeld and Swain acquired the mine. It resumed production in 1890 and several hundred tons of ore were shipped (Tenny 1927–29: 292). During the 1890s, after the new owners expended \$100,000 to open the old workings, they succeeded in making the mine profitable again. Although the demonetization of silver in 1893 had the effect of decreasing mining activity throughout Arizona Territory, the mining depression was offset in the Patagonia Mountains by improved base-metal metallurgy and the consequent lowering of smelter rates and concentration costs (Schrader 1915).

The lead-silver mines in the area, including Mowry, were worked intermittently for the next few decades with varying success (Tenny 1927–29: 285). By 1901, the Santa Cruz Mining Company, a Kansas City company with a subsidiary office in the town of

Patagonia, was operating the Mowry Mine. In 1904, under the direction of Albert Steinfeld, the Tucson merchant and mining investor, the mine employed six men and had both steam and gasoline power. In that year, a 100-ton concentrator was constructed and during the following year, the owners erected a 100-ton steel blast furnace for smelting lead (Fig. 8). In 1907, there were 25 men working the mine and Mowry was the second lead producer, after Tombstone, in southern Arizona. After the depression at the end of that year, however, the mine closed again (Schrader 1915:297).

Although information on Mowry's operation during the decade between 1910 and 1920 is spotty, it appears that the mine operated intermittently but with a much larger workforce. Reopened in 1909 by A. J. Hazeltine of Warren, Pennsylvania, the mine at times had 300 to 500 employees, with about 100 men working underground and the rest working in the mill, smelter, and at other above ground jobs. In 1909, the concentrator and smelter were still on the site,



Head-quarters and Offices of the Mowry Silver Mine.

Figure 7—Drawing of the Mowry smelter, 1864. J. Ross Browne.

and equipment had been upgraded by the addition of three steam hoists, two 10-horsepower gasoline hoists, and one five-drill air compressor (Schrader 1915: 298; Tenny 1927–29). During this period Mowry had a lime kiln, and lime was burned for local use (Schrader 1915:359). In 1914, the concentrator was destroyed by a lightning fire (Schrader 1915: 298–99). It reopened in 1918. Employees did several thousand feet of development work. Excavating shafts above the flooded water level, 14 underground miners and six aboveground employees were able to ship about 100 tons of ore per month (Tenny 1927–29: 293; State of Arizona 1918). By 1920 the mine, employing four aboveground and 17 underground workers, was producing 225 tons of lead and silver ore per month (State of Arizona 1920).

During the rest of the 1920s operation was intermittent and production decreased. In 1927, for example, there were only three men working aboveground and four underground. In 1928, the working shaft caved in. Despite this setback, and the

onset of the Great Depression, production continued on a much smaller scale. Records show that some lead ore was shipped in 1930 and 1931. Reports indicate that the Mowry Mine continued to ship ore from the late 1930s until the early 1950s. Beginning in the early 1940s, mine owners also shipped silver-lead ore from the waste dump and during the late 1940s they shipped lead ore from the smelter's slag remains, in addition to extracted lead ore and zinc ore. During this period, Robert Lenon of Patagonia re-mined the waste dump. Some of this material went by train to the El Paso smelter. Between World War II and the early 1950s, manganese was a desirable mineral, and manganese from the Mowry Mine made up an important portion of the yearly amounts shipped to the US Government Purchase Depot in Deming, New Mexico. In 1952, for example, Mowry shipped 588 tons of manganese ore to the Depot.

Some placer mining was done in the Mowry area as well, particularly during the depression of the 1930s, when local unemployment in the surround-

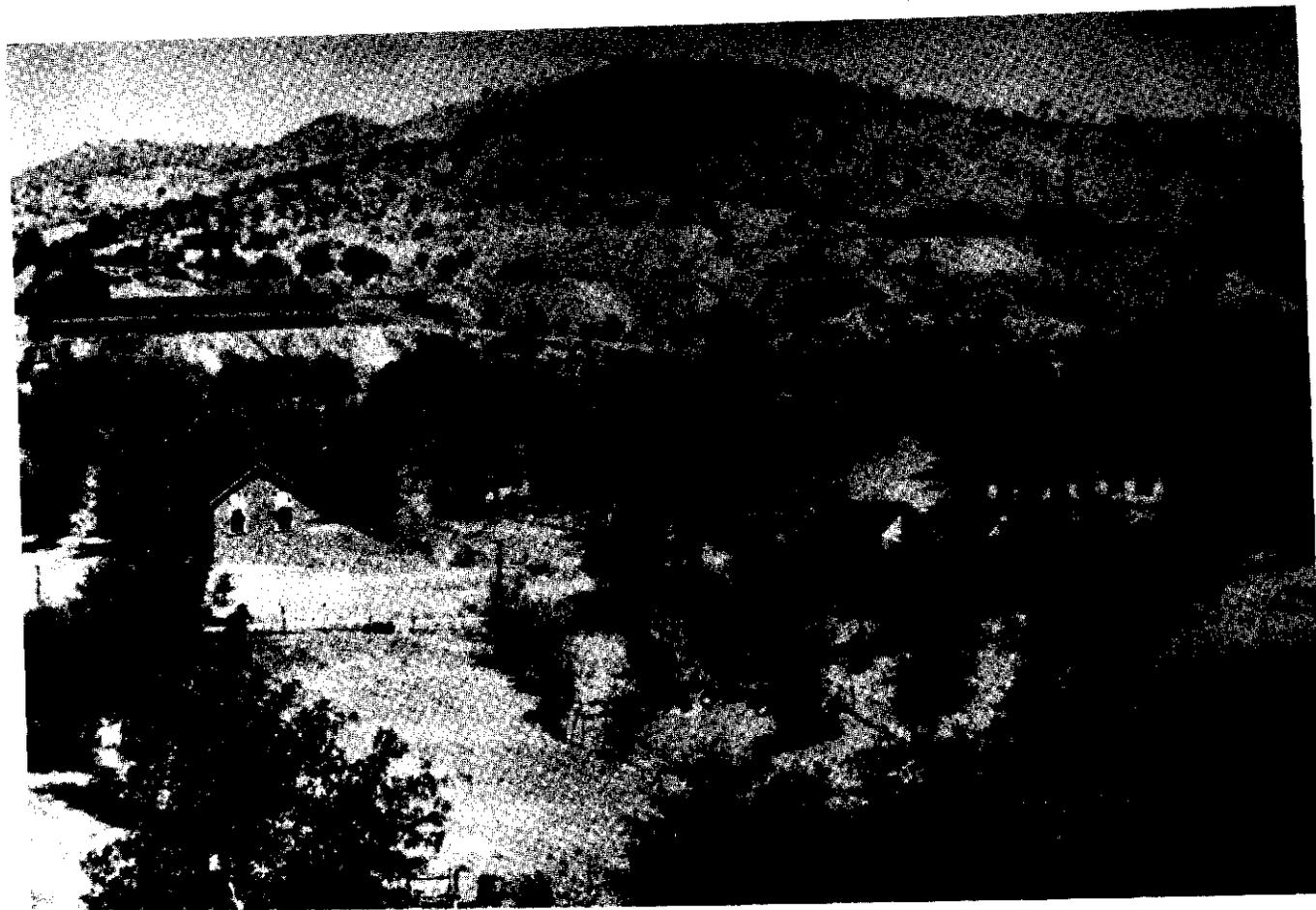


Figure 8—The Mowry mine and reduction works, circa 1909. United States Geological Survey photo.

ing area led to an increase in prospecting and individual placer mining. In the summer of 1933, at least five men were working Guajolote Wash, downstream from the old Mowry smelter. Because lack of water prevented large-scale sluice operations, however, average returns per person per day were less than 50 cents (Wilson 1961).

Subsidiary Mines Near Mowry

Schrader (1915:307–21) described several smaller mines, either within the study area or very close to it, all of which were producing mines during the early 20th century. Only those mines within four miles of Mowry are included in the list below. Although some of the subsidiary mines are slightly outside the study area, the presence of large numbers of mine workers and considerable mining activity at these mines certainly affected the study area. Their presence had an additional impact on the Mowry townsite, through increasing the number of area residents and enlarging the local market economy.

The Morning Glory Mine, 1 1/4 miles west of the Mowry Mine, was located during the 1880s by David Neal and A. S. Henderson. Relocated in 1895–96 by Richard Farrell, it was a modest but steady producer of low grade zinc and silver ore.

The Augusta Mine, 1 3/4 miles northwest of Mowry, was discovered in 1878 and relocated in 1905. It produced 100 tons of low grade lead, zinc, silver and gold ore.

The Four Metals Mine, in the head of Providencia Canyon on the south edge of Guajolote Flat, 3 miles northwest of Washington and 2 1/2 miles southwest of Mowry, was located during the 1860s. It was later owned by George Gross, who sold it in 1904 to the Four Metals Mining Co. with headquarters in Mowry. In 1915, the Four Metals camp had a population of 100 Mexican laborers. Two good wagon roads connected it to Mowry. The mine had some 3,000 feet of workings, company buildings sufficient for 150 workers, and a 20-foot well.

The Winfred Mine, 1 1/4 miles east of the Four Metals Mine, 2 miles northwest of Washington and 3

1/2 miles south-southwest of Mowry at the head of Mowry Wash, was owned by the Four Metals Mining Company. It had 1,000 feet of tunnels.

The Mowry Townsite and Settlement

The boom at Mowry occurred during its early years of operation with periods of intense activity during the 1860s, the 1890s, and again during the teens. During Sylvester Mowry's period of operation, the mining camp at Mowry had several substantial buildings, in addition to the smelter with its brick stack. Some structures at Mowry were made of lumber, but most of the Mowry buildings were adobe. Although the Forest Service bulldozed many of the Mowry structures, several adobe ruins are still visible at the site today (1995). The majority of the present ruins probably date from the third period of operation in the early 20th century.

Nearby on Mowry Wash, homesteaders operated irrigated farms using water from the creek. The size and extent of development at these farms is described in Chapter 8. Several dry farmers planted crops on the nearby mesa and on Guajalote Flat, northeast of Mowry. The mining camp developed into a small town, which at times had several hundred residents, with stores, saloons, and pool halls. Warren Allison operated a store at what he referred to as Mowry "flat" during the 1870s and 1880s. He stated that many prospectors came down from the mountains to trade at his store and even people from Santa Cruz and other places in Sonora came as far as Mowry to make purchases. Allison later moved to Harshaw where he ran a butcher shop, but moved to Tucson in 1881 after the Hermosa played out (Allison ms.). Mowry developed the unsavory reputation common to mining camps and was considered a somewhat undesirable place for family living. In 1906, Jim Regan moved to Mowry, where his brother Frank was operating a saloon. Regan's wife refused to live in the camp and the family moved to Patagonia (Hathaway 1972). (See Appendixes 5.4 and 5.5 for statistics on settlements.)

THE WASHINGTON/DUQUESNE AREA

The Washington Camp/Duquesne area, three miles south of Mowry, covered approximately 1,600 acres of mining ground and included eighty claims, 42 of which were patented by 1915 (Schrader 1915:321). Although Washington Camp and Duquesne

developed as separate mining properties and camps, they are discussed here together because of their close proximity, only three-quarters of a mile apart, and because for many years most of the mines in the area were owned and operated by a subsidiary of Westinghouse Electric, the Duquesne Mining and Reduction Company, of Pittsburgh, Pennsylvania. The Duquesne Company began purchasing individual mines during the mid 1880s and continued its expansion through the early years of the 20th century. After the Duquesne Company consolidated the local mines, it operated a mill in Washington Camp and maintained headquarters in Duquesne.

According to Frank Schrader (1915:322), Mexican prospectors were the first locators of the area's important ore deposits. When Schrader visited the site in 1915, he observed the ruins of an old adobe smelter on the trail between the Belmont Mine and San Antonio Pass. Schrader believed that during the Mexican period, miners had used the smelter but that they had also taken ore extracted in the Washington/Duquesne area across the present border into Sonora for treatment in arrastras. During the Territorial period, mines near Washington Camp developed several years before those at Duquesne. Soon after the Gadsden Purchase, American developers, including Thomas Gardner, an early settler at La Noria, made claims and did some work at these mines (Kane ms.). During the 1880s, Colonel William Greene, the developer of Cananea, was also active in the Washington mines and lived at Washington Camp for a time (Bigelow 1968:106-07). The earliest claims dating from the Territorial period include the Empire and the San Antonio, both patented during the 1870s, and the Belmont, which earlier had produced the ore smelted in the old adobe smelter on the trail to San Antonio Pass. After 1880, dozens of claims were made.

During both the 19th century and the 20th century, three large mines, the Holland and the Bonanza, nearer to the Duquesne townsite, and the Pride of the West, near Washington Camp, dominated ore production. The Duquesne Mining and Reduction Company gradually acquired all three of the big producing mines, along with the majority of the smaller mines in the area. In 1889 (variously reported as 1884), the company acquired the Bonanza Mine, their first large mine in the vicinity. In 1905, the company purchased the Holland Mine and in 1906, the Pride of the West.

The Holland Mine was first located about 1880 by Henry Holland, who soon sold it to H. L. Luttrell

and partners from California for \$60,000. Lutrell's name was briefly applied to the mining camp's post office, which operated from 1880 to 1883 and sometimes was confused with the post office at La Noria/Lochiel. The mine was considered "a spectacular venture" for the time (Tenny 1927-29:284; Schrader 1915:338). Early in 1881, the Luttrell District (Washington/Duquesne) was listed as one of the three largest producers of silver bullion in the territory.

The Holland Smelting and Mining Company built a smelter on the property, but the mine produced little ore due to mismanaged finances. By July 1881 all work stopped (Tenny 1927-29:284). By 1884 new lessees of the mine were utilizing a water-jacket smelter installed at "Sonora," near the Mexican border. The smelter had a 14-ton per day capacity. The first month's production of ore consisted of 797 bars (101 pounds each) of 95 percent lead, 210 ounces of silver, and 1 1/16 ounces of gold. About 150,000 ounces of silver, 750 ounces of gold, and 1,300,000 pounds of lead were produced during the year. The operation ran for about eight months until the miners encountered "sulphide ore of lead and iron in garnet," both conditions unsuitable for the smelter, and the mine was forced to close again (Tenny 1927-29:294-95; Schrader 1915:338).

In 1896, F. L. Bartlett of Denver purchased the mine and built a concentrator to treat the complex ore found at the lower-levels, crushing the ore in Huntington mills and concentrating it on Wifley tables, for recovery of silver, lead, and zinc. The zinc was shipped to Cañon City, Colorado, for manufacture of zinc oxide. After one year the operation stopped work (Tenny 1927-29:296). In 1905, the Duquesne Company acquired the Holland Mine, but did not resume operation. The mine had produced more than 30,000 tons of ore, with a greater profit than any other mine in the camp (Schrader 1915:339).

The Bonanza was another of the early mines, located during the 1880s by Thomas Shane and N. H. Chapin. During the earlier years, a considerable amount of "chloriding," small-scale mining of silver chlorides exposed to the air, was done at the mine (Schrader 1915: 336; Young 1970: 25). In 1884, the Duquesne Company purchased the Bonanza along with the nearby Pocahontas, Pluto, and Illinois mines. The Duquesne Company operated the property off and on for the rest of the century, although little work was done until the revival of the copper market in the late 1890s (Tenny 1927-29; Schrader 1915:322). In 1896, the company leased a small furnace in El Paso

for about five months and shipped 200 train car loads of ore until it reached sulphides that could not be smelted in the mine workings (Schrader 1915:322). By 1903 the Holland Mine had its own steam plant and crusher and by 1904 a small concentrator (Stevens 1903-04).

The Pride of the West, or Washington Mine, located in 1880 by a party of prospectors, produced large amounts of copper ore. In 1898 N. H. Chapin leased the mine and shipped 30 tons of ore averaging 12 percent copper daily to the Silver City smelter. In 1899, C. R. Wifley, inventor of the Wifley concentrating table, and several associates in Denver purchased the Pride of the West. When the mine produced an estimated 4,000 ounces of silver during the first year, the owners immediately made plans to build a large-scale milling operation on the property and soon erected a 50-ton concentrator and a mill (Tenny 1927-29:296). By June 1900, the Pride of the West mill consisted of a crusher, stamps, and Wifley tables, and it was producing a 50 percent lead concentrate. The owners installed a roaster to roast the tailing from the Wifley tables and a Weatherill magnetic concentrator to separate the copper-iron from the roasted zinc product. The owners shipped zinc concentrates (56 percent zinc) to Europe, and copper concentrates (24 percent copper) to the Copper Queen Smelter in Douglas (Tenny 1927-29: 297).

By April 1901, changes in metal prices initiated changes in production procedures and all crushed ore was roasted and passed over magnetic concentrators to produce a copper iron product and a separate zinc-lead-copper-product, which was then treated on Wifley tables to create a lead-silver concentrate. The blends, a garnet-quartz-calcite product, were rejected as tailing. The operators also installed a reverberatory furnace to smelt the copper concentrate to a 50 percent matte. In 1901, production was at an all-time high with eight tons of matte and five tons of lead concentrates daily (Tenny 1927-29: 297). The 1901 high production initiated a period of peak construction at the Pride of the West. The mill, 1,400 feet from the mine in Washington Camp, connected to the mine by a switchback three-rail gravity tram laid on a 15 percent grade. The mine also had a 400-foot winze, and a 120-foot double-compartment shaft with a 25 horsepower steam hoist. The furnace, however, only operated for a short period, after which time concentrates were shipped to Silver City and other reduction works. In 1902, the plant was remodeled and enlarged from 50 to 100 tons. It operated

from the spring of 1902 until December, 1903. At the end of the year a change in the type of ore extracted, from a higher grade copper ore to a lower grade copper ore with high zinc content, forced the mine to close. The camp was nearly deserted for three years (Schrader 1915:323).

After 1906, when the Duquesne Company consolidated all of the major producing mines in the area with the purchase of the Pride of the West, production, development and efficiency increased and the mines thrived until the post World War I depression. In addition to the Holland, Bonanza, and Pride of the West, the Duquesne Company owned several smaller mines in the Washington/Duquesne group on 800 acres of land. The best producing of the smaller mines were the Belmont, New York, California, and Kansas mines. Immediately after consolidation, the company had to weather the faltering economy of 1907. By 1908 it was employing about 100 men. That same year, the company installed a considerable amount of equipment at the three major mines, and

used the mill next to the Pride of the West to do all of the on site ore processing (Stevens Handbook, 1906, 1908). (See Fig. 9 of the Washington Camp/Duquesne Reduction Works and the Pride of the West Mine.)

By 1915, the Bonanza, the principal mine at the combined camps, had been developed down to a depth of 650 feet, with over 100 feet of winzes, and 600 feet of raises. It was connected to the mill by a 3,000-foot aerial rope tramway. The majority of the ore extracted was "hand treated" at the mill. The surface equipment at the Bonanza consisted of two 100-horsepower wood-burning boilers, operating a 6-drill compressor, a 50-horsepower hoist, two 4-inch discharge sinking pumps, capable of raising water 600 feet, and three small Cameron pumps. Although many of the other mines in the area did not become flooded even at lower levels, the Bonanza had to be pumped. Water from the 635-foot level was removed by operating pumps for four and one half hours every five days, at which time a two and a half inch stream was discharged. Near the entrance to the mine



Figure 9—Washington Camp/Duquesne. Pride of the West Mine at left; Duquesne Company Reduction Works at right, circa 1909. United States Geological Survey photo.

was a machine shop, a blacksmith shop, and a saw-mill (Schrader 1915: 324–35).

By 1915, the Pride of the West Mine had a 400 foot shaft, a 700 foot tunnel with a 400 foot winze and a 50-foot shaft containing three levels. The mine employed a 25-horsepower steam hoist. The total production of the Pride of the West Mine through 1909 was estimated at 90,000 tons of ore, which averaged 12 percent copper and a small amount of silver (Schrader 1915:323). After 1907, the work at the Pride of the West consisted mainly of assessment work, while methods for treating the new types of ore that had been reached were in an experimental stage (Schrader 1915:323–24).

Construction of the mill near the Pride of the West Mine began shortly after 1899, when C. R. Wifley acquired a half interest in the mine. The initial mill was a 50-ton stamp mill, which operated until 1902, when it was enlarged to a 100-ton capacity. By 1909, after the Duquesne Company took over the property, the mill included a 50-ton smelter, a 100-ton electric mill with astatic, magnetic, and electrical separators, eight Wifley tables, crush rolls, a 150-horsepower Corliss engine, a small Atlas engine, a reverberatory matte furnace, and a 60-horsepower Stetson hoist. Next to the mill there was a 100-foot mechanical roaster and a 25-ton reverberatory furnace (Schrader 1915:323–24).

By 1912, the mines were shipping a carload of ore a day. The mill ran intermittently during this time (Tenny 1927–29:297; Schrader 1915:332). Ore left the mill in wagons for various destinations. The copper, lead, and zinc concentrates were initially hauled to the railroad at Patagonia. In later years, however, concentrates were hauled to Zorilla or to Naco, both stations on the Sonoran railroad constructed by the Cananea Consolidated Copper Company. The Cananea to Naco portion of the line was completed in 1902 and the Naco to Nogales section was completed in 1908 (Tenny 1927–29: 298; Schrader 1915: 324).

The Washington/Duquesne mines remained very active through the decade of the teens. Large-scale work began in 1913. By 1915 the Bonanza Mine alone employed 27 men aboveground and 19 belowground, producing an average of 400 tons of copper and zinc ore a month (State of Arizona 1915). In 1918, the combined employment force at both the Bonanza and the Belmont mines consisted of 90 men above- and 190 belowground; 3,300 tons of ore were coming out of the two mines per month (State of Arizona 1918). This high production continued until early 1919, when the mines closed and

the plant was dismantled and sold (Tenny 1927–29).

During the 1920s and 1930s, production at the Washington/Duquesne area mines was intermittent. The Pride of the West managed to continue to ship a “considerable tonnage of sorted lead and copper ore on lease account” until the depression in metal prices at the end of 1920 (Tenny 1927–29:298). Brief production peaks occurred during the next decade. In 1930, for example, various mines from the two camps shipped about 400 tons of lead-zinc ore to Coffeyville, Kansas, as well as lead ore, oxidized copper ore, and copper-lead ore to other locations (Mineral Resources 1930). The 1940s proved to be far more productive. In 1940, the Callahan Zinc and Lead Company purchased the Duquesne group of mines and built a 100-ton flotation plant. In 1940, about 17,500 tons of zinc-lead-copper ore were treated in the flotation plant. In 1941, 27,572 wet tons of zinc-lead-copper ore were treated, 1,109 tons of silver-lead-copper concentrate and 696 tons of copper concentrates were shipped to El Paso, and 3,601 tons of zinc concentrates to Amarillo, Texas. In 1942, the flotation mill was enlarged to 125-tons, and it treated 31,136 tons of zinc lead-copper ore, including 967 tons of custom ore (from nearby mines). Copper concentrates and lead copper concentrates (1,016 tons) were shipped to El Paso, and zinc concentrates (4,011 tons) went to Amarillo. In 1943, 26,739 tons of zinc-lead-copper ore were treated in an even larger 140-ton flotation mill, which treated 4,255 tons of custom ore, including 4,206 tons of zinc-copper from the Pride of the West Mine, and 49 tons of copper ore from the Santo Niño mine. Despite this relatively high production, in 1944, the Callahan Zinc and Lead Company decided to move its 140-ton mill to a property in Nevada. During the year before the mill was moved, 14,578 tons of ore were treated by flotation, including 2,326 tons of zinc-copper ore from the Pride of the West Mine.

During the rest of the 1940s and into the early 1950s the Washington/Duquesne mines, particularly the Pride of the West, which was owned at the time by A. R. Byrd, Jr., began treating their ore at the Trench mill concentrator at the Trench mill site, which was owned by the American Smelting and Refining Company. In 1950, for example, the Duquesne group of claims operated all year long, hauling 2,498 tons of ore (averaging per ton: 6.40 ounces silver, 1.73 percent copper, 4.22 percent lead, and 12.44 percent zinc) to the Trench mill. Even larger production occurred in 1952, when eleven claims in the Duquesne area trucked 12,620 tons of “various types of ore” to the

Trench mill. The ore contained 73,235 ounces of silver, 439,049 pounds of copper, 943,547 pounds of lead, and 2,500,197 pounds of zinc. Forty-eight tons of copper ore were also shipped directly to a smelter, most likely El Paso. After the 1950s, activity at the mines steadily decreased until all production ended.

Total production of the mines at Washington/Duquesne, which for several years were the second largest lead producing mines in Arizona, was impressive. Between 1899 and 1925, the mines (excluding the Pride of the West, which was not owned by the company producing the estimates) had a total estimated production of 15,000,000 pounds of copper, 12,000,000 pounds of lead, about 3,000,000 pounds of zinc, \$350,000 of silver, for a total value of \$4,000,000. Between 1940 and 1944, while Callahan Lead and Zinc was operating the mines, production amounted to 116,000 tons of ore containing 1.44 percent copper, 2.39 percent lead, 7.75 percent zinc, and 0.77 ounces silver per ton. After 1944, the Duquesne Mining Company shipped almost 14,000 tons of ore to American Smelting and Refining Company's Trench mill, which averaged 1.73 percent copper, 3.75 percent lead, 19.94 percent zinc, and 4.35 ounces silver per ton (AGS Duquesne file, Defense Minerals Administration Report, DMA Docket 3, page 2).

The Settlement at Washington Camp/ Duquesne

Washington developed as a mining camp several years prior to Duquesne. One mile northwest of the camp, Mount Washington, which first appeared on General Land Office maps in 1883, gave its name to the mine and camp. During the 1880s and 1890s, owners constructed a powder house and a mill, several elegant two story lumber residences, and a cluster of some 20 additional residences. Some of the buildings were adobe but the majority were constructed of lumber that had been milled at the Sunnyside lumber mill and hauled to the site in large wagons. The settlement had several saloons and stores, including one that was operated for many years by Mr. You Gang, known to local Mexican residents as "Kima, el Chino." At its peak of population between 1900 and World War I, Washington Camp had almost 1,000 residents, with several stores, saloons, and a small accommodation school. During the 1910s, Harry Vaughan owned another small store and his wife was a nurse for the mining operation. Edward K. Chamberlain practiced medicine in

Washington Camp (Granillo 1994; Schrader 1915:323; Arizona Cattlelog 1953).

Duquesne, approximately three-quarters of a mile south of Washington Camp, served as an administrative center after 1905-06 when the Duquesne Company consolidated the area mines. It never developed into a small town as Washington Camp did. At Duquesne, the comfortable and substantial company structures included a large lumber boarding house for miners and laborers, an assay office, the manager's house, and the company office buildings. Many of these abandoned buildings are still standing today. In 1909, the company installed a large diesel power plant to bring electricity to offices and homes (Tenny 1927-29:298).

As early as 1880, the combined camps had daily mail service with a post office at Washington Camp. The name of the post office was changed to Duquesne in 1890, changed back to Washington Camp six months later, to be changed again in 1904 to Duquesne, under which name it operated until it was discontinued in 1920 (Barnes 1985:327). The school in Washington operated until the 1960s. As late as the 1970s, Washington still had a pool hall. There were reportedly 27 residents at Washington in 1995 and none at Duquesne.

THE SUNNYSIDE AREA

Near Sunnyside, on the western slopes of the Huachuca Mountains, several mines and claims comprised the Huachuca/Hartford Mining District. The largest, longest operating, and highest producing mines included the Copper Glance, the Eureka, the Hamburg, the Harper, and the Wakefield. Farther away from the Sunnyside townsite were the Armistice, the Cave, the Manila, the Pomona, the Reef and the State of Texas mines (Keith 1973: 64-67).

The Copper Glance Mine, five miles upstream from the Sunnyside townsite at the head of Sunnyside Canyon, was the only mine in the area that had significant production. In the early 1880s, a man named Gates claimed the mine but soon abandoned it after discouraging assay results. In 1887, Albert Gattrell, a former saloon keeper, banker, and teacher in Charleston, relocated the mine. Gattrell soon took on a partner, Samuel Donnally, who became head of a Protestant religious community at Sunnyside. Under Donnelley's direction, the Sunnyside religious community operated the mine, which provided their community's main support for many years (Lamma

1982: 5). During the 1890s, the Copper Glance produced and shipped a carload of ore per month containing gold, silver and copper, with values of two-thirds of an ounce gold, 275 ounces silver, and 50 percent copper (Lamma 1982:7). The religious community worked several other nearby mines, including the Eureka and the Lone Star. The Eureka, which had been originally located by Rollin Richardson and sold to Colin Cameron during the 1880s, proved to be much less productive than the Copper Glance. The Lone Star, three miles southeast of Sunnyside township was also unproductive. Donnally constructed a house at the Eureka, partially made of stone, and another at the Lone Star, where he lived for several years. However, the Copper Glance was the main residence for members of the religious community, who referred to it as "the upper camp." The camp was equipped with a concentrator, a pond, a machine shop, stables, and several log houses and tents. It was connected to the Fort Huachuca-Lochiel road by a burro trail, and the community used burros and mules to pack out the ore. Milled ore went to the railroad at Fairbank, where Mrs. Donnally stayed to supervise the packers and their pack animals.

By 1904, a Tombstone company had purchased the Copper Glance and Eureka mines and the mines were operating from an office in Naco. That year the company shipped more than \$100,000 worth of ore and concentrates out of the district. Smelter returns per ton averaged 27 percent copper, \$6 gold, and 184 ounces of silver. The mines were idle in 1906 and 1907, and the company was pronounced "deadbeat" in 1908 (Stevens 1904-1908). During the 1920s, mining at the Copper Glance revived (Tenny 1927-29) and the community at Sunnyside continued to provide support services for the miners. During the Great Depression in the winter of 1932-33, while water was still plentiful, approximately 30 men who would have been otherwise unemployed worked small-scale sluice operations. In June, 1933, three separate concerns were hydraulicking on a small scale, with water pumped from springs or shallow wells (Wilson 1961).

Another small mine nearby, the Peterson silver mine, two miles north of Sunnyside at Peterson Spring, was operated by Gustave "Pete" Peterson in partnership with the famous U.S. Marshall Jeff Milton. According to local lore, Milton befriended Peterson and had reportedly saved his life in a bar-room brawl while both were serving with the Texas Rangers. In Arizona, Milton grubstaked Peterson to

the mining claim, where Peterson, who was something of a hermit, eked out a living from the mine and his garden, telling occasional visitors tall tales about the wealth of the mine. Milton visited frequently and had been at the mine only a few days before Peterson was found murdered in his camp house. The murder occurred shortly before World War I. Despite Milton's efforts, the murderer was never apprehended, although a soldier from Fort Huachuca confessed years later on his death bed (Lamma 1982:38).

The Settlement at Sunnyside

During the late 1880s, Scottish immigrant Samuel Donnally, the former director of the Holiness Mission at Tombstone, launched the community at Sunnyside. During the early 1890s, the community lived and worked the mine at the Copper Glance, where in 1896 some 80 persons were living. The "lower camp" at Sunnyside townsite, at the foot of Miller Peak, was originally the location of the community's sawmill, which had been started to supplement income from the mine. Initially half the men worked at the mine and half at the sawmill. However, during the late 1890s, because production at the mine decreased and the sawmill was situated in a more desirable, warmer location (hence the name Sunnyside), the community, then consisting of approximately 50 members, moved to the "lower camp." By 1898 all of the residents were at the lower camp.

The sawmill became the main support for the community members, who sold lumber to settlers in the San Rafael Valley and to the booming mining community at Washington Camp, where the majority of the buildings were constructed of Sunnyside lumber (Granillo 1994). The community sold the higher quality pine lumber, while the inferior knotty boards and crooked pieces were used to build the cabins at the Sunnyside townsite. The loggers also felled many of the larger juniper trees in the area, selling select pieces of the wood for furniture, particularly fireplace mantels and drain boards. Juniper was highly desirable for gate and fence posts and for foundation supports because it does not rot when placed in the ground. Juniper was also a preferred fuelwood for steam boilers and smelters (Lamma 1982:23-24). Members of the community also cut wild hay on contract for Fort Huachuca, and leased their draft horses for railroad construction and grading. They also leased them on occasion to nearby mines.

The community of "Bible-gleaning Christians" was non-denominational. Income went into a common treasury. Although individual families lived in separate houses, none of the individual homes had a kitchen, and many activities were done communally. Residents ate together in a community dining hall and did the laundry in a common laundry building. At first they hauled food by wagon from Tombstone to Garden Canyon on the east side of the Huachucas, and then transported it by burro to Sunnyside. In later years, however, the community became self-sufficient with gardens, a large orchard, and a community dairy. It eventually provided all its food needs and sold produce to outsiders. Sunnyside had a school and religious services were held in the town, although occasionally residents attended church at the Lone Star Camp three miles away.

With Donnally's death in 1902, interest in the community declined. After the local demand for lumber diminished with the competition from lumber imported by rail into Patagonia, members began to abandon the community. By 1907, Cyrus Cooper was the only resident. After statehood, however, several former community members, including Albert Gattrell and Louis McIntyre, the Sunnyside school teacher, filed homestead claims and returned to the area. Gattrell filed on the Sunnyside townsite and McIntyre on a piece of land in Parker Canyon, where he operated a store for many years. Gattrell attempted to revive the community at Sunnyside. The school and post office resumed operation, but the population never increased beyond 20 persons. Gattrell raised a large garden and ran some cattle and made additional money by selling off some of the old houses for their lumber. After the death of both of the Gattrells, Laura Nye operated a ranch from headquarters at the townsite until the early 1940s, when she sold it to William Hathaway (Lamma 1982:41). During the 1950s, John McIntyre, Louis's son, became caretaker of the former community. The younger McIntyre hoped that in his retirement years he would be able to establish a museum and preserve the buildings at the religious camp. Unfortunately, many of the buildings have collapsed and the milling and mining implements have been carried away (Arizona Republic 5/28/1967; PAHS clipping files).

THE HARSHAW AREA

Although it is located a few miles north of the study area, the mining development at Harshaw had sig-

nificant impact on the surrounding area. Harshaw had the largest population and the most extensive and long lasting mining activity of any of the area's mining camps, maintaining a significant number of families on the northern boundary of the study area until the 1960s. Because of the associated population impacts, the mines of this district closest to the study area deserve mention here. The earliest producing properties were the Old Trench, Pádréz (January), the Hermosa, Hardshell, Alta, Flux, and World's Fair mines, all of which were opened to the depth of 300 to 500 feet prior to World War I and produced large quantities of high-grade lead and silver ore. Although more easily accessed from Patagonia and Sonoita Creek and more distant from the study area, the Flux Mine was a major producer and merits mention in this report. Located during the early 1850s, it was first worked during the Mexican period. In 1858, ore from the Flux was smelted in an old adobe smelter near Sonoita Creek, and lead from this mine supposedly supplied ammunition during the Civil War.

Near these mines, the small town that developed at Harshaw became the focal point of settlement for mine workers. Originally called Durazno, for the venerable peach trees planted by Mexican settlers, the camp at Harshaw was renamed in 1879 for David Tecumseh Harshaw, a Forty-niner and volunteer with the First California Infantry, who was the first American to work the area's claims. After his military service, Harshaw returned to Arizona in 1872 with a herd of 1,000 head of cattle, intending to settle in the San Pedro Valley. However, he was soon working placers in the Patagonias, where he located claims near Durazno, found a vein of silver near the Trench Mine, and worked a third claim that became the Alta Mine. Among the new claims staked by Harshaw and his brother-in-law José Andrade, were the Harshaw and the Hardshell mines, a quarter mile apart due south of the Mexican settlement of Durazno. In 1879, Harshaw sold out to the Hermosa Mining Company of New York.

The Hermosa Mine

Two years before the purchase, in 1877, the Hermosa Mining Company of New York had located the Hermosa Mine, three-quarters of a mile south-southeast of the Harshaw Mine. It was the Hermosa that gave the Harshaw area its great importance. By 1880, the Hermosa Mine had seven shafts. In that year, a new tunnel was being excavated to open the

mine and 60 to 70 men were grading a site for a new reduction mill. Before the year was over, the 20-stamp Hermosa Mill was crushing 75 tons of ore per day. It was the biggest mill in Arizona Territory (Wehrman 1965:29–30; Tenny 1927–29) (see Fig. 10).

In 1880, the company further developed the property, constructing a 100-ton stamp amalgamation mill. This mill and the nearby company headquarters about one-half mile from the mine became the "nucleus" for the town of Harshaw. The expanded mill was again the largest in Arizona at the time. Production for 1880 was \$365,654 (Tenny 1927–29:304). According to another source, the mine operated from October 1880, to November 1881, with 150 men working. The mill ran for 18 months and produced about \$1,000,000 in silver chloride ore, all of which was amalgamated directly at the millsite and the bullion shipped (Schrader 1915:272). In 1881, the Harshaw District was listed as one of the top three silver producers in the territory of Arizona. By the end of 1881, however, the high-grade ore was exhausted and the

mine closed. Its total production in bullion amounted to \$1,155,154 (Tenny 1927–29).

Later in the decade a new owner, James Finley of Tucson, installed a small three and a half foot Huntington Mill at Harshaw to treat the ore, and later expanded it to a five foot mill. In 1890, the Hermosa Mine produced 142,857 ounces of silver, making it one of the most productive silver mines in the area. At some point during the early 1890s, the mine was bonded to Senator McGoverney of Cañon City, Colorado.

After the demonetization of silver in 1893, little further work was done until the last years of the decade, when the Hermosa Mining Company of Oklahoma enlarged the mill and did 900 feet of work below the old stopes, but with little success (Tenny 1927–29). In 1902, the company remodeled the mill, installing a new five-foot Huntington mill. After the remodeling, the mine was reported to have produced ore worth \$7,000 in a "22-day run" (Schrader 1915:272–73). The Hermosa operated intermittently during the 1940s. In 1949, Hermosa and the World's

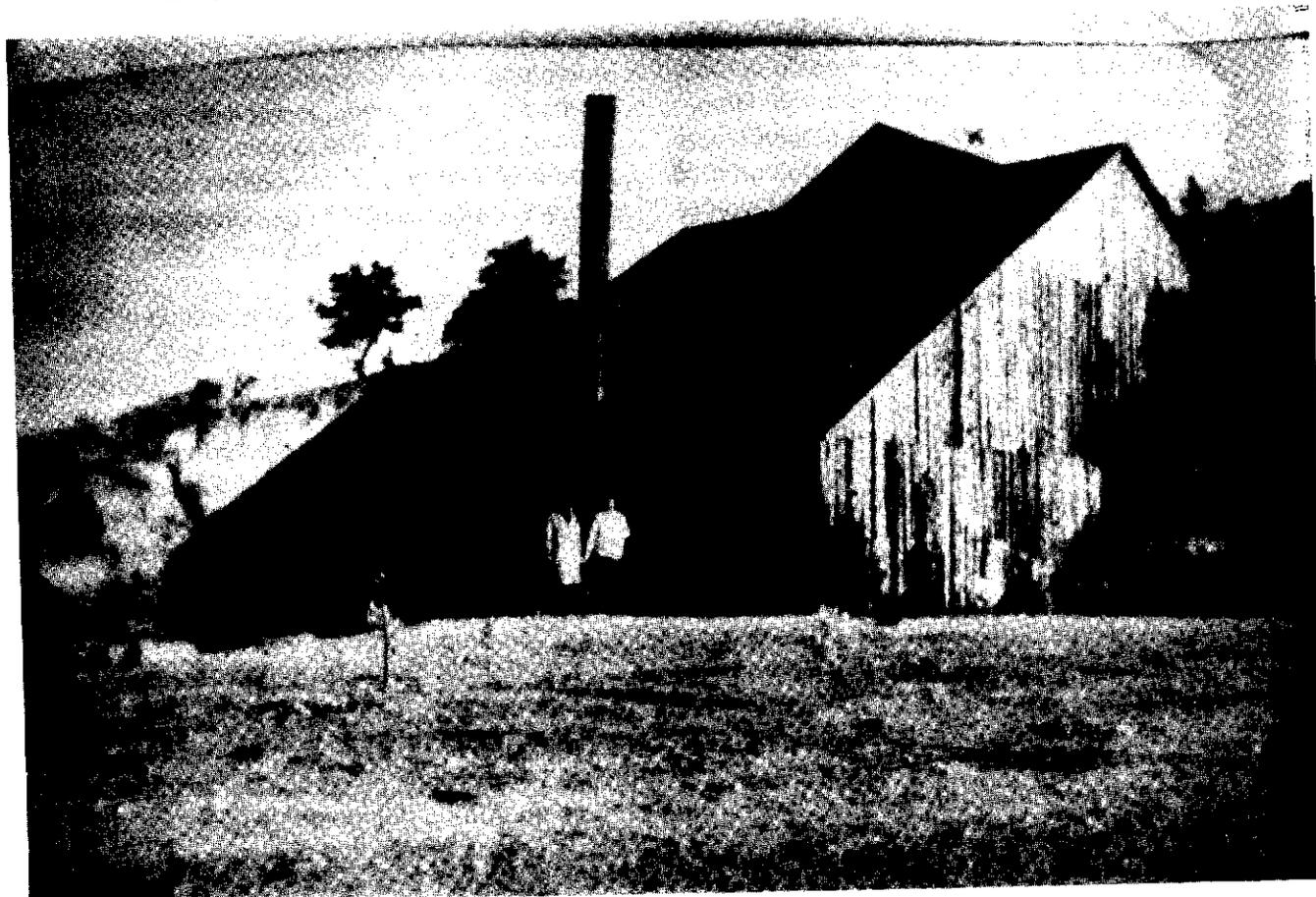


Figure 10—The Hermosa Mill, near Harshaw. 1880s. (Courtesy of Norman Hale.)

air Mine together produced 61 tons of silver ore (U.S. Department of the Interior).

The Hardshell Mine

The Hardshell Mine was located about one mile south-southwest of Harshaw in Hardshell Gulch. Discovered by José Andrade and his brother-in-law, David Harshaw, the mine was purchased by Rollin Richardson, the developer of the Patagonia townsite. By 1896, Richardson's Empire Mining & Milling Company had sunk a 400-foot inclined shaft, extracted 4,000 tons of ore, and shipped 3,000 tons to El Paso. In 1897, Richardson constructed a 100-ton blast furnace at Rollin, the new townsite he was developing eight miles from Harshaw and two and a half miles south of Crittenden on the railroad, which was soon to be renamed Patagonia. Conveniently located on the railroad, the Patagonia furnace smelted the ore from the Hardshell, the Flux, and other mines in the area. In 1899, Richardson built a 50-ton concentrator at the Hardshell, which was later remodeled to make a high manganese concentrate (Tenny 1927-29). For a few years after 1901, when population at the mining camp peaked, Hardshell had a post office. However, operation of the mine and concentrator were intermittent and population at the mining camp was equally unstable. In two separate inspections of the mine, 1909 and 1915, Frank Schrader reported that the mine still had its 50-ton concentrator, 40-horsepower steam hoist, and a permanent camp with comfortable adobe buildings (Schrader 1915:265-66).

A formal inspection of the mine facilities in 1918 reported that there were 12 employees working aboveground, and 16 below. They were producing 100 tons of primarily manganese ore per month. The following year found 15 miners working above, and seven belowground. The mine was in a development stage, mining lead and silver ore. In 1920, there were three more employees above ground, and one more below, still working to develop the mine. In 1930, the Hardshell shipped 768 tons of oxidized lead ore (State of Arizona 1918-20).

Other Mines in the Harshaw District

The World's Fair, two miles west of Harshaw on Alum Gulch, produced more than one million dollars worth of ore prior to World War I. It was equipped with a 10-stamp mill with concentrators

and a steam hoist. At the head of Alum Gulch, the Humboldt, Red Bird, and January (Pádréz) mines all had shafts dating from the 1880s and produced considerable amounts of ore. During the 1850s, Mr. Pádréz located the Trench Mine, about 1 1/2 miles west of Harshaw on the road toward the World's Fair. During the 1870s, the Hearst estate of California worked the Trench extensively. Prior to World War I, the mine had a mill and produced large amounts of high grade lead silver ore. Other producing mines in Alum Gulch included the Sunnyside Mine, located by Richard Farrell of Harshaw; the Blue Eagle, owned and operated by James Hale of Harshaw; the Invincible, Standard and Thunder prospects; and the Hampson prospect at the end of the wagon road in Alum Gulch. Although closer to Patagonia and farthest from the study area, the Flux (formerly Goshen) Mine, owned for several years by R. R. Richardson, the developer of Patagonia, was a major producer in this district. Prior to World War I, the mine had over 5,000 feet of workings and a mill. Ore was treated in the Patagonia and Benson smelters. Southwest of Harshaw, near the road to Mowry were the American Mine and the Blue Nose Mine, both active during the 1880s (Schrader 1915:245-71).

Many of the mines in the Harshaw District continued producing after other mines in the vicinity had closed down. In 1931, for example, the World's Fair, Hardshell, and Flux mines combined produced about 1,000 tons siliceous silver ore and 400 tons sulphide lead. Some of the ore was shipped to an El Paso smelter (U.S. Department of Commerce 1930-31). The Hardshell was active during the 1940s, producing lead-silver ore: 258 tons in 1943; 110 tons of oxide silver-lead ore in 1944; 147 tons of oxide lead ore in 1946; and 493 tons in 1947. In 1944, the mine was purchased by the American Smelting & Refining Company (U.S. Department of Interior, 1940, 1943-44, 1946). As late as 1964, the Hardshell Mine was the largest producer of lead and silver in Santa Cruz County (U.S. Dept. of The Interior 1964). The Flux and the Trench Mine continued in operation through the 1960s.

Settlement at Harshaw

In one short year, 1880, the old Mexican settlement of Durazno, renamed Harshaw, became a cosmopolitan mining town. The Harshaw District experienced a true mining boom. Old locations like Mowry and the Trench Mine were reopened and new locations

were being opened daily. By 1880, the 40 square mile district had 35 producing mines. Harshaw became the mercantile and supply center for the surrounding mines. Georgia Wehrman (1965:30-32) produced an excellent analysis of the 1880 Census for Harshaw. It enumerated more than 600 residents, whose birthplaces spanned the globe, including over 35 states and three territories of the United States, 14 European countries, China, India, and Mexico. Mexicans accounted for the largest number of foreign born, although many of these individuals had been naturalized by virtue of the Gadsden Purchase. Harshaw residents included more than 20 individuals for each of the following countries: Ireland, China, England, Canada, and France. The majority of occupations were listed as miners, construction workers, or laborers. Twenty-four individuals were selling groceries and another 24 sold liquor. Restaurants employed 35 and the laundry 11. There were 10 blacksmiths, two tanners, one cooper, one wagonmaker, and one millwright. The town had one hotel, two lodging houses, four livery stables, one tailor, several shoemakers, several barber shops, one tobacco shop, one watchmaker and one stationery. There were two lawyers, one musician, one physician, three druggists, one telephone operator, one printer, and four prostitutes. Harshaw had two short-lived newspapers, *The Harshaw Bullion*, published by Charles D. Reppy, one of the founders of the *Tombstone Epitaph*, and the *Patagonia Sentinel*, published by L. D. Sayre. Within a few years, the Harshaw townsite had a school. Only eight miles from the Patagonia station on the New Mexico and Arizona Railway line, Harshaw also had daily stage service on the Patagonia to Harshaw, Mowry, Washington, and Duquesne stage line. The town had a post office from 1880 to 1903 (Barnes 1985:318).

Nonetheless, Harshaw's true boom was limited to the years between 1880 and 1882. After that time ore production decreased and a series of devastating floods and fires occurred in 1881, causing the town's population to decline. By the end of 1882, the *Epitaph* reported that four-fifths of the buildings in Harshaw were unoccupied (Murbarger 1964:135). Despite the disasters and depopulation, the town continued to have a population of approximately 70, with one or two small businesses serving the surrounding area.

The town revived to some degree during the 1890s, and the finest homes in Harshaw were constructed at this time. Informants familiar with the old townsite describe a townsite with a majority of adobe struc-

tures. However, Frank Schrader, who visited the site in 1909, stated that many of Harshaw's buildings were made of stone (Schrader 1915). The houses of the Farrells and the Bests were of adobe construction. The Finley's house was constructed with bricks from the old stack at the Mowry smelter. These are the only structures still standing. All other buildings were demolished by the Forest Service under an earlier policy which specified that such structures should be removed. (See Fig. 10 of the *Hermosa Mill* and Fig. 11 of the *Farrell house*).

Nearby Hardshell, only a mile from Harshaw out along the present road to Lochiel, also developed into a small settlement and even had a post office for several years. Competition from nearby Patagonia and Crittenden, both of which had railroad stations, and the 1903 death of James Finley, owner of the *Hermosa Mine*, ended Harshaw's prominence as a mercantile center for the local mines. By 1909, there were only a few residents at Harshaw, some of whom continued living at the settlement until the 1960s, when the Forest Service destroyed most of the remaining buildings, situated on National Forest. Harshaw still has two resident families at the present time (1995), descendants of Richard Farrell, one of the earliest settlers of the town (Hale 1994).

MEADOW VALLEY

Meadow Valley, another portion of the study area in the Red Rock District, had a few small mines that were active into the early 20th century. The first mining in Red Rock District was done by a group of French mining engineers, who arrived during the late 1870s. Among the Frenchmen was a man named Carré, who in 1881 located the *La Plata Mine* in Red Rock Canyon, and two French partners named Salá and Michelato, who located another claim one mile north of the *La Plata*. South of these mines, within the study area, Frank Olsen began working the *Meadow Valley Mine* in 1881. Olson continued doing small amounts of development work on the mine but with little production. Another group of claims on the *Meadow Valley flat*, owned by Frank Hale and called the *Hale Prospects One through Three*, consisted of shallow pits opened in vertical fissures (Schrader 1915:241-45). None of these mines were significant producers.

ENVIRONMENTAL IMPACTS FROM MINING

The activity of mining itself produced both direct and indirect impacts on the study area. The most



Figure 11—James Finley house, under construction, Harshaw. 1890s. (Courtesy of Norman Hale.)

obvious of the direct impacts are the result of smelting and the creation of slag piles and tailings, with the associated distribution of metals and chemicals. However, within the study area, these more obvious impacts were relatively slight. Groundwater may be affected by acid tailings if moisture from the pile percolates directly downward and enters the water table. When deposited next to watercourses, or if mixed with alluvium during downstream transport, acid drainage from tailings may occur (Dean 1982:1-10). The Arizona Department of Environmental Quality has received complaints of poor water quality in the Harshaw Creek area, but poor water quality has not been a noticeable problem within the study area. The absence of a water quality issue, despite large tailing piles near water courses in the Washington/Duquesne area, may result from the small number of residents living downstream from the disturbed areas. Near the Hermosa and Hardshell mines, small waste dumps dot the landscape and disturbed land erodes into the nearby creeks. This is the case in the Washington/Duquesne area as well, where Washing-

ton Gulch and Duquesne Wash are heavily eroded and downcut in many areas.

A significant, but less obvious impact, comes from earth removal. Although it is impossible to calculate the quantity of earth taken from the mines' workings, cumulative earth removal can be roughly estimated from the length, width, and height of the workings at each mine, creating an estimate of the total of earth removed from all tunnels, winzes, adits, and stopes at any one of the mines for which good records have been kept. Impacts varied according to the location in which the earth was deposited. Obstruction of water courses with the removed earth could result in redirection or downstream erosion of the streambed.

One of the most important indirect impacts from mining was the creation of viable employment for large numbers of people who otherwise would not have settled within the study area. The impacts from these residents during the early period of settlement came from clearing and leveling of home sites, house construction, gardening and farming, well digging,

road construction, travel, and fuelwood cutting. Freighting and travel generated significant impacts as well, with dozens of wagon loads of ore hauled daily in eight-mule team wagons and a daily mail and stage service between Patagonia, Harshaw, Mowry, Washington, and Lochiel. The proliferation of roads, including many smaller roads that were used for logging or for access to smaller mining camps, along with road maintenance, had significant impacts on the study area.

Impacts from settlement depended on the size of the settlement area and the length of settlement, the number of people occupying an area, and the length of time the area has had to recover, as can be seen from a comparison of the abandoned mining sites and settlements at Mowry and Washington Camp. At Mowry, mining and settlement occurred at an earlier period, generated a maximum population of 300, and ended after a period of less than 20 years. On the 10- to 15-acre area where the Mowry smelter and mill were located, the ground is still relatively unvegetated, and it is obvious that former human activities have altered the land. Along Mowry Wash and closer to the Lochiel road, where the majority of the worker's houses and the office buildings, school, and store were located, there is relatively little evidence of human habitation, and if not for a few stone foundations and ruins of adobe structures, it would be difficult to tell that a small settlement had existed on the site.

The area around Washington/Duquesne, however, still appears devastated. At these mining camps, mining activity was much greater, with more ore extracted, more shafts opened, and more earth removed. Large scale development occurred at a later date when more sophisticated technology enabled operators to alter the landscape to a greater degree. Population was at least three times larger than at Mowry, and residents remained in the camps for some 30 years longer than at Mowry. Earth removal has seriously altered the topography. Trees and other vegetation have not regenerated on large areas of ground near the Pride of the West Mine and mill site or in the area near the Duquesne Company's headquarters. Duquesne Wash is eroded and downcut. The obvious relative impacts are much greater at Washington/Duquesne than at Mowry.

Fuelwood cutting for charcoal making, for direct use in boilers and furnaces, and for domestic use by mine workers is probably the single most significant impact from mining. In 1882, only two years after

the boom at Harshaw began, a Tombstone Epitaph reporter noted on his visit the declining town, "The hills adjacent to the town, have been denuded of the . . . beautiful trees by which they were adorned, and the birds that were wont to sing to us ... have departed. . . ." (Epitaph 12/16/1882, quoted in Murberger 1964:135). It is evident from figure 8 of Mowry and figure 9 of Washington Camp that large numbers of trees had been cut for fuelwood consumption. Both areas are much more heavily wooded at the time of this writing.

The conversion from wood fueled boilers and furnaces to gasoline powered engines or diesel powered electric plants is of critical concern for evaluating impacts and gauging the rate of regeneration. Unfortunately, few of the newspaper articles or mineralogical reports concerning mining development mention the type of fuel used in the heavy equipment on site. However, it is clear fuelwood and water were in short supply at Mowry as early as 1913, and as a result of the shortage, the new internal combustion engines had become highly desirable (AGS clippings file). The complaint about inadequate fuel was repeated at many of the other mines. After 1910, more frequent notices appear that the older steam boilers were being sold to wrecking yards and replaced with electric or diesel machinery. We assume that more highly capitalized companies working more productive mines could afford to install the most modern equipment at an earlier date. In 1914, the World's Fair Mine converted from steam to gasoline (AGS clippings file). In 1917, the Duquesne Company had an electric power plant for its mill. Hardshell was still using a steam hoist as late as 1919, but by 1921 was considering the installation of expensive modern electric equipment (AGS clipping files). To further complicate the investigation, some of the mines used equipment that employed different types of fuel simultaneously. For example, in 1915 the Washington/Duquesne mill still used two 100 horsepower wood-burning boilers while at the same time it had a 100-ton electric mill (Schradler 1915:324).

Use of fuelwood for domestic purposes is a second major impact. Geographers have estimated that one family using wood to heat and cook consumes an average of four cords of wood per year, or approximately one cord per person per year. Although this estimate obviously varies with climate and house size, it would appear to be appropriate to climate and living conditions within the study area. Using this consumption rate, 1,000 residents at Washington/

Duquesne living in 250 households would have consumed 10,000 cords of wood in one decade. In the Lowry vicinity, 300 residents in 60 households would have consumed 2,400 cords in a decade. In any case, the fuelwood consumption of these early residents was large enough to noticeably decrease the stands of trees around most settlements. Cuco Branillo, who has lived his entire 84 years in the Lochiel-Washington area, stated that during the early years of the century there were dozens of Mexican

wood cutters employed full time in the Washington Camp area. Another life-long resident of the study area, Helen Ashburn, offered the additional information that fuelwood was sometimes exported into Mexico. Conversion to other types of fuel is a less important question in domestic use, since very few of the settlers in the study area had propane stoves prior to the 1950s, and the majority continued to heat with wood for many years after that time. This impact is discussed further in Chapter 8.

Appendix 5.1

The Influence of Apache Raiding on Mining and Settlement

During the Mexican period (1821–54), Apache hostilities caused the depopulation of much of northern Sonora and forced the abandonment of many mines and any isolated ranches in the study area. Although Apaches did not permanently reside within the study area, they frequently used the route down the Santa Cruz River to reach settlements in Sonora. Historians have identified seven major routes used by Apaches to reach Mexican settlements. Since much of the Apache travel was for purposes of raiding, the westernmost of these trails became known as the “great stealing road” of the Apaches or the “Coyotero trail.” The trail originated in the Pinal and White Mountains of eastern Arizona, crossed the Gila River, continued down Aravaipa Canyon, and followed the San Pedro River into Mexico (Smith 1964:9–10). From the San Pedro, Apaches could easily cross into the San Rafael Valley via the Babocomari and Canelo Pass or through Montezuma Pass in the Huachucas. During the Mexican period the route was mainly used by the Gileo and Pinal Apaches. After the 1860s, however, Chiricahuas came into the area more than other Apache bands.

The Forty-niners recounted many incidents of Apache raiding that they experienced themselves and repeated secondhand tales of Apache hostilities heard from the residents of Santa Cruz. Although the Mexican military had mounted several offensives against the Chiricahua Apaches from the presidio of Santa Cruz during 1849, Apache warriors held the upper hand, particularly since many Mexican soldiers were abandoning their posts to join the California gold rush (Sweeney 1991:69–70). On Sunday April 29, 1849, a large group of warriors attacked Santa Cruz and the following day they killed seven men at work in the fields (Sweeney 1991:71). The Apache threat became so severe, that in May 1849, the state of Chihuahua adopted the Fifth Law, offering bounties for Apache scalps and a large sum for captured warriors, women, and children (Sweeney 1991:76). The state of Sonora later adopted a similar law. In the fall of 1849, Colonel José María Elías González mounted an unsuccessful offensive against the Chiricahua. Again in 1852, another more successful campaign was mounted against the Chiricahua from Santa Cruz (Sweeney 1991: 76,89).

Forty-niners attributed abandoned settlements and mining sites to Apache raiding. San Lazaro, where extensive mining and smelting activity had taken place, had been abandoned a few years earlier after a particularly intense Apache attack in which over 1,000 head of cattle were stolen and many buildings burned (Hunter ms:114). Forty-niners described farmers at Santa Cruz going out to work their cornfields armed with guns and spears (Clarke 1852:81–82). Several Forty-niners reported that shortly before their visit to Santa Cruz 200 Apaches had charged the walled town in full view of the “redoubtable fort,” and had driven off all the loose stock they could take (Hayes 1929:43). Near Santa Cruz, members of Captain Isaac Duval’s mule-back party of Texans recovered a herd of 50 head of sore-footed cattle bearing Mexican brands, many of which were “pocked with lance marks.” The Texans discovered the Apache ranchería, burned the wigwams and chased the furious Indians to the summit of the high mountain near their road (Harris 1960:73–76). Incidents such as these were frequent in the study area both under Mexican control and after acquisition by the United States.

During the period between the Gadsden Purchase and the Civil War (1854–1861) Apache hostilities continued. On August 25, 1854, between 15 and 20 Apaches attacked a Texas cattle drive near Santa Cruz, killed one of the drovers, and stole several hundred head. The same group of Apaches subsequently stole 140 head from another drive, and a few days later they stole the entire Fairchild herd of several hundred head. After these incidents, a group of Texans assembled in the town of Santa Cruz, pursued the Apaches, and succeeded in killing 21 Indians and recovering 47 head of cattle (Haley 1979:34; 77–78).

Scattered military garrisons near the study area afforded some protection to travelers, settlers, and miners. A small force of Mexican troopers continued to be stationed at Santa Cruz. During the late 1860s, a garrison of 20 Mexican soldiers was stationed at an abandoned ranch on the San Pedro River in Sonora (Spring 1966:111–113). On the United States side of the border, the first military post within the Gadsden Purchase was Camp Moore, established in November 1856 at the present location of Calabasas on the

Santa Cruz River eight miles north of the international boundary. Commanded by Major Enoch Steen, the post consisted of a few adobe buildings and was supplied from New Mexico and Sonora. In June 1857, the post was renamed Fort Buchanan and the four companies of 1st Dragoons stationed there were moved to a new site on Sonoita Creek, between the present towns of Sonoita and Patagonia (Altschuler 1983:48). The move to Sonoita Creek established a buffer against Indian raids from the east into the Santa Cruz Valley. (Serven 1965:27).

Buildings at Buchanan were mostly cabins of upright logs chinked with adobe, and were scattered along the creek, more like a village than a normal military post. The post employed Papago Indians to gather wild hay (Serven 1963:37) and purchased the majority of its supplies in Sonora, rather than from other U.S. territories. In 1856 and 1857, government teamster John B. Hinton freighted supplies between Magdalena, Sonora, and Fort Buchanan, driving a 20-mule team wagon, usually as part of a train of 16 to 18 wagons. On American soil, an escort of soldiers accompanied the wagons, but they were not allowed to cross the border into Mexico (Hinton ms.). Army personnel quickly realized that Fort Buchanan was in an unhealthy, swampy location on Sonoita Creek and made plans to relocate to higher ground where malaria was less prevalent. However, the Civil War intervened and the post was abandoned and burned in July 1861, while Confederate troops were entering Arizona Territory (Altschuler 1983: 19-21).

The southern portion of Arizona Territory was without military protection from July 1861 until August 1867, when Tucson commander Colonel Thomas Crittenden, 32nd Infantry, ordered the establishment of Fort Crittenden, at the previously selected site a half mile from old Fort Buchanan. The post operated from this site until 1872, when General George Crook closed it down. A portion of Troop F, 5th Cavalry stayed on after the closure through harvest-time to protect local farmers, most of whom depended on the post to market their produce. A small garrison remained until June 1873 to oversee the removal of government property (Altschuler 1983:25).

Camp Wallen, a second post near the study area, was active from May 1866 through October 1869. Intended to block the Apache route from the San Pedro River into Sonora, the post was located at the old Babocomari Ranch on the north bank of the Babocomari River. Several of its adobe buildings in-

corporated the walls of the former Mexican rancho. In order to avoid the small garrison, Apaches used an alternative route and continued their incursions into Mexico (Altschuler 1983:62-63). Because Wallen was ineffective in stopping incursions it was abandoned in 1869. By 1872, only the adobe walls were left standing (Splitter 1962:83).

From the time of the withdrawal of the last soldiers from Crittenden in 1873 until the re-establishment of a temporary post at old Camp Wallen in 1876, the closest military garrison to the study area was at Tucson. In March 1877, Fort Huachuca replaced the temporary camp at Wallen and was quickly expanded into a full fort (Altschuler 1983:32). During the Geronimo campaign, it became a crucial post with a large garrison that saw much action.

Despite nearby military protection, the 15-mile route between Santa Cruz and Mowry was the scene of frequent Apache attacks. While Sylvester Mowry was operating the mine, he maintained a virtual garrison, surrounded the houses with high walls, and sent his men to work with "a gun in one hand and tools in the other" (Sweeney 1991:191). After 1861, Chiricahua warriors, including Cochise, began raiding the area. In June 1861, Cochise had made a devastating sweep through the Santa Cruz Valley, destroying the Canoa Ranch (Sweeney 1991: 175). Attacks increased after the July 1861 Union withdrawal. During the winter of 1861-62, Cochise concentrated his efforts on the Mowry-Santa Cruz road. In December 1861, Thomas Gardner, a resident of La Noria who imported Mexican beef to supply the Mowry mine, encountered Cochise on the road to Santa Cruz. According to Tom Jeffords, Cochise wanted to steal Gardner's spirited horse. He requested a parley then shot Gardner without raising his rifle (Sweeney 1991:191-92). In February 1862, Dr. Elliot Titus, one of the owners of the Mowry Mine, and Delaware Joe, a Delaware Indian employed by the mine, were killed on the Santa Cruz-Mowry road approximately three miles north of the San Antonio Mine. In April 1862, Apaches stole several hundred dollars worth of silver bullion and killed seven "peons," whom Mowry had sent to Santa Cruz in an ox cart and without an escort, again on the road between Mowry and Santa Cruz (Sweeney 1991:193).

Union troops reoccupied southern Arizona in May 1862 and reinstated Fort Buchanan. Despite this more effective military presence, Apaches continued raiding. In December 1863, Apaches killed two employees of the Patagonia [Mowry] Mine, named Mills and

Stevens, on their way from San Antonio to Mowry in the same location as the 1861 attack on Dr. Titus. On the day that Mills and Stevens were killed, the same group of Apaches attacked Samuel Butterworth, newly selected president of the Arizona Mining Company, near Santa Barbara on his way from Guaymas to Santa Cruz. Butterworth escaped but became lost and was later rescued by Sergeant Commadurn of Santa Cruz far from the site of the attack (Browne 1950:195-202). When J. Ross Browne visited the cemetery near Mowry in 1864, 15 of the 17 graves contained victims of violence, mostly Apache attacks.

In July 1865, after warriors with Cochise attempted to run off the cattle herd from the San Rafael Ranch twice in one week, General John Mason of the California Volunteers ordered a scout of the Huachuca Mountains and San Pedro Valley. Captain Hiram Messenger left the Mowry mines with over 30 men but failed to find Cochise (Sweeney 1991:233-34). In April 1866, Chiricahua warriors again attacked the San Rafael Ranch, forcing owner Rafael Saavedra and his servants into the main house. When the Apaches set the outbuildings on fire, trapping one of the woman workers, Saavedra rushed out of the hacienda and saved the woman but was killed in the process. The San Rafael Ranch was abandoned soon after this incident. Both Juan López, a worker at the San Rafael, and Thomas Yerkes, who lost 66 head of cattle in the same raid, identified Cochise as the leader of the warriors (Sweeney 1991:242). On May 31, 1866 Cochise attacked Camp Wallen itself, stealing the cattle herd and leaving only five horses at the post.

In February 1867, Cochise and a party of warriors, estimated at between 20 and 40 men, attacked the Mowry Mine. The war party pinned down a group of five Americans in one of the mine buildings, where a large supply of weapons and ammunition were kept. One of the mine owners, Richard Doss, who was visiting at the time of the attack with Thomas Yerkes, was wounded in the leg while running into the building. Several hours after the attack began, the mail contractor Oscar Buckalew arrived on the scene. While attempting to drive off the Apaches, Buckalew was also wounded in the leg, which later required amputation. While the battle was raging, Oscar Hutton and a second man also approached the mine and observed the fight. The two local residents immediately fled to Santa Cruz for help, with several Apaches in hot pursuit. They returned with a force of 31 citizens and sent messengers to Camp Wallen, where Captain William H. Brown dispatched

several troopers in pursuit. Both groups failed to find the Indians (Sweeney 1991: 247-48).

In June 1869, Apache forays became so severe they threatened to disrupt settlement along the border. After again attacking the Yerkes ranch and killing Eli Pennington at a neighboring ranch, warriors with Cochise fled with stolen cattle into Mexico. Lieutenant Florencio Ruiz of the *presidio* of Santa Cruz pursued Cochise north into Arizona and then east across the San Pedro to the Dragoons where he recaptured some of the cattle. Apache forces outnumbered the Mexican troopers, who were forced to retreat to Santa Cruz (Sweeney 1991:266-67). In the spring of 1870, Cochise attacked Thomas Gardner's ranch in the Sonoita Valley. Troops from Crittenden pursued and killed several Chiricahuas but failed to capture Cochise. In May 1871, Cochise returned to the vicinity of Santa Cruz, where his warriors ambushed 11 men south of the Patagonia Mountains, killing two and wounding two others. Cochise himself may have been wounded in that engagement (Sweeney 1991:314). On a single day in August 1872, Apaches killed seven Mexicans near the study area, three near Fort Crittenden and four between the Santa Cruz and Sonoita valleys (Thrapp 1967:116).

After the establishment of the short-lived Chiricahua Reservation during the fall of 1872, Apache attacks throughout the area decreased. However, the death of Cochise in 1874 left the Chiricahuas without unifying leadership. Within two years, in June 1876, the reservation was abruptly terminated and the reluctant Chiricahuas transferred to San Carlos. During the next 10 years, Chiricahuas and members of other Apache groups repeatedly escaped. Chiricahuas resumed raiding in southern Arizona and Mexico, using their old trails through the San Pedro and San Rafael valleys. In June 1876, Apaches killed two young Texas cowboys, George Price and Pete Sherwin, the first settlers at the location later known as Parker Canyon. The cowboys had constructed a 12x16 foot cabin, built a corral and imported 100 head of cows, 50 steers and 10 horses from the area around Santa Cruz, planning to sell beef to the mines in the Mowry area. Two weeks after they brought their livestock to the canyon, Henry Morton, proprietor of a store at the settlement which became Harshaw, found the bodies of the cowboys riddled with arrows and the cabin burned to the ground (Willson *Arizona Republic* 10/17/1965).

Between October 1882 and April 1886, General George Crook was in charge of the Apache campaign.

He was replaced by General Nelson A. Miles, who secured Geronimo's surrender in September 1886. During the spring of 1883, Crook launched a major campaign against the Chiricahua and other Apaches who had taken refuge in Mexico. This campaign kept many of his troops stationed in temporary camps close to the international boundary for the next two years. During the final phase of the Apache wars, in the Geronimo campaign of 1885-86, Lieutenant John Bigelow's small detachment of "Buffalo Soldiers," Troop K, Tenth Cavalry, was stationed at the Mowry Mine. Bigelow's detachment of some 40 enlisted men was strategically located to guard the Mowry, Washington and San Antonio passes through the Patagonias and to protect traffic on the Patagonia-Santa Cruz road. Although a soldier was sometimes stationed at the San Rafael Ranch, the only other military presence in the project area was Captain Charles Hatfield's camp. This camp, first located in Copper Canyon and later in Cave Canyon, guarded passes in the Huachucas.

While Bigelow was stationed at Mowry, residents reported hostile Apaches on a number of occasions and several actual attacks occurred. In July 1885, Chiricahuas killed the driver of the stage between the Sonoita Valley and Lochiel. It may have been following this incident that 16-year-old Jim Hathaway, another pioneer resident of the San Rafael Valley, took over the Crittenden-La Noria mail route (Hathaway 1986:103). In June 1886, 15 Apaches came through the area and one man was killed at Peck's mine, between the Blue Nose and Harshaw (Bigelow 1968:213). In Sonora, residents of Santa Cruz repeatedly reported Apaches passing by their town, and toward the end of Bigelow's tour of duty, he spent several weeks pursuing Apaches in Mexico.

During the year Bigelow was stationed in the study area, the majority of his time was occupied with the routines of army life, offering him enough leisure to observe his surroundings and to write a 13-month diary, filled with information about frontier life. The mine at Mowry was not operating during Bigelow's stay, and settlement was limited to one or two Mexican families, including a man named Ruiz who was one of Colin Cameron's cowboys. The troopers lived in tents scattered among the abandoned mine buildings, used the large corral for their 50 horses and pack mules and cooked meals in one of the empty adobe buildings. As soon as their tour of duty was over, two of Bigelow's troopers opened a saloon and store in one of the abandoned buildings (1968:94). Bigelow

(1986:90) considered that his men suffered from a shortage of arms and stated that during the winter his livestock had inadequate feed despite the native hay cut by an army contractor at Lochiel (Bigelow 1968:103).

Bigelow's diary ends after he returned from his June 1886 expedition into Mexico. Less than three months later, Geronimo surrendered and Apache hostilities ended. Although one might assume that the threat of Apache attacks would have retarded the growth of mining and settlement in the study area, this does not seem to have been the case. While Bigelow was stationed at Mowry, he attended dances in Lochiel on several occasions. Although Bigelow does not describe the settlement in detail, his diary implies that the town had achieved a surprising degree of development and some comfort. Dances were held in a large wooden-floored building, which surprisingly was not the schoolhouse, since the school was usually the only building large enough for dances in a small frontier town. Lochiel had several warehouses, two stores, a school, a post office, and a Justice of the Peace. Bigelow traveled to Harshaw and stayed there in an actual hotel. Several years after the big Harshaw mining boom had bottomed out, the town still had its rustic hotel, a store, and several saloons. At Mowry, the U.S. Army was about to foster the settlement's revival by contributing two new residents and, indirectly, a new saloon. Active mining was taking place at Washington Camp, where the famous Colonel Greene was living during Bigelow's stay. Bigelow mentions many small mines, including the Peck Mine and the Blue Nose Mine, for which there is little formal record. They may have been unproductive mines, but at the time of Bigelow's stay, they were important sites because they had residents. Traffic on the Patagonia-Santa Cruz road was frequent, despite its obvious lack of safety.

It is clear from Bigelow's description, that although the study area was a dangerous place to live, the Apache threat had not seriously retarded either mining or settlement. During the Civil War, when military protection was withdrawn, although mining slowed down, it did not stop altogether. At Mowry, and perhaps at other locations, miners and smelter workers were armed. After the garrisons at Crittenden and Huachuca returned, mining activity increased, but booms occurred only when important strikes were made. Finding rich veins of ore, rather than the number of Apache attacks, determined the level of mining activity. After the final Apache de-

feat, the study area did not experience a significant population increase. Rather than seriously retarding development in the study area, the significant effect of the Apache wars may have been the introduction of new miners and settlers into study area. The ma-

jority of the early locators of Mowry, for example, were military men, including Lieutenant Mowry himself. Several of the proprietors of stores and saloons and many unsuccessful prospectors were also former military men.

Appendix 5.2

Mining Glossary

amalgamation: process of extracting gold and silver from crushed ores by bonding with mercury; the quicksilver is later expelled by heat and used again.

concentrating: process of separating metal ore from the waste rock or mineral from which it is enclosed. The ore is crushed, then separated into metals and waste material. Separation can be done by gravity (dry or in water), oil or froth flotation, or magnetically.

flotation: method of separating or concentrating the metallic sulfide minerals in an ore, generally by mixing the pulverized ore with acid and oil, then agitating it by air or paddles to produce a froth or scum that allows the metallic minerals to rise up and float off, leaving the waste material. Does not work well with oxidized ores (ores in the process of oxidization through exposure to air or water).

gravity concentration: separation of metals based on their differences in gravity.

Huntington Mills: where ore is ground by heavy wheels moving around in a circular motion.

lixivation: process of leaching out the metallic contents in ores.

magnetic separator: separates magnetic ores with a magnet. Can be done from wet pulverized ore or with dry ore; the latter uses a high speed magnetic belt. The latter method is also used with the Wetherill Magnetic Separator.

matte: copper product, somewhere between blister copper (copper 96-99%) and sulfide copper ore; it varies greatly in percentage of metal. Obtained by eliminating sulfur and other elements from sulfide copper ores.

reverberatory furnace: type of smelting furnace where "flame from the grate below is reflected back by the roof, on the charge of ore above."

roaster: an oven to remove sulfur, arsenic, and other "volatile elements" from ores.

smelting: reduction of ores and crude metals (separating metals from their ores) in furnaces. Heat, fuel, and fluxing material (a substance that promotes melting) are added to the ores to be smelted.

stamp mill: mill where mineral ore is crushed by stamps, heavy iron castings that are attached to pistons and crush rock or ore by heavy blows against a round steel block (a die). Usually five stamps are housed inside a steel box (battery box). The mixture is wet, and particles of a desired size pass through a sized screen. Solution can then be followed by amalgamation.

water-jacket: the outer casing of a blast furnace, where water circulates to keep the furnace walls from melting in the intense heat.

Wetherill Magnetic Separator: see magnetic separator.

Wifley concentrating table: form of gravity concentration. Progressively longer narrow wooden strips extend from one end of a rectangular wooden table to the other. Ground ore is fed onto the table, and wash water flows across, while the table is given a bumping motion. The heavier particles are discharged over the end, while the lighter material is washed over a lower side. Generally gold is deposited at the top, followed by tungsten, then lead, copper, iron, and zinc.

50-ton/100-ton concentrator: amount of ore that can be processed in one day (50 tons, 100 tons, etc.).

Appendix 5.3

Mining Statistics

Table 1—Concentrator and mill locations.

Location	Dates	Description
Harshaw Area		
Blue Nose/Abe Lincoln Mine	1927-1928	100 ton flotation mill.
Flux Mine	1914-1919; 1920-1921	Dry concentrator, constructed in 1914, connected the mine and mill with a 5,000 foot aerial tramway. In 1918, a 250 ton flotation concentrator replaced the old concentrator. The oxidized ore proved refractory to flotation and the milling was discontinued early in 1919. Reopened in 1920 to treat a small tonnage of complex sulfide ore in its concentrator, but went into hands of a receiver in 1921.
Hardshell Mine	1899; 1900-1901; 1915 on	50 ton concentrator in 1899, remodeled in 1915 to make a high manganese concentrate.
Harshaw Mine	1877-1878; 1880's	Lixiviation plant. 1877-88 ore from Alta Mine treated here. Concentrator built in the 1880s.
Hermosa Mine	1877-1881	20 stamp mill constructed in 1877. A 100 ton stamp amalgamation mill was completed in 1880. Mine closed when the better ore was exhausted in the end of 1881.
Morning Glory Mine	1927-1929	Reopened in 1927. 100 ton concentrator completed in 1929, and closed a few months later.
Three R Mine	1917-1926; 1929-1930	Combined flotation and gravity concentrator, erected 1917. Damaged by flood and closed in 1926. 140 ton flotation mill reported in 1928. Operating for a short time in 1930.
Trench Mine	1882-1963	Small gravity concentration plant. Constructed in 1882. Operated intermittently. 200 ton flotation plant constructed in 1939. Flotation plant in use 1940-1957, treating ores from the Trench and Flux Mines.
World's Fair Mine	mid-1890's; 1920-1930	10 stamp gravity concentrator in mid 1890's. A concentrator was installed in 1918, and operated about one year. The old concentrator was remodeled into a flotation plant in the 1920's.
Mowry Mine		
Mowry Mine	1904-1907; 1909-1914	100 ton concentrator installed in 1904, closed in 1907 because of depression. Reopened in 1909. Destroyed by fire in 1914.
Sunnyside Area		
Exposed Reef Mine	1907-1909	
Washington Camp/Duquesne Area		
Holland Mine	1896-1897	Huntington Mills, Wifley tables (to recover lead and zinc concentrates), concentrator constructed in 1896. Open one year.
Pride of the West Mine (Washington Mine)		1899-1903; 1910 on 50 ton concentrator, crusher, Wifley concentrating tables (for lead), a Weatherill Magnetic Concentrator (to separate the copper-iron from the zinc roasted product) installed after mine was purchased early in 1899 by A.R. Wifley and his associates in Denver. Remodeled in 1902 and enlarged from 50 to 100 tons. Idle from 1903 to 1907. In 1910, the mill included a 100 ton electric mill, electrical separators, a Sutton dry concentrator, eight Wifley tables and crush rolls.
Buena Vista Group	1902	
Duquesne Group	1940-1944	100 ton flotation plant. Increased to 125 tons in 1942, and 140 tons in 1943.

Table 2—Principal Minerals.

Mines	Minerals
Harshaw Area (Mines with 2,000+ tons ore production included only)	
Three R	Alunite
Alta (1%), Flux (2.5%), Morning Glory (3%), Three R (4%)	Copper (Cu)
Alta (35%), American (2%), Blue Nose (2%), Flux (5%), Hardshell (6%), January and Norton mine group (4%), Trench (8.5%), World's Fair (6.6%)	Lead (Pb)
Bender, Black Eagle, Hardshell (40%), Hermosa, Salvadore	Manganese (Mn)
Alta (10 oz), American (21 oz), Bender (20 oz), Black Eagle (22 oz), Blue Nose (18 oz), Flux (5 oz), Hardshell (8 oz), Hermosa (20 oz), January and Norton mine group (7 oz), Morning Glory (4 oz), Salvadore (20 oz), Trench (13 oz), World's Fair (58 oz)	Silver (Ag)
Alta, American, Blue Nose (1%), Flux (8%), January and Norton mine group (6%), Trench (6.3%)	Zinc (Zn)
Mowry Mine	
Principle minerals: lead (4%), silver (3 oz), manganese (25%), beryllium, molybdenum, vanadium, antimony	
Bunnyside Area (Mines with 200+ tons ore production included only)	
Copper Glance, Eureka, Hamburg	Copper (Cu)
Copper Glance, Eureka, Hamburg, Harper, Reef, Wakefield	Gold (Au)
Armistice, Cave, Eureka, Hamburg, Pomona, State of Texas	Lead (Pb)
Armistice, Copper Glance, Eureka, Hamburg, Harper, Reef, State of Texas, Wakefield	Silver (Ag)
Reef	Tellurium (Te)
Harper, Pomona, Reef, Wakefield	Tungsten (W)
Cave, Hamburg, State of Texas	Zinc (Zn)
Washington Camp/Duquesne Area (Mines with 2,000+ tons ore production included only)	
Belmont (3%), Bonanza (3%), Duquesne (1.5%), Empire (1%), Estelle & Louise (2%), Gladstone mine group (8%), Holland (2%), Illinois (4%), Indiana (3%), Kansas (3%), Maine (4%), New York (2%), Pride of the West (4.5%), Santo Niño (7%)	Copper (Cu)
New York	Gold (Au)
Belmont (3%), Bonanza (1%), Duquesne (3%), Empire (4%), Estelle & Louise (2%), Holland (10%), Illinois (2%), Indiana (2%), Kansas (4%), Maine (3%), New York (9%), Pocahontas (23%)	Lead (Pb)
Santo Niño	Molybdenum (Mo)
Belmont (6 oz), Bonanza (4 oz), Duquesne (5 oz), Empire (7 oz), Estelle & Louise (4 oz), Gladstone mine group (3 oz), Holland (12 oz), Illinois (4 oz), Indiana (4 oz), Kansas (4 oz), Maine (5 oz), New York (7 oz), Pocahontas (20 oz), Pride of the West (4 oz), Santo Niño (1 oz)	Silver (Ag)
Belmont (9%), Bonanza (7%), Duquesne (8%), Empire (7%), Estelle & Louise (9%), Holland (18%), Illinois (9%), Indiana (17%), Kansas (6%), Maine (8%), New York (4%), Pride of the West (1.4%)	Zinc (Zn)

Sources: Kelth, 1973; Kelth, 1975

Table 3—Mining and mineral districts and camps.

Mining Districts ¹	Location
Evans (noted in Dewey, 1881)	
Harshaw	(T22-23S; R15-16E)
Hartford/Huachuca Mountains/West Huachuca	(T22-24S; R19-21E)
Palmetto	(T22-23S; R15E)
Patagonia	(T23-24S; R15-16E)
Red Rock	(T21-23S; R16-18E)
San Antonio (Dewey, 1881)	
Mineral Districts²	
Bluebird	
Bradford	
Harshaw	
Palmetto	
Parker Canyon	
Quercos	
Red Rock	
Washington Camp	
Mining Camps³	
Benton	Patagonia
Buena Vista	Patagonia
Crittenden	Wrightson
Duquesne	Patagonia
Elevation	Harshaw
Four Metals	Patagonia
Golden Rose	Patagonia
Gray	Palmetto
Gross	Patagonia
Hale	Red Rock
Hamburg	Hartford (located at the Hamburg mine: T23S; R20E, Cor.16, 17, 20, 21) (Tenney, 1927-29)
Hardshell	Harshaw
Harshaw	Harshaw
Jarilla	Palmetto
Jensen	Red Rock
La Plata	Red Rock
Lochiel	
Mowry	Patagonia
National	Patagonia
O'Conner	Patagonia
Old Soldier	Patagonia
O'Mara	Patagonia
Patagonia	Harshaw
Standard	Harshaw
Three R	Palmetto
Thunder	Harshaw
Trench	Harshaw (on Harshaw quadrangle map 1958: T23S; R16E, no quadrant mapped)
Wakefield	Hartford (on Huachuca Peak quadrangle map 1958/1978: T23S; R20E, E. Cen., 25; W. Cen., 30)
Washington	Patagonia (on Harshaw quadrangle map 1958: T23S; R16E, no quadrant mapped)
Wieland	Harshaw
World's Fair	Harshaw

Sources:

¹Schrader, 1915; Keith, 1973; Keith, 1975²Wally, 1985:66-68; Schnabel, 1986³Schrader, 1915; other sources noted after name

Table 4—Dates of operation of the largest mines.

Mines	Dates of Operation
Harshaw Area (Mines 2,000+ tons of ore)	
Alta	Intermittently, late 1870's and early 1880's into early 1900's.
American	Intermittently from 1880's to 1943.
Bender	Late 1800's; WW1; 1937; 1952-55.
Black Eagle	Intermittently from early 1900's to 1940.
Blue Nose	Intermittently from 1880's to 1956.
Flux	By Mexicans in 1850's; intermittently to 1963.
Hardshell	Intermittently 1896-1964.
Hermosa	1870's to 1900; 1908; 1949-50.
January and Norton mine group	Early 1870's; 1925-28; 1944-49.
Morning Glory	Late 1880's; 1907-1929.
Salvadore	1880's; 1936-44.
Three R	Late 1880's; Intermittently from 1908-1956.
Trench	Late 1850's to late 1890's; 1918-45.
World's Fair	Intermittently from early 1880's to 1954.
Mowry Mine	
Mowry	Spanish and Mexican periods; intermittently to 1952.
Bunnyside Area (includes mines inside the study area with 200+ tons ore produced and mines nearby [in parentheses] with 500+ tons ore)	
Copper Glance	Early 1900's; 1913-15.
Harper	Early 1900's; 1941
Wakefield	Intermittently 1896-1940; 1943-44.
(Armistice)	1940-44; 1948-49.
(Cave)	1946-47.
(Pomona)	1918; Intermittently 1945-63.
(Reef)	Early 1900's; 1916-18; 1934-42; 1955-56.
(State of Texas)	Worked by Spaniards; late 1880's; 1943-46.
Washington Camp/Duquesne Area (Mines 2,000+ tons of ore)	
Empire	Intermittently since 1870's.
Estelle & Louise	1940-1963.
Gladstone mine group	Intermittently from early 1900's to 1951.
Illinois	1800's; late 1950's.
Indiana	Intermittently from early 1940's to 1966.
Kansas	Intermittently from late 1870's to 1959.
Maine	Intermittently from 1880's to 1965.
New York	Late 1870's to 1880's; early 1900's.
Pocahontas	1880's; 1930's.
Pride of the West	1880's; intermittently to 1955.
Santo Niño	Intermittently from early 1900's to 1955.
Belmont	Worked by Mexicans before 1860; 1930's-1940's.
Bender	Late 1880's; WW1; 1937; 1952-55.
Bonanza	1880's; early 1900's to 1921; 1941-44; 1951-57.
Duquesne	1940's and 1950's.
Holland	1800's.

Sources: Keith, 1973; Keith, 1975

Table 5—Mineral production amounts in specific time periods.

Mine	Date	Amount
Harshaw Area		
American	1880-1910	\$75,000 silver
Black Eagle	1918-1921	\$50,000 silver
Blue Nose		500,000 pounds lead; \$225,000 silver; total value \$250,000
Flux	1882-1925	4,500,000 pounds lead; \$100,000 silver; total value \$300,000
Hardshell	1880-1920	5,000,000 pounds lead; \$250,000 silver; total value \$500,000
Hermosa	1880-1930	\$1,000,000 silver
January	1882-1910	\$10,000 silver
Josephine	1885-1930	2,000,000 pounds lead; \$525,000 silver; total value \$625,000
Morning Glory	1896-1925	500,000 pounds copper; \$15,000 silver; total value \$100,000
Salvadore	1880-1910	\$25,000 silver
Three R	1909-1930	10,000,000 pounds copper; \$65,000 silver; total value \$2,500,000
Trench	1905-1920	1,500,000 lead; \$80,000 silver; total value \$200,000
World's Fair	1903-1930	400,000 pounds copper; 100,000 pounds lead; \$725,000 silver; total value \$800,000
Mowry Mine		
Mowry	1858-1930	10,000 pounds lead; \$500,000 silver; total value \$1,000,000
Sunnyside Area		
Copper Glimce		300,000 pounds copper; \$4,000 gold; \$50,000 silver; total value \$100,000
Eureka		470,000 pounds lead; total value \$15,000
Washington Camp/Duquesne Area		
Duquesne	1899-1925	15,000,000 pounds copper; 12,000,000 pounds lead; \$350,000 silver; 3,000,000 pounds zinc; total value \$4,000,000
Pride of the West	1899-1907	6,000,000 pounds copper; 5,000,000 pounds lead; \$275,000 silver; total value \$1,400,000
Santo Niño	1926-1930	1,700,000 pounds copper; total value (includes a small amount of molybdenum) \$300,000

Source: *Elsing, 1936*

Table 6—Smelter locations.

Location	Dates	Description
La Noria	1884	A water-jacket smelter installed at Sonora, near the Mexican border. It was reconditioned and enlarged, and named the La Noria smelter. A single furnace of fourteen tons capacity which treated ten tons a day. Holland mine ores were smelted there. Plant and mine closed after eight months. They encountered sulfide ore of lead and iron in garnet, which they could not treat in the smelter.
Between Belmont Mine and San Antonio Pass		Ruins of an adobe smelter in use during the Mexican period.
Crittenden	1888-1889	Lasted for one year.
Holland Mine	1879-1881	Near Washington Camp.
Mowry	1905-1907; 1909; 1915	100 ton steel blast furnace (lead smelter). Closed in 1907 because of a business depression. Present in 1909. Around 1915, lime was burned for local use, from local limestone.
Patagonia	1897	100 ton blast furnace 2 miles south of Crittenden, which became the nucleus of Patagonia. Smelted ore from Flux and Hardshell mines.
Pride of the West	1900-1903; 1906-1910 (Washington Mine)	Roaster installed in 1900. Reverberatory furnace built in 1901. The furnace was operated for a short time, after which concentrates were shipped to Silver City and other reduction works. Deserted in 1903. Purchased in 1906 by the Westinghouse Co. and run intermittently. In 1910, a 100 foot mechanical roaster and a 25 ton reverberatory matte furnace existed.
San Rafael Valley	1880-1889	In 1880 a small furnace was constructed, on the San Rafael ranch (on the Santa Cruz River). It was purchased by the Duquesne Co. in 1889. The Pocahontas Mine treated a large amount of ore in this.

Table 7—Estimated tonnage of ore production.

Mines	Tons of Ore
Harshaw Area	
Alta, Black Eagle, Morning Glory, Salvadore	2,000–5,000
American, Bender	6,000–10,000
Blue Nose, World's Fair	11,000–15,000
Hardshell	36,000
Hermosa	70,000
January and Norton mine group	71,000
Three R	130,000
Trench	237,000
Flux	850,000
Mowry Mine	
Mowry	200,000
Sunnyside Area	
Copper Glance, Harper, Power	200–500
Armistice, Cave, Manila, Pomona, State of Texas	600–1,000
Reef	2,000–3,000
Washington Camp/Duquesne Area	
Belmont, Gladstone mine group, Illinois, Maine, Pocahontas	2,000–5,000
Empire, Indiana	6,000–10,000
Duquesne, Estelle & Louise, New York, Santo Nino	20,000–21,000
Kansas	40,000
Bonanza	55,000
Holland	80,000
Pride of the West	103,000

Sources: Keith, 1973; Keith, 1975

Table 8—Washington Camp/Duquesne Area mines and claims.**Core Area Mines and Claims**

Annie, Belmont, Bonanza, California-Grasshopper mine group, Dave Allen, Double-Standard, Duquesne, Empire, Estelle & Louise, Holland, Illinois, Indiana, Indianapolis, Kansas, Maine, Manzanita, Mary Jane, New York, Pocahontas, Pride of the West, San Antonio, Silver Bell, Slim Jim, and Smuggler & Texas.

Surrounding Area Mines and Claims

Bennett, Benton, Big Lead, Buena Vista, Four Metals, Gladstone mine group, Golden Rose, Isabella, Jabalina, Line Boy, King, Marche, National, Paymaster, Proto, Santo Nino, Shamrock, Villy, and Winifred.

Mine Owners

Pride of the West Mine (Washington Mine) (T23S, R16E, SE1/4 Sec.34)

Salisbury; W.A. Clark; N.H. Chapin; C.R. Wifley; Pride of the West Mining & Smelting Co.; Duquesne Mining & Reduction Co.; Humphrey Mining Co.; Byrd; Radon Mining Co.; Nash Mines.

Holland Mine (T24S, R16E, center Sec.3)

Henry Holland; Dr. Luttrell; Holland Smelting & Mining Co.; Coughlin; Duquesne Co.; F.L. Bartlett; Westinghouse Electrical Co.; Duquesne Mining & Reduction Co.; Callahan Zinc Lead Co.; Byrd; Nash Mines.

Bonanza Mine (T24S, R16E, NW Sec.2)

Thomas Shane & N.H. Chapin; Hensley; Duquesne Co.; Westinghouse Electrical Co.; Duquesne Mining & Reduction Co.; Callahan Zinc Lead Co.; Byrd; Elayer & Co.; Sam Knight Mining Lease; Nash Mines

Sources: Copper Handbook 1903–1908; Schrader 1914; Schrader 1915:320; State of Arizona 1915, 1917–1919; Tenny 1927–29; Lenon, 1950; Harshaw quadrangle map 1958.

Appendix 5.4

Dates of Operation: Schools and Post Offices

SCHOOLS WITHIN THE STUDY AREA

Mowry School, Mowry (1880's-1930). (A portion of the building's adobe walls still stand near the site of the old Mowry Mine.)

Washington Camp School, Washington Camp - Duquesne (1899-late 1960's).

Parker Canyon School, Parker Canyon (?-1947).

Red Rock (or San Rafael Valley) School, San Rafael Valley near Parker Brothers Ranch (1912-1946).

Sunnyside School, Sunnyside Townsite (late 1880's to 1899).

West Huachuca (or Campini or School Canyon) School, School Canyon (1889-?).

Harshaw School, Harshaw (1889-1969). (The original school vanished, but a new school built in the 1920s was used until 1969. In its heyday 60 students were enrolled.)

SANTA CRUZ COUNTY POST OFFICES

Post Office	Established	Discontinued	Mail to:
Duquesne (formerly Washington)	17 August 1904	14 February 1920	Parker Canyon
Harshaw	29 April 1880 re: 6 January 1893 re: 5 February 1902	31 December 1891 15 June 1895 4 March 1903	Crittenden Crittenden Patagonia
La Noria	24 April 1882 re: 1 April 1910	11 June 1883 30 September 1911	Harshaw Duquesne
Lochiel	6 October 1884 re: 14 January 1889 re: 6 June 1893 re: 21 August 1909	29 February 1888 29 April 1893 30 November 1905 31 March 1910	San Rafael Washington Duquesne La Noria
Mowry	26 August 1905	31 July 1913	Patagonia
Parker Canon	11 April 1912	31 December 1927	Parker Canyon
Parker Canyon	1 January 1928	31 January 1929	Patagonia
San Rafael (formerly Lochiel)	1 March 1888 re: 25 March 1913	4 October 1888 31 May 1917	Washington Patagonia
Washington	13 May 1880 re: 1 May 1884	26 April 1882 16 August 1904	Harshaw Duquesne

- Duquesne** Site: (1902) unsurveyed, 5 miles north of Lochiel, 7.5 miles west of Santa Cruz River. Formerly Washington. Postmaster compensation: 1905-\$217.87; 1909-\$254.
- Harshaw** Site: (1901) 3/16S/23E, approximate location on unsurveyed lands. Directly on route 68163, Patagonia to Lochiel, service 6 times a week. Village population 200, total population to be supplied 250. Postmaster compensation: 1881-\$452.44; 1883-\$158.15; 1885-\$217.92; 1887-\$177.52; 1889-\$171.33.
- Lochiel** Site: (1908) 21/24S/17E, near mail route 68195, Patagonia to Duquesne. To be supplied from Duquesne. Population to be supplied "Hundred or more". (1903) On route 68180, 1 mile north of Santa Cruz River. Postmaster compensation: 1885-\$86.75; 1887-\$154.74; 1889-\$42.89; 1895-\$153.75; 1897-\$139.91; 1899-\$182.36; 1901-\$162.91; 1903-\$182.99; 1905-\$147.22.
- Mowry** Site: (1905) unsurveyed, directly on route 68180, Patagonia to Lochiel, service 6 times a week. Population to be supplied 250. Postmaster compensation: 1909-\$210.
- Parker Canyon** Site: (1927) 5/24N/18E, 10 chains west of Parker Canyon Creek. (1912-as Parker Canon) "We hope the name 'Parker Canon' will be given as it is well known, and even some mail is now coming here addressed 'Parker Canon'."
- San Rafael** Site: (1913) 11/23S/17E, to be supplied from Mowry. Population to be supplied 75.
- Washington** Postmaster compensation: 1881-\$79.61; 1885-\$32.79; 1887-\$51.31; 1889-\$75.76; 1895-\$35.19; 1897-\$98.67; 1899-\$216.04; 1901-\$217.74; 1903-\$324.04.

Appendix 5.5

The 1880, 1900, and 1920 Federal Censuses

Table 1—Age-sex structure of people living in the San Rafael Study Area, 1880.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	8	1	9	2	2	4	0	0	0
5-9	7	2	9	3	5	8	0	0	0
10-14	0	0	0	4	2	6	0	0	0
15-19	16	1	17	3	0	3	0	0	0
20-24	18	4	22	13	0	13	0	0	0
25-29	27	4	31	11	0	11	0	0	0
30-34	12	0	12	15	3	18	0	0	0
35-39	10	0	10	10	0	10	0	0	0
40-44	5	1	6	8	0	8	0	0	0
45-49	3	0	3	13	1	14	0	0	0
50-54	2	0	2	3	0	3	0	0	0
55-59	0	0	0	5	0	5	0	0	0
60-64	0	0	0	1	0	1	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80+	0	0	0	0	0	0	0	0	0
Total	108	13	121	91	13	104	0	0	0

Table 2—Age-sex structure of people living near the head of Santa Cruz river, 1880.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	0	0	0	0	2	2	0	0	0
5-9	0	0	0	1	2	3	0	0	0
10-14	0	0	0	1	0	1	0	0	0
15-19	0	0	0	0	0	0	0	0	0
20-24	0	0	0	1	0	1	0	0	0
25-29	0	0	0	0	0	0	0	0	0
30-34	0	0	0	2	1	3	0	0	0
35-39	0	0	0	0	0	0	0	0	0
40-44	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0
50-54	0	0	0	1	0	1	0	0	0
55-59	0	0	0	1	0	1	0	0	0
60-64	0	0	0	0	0	0	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
Total	0	0	0	7	5	12	0	0	0

Table 3—Age-sex structure of west slope miners living in the Huachuca Mountains, 1880.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	0	0	0	0	0	0	0	0	0
5-9	0	0	0	0	0	0	0	0	0
10-14	0	0	0	0	0	0	0	0	0
15-19	0	0	0	0	0	0	0	0	0
20-24	0	0	0	0	0	0	0	0	0
25-29	0	0	0	2	0	2	0	0	0
30-34	0	0	0	3	0	3	0	0	0
35-39	0	0	0	2	0	2	0	0	0
40-44	0	0	0	2	0	2	0	0	0
45-49	0	0	0	3	0	3	0	0	0
50-54	0	0	0	0	0	0	0	0	0
55-59	0	0	0	0	0	0	0	0	0
60-64	0	0	0	0	0	0	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
Total	0	0	0	12	0	12	0	0	0

Table 4—Age-sex structure of people living on the west side of the Huachuca Mountains of the Tanner & Hays Sawmill, 1880.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	0	0	0	0	0	0	0	0	0
5-9	0	0	0	0	0	0	0	0	0
10-14	0	0	0	0	0	0	0	0	0
15-19	0	0	0	0	0	0	0	0	0
20-24	0	0	0	6	0	6	0	0	0
25-29	0	0	0	5	0	5	0	0	0
30-34	0	0	0	5	0	5	0	0	0
35-39	0	0	0	3	0	3	0	0	0
40-44	0	0	0	1	0	1	0	0	0
45-49	0	0	0	2	0	2	0	0	0
50-54	0	0	0	0	0	0	0	0	0
55-59	0	0	0	1	0	1	0	0	0
60-64	0	0	0	0	0	0	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
Total	0	0	0	23	0	23	0	0	0

Table 5—Age-sex structure of inhabitants in transit, west of Huachuca Mountains, 1880.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	0	0	0	0	0	0	0	0	0
5-9	0	0	0	0	0	0	0	0	0
10-14	0	0	0	0	0	0	0	0	0
15-19	1	0	1	0	0	0	0	0	0
20-24	2	0	2	0	0	0	0	0	0
25-29	7	0	7	0	0	0	0	0	0
30-34	2	0	2	0	0	0	0	0	0
35-39	1	0	1	0	0	0	0	0	0
40-44	2	0	2	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0
50-54	1	0	1	0	0	0	0	0	0
55-59	0	0	0	0	0	0	0	0	0
60-64	0	0	0	0	0	0	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
Total	16	0	16	0	0	0	0	0	0

Table 6—Age-sex structure of people living near Luttrell (or La Noria), 1880.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	4	0	4	2	0	2	0	0	0
5-9	4	0	4	2	3	5	0	0	0
10-14	0	0	0	3	2	5	0	0	0
15-19	14	0	14	3	0	3	0	0	0
20-24	14	1	15	6	0	6	0	0	0
25-29	16	2	18	4	0	4	0	0	0
30-34	8	0	8	5	2	7	0	0	0
35-39	6	0	6	5	0	5	0	0	0
40-44	2	1	3	5	0	5	0	0	0
45-49	3	0	3	8	1	9	0	0	0
50-54	1	0	1	2	0	2	0	0	0
55-59	0	0	0	3	0	3	0	0	0
60-64	0	0	0	1	0	1	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
Total	72	4	76	49	8	57	0	0	0

Table 7—Age-sex structure of people living near San Rafael, 1880.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	4	1	5	0	0	0	0	0	0
5-9	2	2	4	0	0	0	0	0	0
10-14	0	0	0	0	0	0	0	0	0
15-19	1	0	1	0	0	0	0	0	0
20-24	0	2	2	0	0	0	0	0	0
25-29	2	1	3	0	0	0	0	0	0
30-34	1	0	1	0	0	0	0	0	0
35-39	1	0	1	0	0	0	0	0	0
40-44	0	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0
55-59	0	0	0	0	0	0	0	0	0
60-64	0	0	0	0	0	0	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
Total	11	6	17	0	0	0	0	0	0

Table 8—Age-sex structure of people living near Santa Cruz river, 1880.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	0	0	0	0	0	0	0	0	0
5-9	1	0	1	0	0	0	0	0	0
10-14	0	0	0	0	0	0	0	0	0
15-19	0	1	1	0	0	0	0	0	0
20-24	2	1	3	0	0	0	0	0	0
25-29	2	1	3	0	0	0	0	0	0
30-34	1	0	1	0	0	0	0	0	0
35-39	2	0	2	0	0	0	0	0	0
40-44	1	0	1	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0	0
55-59	0	0	0	0	0	0	0	0	0
60-64	0	0	0	0	0	0	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	0	0	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
Total	9	3	12	0	0	0	0	0	0

Table 9—Occupations, by ethnicity, of San Rafael Study Area, 1880.

Occupation	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
Baker	0	0	0	2	0	2	0	0	0
Blacksmith	0	0	0	3	0	3	0	0	0
Butcher	0	0	0	1	0	1	0	0	0
Capitalist	0	0	0	1	0	1	0	0	0
Carpenter	0	0	0	3	0	3	0	0	0
Clerk	0	0	0	2	0	2	0	0	0
Coal Burner	2	0	2	0	0	0	0	0	0
Cook	0	0	0	1	0	1	0	0	0
Collector	0	0	0	1	0	1	0	0	0
Engineer	0	0	0	1	0	1	0	0	0
Farmer	0	0	0	3	0	3	0	0	0
Herder	8	0	8	1	0	1	0	0	0
House Keeper	0	9	9	0	3	3	0	0	0
Inspector of Customs	1	0	1	0	0	0	0	0	0
Laborer	22	0	22	10	0	10	0	0	0
Lawyer	0	0	0	1	0	1	0	0	0
Mason	1	0	1	0	0	0	0	0	0
Merchant	0	0	0	2	0	2	0	0	0
Mill man	0	0	0	3	0	3	0	0	0
Millwright	0	0	0	1	0	1	0	0	0
Miner	0	0	0	33	0	33	0	0	0
Prospector	0	0	0	1	0	1	0	0	0
Ranch Man	0	0	0	2	0	2	0	0	0
Retail Grocer	1	0	1	0	0	0	0	0	0
Sawmill Owner	0	0	0	2	0	2	0	0	0
Servant	25	0	25	0	0	0	0	0	0
Stock Raiser	0	0	0	3	0	3	0	0	0
Teamster	13	0	13	2	0	2	0	0	0
Wood Chopper	2	0	2	0	0	0	0	0	0
Total	75	9	84	79	3	82	0	0	0

Table 10—Duquesne/Washington Camp (1880).

Total population:	120	Occupation:	
Number of women:	11	Miners:	54
Family units / number per household:		Prospectors:	13
2 households of	2	Keeping house:	4
1 household of	3	Grocers:	4
2 households of	4	Restaurant Keepers:	3
1 household of	5	Cooks:	2
1 household of	9	Saloon Keepers:	2
91 individuals		Brick Masons:	2
Ethnicity / place of birth:		At Home:	2
United States:	68	Butchers:	2
Europe:	34	Laundry Men:	2
Mexico:	10	Bakers:	2
China:	6	Laborers:	2
Canada:	1	Blacksmiths:	2
Japan:	1	Assistant Cook:	1
		Assayer of Ores:	1
		Carpenter:	1
		Mine Foreman:	1
		Mining Supervisor:	1
		Packer:	1
		Seamstress:	1
		Stone Mason:	1
		Herder:	1
		Farmer:	1

Table 11—Lochiel (Luttrell and La Noria) (1880).

Total population:	111	Occupation:	
Number of women:	7	Servants:	25
Family units / number per household:		Miners:	23
6 households of 2		Keeping House:	5
1 household of 6		Laborers:	16
3 households of 7		Blacksmiths:	2
62 individuals		Bakers:	2
Ethnicity / place of birth:		Carpenters:	2
Mexico:	58	Coal Burners:	2
United States:	40	Merchants:	2
Germany:	4	Wood Choppers:	2
France:	3	Butcher:	1
Ireland:	3	Capitalist:	1
England:	2	Clerk:	1
Switzerland:	1	Collector:	1
		Cook:	1
		Herder:	1
		Mason:	1
		Millwright:	1
		Prospector:	1
		Retail Grocer:	1
		Stock Raiser:	1

Table 12—Hardshell Mine (near Harshaw) (1880).

Total population:	27	Occupation:	
Number of women:	0	Miners:	10
Family units:	0	Carpenters:	5
Ethnicity / place of birth:		Laborers:	5
Europe:	16	Blacksmiths:	1
United States:	10	Millwright:	1
Canada:	1	Teamster:	1
		Wagon Maker:	1
		Undetermined:	1

Table 13—San Rafael (1880).

Total population:	17	Occupation:	
Number of women:	6	Herders:	3
Family units / number per household:		Keeping House:	3
2 households of 5		Laborer:	1
1 household of 7			
Ethnicity / place of birth:			
Mexico:	17		

Table 14—Santa Cruz River (1880).

Total population:	24	Occupation:	
Number of women:	8	Laborers:	5
Family units / number per household:		Herders:	3
2 households of 2		Keeping House:	3
1 household of 3		Miners:	2
1 household of 8		Stock Raising:	2
9 individuals			
Ethnicity / place of birth:			
Mexico:	10		
United States:	8		
Ireland:	2		
France:	2		
Canada:	1		
Austria:	1		

Table 15—Teamsters West of Huachuca (1880).

Total population:	16	Occupation:	
Number of women:	0	Teamsters:	13
Family units / number per household:		Herders:	2
1 household of 2		Inspector of Customs:	1
14 individuals			
Ethnicity / place of birth:			
Mexico:	14		
United States:	2		

Table 16—Huachuca Mountains, west side Tanner and Hays Sawmill (1880).

Total population:	23	Occupation:	
Number of women:	0	Laborers:	10
Family units:	0	Mill Men:	3
Ethnicity / place of birth:		Ranch Men:	2
United States:	23	Saw Mill Owners:	2
		Teamsters:	2
		Clerk:	1
		Engineer:	1
		Farmer:	1
		Sawyer:	1

Table 17—Huachuca Mountains, west side miners (1880).

Total population:	12	Occupation:	
Number of women:	0	Miners:	8
Family units:	0	Farmers:	2
Ethnicity / place of birth:		Blacksmith:	1
United States:	4	Carpenter:	1
Ireland:	3		
England:	2		
Scotland:	1		
Denmark:	1		
Germany:	1		

Table 18—Age-sex structure of people living in Santa Cruz County, Enumeration District 60 (including Study Area), 1900.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	45	37	82	20	22	42	2	0	2
5-9	49	49	98	22	20	42	0	0	0
10-14	23	21	44	24	12	36	0	1	1
15-19	32	30	62	12	12	24	0	0	0
20-24	44	28	72	17	12	29	1	0	1
25-29	36	17	53	13	20	33	1	0	1
30-34	28	12	40	18	6	24	1	0	1
35-39	18	10	28	26	10	36	3	0	3
40-44	15	8	23	19	7	26	4	0	4
45-49	9	10	19	17	4	21	3	0	3
50-54	9	9	18	16	3	19	2	0	2
55-59	2	3	5	10	3	13	1	0	1
60-64	4	1	5	4	1	5	1	0	1
65-69	1	2	3	4	2	6	0	0	0
70-74	0	0	0	5	0	5	0	0	0
75-79	1	0	1	0	0	0	0	0	0
80+	0	0	0	1	1	2	0	0	0
Total	316	237	553	228	135	363	19	1	20

Table 19—Occupations, by ethnicity, of Santa Cruz County, Enumeration District 60 (including study area), 1900.

Occupation	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
Administrator	0	0	0	1	0	1	0	0	0
Architect / Builder	0	0	0	1	0	1	0	0	0
Assayer	0	0	0	1	0	1	0	0	0
Assistant Postmaster	0	1	1	0	0	0	0	0	0
Blacksmith	2	0	2	3	0	3	0	0	0
Bookkeeper	0	0	0	1	0	1	0	0	0
Boarding House Operator	0	5	5	0	1	1	1	0	1
Brick Maker	0	0	0	3	0	3	0	0	0
Burro Driver	1	0	1	0	0	0	0	0	0
Carpenter	0	0	0	3	0	3	0	0	0
Chemist	0	0	0	1	0	1	0	0	0
Cook	0	0	0	0	1	1	8	0	8
Cowboy	29	0	29	4	0	4	0	0	0
Customs Inspector	0	0	0	1	0	1	0	0	0
Deputy Collector of Customs	0	0	0	1	0	1	0	0	0
Electrical Engineer	0	0	0	1	0	1	0	0	0
Engineer	1	0	1	8	0	8	0	0	0
Farm Laborer	3	0	3	0	0	0	0	0	0
Farmer	10	0	10	10	0	10	0	0	0
Fireman	1	0	1	0	0	0	0	0	0
Freighter	1	0	1	4	0	4	0	0	0
House Keeper	0	17	17	0	2	2	0	0	0
Laborer	37	0	37	2	0	2	0	0	0
Laundry	0	13	13	0	0	0	1	0	1
Lawyer	0	0	0	1	0	1	0	0	0
Machinist	0	0	0	2	0	2	0	0	0
Mill Foreman	0	0	0	1	0	1	0	0	0
Millwright	0	0	0	4	0	4	0	0	0
Mine Foreman	1	0	1	1	0	1	0	0	0
Mine Manager	1	0	1	2	0	2	0	0	0
Miner	77	0	77	43	0	43	0	0	0
Mining Engineer	0	0	0	3	0	3	0	0	0
Mining Operator	0	0	0	1	0	1	0	0	0
Mining Supervisor	0	0	0	3	0	3	0	0	0
Physician	0	0	0	1	0	1	0	0	0
Post Office Clerk	0	0	0	1	0	1	0	0	0
Postmaster	0	1	1	0	0	0	0	0	0
Prospector	0	0	0	2	0	2	0	0	0
Railroad Foreman	0	0	0	1	0	1	0	0	0
Railroad Laborer	9	0	9	0	0	0	0	0	0
Ranch Foreman	0	0	0	1	0	1	0	0	0
Ranch Manager	0	0	0	1	0	1	0	0	0
Range Foreman	1	0	1	0	0	0	0	0	0
Real Estate Agent	0	0	0	1	0	1	0	0	0
Restaurant Keeper	0	0	0	0	0	0	1	0	1
Saloon Keeper	2	0	2	0	0	0	1	0	1
Sawmill Supervisor	0	0	0	1	0	1	0	0	0
School Teacher	0	0	0	2	1	3	0	0	0
Secretary	0	0	0	1	0	1	0	0	0
Servant	1	0	1	1	0	1	0	0	0
Shoemaker	1	0	1	0	0	0	0	0	0
Soldier	0	0	0	1	0	1	0	0	0
Stock Herder	1	0	1	0	0	0	0	0	0
Stock Raiser	2	0	2	35	0	35	0	0	0
Store Keeper	0	0	0	3	0	3	1	0	1
Teamster	3	0	3	2	0	2	0	0	0
Wood Chopper	10	0	10	0	0	0	0	0	0
Wood Hauler	10	0	10	0	0	0	0	0	0
Total	204	37	241	160	5	165	13	0	13

Table 20—Age-sex structure of people living in the San Rafael Study Area, 1920.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	58	47	105	19	20	39	0	0	0
5-9	41	40	81	25	30	55	0	0	0
10-14	38	31	69	27	23	50	0	0	0
15-19	19	33	52	15	11	26	0	1	1
20-24	17	26	43	28	17	45	0	0	0
25-29	26	23	49	19	14	33	0	0	0
30-34	18	21	39	17	13	30	0	0	0
35-39	25	18	43	25	15	40	0	0	0
40-44	17	9	26	23	15	38	0	0	0
45-49	21	12	33	18	14	32	0	0	0
50-54	10	4	14	20	10	30	0	0	0
55-59	5	3	8	17	5	22	0	0	0
60-64	7	3	10	13	6	19	1	0	1
65-69	2	0	2	9	2	11	1	0	1
70-74	1	3	4	9	1	10	0	0	0
75-79	0	1	1	4	6	10	0	0	0
80+	4	0	4	0	0	0	0	0	0
Total	309	274	583	288	202	490	2	1	3

Table 21—Age-sex structure of people living in Cochise County, Garces Precinct, 1920.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	5	3	8	8	8	16	0	0	0
5-9	5	3	8	10	12	22	0	0	0
10-14	2	4	6	15	7	22	0	0	0
15-19	1	2	3	9	3	12	0	0	0
20-24	1	2	3	15	6	21	0	0	0
25-29	4	2	6	6	6	12	0	0	0
30-34	1	1	2	9	5	14	0	0	0
35-39	2	2	4	14	10	24	0	0	0
40-44	3	0	3	15	9	24	0	0	0
45-49	1	0	1	7	5	12	0	0	0
50-54	0	0	0	9	5	14	0	0	0
55-59	2	0	2	6	3	9	0	0	0
60-64	0	0	0	8	1	9	0	0	0
65-69	0	0	0	6	1	7	0	0	0
70-74	0	0	0	3	0	3	0	0	0
75-79	0	0	0	2	2	4	0	0	0
80+	0	0	0	0	0	0	0	0	0
Total	27	19	46	142	83	225	0	0	0

Table 22—Age-sex structure of people living in Cochise County, West Huachuca Precinct, 1920.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	0	2	2	7	4	11	0	0	0
5-9	2	0	2	5	5	10	0	0	0
10-14	1	1	2	1	4	5	0	0	0
15-19	0	0	0	1	1	2	0	0	0
20-24	0	0	0	2	3	5	0	0	0
25-29	0	0	0	6	2	8	0	0	0
30-34	0	1	1	1	3	4	0	0	0
35-39	1	0	1	4	0	4	0	0	0
40-44	0	1	1	2	0	2	0	0	0
45-49	0	0	0	2	2	4	0	0	0
50-54	0	0	0	5	3	8	0	0	0
55-59	0	0	0	3	0	3	0	0	0
60-64	0	0	0	0	2	2	0	0	0
65-69	0	0	0	1	0	1	0	0	0
70-74	0	0	0	2	1	3	0	0	0
75-79	0	0	0	1	1	2	0	0	0
80+	0	0	0	0	0	0	0	0	0
Total	4	5	9	43	31	74	0	0	0

Table 23—Age-sex structure of people living in Santa Cruz County, Precinct 6 (Washington - Canelo), 1920.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	40	24	64	0	0	0	0	0	0
5-9	23	26	49	1	4	5	0	0	0
10-14	25	18	43	0	0	0	0	0	0
15-19	11	18	29	0	2	2	0	1	1
20-24	10	16	26	3	0	3	0	0	0
25-29	9	12	21	2	0	2	0	0	0
30-34	13	13	26	2	2	4	0	0	0
35-39	14	11	25	1	0	1	0	0	0
40-44	9	5	14	0	0	0	0	0	0
45-49	10	10	20	2	1	3	0	0	0
50-54	9	2	11	2	1	3	0	0	0
55-59	2	2	4	2	1	3	0	0	0
60-64	5	2	7	0	0	0	1	0	1
65-69	1	0	1	0	0	0	1	0	1
70-74	0	2	2	0	0	0	0	0	0
75-79	0	0	0	0	1	1	0	0	0
80+	2	0	2	0	0	0	0	0	0
Total	183	161	344	15	12	27	2	1	3

Table 24—Age-sex structure of people living in Santa Cruz County, Precinct 7 (Lochiel), 1920.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	2	5	7	1	4	5	0	0	0
5-9	3	3	6	0	3	3	0	0	0
10-14	2	3	5	2	4	6	0	0	0
15-19	2	1	3	0	0	0	0	0	0
20-24	1	1	2	2	3	5	0	0	0
25-29	1	3	4	2	1	3	0	0	0
30-34	3	2	5	2	2	4	0	0	0
35-39	3	1	4	4	1	5	0	0	0
40-44	1	0	1	0	1	1	0	0	0
45-49	3	0	3	2	1	3	0	0	0
50-54	0	0	0	1	1	2	0	0	0
55-59	0	0	0	1	0	1	0	0	0
60-64	1	1	2	1	2	3	0	0	0
65-69	0	0	0	1	1	2	0	0	0
70-74	0	0	0	4	0	4	0	0	0
75-79	0	1	1	1	1	2	0	0	0
80+	1	0	1	0	0	0	0	0	0
Total	23	21	44	24	25	49	0	0	0

Table 25—Age-sex structure of people living in Santa Cruz County, Precinct 12 (San Rafael), 1920.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	3	6	9	3	2	5	0	0	0
5-9	4	2	6	6	4	10	0	0	0
10-14	2	2	4	5	7	12	0	0	0
15-19	4	3	7	4	3	7	0	0	0
20-24	1	3	4	6	4	10	0	0	0
25-29	4	2	6	2	2	4	0	0	0
30-34	0	0	0	2	1	3	0	0	0
35-39	0	1	1	1	2	3	0	0	0
40-44	3	2	5	5	4	9	0	0	0
45-49	2	2	4	4	4	8	0	0	0
50-54	0	1	1	1	0	1	0	0	0
55-59	1	0	1	4	1	5	0	0	0
60-64	0	0	0	2	1	3	0	0	0
65-69	1	0	1	1	0	1	0	0	0
70-74	1	0	1	0	0	0	0	0	0
75-79	0	0	0	0	1	1	0	0	0
80+	1	0	1	0	0	0	0	0	0
Total	27	24	51	46	36	82	0	0	0

Table 26—Age-sex structure of people living in Santa Cruz County, Precinct 16 (Mowry), 1920.

Age	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
0-4	8	7	15	0	2	2	0	0	0
5-9	4	6	10	3	2	5	0	0	0
10-14	6	3	9	4	1	5	0	0	0
15-19	1	9	10	1	2	3	0	0	0
20-24	4	4	8	0	1	1	0	0	0
25-29	8	4	12	1	3	4	0	0	0
30-34	1	4	5	1	0	1	0	0	0
35-39	5	3	8	1	2	3	0	0	0
40-44	1	1	2	1	1	2	0	0	0
45-49	5	0	5	1	1	2	0	0	0
50-54	1	1	2	2	0	2	0	0	0
55-59	0	1	1	1	0	1	0	0	0
60-64	1	0	1	2	0	2	0	0	0
65-69	0	0	0	0	0	0	0	0	0
70-74	0	1	1	0	0	0	0	0	0
75-79	0	0	0	0	0	0	0	0	0
80+	0	0	0	0	0	0	0	0	0
Total	45	44	89	18	15	33	0	0	0

Table 27—Occupations, by ethnicity, of people living in San Rafael Study Area, 1920.

Occupation	Mexican			Anglo			Other		
	M	F	Total	M	F	Total	M	F	Total
Baker	0	0	0	0	0	0	1	0	1
Blacksmith	0	0	0	1	0	1	0	0	0
Bricklayer	0	0	0	2	0	2	0	0	0
Brick Mason	0	0	0	1	0	1	0	0	0
Boarding House Keeper	2	0	2	0	0	0	0	0	0
Bookkeeper	0	0	0	3	0	3	0	0	0
Butcher	0	0	0	3	0	3	0	0	0
Carpenter	0	0	0	1	0	1	0	0	0
Cook	0	1	1	0	1	1	1	0	1
Cowboy	3	0	3	5	0	5	0	0	0
Customs Inspector	0	0	0	1	0	1	0	0	0
Dairy Man	0	0	0	1	0	1	0	0	0
Deputy Collector, Customs	0	0	0	1	0	1	0	0	0
Dress Maker	0	0	0	0	1	1	0	0	0
Driller (Well)	0	0	0	0	2	2	0	0	0
Driver	1	0	1	0	0	0	0	0	0
Engineer	0	0	0	4	0	4	0	0	0
Entomologist	0	0	0	1	0	1	0	0	0
Farmer	13	0	13	90	0	90	0	0	0
Foreman, Stock Ranch	0	0	0	1	0	1	0	0	0
Holstman (Mine)	0	0	0	2	0	2	0	0	0
House Keeper	0	4	4	0	4	4	0	0	0
Justice of the Peace	0	0	0	1	0	1	0	0	0
Laborer	96	1	97	23	0	23	0	0	0
Laundress	0	10	10	0	0	0	0	0	0
Lawyer	0	0	0	1	0	1	0	0	0
Maid	0	1	1	0	0	0	0	0	0
Manager, Cattle Ranch	0	0	0	2	0	2	0	0	0
Manager, Farm	1	0	1	2	2	4	0	0	0
Manager, Mine	0	0	0	1	0	1	0	0	0
Mechanic	1	0	1	1	0	1	0	0	0
Merchant (General Store)	1	0	1	4	0	4	0	0	0
Metal Worker (Factory)	0	0	0	1	0	1	0	0	0
Mine Owner	0	0	0	1	0	1	0	0	0
Miner	15	0	15	19	0	19	0	0	0
Naturalist	0	0	0	1	0	1	0	0	0
Nurse Maid	0	0	0	0	1	1	0	0	0
Photographer	0	0	0	1	0	1	0	0	0
Pool Hall Keeper	1	0	1	0	0	0	0	0	0
Pool Hall Manager	1	0	1	0	0	0	0	0	0
Printer	0	0	0	1	0	1	0	0	0
Prospector	0	0	0	1	0	1	0	0	0
Railroad Office Employee	0	0	0	1	0	1	0	0	0
Rancher	0	0	0	3	0	3	0	0	0
Salesman	2	0	2	1	0	1	0	0	0
School Teacher	0	0	0	0	8	8	0	0	0
Stock Man (Cattle Ranch)	0	0	0	27	1	28	0	0	0
Teamster	0	0	0	1	0	1	0	0	0
Truck Driver	0	0	0	2	0	2	0	0	0
Wage Worker (mine)	1	0	1	0	0	0	0	0	0
Wood Carrier	7	0	7	0	0	0	0	0	0
Total	145	17	162	212	20	232	2	0	2

Table 28—Duquesne/Washington Camp (1920).

Total population:	374	Occupation:	
Number of women:	175	Laborers:	51
Family units / number per household:		Laundresses:	8
11 households of 2		Miners:	6
17 households of 3		Wood Carriers:	6
15 households of 4		Farm Laborers:	4
17 households of 5		Mining Men:	2
10 households of 6		Truck Drivers:	2
5 households of 7		Cooks:	2
2 households of 8		Farmers:	2
2 households of 9		Keeper of Rooming House:	2
1 household of 10		House Keepers:	2
37 individuals		Auto Stage Driver:	1
Ethnicity / place of birth:		Chambermaid:	1
Mexico:	334	Mechanic:	1
United States:	31	Merchant:	1
Canada:	3	Merchant and Butcher:	1
China:	2	Pool Hall Keeper:	1
England:	1	Pool Hall Manager:	1
New Zealand:	1	Salesman:	1
		Salesman Mining Co. Store:	1
		Store Keeper:	1
		Teacher:	1
		Teamster:	1
		Wage Worker around mine:	1

Table 29—Lochiel (1920).

Total population:	93	Occupation:	
Number of women:	49	Farmers:	13
Family units / number per household:		Cowboys:	5
4 households of 2		Laborers:	4
5 households of 3		Stockmen:	3
2 households of 4		Stockmen/Farmers:	3
2 households of 7		House Keepers:	2
1 household of 9		Managers of own Farms:	2
2 households of 10		Teachers at Public School:	2
19 individuals		Cook:	1
Ethnicity / place of birth:		Customs Debt Collector:	1
Mexico:	43	Customs Inspector:	1
United States:	49	Engineer:	1
Austria:	1	Manager of Cattle Ranch:	1
		Merchant:	1
		Nursemaid:	1

Table 30—Mowry (1920).

Total population:	124	Occupation:	
Number of women:	62	Mine Laborers:	11
Family units / number per household:		Miners:	9
8 households of 2		Farm Laborers:	3
6 households of 3		Farm Managers:	2
4 households of 4		Farmers:	2
3 households of 5		Hoist-Men at Mine:	2
1 household of 6		Ranch Laborers:	2
1 household of 7		House Keeper:	1
3 households of 8		Laundress:	1
1 household of 11		Manager of Cattle Ranch:	1
11 individuals		Manager of Mining Co.	1
Ethnicity / place of birth:		Mechanic at Mining Co.	1
Mexico:	90	Mine Owner:	1
United States:	31	Store Keeper:	1
England:	2	Teacher:	1
Sweden:	1		

Table 31—Miscellaneous (San Rafael) (1920).

Total population:	134	Occupation:	
Number of women:	61	Farmers:	21
Family units / number per household:		Farm Laborers:	7
2 households of 2		Stockmen/Farmers:	5
7 households of 3		Farm Helpers:	2
7 households of 4		Common Laborer:	1
1 household of 5		Cowboy:	1
5 households of 6		Dressmaker:	1
2 households of 7		Farm Manager:	1
2 households of 8		Farmer/Cowboy:	1
16 individuals		House Keeper:	1
Ethnicity / place of birth:		Miner:	1
Mexico:	51		
United States:	79		
Ireland:	2		
Belgium:	1		

Chapter 6

Chapter 6

Colin Cameron and the Struggle to Expand the San Rafael Land Grant

During the late 19th century, the territory of Arizona changed from a frontier to an extractive colony of the industrialized world (Sheridan 1995). We use the term frontier advisedly, avoiding the Turnerian or Boltonian conceptions of the term as a boundary between civilization and barbarism, or civilization and wilderness, because those connotations reflect the value judgments and self-justifications of the conquerors. Instead, we view the Arizona frontier as a region where different ethnic groups with different levels of social and political organization struggled for control over the region—where the political, economic, and military hegemony of the Spanish empire, the Mexican republic, and the United States was tenuous and incomplete. That struggle did not end until the U.S. and Mexican governments defeated the Apaches and deported them or confined them to reservations. That process began in earnest with Crook's campaign against the Yavapais and Western Apaches in the fall of 1872, and ended with the surrender of Geronimo to General Nelson Miles on September 4, 1886.

The military conquest of the American Indians allowed Arizona settlers unimpeded access to the natural resources of the territory, including the study area. The presence of the military and the creation of reservations also provided the most important markets for the goods those settlers produced, particularly agricultural produce, mutton, and beef. During the 1850s and 1860s, herders and drovers from New Mexico and Texas drove most of the sheep and cattle into the territory because there were few ranches in Arizona itself. One of the most important avenues into the territory was the Southern Overland Trail, which skirted the study area (see Chapter 4). By 1870, the federal census listed only 5,132 cattle in the Arizona territory, but that figure was undoubtedly too low. In his unpublished dissertation, James Wilson (1967:34) cites the reminiscences of pioneer stockmen to arrive at a more realistic estimate of 37,694. Nonetheless, Arizona ranching was still in its infancy 22 years after the Treaty of Guadalupe Hidalgo and 16 years after the Gadsden Purchase.

Beginning in the 1870s, however, stockraisers began to establish cattle and sheep operations across

the territory. Colonel Henry Hooker founded the famous Sierra Bonita Ranch at the north end of the Sulphur Springs Valley in 1872 and was running 5,500 head by 1880. Walter Vail, Herbert Hilsop, and John Harvey organized the Empire Ranch near Camp Crittenden north of the study area. Beginning with the old Fish homestead of 160 acres, they expanded their range until it carried more than 5,000 head. Then they purchased the nearby Cienega Ranch to the east so they could sell off its 23,000 sheep and replace them with cattle. Homesteaders, squatters, and a few of the *parcioneros* of the San Rafael de la Zanja land grant or their descendants even moved back into the San Rafael Valley. For the first time since the 1830s and early 1840s, the desert grasslands of southeastern Arizona supported cattle and sheep. According to Sheridan (1995):

This was the era of the open range, when most cattle roamed unfenced public land. In 1877, the Desert Land Act increased homestead allotments from 160 to 640 acres, but a section of land was still hopelessly inadequate to maintain a successful cow-calf operation in arid country. So as Arizona's ranges began to fill up, the stockmen themselves developed a set of unwritten customs to govern grazing rights. Whoever controlled the water controlled the range. Ranchers patented sections around springs, *cieneegas*, and streams, and then other ranchers and government officials recognized their right to run cattle on the surrounding public lands. During early territorial days, the range must have seemed limitless, and the system made sense. By 1882, however, more than 21,000 acres had been distributed under the Desert Land Act. Soon, every spring, seep, and stream had been pre-empted. The infinite land suddenly became finite, and the wilderness was transformed into a gigantic cattle ranch in less than 20 years.

FOUR SQUARE LEAGUES OR FOUR LEAGUES SQUARE

A grandiose if idiosyncratic example of this process was the San Rafael de la Zanja land grant, which

dominated the development of cattle ranching in the study area for two decades. The process began when Pennsylvania investor Rollin R. Richardson acquired the grant. According to Richardson's brief autobiography in the Arizona Historical Society, "I came to Arizona in 1880 and dabbled in mining and went into the cattle business, buying the San Rafael Land Grant (getting an option on it) and bought all the cattle on it from the squatters who were there—two Americans and six Mexicans" (Richardson n.d.). The Mexicans may have been *parcioneros* or heirs of *parcioneros* from Santa Cruz, Sonora. One of the Americans was Dr. Alfred A. Green, who later contended that he alone possessed "the full and absolute title to the whole of the ranch San Rafael de la Zanja" and submitted a claim to the Committee on Private Land Claims of the U.S. Congress (Wayland 1964:44).

During the next three years, Richardson invested \$40,000 in the San Rafael. A small part of that investment was the \$275 he paid George Roskruge, U.S. Deputy Surveyor, "to survey and find the monuments of the San Rafael Land Grant (or rather to TRY to find them)," (Richardson to James Finley, February 1, 1891, in the Journal of Private Land Grants [JPLG], Vol. I). In a letter to U.S. Surveyor General John Wasson (September 7, 1880), Roskruge wrote:

In accordance with your instructions I proceeded to the San Rafael valley and at the place called la Zanja, where Slaven has now a stock ranch, I found a post marked S.R.Z., for the center of the San Rafael Land Grant. From this point I ran north 200 cordels or five miles 16.66 chains to a point, at 5 miles and 20 chains I found on the right bank of an arroyo an oak tree blazed, the blaze being so old that the bark had grown over it, forming a kind of curtain. I found indistinct marks on it which might be easily traced into a cross, that is if it was painted, as was the case of the one marking the south center of the Canoa Land Grant.

From the above mentioned point I ran west, at 4 miles the line was on the edge of the mesa land and about 1/4 of a mile south of a prominent red hill or butte, the line that ran through low hills and at 200 cordels, or 5 miles 16.66 chains I came to the old Santa Cruz road at a point about 2 1/2 miles E.N.E. of the town of Harshaw and the Hermosa mine. The line if continued west would in about two miles strike the Alta mill site or Serna's camp.

I ascended a high hill at end of line, and from

observation found that a line run due south would not strike the mineral belt in Arizona, the grant apparently being intended to cover grazing and agricultural lands only.

Herewith is a sketch showing north and western boundaries of grant, allowing it to contain 16 square Mexican leagues and the approximate position of Harshaw and the Hermosa mine.

Wasson passed on Roskruge's report and sketch to L. Gilson, the manager of the Harshaw Mining Company, on September 20, 1880. He also assured the manager that "if Congress or other authorized tribunal should ever do so unjust and unlawful an act as to confirm said grant for sixteen square leagues, that none of the mines now being worked or mills or smelting works now erected in the Patagonia mountains, Pima county, Arizona, would fall within said lines." Wasson disdainfully added, "It may be of some interest to you to know that the basis of the claimants' claim to 16 square leagues in said grant, rests mainly, and solely, I may say, upon the interpretation of the phrase or expression '*cuatro sitios de ganado mayor*' and the fact that some ignorant or dishonest measurers measured or pretended to measure 16 instead of 4 square leagues as asked for in the original petition of the grant."

Wasson enclosed a pamphlet defining the term *sitio*. "There is not any earthly show for the claimants in the San Rafael de la Zanja case to ever get confirmed a *vara* over four square leagues, and even if it were otherwise, all the mines, improvements, and reduction works now operated or existing in Patagonia mountains would still be some miles away from any part of said grant," Wasson concluded. "In any event it would be a monstrous outrage to confirm mines and minerals in grants made for grazing and pasturage, and it is not at all likely Congress or the Supreme Court will so far forget the duty they owe to the public as well as the simple requirements of our treaty obligations as to do any such thing."

Earlier that year, Wasson himself had confirmed the grant for four square leagues, or 17,324 acres. On June 11, 1880, he also signed his name to a survey plat map that established far different boundaries for the grant from Roskruge's sketch. Roskruge's sketch encompassed more than 150,000 acres, about nine times the land that Wasson confirmed. In his report on the first survey, Roskruge claimed to have found the original monuments of the grant as well, a claim he expounded upon in greater detail under oath nine

years later. According to testimony delivered before Bryan W. Tichenor, a Notary Public of Pima County, on October 14, 1889:

Affiant [Roskruge] further says that during the months of March and April, 1887, he went carefully over the lands embraced in the said private land claim, for the purpose of making a survey of said claim and that during the months above mentioned, he did make an accurate, careful and correct survey of said claim, in accordance with the monuments and landmarks described in the title papers thereof, and called for by the same; that he found no difficulty in locating upon the ground all the monuments and landmarks called for and described in the expediente, and that the landmarks, calls, monuments, and boundaries of said private land claim are notoriously well known and unmistakable.

Affiant says that the central point of said grant, as called for in the expediente, is the now abandoned town of San Rafael, the ruins of which are plainly visible, which affiant found at the place called for in the expediente, and answering the description of the same.

In his affidavit, Roskruge goes on to describe all the landmarks and monuments of the grant, which conform to those in the Mexican documents cited in Chapter 3. The affidavit concludes:

Affiant further says that he is familiar with the preliminary survey of said private land claim made by U.S. Deputy Surveyor Solon M. Allis, under instructions from U.S. Surveyor-General Wasson, of May 13, 1880, and that to this affiant's personal knowledge said preliminary survey is incorrect in every particular; that it does not conform to any one of the monuments called for in the expediente; that the tract of land surveyed, measured and monumented according to the original title-papers is in a square, but that the preliminary survey is in an irregular shape, having no resemblance whatever to the original grant; that the central point of the original grant, as described in the expediente, is at San Rafael, but that the initial point of said preliminary survey is at a spring (La Zanja), more than half a mile distant from San Rafael; that the corners of the preliminary survey are points arbitrarily chosen by the U.S. Deputy Survey under instructions from the U.S. Surveyor-General, and that

such corners are not the corners called for in the expediente.

Roskruge's affidavit contradicted his earlier report several times, particularly over the central point of the land grant itself—la Zanja versus "the abandoned town of San Rafael." Furthermore, neither Wasson or Roskruge mention the preliminary survey by Allis, even though that survey must have been the basis for Wasson's 1880 map. Perhaps the most damning evidence of discrepancy, however, came from Richardson himself. On February 1, 1891, Richardson wrote to James Finley of Harshaw, a political enemy of Roskruge. His letter read:

During the fall of 1880 and fall of 1881, I employed George J. Roskruge to survey and find the monuments of the San Rafael Land Grant (or rather TRY to find them). Four of us worked for six days in 1880. Starting from the center or starting point near the old Slaven ranch, we measured carefully and ran the lines as Roskruge said they should be run, by the description of the old papers. We visited all places where the monuments were supposed to be and gave as we supposed, a THOROUGH SEARCH for the monuments; also for the tree with the cross, said to be up the valley 200 cordells from the starting point. We spent a great deal of time looking for said tree and for monuments. We failed to find the tree; did not find any monuments on the ne, nw and se corners. We did find a pile of stones at the sw corner in what is called San Antonio Pass. I paid George J. Roskruge \$175 for his services on the first work or survey, and about 100 for the last work. I spent a great deal of time while in possession of San Rafael ranch, between the summer of 1880 and spring of 1883, in looking for that tree with the cross and the monuments at the ne, nw and se corners, but failed to find them. I have no idea that monuments at those points were ever built.

These contradictory surveys—and the conflicting interpretations of the phrase "cuatro sitios de ganado mayor"—set the stage for a legal battle that occasionally erupted into violence during the late 19th century. In many respects, the battle resembled the classic Hollywood stereotype of the range war, pitting a ruthless cattle baron against small stockraisers or "squatters." But the cattle baron was not Richardson. In 1883, he sold his interests in the San Rafael to a

consortium of Eastern investors organized by another Pennsylvanian, Colin Cameron. Richardson used the money from the San Rafael sale to buy the Monkey Springs Ranch from pioneer stockman Thomas Hughes. He expanded the ranch, speculated in mining, and founded the town of Patagonia, where he died in 1923 (Cunningham 1985). Colin and Brewster Cameron were the ones who tried to turn the land grant into a ranching empire in the San Rafael Valley.

THE STRUGGLE FOR THE 16 SQUARE LEAGUES AND THE "OVERPLUS" LANDS

At first glance, they were an unlikely pair of range cattlemen. Colin was the first to arrive, stepping off the train in Tucson in 1882. Dressed in Eastern clothes and carrying a walking stick, Cameron had no experience in the range cattle industry. After a brief stint in college, he managed several large dairy farms in Pennsylvania stocked with Jersey and Guernsey cows. But he was the son of a railroad magnate and the nephew of Simon Cameron, Secretary of War under Lincoln and a former U.S. Senator from Pennsylvania, and he carried those political and business connections with him when he began searching for the right ranch to buy. After consulting with Walter Vail, Henry Hooker, and other prominent southern Arizona stockmen, Cameron negotiated with Richardson to purchase the San Rafael. When Richardson agreed, Cameron contacted friends and family members back east, who organized the San Rafael Cattle Company, selling 300 shares of stock for \$500 apiece. Unlike many of the Mexicans, Texans, and other Southerners moving onto the Arizona range, Cameron viewed ranching as an investment, not a way of life. He admired the tenacity of these pioneer stockraisers but believed that the small rancher was doomed despite "his courage and his gun" (Wayland 1964:6).

Cameron and his brother Brewster spent the next two decades doing their best to make that prophecy come true. Colin ran the ranch while Brewster, a lawyer by profession and a general agent for the U.S. Justice Department, manipulated territorial politicians to advance the San Rafael Cattle Company's designs. And those designs were simple: make sure that everyone—"squatters," surveyors, and the U.S. government—recognized that the San Rafael de la Zanja land grant encompassed 16 square leagues.

The key to that claim was the occupation of the so-called "overplus" lands. According to Spanish and

Mexican custom, grantees could run their stock on range surrounding their grant as long as that land had not been given to someone else. They also could acquire title to the overplus by having it surveyed and paying the government whatever the extra land would have cost at the time of the original grant. Cameron did so, paying the U.S. land office in Tucson \$1,359 for 12 square leagues of lush desert grassland. He also hired surveyor J.B. McLaughlin to re-survey the grant's boundaries. Finally, he convinced U.S. Surveyor General J.W. Robbins to withhold the land from entry into the public domain. By the fall of 1883, Cameron and his fellow investors held dubious title to 152,899 acres stocked with 1,200 head of cattle. Seven years later, the San Rafael Cattle Company bought four additional ranches south of the grant. Those tracts lay south of the border where the Santa Cruz River makes a loop through Sonora (Wayland 1964).

Cameron's new domain was not virgin territory. Fifteen to 20 Mexican and Anglo families occupied various portions of the range. Cameron bought out the settlers around la Zanja, the center of the grant where the Santa Cruz River had carved a *zanja*, or ditch, but he decided to let the other ranchers remain for a little while longer to keep larger operations from invading the range. As he told Alexander Fulford, a Maryland merchant who became a major stockholder and purchasing agent for the cattle company, "No man can hold large bodies of unoccupied land in this territory any longer. If these fellows stay here until we fill the country so full of cattle that it costs them more to have theirs, they will get up and go to Sonora or some other distant point" (Wayland 1964:10).

To accomplish that task, Cameron plunged into the stocking game, which was driving cattle and sheep into every corner of the Arizona territory. By the end of 1883, Cameron had nearly quadrupled the San Rafael herd to 4,293. And that was only the beginning. On January 1, 1886, Brewster Cameron wrote A.M. Fulford that it was "only a question whether our cattle eat this grass or the stock of other parties. There is so much grass that we cannot hope to keep others away unless we fill up the range . . . Nothing is clearer to my mind than that we should occupy the range" (Wilson 1967:68). Throughout the boom years of the 1880s, the San Rafael Cattle Company relentlessly expanded. By the spring of 1885, nearly 7,000 cattle grazed the range. By the end of 1887, Cameron was running more than 17,000 head (Brewster 1966).

He also established employees and partners at strategic locations across his range. V.H. Igo farmed 50 acres of corn, beans, and melons in the northeastern corner of the spread where the Canelo Hills blocked off the valley. He sold all of his produce to Cameron and the 15 cowboys and their families Cameron employed. Two miles south of there, a Mexican *vaquero* named "Demacia" (probably Demasio) watched over San Rafael cattle in the area and raised 15 acres of grain for forage. To the northwest, in Red Rock Canyon, Cameron ran 300 head in partnership with Henry Johnsen and George W. Moltz. A man named Clapp cultivated grain and vegetables for the San Rafael two miles southwest of there. Two other *vaqueros* took care of the main herd that watered at the old well near la Zanja and grazed the gramma grasses, sacaton, and buffalo grass along the Santa Cruz's channel. Cameron built a windmill there to increase the water supply, and also piped water from springs along the Santa Cruz to other locations. Four miles southeast of la Zanja, another Cameron employee watched over a smelter and another well. Meanwhile, Cameron himself resided at his new ranch headquarters four or five miles southwest of la Zanja near the old Mexican-era settlement of La Noria on the Mexican border. He called the headquarters Lochiel. There he built a spacious home for his wife, who arrived in the fall of 1885. He also planted an orchard of fruit trees, built a barn for three Guernsey cows, and kept a pack of purebred fox terriers. Cameron may have been in the range cattle business, but he surrounded himself with the pleasures of a Pennsylvania country gentleman, including five thoroughbreds from Kentucky. When Brewster visited the San Rafael for the first time in 1884, he called it a "principality."

The principality had plenty of enemies. In 1884, several small stockraisers drove their cattle onto the overplus lands of the San Rafael. One, a Mexican named Salcido and his family, moved into an adobe dwelling in the northwest corner of Cameron's range. In early January 1885, the house burned to the ground and Cameron accused Salcido of trespassing and arson. Brewster, who was operating out of Tucson by that time, hired the law firm of Harry Jeffords and Selim Franklin to represent them. The Camerons won. Their victory provoked a wave of outrage across southern Arizona. In the words of the *Clifton Clarion* (January 21, 1885), "The Cameron family are not regarded in Pima county with any consideration, for they are looked upon as land grabbers. In the pre-

sentation of Salcido they retained an array of legal council [sic] to assist the law officer of the county which is indicative of the fact that the criminal arm of the law is to be invoked to assist the strong against the feeble."

It was the first of many legal battles the Camerons fought to retain control over the overplus lands. By March 1885, so-called "squatters" were running 1,150 head on those lands. When Cameron informed the stockholders of this threat, they authorized him to purchase more cattle to stock the range. Cameron was in the process of upgrading his herds with Herefords, a breed he pioneered in the Southwest. But to keep other ranchers out, he bought Mexican longhorns and any other scrub or *corriente* stock he could lay his hands on. Cattle were an instrument of occupation; by continually increasing his herds, Cameron was simply doing what every other big operator was doing in Arizona at that time. In 1885, the governor's *Annual Report* claimed that there were 652,500 cattle in the territory. And even though prices dropped from \$30 to \$10 a head that fall, the stocking game continued (Wayland 1964; Wagoner 1952). According to Sheridan (1995):

Speculation ran rampant. Between 1885 and 1887, 113,178 of the 199,026 acres (57 percent) filed upon under the Desert Land Act belonged to people who did not reside in the territory. In 1870, the federal census reported 5,132 cattle in the Arizona territory. By the late 1880s, there were nearly a million. As cattelman Will C. Barnes later reminisced, "What a lot of blind men we all were. Nobody wanted to sell a cow for anything. It was numbers and nothing else. We fondly imagined that these wonderful ranges would last forever and couldn't be overstocked."

The process accelerated after Geronimo surrendered in 1886. In a letter to Fulford (February 3, 1886), Cameron wrote, "The constant dread of Apache atrocities makes white people good neighbors . . . when you hear almost daily of tortures too horrible to publish and wonder when your turn may come, there is not so strong an inclination to quarrel with those about you." But with the deportation of the Chiricahua Apaches to Florida, more stockraisers drove even more animals into Arizona. A lieutenant Richards and a surgeon at Fort Huachuca named Dr. Brown stocked a canyon north of the Canelo Hills with 250 cattle and made plans to push more stock into Harshaw and Mowry canyons. The San Rafael Cattle Company preempted that strike by arranging to sink wells for its own animals at Harshaw, Mowry, and Washington Camp.

In 1885, Brewster Cameron also hired Lewis Wolfley, who became territorial governor of Arizona four years later, to buy up the titles of any surviving *parcioneros* or their heirs to the San Rafael de la Zanja grant in order to strengthen the company's appeal for an official resurvey of the grant. It took Wolfley and Colonel Fredrick Ronstadt more than a year to track down most of the *parcioneros*, but they finally purchased a majority of the shares from the residents of Santa Cruz for about \$80 apiece. Three *parcioneros* demanded \$3,000 per share; Brewster wore them down until they accepted \$80. Then the Camerons learned that Dr. Alfred Green, who had ostensibly sold his share of the San Rafael to Richardson, held the title of Ramón Romero. Green soon claimed that he alone was the true owner of the grant (Wayland 1964).

The San Rafael Cattle Company's troubles continued to multiply when Ray Sparks, commissioner of the Land Office in Tucson, asked the Secretary of the Interior to declare the overplus lands public domain. Soon small ranchers were cutting San Rafael fences, and a group of men led by George McCarthy seized Smythes Cienega in the northwest corner (probably in the northeast corner) of the grant and evicted Cameron's Mexican vaquero, Demasio. With all the bravado of a cattle baron in the movies, Cameron wrote Fulford (September 4, 1886), "These scoundrels are worse than Apache Indians. This ranch is not big enough for them and the San Rafael Cattle Company" (Wayland 1964).

McCarthy, who had homesteaded in a valley between the Canelo Hills and the Huachucas on land the San Rafael Cattle Company claimed, tried to fight the Camerons by filing a complaint with the Secretary of the Interior that they were fencing off public domain. Friends of the Camerons intercepted the letter, and the Camerons swore out a warrant that McCarthy had perjured himself. McCarthy avoided being served with the warrant, but his charge about illegal fencing languished because of the Cameron's widespread political influence in Arizona. According to McCarthy (1927): "I did not succeed in getting the Government to take up the trespassing charge against Cameron until Judge Barnes took up the judgeship. When I went to him and asked about the case he said he knew nothing of it and asked his clerk. He found that it had been waiting for two years and had never been put on the docket. 'Look here,' he asked, taking the clerk by the ear, 'Don't you know that should have been put on the docket so that it

would be brought to my attention? You have no say as to what shall go on the docket and what not. That would be a pretty how-do-you-do, and all sorts of cases could be sidetracked. If I ever catch you doing that again, to the pen you go. That is a penitentiary offense.' "

W.H. Barnes, a Democrat appointed chief justice of the Arizona Supreme Court, tried the case in 1887. On June 20, he handed down his decision that the fences of the San Rafael Cattle Company in the northeast corner of the territory it claimed were illegal and ordered them torn down at once. He based that decision on Wasson's surveys of 1880. Many Arizonans applauded the decision. In the words of John Hise, U.S. Surveyor General of Arizona, "This is the first gun in Arizona from the bench of a fearless and honest judge in opposition to what is styled 'land-grabbers' " (Wayland 1964).

That was the only time the Camerons were indicted and tried for any crime. Nevertheless, the allegations against them ranged from legal 'landgrabbing' to murder. On January 15, 1885, the *Arizona Star* quoted John Jameson, who said, "Colin Cameron and three of his men came to my place and set fire to the house and tried to kill my hired man." Postmaster David Allen filed an affidavit stating that Cameron's men murdered a Mr. and Mrs. Fitch and a man named Rafferty and burned their homes down. After Cameron was accused of burning down the homes of two Missouri families south of the border in Mexico in 1885, the governor of Sonora issued a warrant and offered a reward for Cameron's arrest. Alfred Green, the source of many of these charges and a rival claimant of the San Rafael grant, contended that Frederick Tritle, the governor of Arizona at the time, ignored the Mexican government's request for extradition because he was a partisan of the Camerons.

According to Green, the Camerons had many friends in high places. In Pima County, their allies included James Zabriskie, U.S. district attorney, Harry Jeffords, county attorney, Thomas Tidball, U.S. Marshal, and R.C. Markley, notary public at Lochiel. They were also well-connected in Washington, D.C. Their uncle, Simon Cameron, had served as Secretary of War under Lincoln and in the U.S. Senate for 18 years. His son James occupied the same Senate seat. Other stockholders in the San Rafael Cattle Company were William Ker, an assistant U.S. attorney general, and Colonel Oliver Payne, the son of Senator Henry Payne of Ohio. Those connections shielded

the Camerons while they carried out their legal and extra-legal shenanigans (Cunningham 1985).

Colin Cameron also claimed the land on which three of the largest mining camps in the region—Mowry, Harshaw, and Washington Camp—were located. He wanted to collect royalties on the ore miners ripped from the ground, but the contested title of the grant prevented him from doing so. When miners began cutting wood for their smelters near Lochiel, Cameron feared that the removal of the trees would increase erosion and decrease water retention in the soil. In 1889, he wired his cousin in Washington, D.C., U.S. Senator James Cameron, after two miners named Strauss and Parker won a contract from Fort Huachuca to supply the military post with lumber cut on the land grant. Senator Cameron demanded that the Secretary of the Interior stop payment on the contract. After an investigation by the Quartermaster General was carried out, the miners were told to cease cutting wood on San Rafael land (Wayland 1964).

Because of such challenges to their livelihoods, miners and woodcutters as well as small ranchers and homesteaders developed a healthy hatred for the Camerons. On July 15, 1892, the *Arizona Star* reported that an "indignation meeting" had been held in Nogales. "Two stuffed figures were hung upon a telegraph pole and burned in effigy. A placard on one indicated it was a Cameron. The other was placarded: 'Would-be King Cameron'." Nearly a century later, noted Arizona writer J.P.S. Brown, a descendant of the Sorrells family who battled Cameron, wrote a trilogy of novels—*The Blooded Stock* (1990), *The Horseman* (1990), and *Ladino* (1991)—recounting the range war between a family of small ranchers called the Cowdens and Duncan Vincent, "dude owner of the vast VO spread." Vincent is a thinly fictionalized portrait of Colin Cameron.

THE TRAGEDY OF THE COMMONS ON THE OPEN RANGE

The battles between the Camerons and their neighbors in the San Rafael Valley reflected a national struggle to regulate access to the public domain. As early as 1877, President Rutherford B. Hayes approached Congress about developing "a system of leasehold tenure" on the non-irrigable "desert lands . . . west of the hundredth meridian" in order to provide "a source of profit for the United States" and to legalize "the business of cattle raising" on public

lands (Wilson 1967:118). The next year, famed explorer John Wesley Powell voiced his concern over the ways in which public lands were being grazed in his famous "Report on the Lands of the Arid Regions of the United States." Powell also drew up "A Bill to authorize the organization of pasturage districts by homestead settlements on the public lands which are of value for pasturage purposes only." Powell wanted to divide the range into districts and enable stockraisers in those districts to establish exclusive use rights to avoid overgrazing. But even though stockraisers across the West recognized the dangers of unrestricted access to the open range, small ranchers lobbied against any sort of regulation or government intervention. In the words of Arizona cowboy turned forester, Will C. Barnes, "The advocate of the leasing system . . . found themselves opposed by many small owners who feared in any leasing system, no matter how carefully safeguarded, a monopolization of the ranges by large stock owners and livestock corporations" (Wilson 1967:121).

Colin Cameron tried to establish the San Rafael Cattle Company's exclusive access to most of the San Rafael Valley and surrounding uplands. He also introduced several other measures to improve both his stock and the conditions of his range. The most famous of these innovations was the introduction of 57 Hereford bulls and six heifers in 1883. Most Arizona ranchers scoffed at the experiment and predicted that the "whitefaces" would never survive the winter. But the purebred Herefords flourished and eventually became the dominant breed on Arizona ranges.

Cameron also was one of the first Arizona ranchers to ship his cattle to Midwestern and Eastern markets, sending 600 Herefords, Shorthorns, and Mexican Longhorns to Kansas City in 1885. After the dry summer of 1888, he also drove 2–3,000 head to the Salt River Valley to winter in the alfalfa fields there. Two years later, as the drought worsened, Cameron sold nearly half his herd while the animals were still fat and healthy, making five railroad shipments to California. In many of these ventures, Cameron disposed of calves and feeders as well as butcher steers. He therefore pioneered a transformation of the Arizona range cattle industry. In the words of Jane Wayland Brewster (1966:140), "From that time forward, ranchers began selling their cattle as feeders, instead of holding them until they were three and four years old. Thereafter, Arizona ranches became essentially breeding establishments."

These innovations and others, including the development of artificial water sources, laid the foundation for careful range management in the San Rafael Valley. Unfortunately, however, uncertainties of title and the unregulated open range prevented such innovations from being widely implemented. On the contrary, ranchers like Cameron often had to drive more stock onto their ranges to keep other stockmen from occupying it. Between 1883 and 1887, the herds of the San Rafael Cattle Company increased from the 1,200 cattle Cameron had purchased from Richardson to 17,000 (Wayland 1964; Brewster 1966). Even if Cameron had been able to keep other cattlemen out of the valley, the range was overstocked.

Nonetheless, both small ranchers and giant cattle companies continued to put more animals onto Arizona ranges even though the intermittent drought that began in the summer of 1885 continued. Heavy rains in 1887 and 1890 temporarily brought some relief, but they also aggravated the problem by giving stockraisers a false sense of confidence in the ability of nature to provide no matter how many head they ran. The summer rains of 1890 in particular led many cattlemen to predict that 1891 was going to be as good a "grass year" as 1881. Rochester Ford, the attorney of the San Rafael Cattle Company, spent part of the summer on the ranch and reported that the Santa Cruz had carved a channel 125 feet wide south of the international border. Stockmen who could afford it drove even more animals onto their ranges (Wayland 1964).

It turned out to be a disastrous mistake. By 1891, the Governor's Report listed 720,940 cattle and 288,727 sheep in Arizona. Cameron and other experienced stockmen placed the real figure for cattle at 1,500,000, more than twice the official count. Then the drought returned with a vengeance. In a short history of the Arizona livestock industry published in the 1896 Report of the Governor of Arizona, Cameron dissected the catastrophe. "The ranges were now, in 1891, throughout the Territory, conceded to be stocked nearly to their full capacity. When the rainy season had passed and not one-half the usual amount of water had fallen; when it was seen that all the old grasses was gone, that the new crop was a failure, and that an unprecedentedly large number of cattle in the calf crop [the calf crop of 1891 was the largest in the history of Territory] had been thrown upon the range, it began to dawn upon the ranchmen that there was a limit to the number of cattle that the range would feed" (Cameron 1896:22).

Despite that growing realization, however, few stockraisers reduced their herds. Cameron, Walter Vail, and a few other southern Arizona ranchers spayed their heifers. Cameron also sold one hundred mares and colts and most of his older, heavier cattle. But Cameron was the exception, not the rule. In Cameron's (1996:22-23) words:

Men with many thousands of dollars at stake, knowing that we have only 40,000,000 acres of grazing land (and that a very large portion of this, by reason of great distance from drinking water, was not available), that it requires from 15 to 25 acres of feed to one animal, made no effort to sell or remove even a part of their stock, but continued on in the even tenor of their way, expecting that the coming year would furnish grass to meet the necessities of the occasion.

In the year 1892 many cattle died in May and June, but not until July and August had passed without rain did cattlemen realize how heavily the ranges were overstocked and had been since 1890, and that their cattle must be moved at once or their whole investment would be lost.

During September and October the bulk of the cattle of southern Arizona was moved to pastures in Texas, Indian Territory, Kansas, California, Nevada, and as far north as Oregon. The overstocking of the range was the same throughout Arizona, but because of the greater severity of the drought in the southern portion of the Territory, the loss there was much greater. All ranchmen concede that it was no less than 50 percent, and some insist that 75 percent is not too great an estimate. A part of this loss was sustained in the year 1892; a greater portion, however, occurred in May, June, and July 1893.

The degradation of the range had a profound impact upon the Arizona range cattle industry. In 1891-92, Arizona stockraisers shipped 300,000 head of cattle and 2,000 horses out of the territory. In Pima County, where most of the study area was located (Santa Cruz County was not created until 1899), the number of cattle dropped from 116,604 to 49,500 (a decline of 57 percent) between 1892 and 1893. As Cameron noted, many ranchers lost from 50 to 75 percent of their herds, with cattle dying of starvation or thirst. The *Nogales Oasis* (July 13, 1893) also noted that cattlemen along the Santa Cruz were complaining that wolves and dogs were killing their calves, many of which were in a weakened state.

Meanwhile, the national depression of 1893 sent cattle prices spiraling downward until they hit an all-time average low of \$9.80 a head in 1894–95 (Hadley 1986). And that was an average; some unfortunate stockraisers had to sell as low as \$5 a head (Morrisey 1950). According to Sheridan (1995), "Cattlemen were desperate to sell at a time when markets were strangling in the grip of a financial panic. For many ranchers, the malignant intersection of drought and depression proved fatal."

Most contemporary observers blamed overstocking for the degradation of the range. In 1901, botanist D.A. Griffiths distributed a questionnaire to prominent stockmen in southern Arizona. Griffiths (1901:12–13) does not mention whether Cameron responded, but he did record the answers of two other prominent ranchers, Henry C. Hooker of the Sierra Bonita and C.H. Bayless, who owned a large ranch near Oracle. One question asked ranchers to compare the amount of natural feed before the cattle boom with conditions at the turn of the century. Hooker replied, "Fully double," while Bayless said, "At that time ten animals were kept in good condition where one now barely exists."

The questionnaire went on to ask, "Do you attribute the present unproductive condition of the range to overstocking, drought, or to both combined?"

"Principally to overstocking," Hooker responded. "In times of drought even the roots are eaten and destroyed by cattle, while if not fed down or eaten out the roots would grow again with winter moisture."

Bayless was even more vehement. "The present unproductive conditions are due entirely to overstocking," Bayless answered. He went on to say:

The laws of nature have not changed. Under similar conditions vegetation would flourish on our ranges to-day as it did fifteen years ago. We are still receiving our average amount of rainfall and sunshine necessary to plant growth. Droughts are not more frequent now than in the past, but mother earth has been stripped of all grass covering. The very roots have been trampled out by the hungry herds constantly wandering to and fro in search of enough food. The bare surface of the ground affords no resistance to the rain that falls upon it and the precious water rushes away in destructive volumes, bearing with it all the lighter and richer particles of the soil. That the sand and rocks left behind

are able to support even the scantiest growth of plant life is a remarkable tribute to our marvelous climate. Vegetation does not thrive as it once did, not because of drought, but because the seed is gone, the roots are gone, the soil is gone. This is all the direct result of overstocking and can not be prevented on our open range where the land is not subject to private control.

That last statement was a revealing one. Large ranchers like Hooker, Bayless, and Cameron were undoubtedly horrified by the deterioration of the range, but they also saw it as an opportunity to press their claims for an end to open access to the public domain. At the beginning of his reply to Griffiths, Bayless wrote:

Within find answers to questions sent me. Permit me to add that no practical plan can well be advanced for increasing plant growth on any open range while free for the use of everybody. Hence I must respectfully urge upon you the importance of impressing the Government officials with the fact that no general improvement of range country can be expected until the land is placed under individual control by lease or otherwise. In a few favored spots where such an arrangement is now secured through local conditions good results might be accomplished, but the greater part of our range country is at present a desert and will steadily become less and less productive, while the present range management, or rather lack of it, prevails.

Recent climatological research, on the other hand, reveals a more complex pattern of cause-and-effect. There were severe droughts in 1892–93 and 1895 that triggered the worst die-offs. Hadley (1986) even contends that an extended drought actually began in the summer of 1885 and lasted on and off until 1905. During that 20-year period, there were six prolonged stretches where the amount of evapotranspiration (moisture lost through evaporation and transpiration) was greater than the amount of precipitation. Moreover, recent research by geoscientists Julio Betancourt, Robert Webb, and others reveal that those dry periods were preceded and punctuated by an unusually high number of years characterized by the El Niño/Southern Oscillation (ENSO) phenomenon: 1867–68, 1871, 1874, 1877–78, 1880, 1884, 1887–89, 1890–1891, 1896–97, 1899–1900, 1902, 1905, 1907 (Webb and Betancourt 1992).

During those years, warm water surfaced in the equatorial Pacific and triggered a global chain of climatic events. In the Southwest, intense and heavy rains flowed down slopes that had been stripped of vegetation, carrying away topsoil. Massive floods then surged down floodplains that had been denuded of riparian plants and channeled by farmers who had dug ditches in streambeds like the Santa Cruz to intercept more groundwater. The floodwaters carved deep arroyos in the alluvial soil, leaving many fields along the Santa Cruz, the San Pedro, and other southern Arizona drainages high and dry. Human impact upon the environment, including grazing and more localized alterations of the floodplains themselves, increased the intensity of both sheet erosion and gulying. Overstocking was just one of the factors that degraded Arizona ranges and watersheds. Droughts interrupted by intense El Niño storms also contributed to the devastation (Bahre 1991; Betancourt 1990; Cooke and Reeves 1976).

THE ECOLOGICAL LEGACY OF COLIN CAMERON

The San Rafael Cattle Company weathered the drought better than most outfits. It was well-capitalized and well-run. At the height of the drought, Cameron rented pastures in Montana and Texas, where he wintered 4,000 head in 1892–93. Those moves allowed him to avoid catastrophic die-offs during the dry years and bankruptcy during the depression. By the end of the 19th century, Cameron had built up the largest herd of registered Herefords in the West.

The company did not fare as well in the courtroom. In January 1899, the Court of Private Land Claims confirmed the San Rafael de la Zanja land grant for four square leagues. Cameron and his stockholders found themselves with a strong and valid title to 17,474 acres, not the 152,889 they claimed. They therefore appealed the case to the U.S. Supreme Court. The U.S. government also appealed the decision, arguing that the grant should be thrown out altogether. The Supreme Court dismissed the government's appeal. It also ruled that even though the original Mexican survey of the grant encompassed 152,889 acres, the survey was illegal. The original grant was for four square leagues, not the survey boundaries. According to Justice White, "No duty rests on this government to recognize the validity of a grant to any area of greater extent than was recognized by the government of Mexico" (Harris 1961).

That decision, handed down in 1900, ended Colin Cameron's battle to dominate the San Rafael Valley. Two years later, he sold the San Rafael land grant and its improvements to Colonel William C. Greene for \$1,500,000. For 20 years, however, he ran San Rafael cattle across most of the valley, controlling nearly nine times the amount of range the court confirmed. His methods were unscrupulous and at times illegal. He intimidated small ranchers and farmers from the Patagonias to the Canelo Hills, fought with miners in Harshaw, Washington Camp, and Duquesne, and delayed the systematic settlement of much of the study area for two decades. In many respects, he fitted the stereotype of the ruthless cattle baron.

Nonetheless, his actions may have kept the San Rafael Valley from becoming as degraded as other desert grassland ranges in southeastern Arizona. The evidence is impressionistic, but it appears that the range of the study area was not as overstocked as stretches of the San Simon and Sulphur Springs valleys to the east. During the 1880s, Cameron occasionally threw rangy Mexican Longhorns onto contested portions of the valley, employing cattle as an instrument of occupation to keep other stockraisers out. He was not entirely successful in doing so, but his relentless campaign to control the valley clouded title and limited access to more than 130,000 acres of land at the height of the cattle boom. Cameron's claims undoubtedly prevented other medium or large outfits from establishing secure footholds in the valley until the boom had gone bust and the cattle business had begun to change. During that same period, Cameron spayed heifers and sharply reduced the size of his herds during severe droughts. These measures may very well have blunted some of the worst excesses of overgrazing that devastated other Arizona ranges where the hegemony of a single rancher or land and cattle company was not so pronounced.

Cameron's battles with miners, particularly in the Patagonias, also may have slowed destructive woodcutting in the foothills of the valley. Cameron, Bayless, Vail, Hooker, and other big ranchers in southern Arizona knew that access to resources such as grass or timber had to be limited. Otherwise, the tragedy of the commons would precede unabated. Their solution was to establish clear-cut private control over those resources—to let a few large operators dominate the open range and divide it into private domains. As they were attempting to do so, however, the federal government was taking the first ten-

tative steps in another direction. During the 1890s, the first Forest Reserves were created in northern Arizona to protect the vast timber stands of the Kaibab Plateau and the Mogollon Rim. Soon after Cameron sold out to Greene, reserves were being

carved out of the public domain in southern Arizona as well. No private individual would ever loom as large over the study area in the twentieth century as Cameron did from 1883 until 1903. Instead, a new player—the U.S. Forest Service—entered the game.

Chapter 7

Chapter 7

Ranching in the San Rafael Valley

Ranching in the San Rafael Valley went through three major stages between the late 1800s and the mid-20th century. The first stage was dominated by Colin Cameron's struggle to establish his control over most of the study area and to drive smaller ranchers off the range. During this period, a few other large outfits with interests in the Sonoita and Patagonia regions also moved into the northeastern portion of the study area—the area that later became known as the Red Rock Range (Fig. 12). Most of the range was open and the federal government exercised little jurisdiction over its public domain. Large ranchers, particularly Cameron, fought to drive small ranchers—a few of them homesteaders, the rest squatters—off the range.

The second stage witnessed a resurgence of smallholding within the study area, especially after the passage of the Forest Homestead Act and the creation of the Huachuca Forest Reserve in 1906. Colonel William C. Greene, who purchased the San Rafael de la Zanja land grant from Cameron in 1903, accepted the limits of that grant and made no attempt to interfere with the economic affairs of his neighbors in the San Rafael Valley. Homesteads proliferated on National Forest land, especially during the dry farming boom of the early 20th century. Many miners also ran cattle and horses in the Patagonia Mountains on what later became the Duquesne and Harshaw ranges. Human population fluctuated in the study area according to mining booms and busts, but the ranching population climbed to its highest levels during the first three decades of the 20th century.

During the 1930s, on the other hand, drought and the Depression drove many smallholders off the land. The third stage therefore saw the consolidation of many smaller operations into fewer and larger ranches, a process that actually began in the 1920s during the drought and depression after World War I (Fig. 13). At the same time, the experiment in dry farming was largely abandoned. Thereafter, relatively large-scale cattle ranching became the most important economic activity in the San Rafael Valley and its surrounding foothills.

EARLY RANCHING

During the years that Colin Cameron was attempting to extend his control of the valley's grazing ranges as far as the slopes of the surrounding mountain ranges, other cattlemen staked their claims and were able to develop smaller ranches. Many of these early ranchers did not stay long. Most were squatters who left few traces in the formal records. The history of the early ranchers, with the exception of a few of the major ranching families who remained in the area for decades, is difficult to reconstruct.

One of the earliest settlers was Tom Gardner, a Forty-niner who became acquainted with the San Rafael Valley during his journey west. In California, Gardner met Sylvester Mowry, who persuaded him to visit the Mowry Mine. In 1859, Gardner moved to the valley where he set up a cattle import business at the Mexican settlement of La Noria. He spent the next decade supplying beef to the mines. While Gardner was working from La Noria, a man named Slavin was living at the ruins of the San Rafael grant. Some sources state that he was a Mormon, but little else is known of him.

Two Texas cowboys who purchased cattle in Mexico and brought them to the area that later became known as Parker Canyon next appeared in the historical records. In 1875, only a few weeks after they had finished constructing their corrals and cabin, the young men were found riddled with arrows. The people who followed them had better luck. In 1880, William Parker, Sr. settled with his large family, including several adult sons and sons-in-law, in the canyon where the Texans had been killed. With protection in numbers, Parker's ranching venture flourished. He and his children soon built up substantial herds, and the small settlement that grew up in the canyon bore the Parker name.

There were at least two or three ranches near La Noria during this early period as well. The year following the Parker arrival, William Harrison occupied the Bellota Ranch. In addition to running cattle, he practiced law and taught school. Antonio de la Ossa brought his family into the region during the early

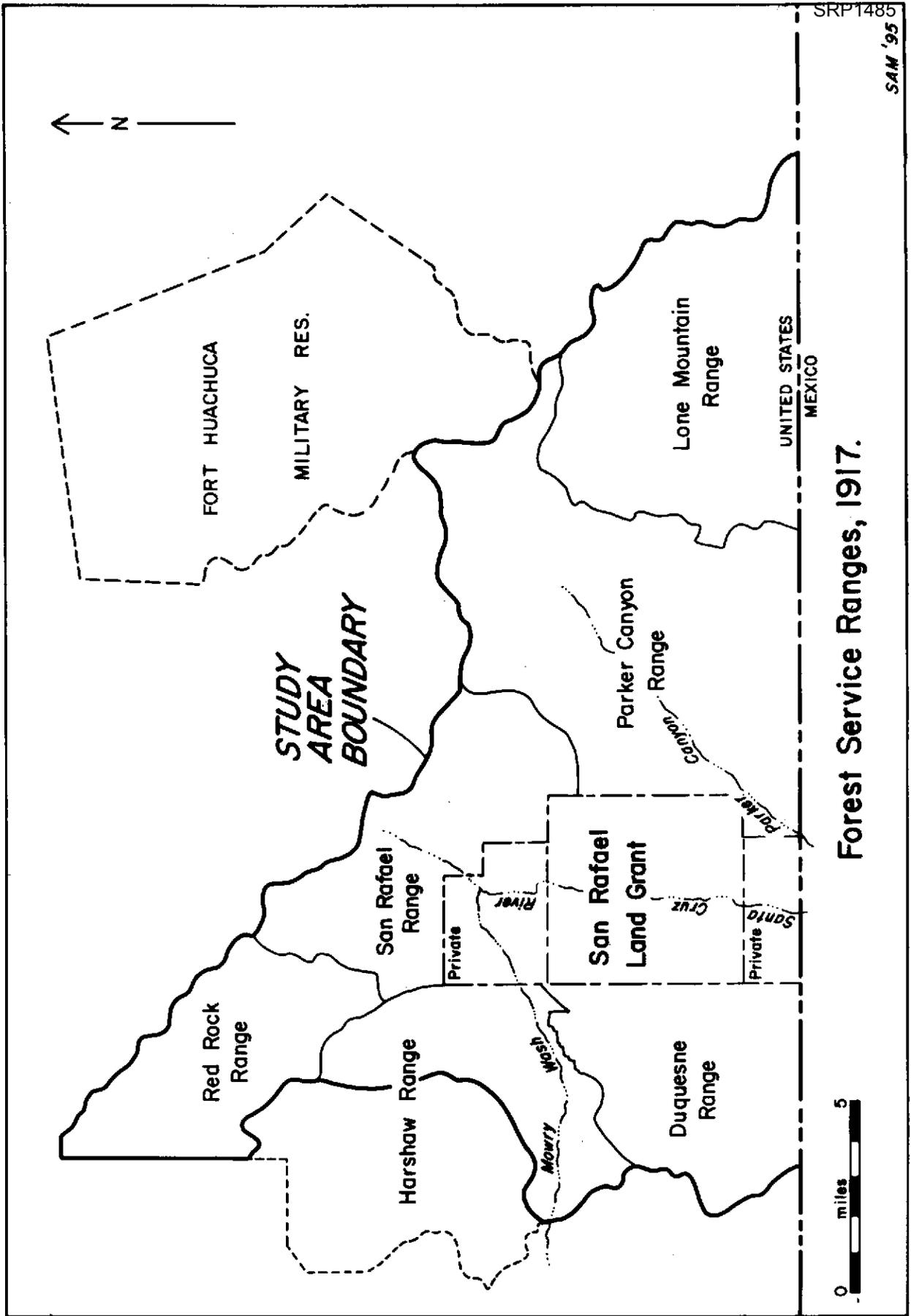


Figure 12

1880s, where he worked as a freighter for the mining camps. By 1886, however, de la Ossa had gone into the cattle business and had established his ranch near the border at La Noria. In 1885, Nicholas Bercich and his family purchased the Hanita (Jarrolitas) Ranch from a previous rancher, a Mr. Bradshaw. An early rancher named Hildebrand had moved away by 1898, leaving a ranch that was considered old and deserted near the Bercich and San Rafael spreads (Oasis 3/19/1898).

During the late 1800s, many smaller ranches were also established on the western slopes of the Huachuca Mountains. John Hand came to Bear Canyon in 1884, where he ran a small herd of cattle. In 1885, Fred Horn settled at the Lone Mountain Ranch and Jim Sutherland occupied the place that became the D'Albini ranch. Fred Beloti lived at the Peterson ranch (Hathaway 1994). The Reppys, later newspaper publishers in Florence, had a ranch near Lone Mountain. The Campinis lived on Campini Mesa below Sunnyside while the Kornes and George Sayers lived above Sunnyside. During the 1890s, a general from Mexico named Juan Cabral also owned a small ranch above Sunnyside but left after his wife died. Her grave remains visible at the turnoff to the ranch itself. At the northeastern end of the study area, John Igo ran cattle and planted an extensive orchard not far from Canille. There were probably many other small ranches on the western slopes of the Huachucas, but since most of the occupants were squatters, they left few records. On the other side of the valley in the Patagonia Mountains, several ranchers began their operations during the 1880s. Tom Farrell and Ahira Butler Sorrells were among the earliest ranchers near Harshaw.

During the late 1880s and the 1890s, the cattle industry in the San Rafael Valley grew rapidly. Three factors contributed to this growth: a series of local mining booms in the Harshaw and Washington Camp areas, the 1882 completion of the railroad from Benson to Nogales, and the 1886 end of hostilities with the Chiricahua Apaches. By 1900, a pattern of ranch operation had been established on the largely open ranges of the study area. This pattern persisted until the late 1930s, when most ranches had at least external fences and the use of motorized vehicles for cattle transportation had become more common.

Throughout the general area, two large round-ups were held each year. Cowboys cooperated with one another to gather cattle from all the ranches. Cattle were branded in the spring and shipped for sale in

the fall. The largest of the two round-ups took place in the fall, after cattle had fattened during the summer rains. With the exception of the San Rafael Ranch, which had external fences at a very early period, most ranches had only a fenced holding trap. These traps held the cattle until the drive came by to move them to shipping pens along the railroad. Calves were separated from the mother cows at the ranch. The cows remained in the holding pens while the calves, yearlings, and any other sale cattle were driven to the railroad. By the early years of the century, most of the cattle were Herefords. Calves usually averaged about 400 pounds. Ranchers on the east side of the valley shipped their cattle from Sonoita; ranchers on the west side took their cattle to Patagonia. Both stations had shipping pens (Lewis 1994) until the Southern Pacific closed the pens at Sonoita during the 1930s (Ashburn 1994).

The San Rafael Ranch shipped separately, driving their sale cattle to Sonoita. The drive took two days, resting the herd for one night in the Canelo Hills. Mother cows accompanied their calves to the railroad and then returned to the ranch after the calves had been shipped. The San Rafael did not employ any extra help for round-ups or trade work with neighbors. The ranch used field hands as extra help when branding and tattooing (Ashburn 1994).

On the east side of the valley, it took approximately one week to gather all the cattle and another three to four days to drive them through Canelo Pass to the railroad. The hold-over points were at the Miller ranch and at the Wood's ranch north of Canelo Pass, where the ranchers allowed cattle to overnight in a holding pasture and use the water. On the west side of the valley, the cattle were driven up the road past Washington Camp, Mowry, and Harshaw. The trip to the cattle pens in Patagonia took approximately three days and cattle were picked up all along the way.

CREATION OF THE HUACHUCA FOREST RESERVE

During the era of the open range, the federal government exercised little control over the Western livestock industry. In 1891, however, Congress gave the president the power to establish Forest Reserves in order to protect the nation's timber resources and remove them from the public domain. All the Forest Reserves in southern Arizona were created by President Theodore Roosevelt between 1902 and 1907.

Most of these reserves were the so-called "sky island" mountain ranges of southeastern Arizona, although lower ranges like the Patagonias and the Canelo Hills were included as well. Once they were in place, the Forest Service began to institute a system of grazing permits that regulated the number of stock on the National Forests.

President Theodore Roosevelt issued the proclamation establishing the Huachuca Forest Reserve on November 6, 1906. Encompassing 314,125 acres, the Reserve became Huachuca National Forest on March 4, 1907. A year later, on July 2, 1908, an executive order consolidated the Huachuca, Tumacacori, and Baboquivari National Forests and renamed the new entity Garces National Forest. On April 17, 1911, Garces National Forest merged with Coronado National Forest, which administered the Santa Rita, Santa Catalina, Dragoon, Whetstone, and Rincon mountains. In 1917, Coronado engulfed the Chiricahua National Forest, which contained the Peloncillos and the Animas as well as the Chiricahua Mountains. Coronado's last expansion took place in 1953, when it took over jurisdiction of those portions of Crook National Forest—the Pinaleno, Santa Teresa, Galiuro, and Winchester mountains—lying in Arizona (Wilson 1987).

There was considerable opposition to the creation of the Forest Reserves in northern Arizona during the 1890s and early 1900s because many ranchers and loggers feared that the federal government would not allow them to exploit Reserve resources. Preservationists like John Muir were calling for the removal of all livestock from the Reserves, and they had many allies in the Department of the Interior, which administered the Reserves until 1905. Ranchers and loggers harassed forest rangers, but they also organized themselves and lobbied strenuously to allow grazing and timber cutting to continue. In 1900, the Arizona Wool Growers' Association even persuaded Gifford Pinchot, chief forester of the Department of Agriculture (USDA), to carry out a study of grazing on the Arizona reserves. Pinchot and his colleague, USDA botanist Fredrick Colville, concluded that properly managed grazing did not harm the forests (Lauver 1938; Sheridan 1995).

Secretary of Interior Ethan Hitchcock suppressed the report and ordered all livestock off the Arizona reserves in 1902. But Pinchot was a close friend of Vice-President Theodore Roosevelt, who became president after William McKinley was assassinated. Roosevelt rescinded the expulsion and declared that,

"The fundamental idea of forestry is the perpetuation of forests by use." Three years later, Roosevelt transferred the Reserves to the USDA's new Bureau of Forestry, which Pinchot ran. Pinchot and Colville's recommendations for managed grazing became the basis for the Forest Service's emerging system of grazing allotments and per capita grazing fees. By the time the Huachuca Forest Reserve was established, then, loggers and stockraisers no longer viewed the Reserves as a complete threat to their way of life. On the contrary, many large ranchers welcomed the regulation of grazing on public lands as long as their access to those lands was privileged and protected (Lauver 1938; Sheridan 1995). The only opposition mentioned in any of the Forest Service reports analyzed below came from stockraisers on the Parker Canyon Range, but their resentment did not seem to be as intense as in other parts of Arizona (Bryan 1917).

The Forest Homestead Act, which Congress passed on June 11, 1906, gave smallholders access to Reserve lands as well. The act enabled settlers to claim a maximum of 160 acres of land within the Reserves. If they lived on the claim and farmed it for five consecutive years, they could receive a patent to the homestead. Unlike conventional homesteads on public domain, however, forest homesteads could be irregular in shape as long as they did not exceed one mile in length. Surveys of claims were authorized and paid for by the government. The act was designed to transfer lands suitable for agriculture from the Reserves to private owners, and boundaries often followed the contours of valleys rather than the grids of township and range (Wilson 1987).

Historian John Wilson (1987) analyzed the forest homestead entries within the Coronado National Forest. The Homestead Entry Survey Plat Book contained 91 forest homesteads encompassing 10,653.38 acres. All were filed between 1910 and 1924, the height of the dry farming boom in the southwestern United States. Interestingly enough, the majority of those claims—51 of them—fell within the study area or the mountains bordering the study area: 10 in the Patagonia Mountains (995.36 acres) and 41 in the Huachuca Mountains or the Canelo Hills (4,887.03 acres). Most of those claims were located in the northern Canelo Hills (outside the study area) or on the southwestern slopes of the Huachucas between Sunnyside and the international border.

According to the 1924 "Range Appraisal Report for the Coronado National Forest" written by C.K. Cooperrider and R.W. Hussey (see below), most of

the forest homesteaders were trying to make a living as small ranchers as well as dry farmers, an agropastoralist adaptation to the semiarid lands of the Southwest and northern Mexico that began in the 1600s and still survives in the river valleys of Sonora today (Sheridan 1988b; see Chapter 3). In the words of Cooperrider and Hussey (1924:41):

The Huachuca Division has the largest number of agricultural claims of any division of the Forest, a large majority of the claimants being grazing permittees, and the protective limit is therefore 130 head which number, while in excess of the average permit, is considered to be the least number with which a fair living can be made. There are enough farm units on the particular allotments just mentioned to seriously disrupt the stock industry should they all be used as base for future grazing preferences. Under existing regulations, should the farm owners qualify and apply for permits it would result in the reduction of all Class B preferences to the protective limit, which latter would probably have to be reduced to a number considerably less than the present 130. This condition, however, is not anticipated as during the past few years several farm units have been sold and consolidated into larger holdings and it is believed that this will continue as many of the smaller permittees have found it impossible to make a decent living from combined farming and small stockraising activities. The protective limit for the entire unit is 130 C. & H., the maximum limit 1200.

The potential disruption foreseen by Cooperrider and Hussey stemmed from the fact that homesteaders could apply for grazing permits on National Forest land even if the ranges were fully stocked. When that happened, the Forest Service reduced the number of animals existing permittees could run. Homesteaders with land bordering the National Forest received Class A permits. Stockraisers with non-adjacent ranches received Class B permits. Since most of the Class B permit holders were large ranchers, they attempted to buy out forest homesteads in order to protect the size of their permits and eliminate competition for grazing rights on National Forest land (Wilson 1987). This undoubtedly created tension between large ranchers and smallholders, even if those tensions never reached the intensity of the Colin Cameron era.

As Chapter 8 points out, most settlers in the study area had abandoned dry farming by World War II. Nonetheless, this mixed agropastoralist economic strategy played an important role in the development of ranching in the San Rafael Valley and its surrounding foothills. Colin Cameron had tried to drive most such "squatters" and homesteaders out of the area in the late 1800s (see Chapter 6). His failure to win confirmation of all the lands he claimed confined large-scale ranching to the valley itself and the Lone Mountain allotment. Meanwhile, small and medium-sized stockraisers continued to scabble to make a living along the drainages of the Santa Cruz in the western foothills of the Huachucas and the eastern slopes of the Patagonias. Beginning in the 1920s, larger operators like Tom Heady and Marshall Ashburn, the Lee family, and Clyde McPhearson began to purchase the homesteads or mining claims of many of these small holders to form ranches like the Heady Ashburn, the Lone Mountain, and the Vaca. Nonetheless, the final consolidation of stockraising in the study area did not occur until the postwar period. Forest homesteads therefore gave smallholders a foothold in the study area for nearly half a century.

They also created perpetual headaches for Forest Service personnel. During the early years, the Forest Service had to carry out surveys in response to individual applications. That was costly and cumbersome, so in 1912, Congress authorized the classification of land within the National Forests in order to systematically remove potentially arable tracts. By 1919, more than 12 million acres had been stripped from the National Forest system (Wilson 1987).

1917 GRAZING WORK PLAN FOR HUACHUCA DIVISION

As Chapter 8 demonstrates, the study area and the Huachuca Division of the Coronado National Forest lost relatively little land despite classification officer Rex King's recommendation that more than 90,000 acres be eliminated. The Forest Service may have flirted with forest homesteads, alienation, and dry farming, but stockraising remained the most sustained use of National Forest land in and surrounding the San Rafael Valley.

Cattle ranching dominated the stock industry. In 1917, Hugh M. Bryan prepared a detailed grazing plan for the Coronado National Forest that determined the carrying capacity of the 14 ranges in the Huachuca Division (fig. 12). According to Bryan

(1917:2): "For many years the Huachuca Mountains and adjacent country have been a center for the cattle industry. Sheep were run in the country many years ago but have not been on the area for a long time, because, according to tradition in the country, the 'Needle Grass' affected the sheep's throat and lungs. No consideration will be given sheep in this Working Plan. There are many small areas on which goats could be run with perhaps more success than cattle. This working plan, however, does not suggest the opening up of any goat range. The reasons are given under the various areas involved."

Bryan goes on to note:

In the past, big outfits have controlled this country. According to the local residents, there were formerly more cattle on the area than at the present time. This is perhaps true. Big herds were thrown on a virgin range. More stock were introduced than the available, watered ranges would carry and the bad seasons in 1893 and 1902-3 reduced the number of stock by big losses. The Forest was created just about the latter time and smaller owners began to replace the big outfits.

The creation of the Forest and Grazing Control were vigorously opposed. It is a free and easy country adjacent to the Border and for long time remote from civilization. The Service received, at its incipiency, encouragement and assistance from but very few of the local people. One by one settlers have recognized the advantage of Forest Service control. The newcomers have seen the advantages more quickly and recent proposed eliminations, which would have put some of the larger owners out of business, have now brought nearly all the stockmen to appreciation of Forest Service protection.

In other words, forest homesteads and the threat of alienation made allies of ranchers and the Forest Service.

Nonetheless, Bryan also claimed that there was widespread "deceit in the matter of the number of stock on the range." According to the report, "Recent sales of fair sized outfits have shown large discrepancies between ownership and Forest permits. The chief problem in grazing management, heretofore, has been to collect receipts from stock already grazing on the Forest. Now there is a double problem because the number of stock on the Division is approaching the maximum and all are not being paid for. Because of lack of control, an accurate count is

now feasible. The partitioning of the range will make it incumbent upon owners to limit their own herds and protect themselves against excess stock of others."

The plan, it should be noted, was being hammered out during the cattle boom of World War I, just a few years before severe drought and a postwar depression drove many ranchers out of business. Eleven years after the creation of the Huachuca Forest Reserve, Forest Service personnel were still trying to close down the open range and bring the cycle of boom-and-bust in the cattle industry to an end, or at least reduce the swing of the pendulum.

The plan went on to discuss the opportunities and constraints on cattle ranching in the region. "There are no rigors of winter to contend with," Bryan observed. "The bad season of the year comes between March and the July rains. When there are no spring rains or when the spring is cold and windy, as in 1917, there is no early grass growth and stock are lost because of a diet of dry grass and cold nights. Poverty is also a source of loss but the Cananea Cattle Company with large, privately owned and understocked pastures in the center of the Forest area have losses of the same kind." This confirms what an experienced Arizona rancher, who once contemplated buying a ranch in the study area, told us about the San Rafael Valley. "It's the best summer range in the state," he said, "but you have to feed your cattle during the winter. Arizona Feed came into business because of those San Rafael ranchers."

Four large cattle companies operated adjacent to the Forest, but Bryan estimated that there were "only one hundred possible qualified applicants from without the Forest." The plan expressed a measure of skepticism about dry farming while admitting its recent successes. "The feasibility of the 160 farm units within the Forest for their primary purpose has appeared very doubtful. Last year, however, all the settlers raised good crops. This year, conditions are propitious; as farmers, the settlers feel that they are making good" (Bryan 1917:3).

Just as King had predicted two years earlier (see Chapter 8), mining was enjoying a renaissance. "The operation of the mines is just now much more profitable than usual and has brought many people into the country. The free stock around these mining camps are a serious problem. Some of the older residents among the mining men have run cattle and some have developed preferences through prior use without ranch property, on the other hand some of the patented mineral areas are available as grazing base lands."

The plan identified five forage associations in the Division determined by altitude. Forage Types A and B, ranging in altitude from 3,800' to 5,500', had "very high forage values." The roughness of the terrain and the heavy brush cover above those altitudes had less water and much less forage value than "the good Curly Mesquite and Grama ranges below." According to Bryan:

The range in general has been closely grazed, due not so much to overstocking as to an incomplete water supply. There is a marked difference, however, between Forest range and the excessively grazed Public Domain. Overgrazed areas are very limited in extent and are found only near watering places.

The Forest Stand is good. There are a few poorly stocked areas that are due in most cases to dense brush in the upper mountains. From a net Forest area of 260,650 acres, there are 95,405 forage acres or an average density factor of .36 (1 percent better than on the Santa Rita Division). There is no Barren Type, the Waste Range amounts to only 9,106 acres and the Forage Type D contains only 10,328 acres. The result of the excellent average Forage Stand and small areas of no or small range value is a practical carrying capacity of 9,830 cattle, yearlong. The average number of Forage Acres per cow is 9.6.

Red Rock Range

The Red Rock Range occupied the northwestern tail of the study area. It consisted of 16,758 acres, with 6,471 forage acres and a carrying capacity of 760 cattle, yearlong. Its topography was dominated by Red Rock Canyon and its tributaries, with elevations ranging from 4,200' to 6,000' in the Canelo Hills. The Red Rock Ranger Station was located in the southern part of the range.

According to Bryan, the range had been controlled for many years by Vail and Ashburn, who also ran many cattle on the Monkey Springs Ranch along Sonoita Creek. Bryan also mentions A.S. Henderson and Julius Kundy [sic; Kunde], who had ranches on the southern stretches of the range. Bryan stated that the range had been heavily grazed, particularly during the spring when early spring forage plants and grasses seemed "to get an early spring start from the winter moisture, a condition not found on the higher ranges on the Division" (Bryan 1917:14). "The for-

age on this Unit represents the best Curly Mesquite, Grama and Browse type on the Division," Bryan reported. "This runs very uniformly through the Range except that Feather Grass, Stipa and Grama are found along the southern portion of the Canelo Hills and Oak replaces the browse in the southern portion of the Range. The spring losses suffered on other Ranges of the Division are not found in this locality."

Bryan also noted that the range was well-watered throughout the year and that the water holes were well distributed. "The practical carrying capacity of this Range, at 8 forage acres to the cow, is 760 head," Bryan said. "The excellent condition of the stock on this area encourages the belief that a still greater carrying capacity is possible as almost that number of stock can be counted on the Range in a single day's ride through it at certain seasons of the year. That more than 760 stock have used the Range is evident by the overgrazed condition on the south and west portions of the Red Rock Range. During the spring season of 1917, where the grass was only an inch to two inches high, the stock were shed off and fat."

Bryan listed the following permittees on the range in 1917: J.S. Gatlin, 200 head (stock removed and refund made); A.S. Henderson, 33 head; Julius Kunde Estate, 188 head; Richard Kunde, 25 head; Frank Siebold, 25 head; and Vail & Ashburn, 450 head, for a total of 721 head under permit. There were also 70 "free" head. The 791 head exceeded the carrying capacity of the range by 31. "Close scrutiny of this Range will be necessary to limit the use of the area by Vail and Ashburn," Bryan recommended. "If the permittees will agree to limit the number of stock in the Red Rock country during the balance of the year, they could well be permitted to graze increased numbers of stock during the spring season."

Neither Bryan nor the Range Divisions and Fence Map noted any fences in or on the boundaries of the Red Rock Range. According to Bryan:

Vail and Ashburn will find no advantage to themselves in closing the gaps in the Canelo Hills between this Range and the Crittenden Range on the north and the hills form a sufficient barrier for the Henderson, Kunde and other stock at the south. The condition along the east boundary is described in the San Rafael Range. The east boundary can later be fixed as the final east boundary of the Vail and Ashburn range. At present, the close connection between the Kunde and McPherson interests would make a

fence a hardship to them. On the south, the ridge south of Red Rock Creek is for the most part an insufficient barrier to stock. It is proposed to close the gaps in this ridge at some later time to isolate the Harshaw Range at the south. The closing of that Range would mean also the fencing of the Forest Boundary. In the records, the southern limit of Vail and Ashburn activity on the Forest is this unplaced south boundary of the Range. Range management by the Forest Service is largely a matter of care to avoid overuse of this choice range.

Aside from that general observation, Bryan criticized "the present method of handling stock" as "too extensive."

"There are very few corrals and hardly sufficient salting grounds," Bryan observed. "The salting grounds, besides, are the same that have been used for many years and are responsible for small overgrazed areas. It would be just as satisfactory to the stockmen to change the locations of these salting places from time to time and make a few more of them. Water development in the Basin and salting there would increase its use. The Vail and Ashburn permit on this area could well be made for a greater number of stock for the spring season." Bryan concluded, "Water developments are now being pushed by Vail and Ashburn and should include one or two tanks on this Range. At some later time, the present range line across Red Rock Canyon should be closed by a fence."

Harshaw Range

The Harshaw Range covered 27,803 acres with 2,237 forage acres and a yearlong carrying capacity of 1,088 cattle. Only the southern portions of this range, including the Mowry mining district, fall within the study area. The northern reaches are drained by Harshaw Creek, a tributary of Sonoita Creek. According to Bryan (1917:16):

The Harshaw Range is hardly a geographical unit although it is an almost perfect topographical unit. The northern part of the Range is close to Patagonia and the Red Rock country and has been used by those stockmen. Owners on the north and east portions of the unit have been interested in Meadow Valley Flat and the Upper San Rafael Valley. The owners on the south have grazed their stock on the upper Harshaw

Creek but should naturally use the range to the south also. The present Harshaw Range, however, is well defined by natural barriers and by existing fences except on the northeast. The Range includes the center of old mining interests and many of the present stockmen have become interested in the stock business through mining. There are many permittees on the area with preferences varying all the way from 6 to 350. There are numerous farm units in the eastern portion of the range that appear to have excellent possibilities for raising the necessary feed for stock.

Bryan noted that most of the range was "rough, mountainous country densely covered with oak brush." Nonetheless, the southeast portion of the range, which is in the study area, was "opener, flatter country, taken up very largely by homesteads.

"Taken as a whole, the forage is excellent but lacks the early spring grazing qualities of lower elevations," Bryan observed. According to Bryan, "The chief watering places of the Range are the Harshaw Creek [out of the study area], the fairly permanent watering place in Meadow Valley Flat [in the study area] and developed watering places as follows: Spring and tank in Meadow Valley Flat, Cananea Tank and wells at numerous ranches. There are no large unwatered areas but considerable increases in the carrying capacity will be affected by more numerous watering places in the rougher country."

The permittees in 1917, many of them outside the study area, were: Ygnacio Arioiz, 6 head; Pete Bergier, 78 head (probably on the study area); E.C. Best, 204 head (probably on the study area); R. Farrell Jr., 8 head; Ellen Farrell, 22 head; Rich. Farrell, 35 head; J.E. Gatlin, 50 head; Luis Lopez, 19 head; Chas. A. & Lottie Miller, 147 head; Mrs. Orton Phelps, 45 head; Mariano Soto, 19 head; Miguel Soto, 34 head; Roy Sorrells, 203 head; and Mrs. A.B. Sorrells, 250 head, for a total of 1,120 head. That total, combined with 120 free head, exceeded the practical carrying capacity of the range (1,088) by 152 head. "The Sorrells found it necessary to move some stock off the Range in 1917 for lack of grass," Bryan reported. "The 1917 adjustment in this Plan provides for a transfer of 200 head to the Patagonia Range."

Concerning stock control, Bryan stated:

The northeastern boundary is the watershed between Harshaw Creek and Red Rock Canyon. This is a project for a future drift fence that

should be pressed as soon as the stock owners can be made to see the advantage of a limited range. The eastern boundary is almost entirely closed by fences on homesteads. The same is true of the southern boundary where there is a long line of homesteads in the Mowry Wash. On the southwest the boundary runs across the open Mowry and Smelter Washes between Mt. Washington and the main divide of the Patagonia Mountains. The fence along this line is proposed in the Santa Cruz Range description. There is no barrier there to hold stock from drifting into the Santa Cruz Valley and steps should be taken to close the area. On the west, the Range boundary is an excellent barrier to stock almost to the Forest boundary. 2 miles of Forest boundary on the north should be closed to stock as soon as a fence is erected to divide the Harshaw from the Red Rock Range. This would establish the southern boundary of the Vail and Ashburn and other interests in the north.

Bryan sardonically commented on the stock methods of the Harshaw permittees. "The rough and broken nature of this Range complicates the handling of stock for the owner in this vicinity," Bryan stated. "In most cases, the stock are just turned loose on the range and rarely seen except on the Range. There are very few corrals and salting places except at the home ranches and the stock is none too tame." In contrast to most of the other Ranges, where permittees were full-time ranchers, some of the stockraisers in the Harshaw and Duquesne Ranges were miners who ran cattle as a subsidiary activity.

Duquesne Range

The Duquesne Range consisted of 15,463 acres, of which only 5,481 were forage acres. Its practical carrying capacity was estimated at only 563 cattle, yearlong. There were large private holdings around the mining towns of Washington Camp and Duquesne and along Adams Canyon. "The Duquesne Range was originally grazed only by stockmen from Lochiel community," Bryan observed (1917:20). "More recently, men connected with the mining towns of Washington and Duquesne have entered the stock business and soon we can expect applications from the numerous settlers between the Grant fence and the main road."

In 1917, the permittees were: You Gang, 76 head; Carey & La Ossa, 20 head; G.J. & G.C. Everett, 147

head; S. Murieta, 30 head; Mrs. C. de la Ossa, 164 head; O.A. de la Ossa, 38 head; Francisco Ramos, 19 head; Mrs. M.B. Trickey, 40 head; M.M. Trickey, 36 head; Harry Vaughn, 24 head; J.W. Hathaway, 30 head; and Mrs. Orton Phelps, 45 head, for a total of 667 head. When the 120 free head were added, the total of 787 head exceeded the practical carrying capacity (563) by 224. Bryan clearly considered this one of the most overgrazed ranges in the Division. In Bryan's words: "There are a considerable area of homesteads and the large holdings of the Duquesne Mining and Reduction Company to which both permitted and free stock have access, which account for the large excess of stock with the small overgrazed area. The entire mining property is decidedly overgrazed and all the southern portion of the Range is overstocked. Without doubt a decrease in the number of free stock in the vicinity of the mines can be effected. Stock at the north should be required to graze the northern portion of the Range and so protect southern portions of the Range. The Parker cattle should be moved off the range. With these changes, the remaining excess should be allowed for another season as a check on the assessed carrying capacity."

Like Harshaw, the stock methods of Duquesne permittees did not impress Bryan. "Stock are poorly cared for on this unit," Bryan stated. "There is an apparent shortage of corrals and salting places. The north half of the Range is underused at the expense of the south half. A number of owners are not stock men. The Service should insist on better control and more intensive methods." Very little new fencing had to be erected, however, because the International Boundary and the western border of the San Rafael land grant were already fenced and the crest of the Patagonia Mountains prevented cattle from drifting over into the Santa Cruz Valley. Bryan recommended more corrals and salting places and the construction of a tank in upper Hayfield Draw north of Adams Canyon.

Parker Canyon Range

This range was the largest in the Division, consisting of 39,893 acres, 15,053 of which were forage acres. It had a practical carrying capacity of 1,583 cattle, yearlong. "Many strong opposers of the Forest Service are among the permittees on the Division," Bryan dryly noted. "Permits have not covered the full number of stock. Recent increases have brought up the permitted number to within ten or fifteen percent of the total stock, nearly all the owners are still

holding out a certain number." The Range was dominated by Parker Canyon and its tributaries. (Bryan describes small areas of rough country along the Canelo Hills and the Huachuca Mountains.) "Otherwise, the entire Range is either open mesas or shallow canyons, entirely accessible and advantageous to stock" (Plan 1917:25). Despite its openness, however, the range had some weaknesses.

"The forage is good except for the large Feather Grass areas," Bryan observed, "but the entire Range is handicapped by the lack of any browse or early spring growth." Moreover, "Permanent water is scarce and there is pressing need for additional watering places. Developments are now being made at home ranches and the Service should encourage improvements at the north end of the Range and in small draws on the mesas. . . . Each water development will mean an increase in this carrying capacity, by avoiding the trampling of much feed. The upper ranges are little used, mainly on account of little water."

The Parker Canyon Range encompassed Area E, a large tract of land that King recommended for elimination in his Extensive Land Classification of 1915 (see Chapter 8). Two years later, however, the Forest Service—or at least its range managers—was clearly having second thoughts about King's proposal. Bryan reported that numerous ranches along Parker Canyon had "fair farm lands," yet "Experiments now in progress on the mesa lands indicate that they are of very limited farming value."

In 1917, the permittees were: N.A. Bercich, 5 head; Bercich & Lacey, 87 head; Mrs. K. Bercich, 18 head; Albert Gattrell, 87 head; J.W. Guthrie, 39 head; David Jones, 47 head; J.I. Jones, 60 head; W.B. Lewis, 312 head; A.M. McNab, 2 head; J.R. McIntyre, 12 head; H. Merritt, 38 head; James Parker, 295 head; R. Lee Parker, 50 head; Treu-Nance Cattle Co., 280 head. The number of permitted head of 1,332 combined with 100 free head for a total of 1,462. But that did not include an unspecified number of stock over permit, which, apparently, there were many. "The District Ranger is checking up on these permittees and will soon have the matter cleared up," Bryan claimed. "It should be kept in mind that past excesses over permit do not add to a stockman's right to the use of the range." Bryan proposed fences along the Canelo Hills to divide Parker Canyon from the Korn Range, along Campini Mesas to separate it from the Lone Mountain Range, and a 4 1/2 mile Palomas Springs fence to separate it from the San Rafael Range. The International Boundary on the south and the San Rafael

de la Zanja land grant on the west were already fenced. "Numerous Parker Canyon permittees stated that they favored and would help in the construction of all these fences."

Regarding stock methods, Bryan noted, "The recent changes in ownership have put more thorough cattlemen in charge of the larger herds. Numerous new improvement projects have been initiated and better handling of stock can be expected." It went on to say, "Stockmen should be encouraged to prepare well in advance to feed in the spring and the erection of silos should be pressed."

Lone Mountain Range

This range consisted of 28,315 acres, of which 10,175 were classified as forage acres. Its estimated practical carrying capacity was 950 cattle, yearlong. "This has been the far away, little known, and little used area of the Division," Bryan (1917:27) remarked. "It has been grazed to some extent by Southerland's cattle, drift stock from Parker Canyon, and by small herds belonging to some of the present permittees." James Sutherland had a somewhat z-shaped homestead in the upper reaches of Cave Canyon below Sutherland Peak that remains patented land today.

Bryan reported that the mesa and lower country in the southern portions of the range was "excellent grazing land" but added, "The important feature of the Range is the presence throughout of Feather Grasses, *Stipa* and 3-Awn. These grasses, with their rank growth, give a false impression of the degree of utilization of the Range. Under present conditions, it is impossible to get even fair use of these grasses. Stock trails lead beside and through the high growth to the opener areas where Grama and Curly Mesquite predominate. On the slopes of the mountains the topography adds to the difficulty of securing utilization." Most ranges on the Huachuca Division were assessed at 9 forage acres per cow, but Lone Mountain's assessment was 10 forage acres per cow "to balance the unpalatable elements of the forage."

Bryan listed four permanent waters: Sycamore Spring, 80 Ranch Spring, "permanent waters at the Sutherland Ranch," and "Junction of the creeks at the Chapman place." Bryan goes on to say:

"There are numerous watering places in wet years, as the water rises in many of the creek beds. Water development is especially desirable between Chapman's ranch and the 80 Ranch, along the Mexican border, but the soil conditions do not indicate

good tank sites. Wells, recently dug in Pleasant Valley, furnish only small amounts of surface water. A fair well has recently been developed on the edge of the allotment at the John A. Jones place. More permanent water can be developed at J.W. Russell's pasture and when the present permittees have complete use of the range, they will no doubt take special measures to protect themselves by water development south and west of the 80 Ranch."

The four permittees in 1917 were: Chapman & Harrison, 589 head; John A. Jones, 185 head; Fred Kellogg, 30 head; and W.J. Russell (Davidovitch), 120 head. The 928 permitted head were all temporary. When combined with the 40 head of free stock, they exceeded the carrying capacity by 18 head. According to Bryan, however, "These figures do not cover the total stock run by these men and the Range carries stock from the majority of owners in the adjacent Parker Canyon Range."

Bryan noted that the range was cut off to the south by the International Drift Fence and to the northeast by the crest of the Huachucas, "which should be assisted by a small drift fence at the saddle at the head of Montezuma Canyon. At present, Lone Mountain stock drift across the divide at this point and across down Montezuma Canyon to the drift fence at the box of that canyon." He also noted, "The new west line, which is at present partially closed by the Nance, Lacey, Jones, and Gattrell places, should be fenced. The permittees have agreed to this range division and will take steps to construct the fence. It may be necessary for the Forest Service to furnish wire." Regarding stock methods, Bryan reported: "The permittees are now considering a fence from the southeast end of Lone Mountain through the Kellogg, Chapman, and Peoples' ranches to the Mexican border. This will divide their allotment into summer and winter ranges. The west portion of the lower country will be the summer range and the eastern portion against the mountain will be the winter range. Protection to the stock in bad years, efficient handling through the chance to wean and separate young heifers from the main herd and deferred grazing will all be made possible by the construction of this fence. It is such a minor undertaking that the permittees will gladly build the fence themselves."

San Rafael Range

The San Rafael was a new range composed of 18,559 acres, of which 7,315 were forage acres. Its

estimated practical carrying capacity was 760 cattle yearlong. The range contained the headwaters of the Santa Cruz and a portion of the Red Rock drainage. "The area is covered with Curly Mesquite and Gram forage which unfortunately is without any brows except Oak on the Canelo Hills where Feather Grass and Stipa predominate in a scatter stand," Bryan (1917:18) remarked. "The forage is of excellent quality but lacks the element of early spring feed."

It was not particularly well-watered, with water sources "limited to the south and west borders of the Range except permanent water in the H.B. Fryer place which extends into Section 36 [east of Meadow Valley Flat]." According to Bryan, "This limitation of the water supply has led to hard use of the area immediately adjoining the Forest Boundary and minimum use of the forage at the heads of the Canyons in the east. This larger area is watered only by the lane into the Parker Ranches and Palomas Springs which has been thrown into the Range to the south."

In 1917, the permittees were: Bud Baldwin, 80 head; H.B. Fryer, 24 head; Bill Gates, 13 head; Clyde McPherson, 331 head; and G.W. & W.D. Parker, 29 head. Earlier in the report, Bryan stated, "McPherson and the Parker Bros. have used this area for some time and will continue to be the large permittees of it." The McPhersons did, indeed, continue to dominate the range, as the allotment statistics later in the chapter attest. The result was the Vaca Ranch, one of the larger outfits in the study area.

The range supported 738 permitted head. When the 80 head of free stock were added, the stock exceeded carrying capacity by 58 head. The Forest Service expected this problem to increase. "The item of free stock will probably increase with the development of the area," Bryan noted. "Farming has proved quite successful on the lands on and adjacent to the Forest and complete utilization of the homestead area can be expected. Use of the farm lands will make the grazing situation on this area very intense."

The erection of fences in the Canelo Hills and the Palomas Fence, mentioned in earlier Range section were going to divide the San Rafael from ranges to the northeast and southeast. The San Rafael de Zanja grant was already fenced to the south. "On the west is Meadow Valley Flat and the head of Red Rock Canyon," Bryan observed. "The water and open country of the Flat is used in common by permittees on this Range, the Red Rock Range and the Harsham Range. There is no disposition on the part of the permittees to establish cutting lines through the

area." Nonetheless, Bryan contended that, "it is not desirable to permit Vail and Ashburn and Harshaw Creek cattle in the headwaters of the Santa Cruz River. The establishment of this Range will bring to the attention of all these permittees the limit of their permit and later a movement may be inaugurated to define this cutting line by the small mileage of fence that will be necessary." The Forest Service, in other words, was slowly but surely dividing up the range to allow for greater regulation and control of stock. But it did not want to move too fast, before permittees had a chance to get used to new stages in that process.

Bryan concluded with some observations on stock methods: "The increase value of cattle [during World War I] is now affecting changes in the method of handling stock on this area. The severe losses in the spring of 1917, which amounted to about 30 percent of the stock on the area, has brought to the attention of the permittees the importance of the proper sort of feeding. Apparently the silo is the only solution to the feeding problem as the losses are not always dependent upon a lack of forage but on dry feed for a long grazing season. Water development and corrals on the Range away from the present ranches should be strongly recommended. Salt and water in abundance will decrease materially the chance of loss from the dry feed and Oak browse."

THE RANGE APPRAISAL OF 1924

In 1924, the Forest Service carried out a range appraisal of Coronado National Forest in order to determine the commercial value of National Forest range in comparison to privately owned land, state land, Indian reservations, and "controlled public domain." Six factors were evaluated—*forage, water, topography, accessibility, handicaps, and range improvements.* Forest Service grazing examiners C.K. Cooperrider and R.W. Hussey wrote the report, while Deputy Forest Supervisor Frank Grubb and Forest Ranger Robert Thompson collected most of the data for the Huachuca Division.

According to Cooperrider and Hussey (1924:41), the Huachuca Division

... has been used as cattle and horse range for between thirty and forty years past and its history is practically identical with other divisions of the Coronado National Forest, i.e. originally used by a few large outfits. With the coming of

semi-agricultural settlements and the small dry farmer, the larger holdings have been reduced and many smaller preferences, varying from a few head to several hundred, have been built up. Intensity of range demand is keen for the majority of the grazing allotments, both by increases from present permittees and from new applicants. A large number of Forest homestead listings on the Lyle, Vaughn, Parker Canyon, Red Rock and Harshaw ranges have resulted in a goodly number of dry farmers, most of whom raise a limited number of cattle in connection with other agricultural operations. In fact, the crops raised on these farm units in an average year will not support the settler without some supplemental means of livelihood, either by grazing livestock or outside employment.

Cooperrider and Hussey stated that the division was "used entirely by cattle and horses and is considered best adapted to that class of stock. Portions of the Huachuca Mountains in the eastern part of the unit could no doubt be used to advantage by goats, but, on account of the importance of this unit as a watershed, their introduction is not considered advisable." They observed that the range was stocked to its full capacity and beyond, with "quite a few excess stock on various portions of the range. They also noted that "prior to the protective cuts made in 1921 and the drought of 1921 of the same year" the division "was carrying too much stock." The quality of the stock was about the same as on other divisions of Coronado National Forest except for the cattle on the Parker Canyon and Lone Mountain ranges, which were "noticeably deficient in size, which is probably due to past inbreeding although insufficient feed is probably another factor as these particular units have not had a good grass year since 1919." Concerning forage, they noted, "By far the larger portion of the unit is in the grama grass type, with curly mesquite type of secondary importance. The feather grass and plume Muhlenbergia types are third and fourth in importance respectively." They went on to say, "Larger portions of the Parker Canyon and Lone Mountain ranges have no early spring vegetation of a palatable nature, wahee, mesquite and other spring feed being conspicuous by their absence. The unit is essentially a grass range, weeds being very much in the minority although annual grasses have in places largely supplanted the original sod. This is particularly noticeable on the Duquesne Range." They also

stated that the poisonous small Blue loco weed, or Sheep loco, infested the western slopes of the Huachucas "and in some years is credited with a loss of from 2 to 3 percent" (Cooperrider and Hussey 1924:42). No range in the study area was as infested as the Garces Range on the eastern slopes, where all stock had to be removed during January and February of most years.

Cooperrider and Hussey (1924:42) classified the Division as "heavily grazed." In their words, "Large portions of the Red Rock, Parker Canyon and Lone Mountain ranges are considered to have been damaged by past overgrazing. Although this is not shown in Bryan's report made in 1917, it is understood that this condition existed at that time. The Duquesne Range has had exceedingly heavy use at some former period, as is evidenced by a replacement of the original grama stands by annual grasses. This must have occurred a good many years ago as the area has been stocked far below its carrying capacity for some time past." Cooperrider and Hussey noted that the western slopes of the Huachucas were fully stocked all the way to the crest of the range at altitudes of 8,500 to 9,000 feet.

Cooperrider and Hussey felt that the Huachuca Division was "fairly adequately watered" even though "natural waters are inadequate for the region and are largely supplemented by wells and a few stock tanks." The west slope of the Huachucas was "particularly well watered," while the driest part of the division was the crest of the Canelo Hills, which formed the northern boundary of the Red Rock and Parker Canyon ranges. "The principal existing types of watering places are springs, both in their natural state and developed with wells a close second," they observed.

There were two large outfits—the Boquillas Land & Cattle Company and Vail & Ashburn—running between 5,000–10,000 head of cattle on the Division, but only Vail & Ashburn ran cattle in the study area, on the Red Rock Range. The Cananea Cattle Company, of course, owned the San Rafael de la Zanja land grant, over which the Forest Service had no control. The Sorrells Brothers ran about 2,000 head on the Patagonia Range and the Baca Float outside the study area. "The other permittees vary from persons owning the neighborhood of 500 head, down to the dry farmers with Class A permits for from 10 to 50 head," Cooperrider and Hussey (1924:42–43) noted. "The majority of the permittees combine farming and stockraising, and many of those whose permits do

not exceed approximately 50 head raise enough forage, in favorable seasons, to feed a portion of their stock through the spring months." They went on to say that, "With the exception of the three outfits already enumerated land holdings are confined chiefly to areas of less than a section in extent, although a few permittees along the northern extremity [outside the study area] have acquired state holdings slightly in excess of that figure. ... During normal years but little supplemental feeding is carried on, although during the recent drought of 1920 and '21 nearly everyone had to feed to a certain extent. This unit has the largest number of Class A permittees [forest homesteaders with land adjacent to the National Forest] of any division of the Forest."

Most ranchers marketed their stock as yearlings or "as heifers and old cows when the heifer increase is retained." A few head were sold locally to be butchered, but most of the market was "foreign," i.e., outside the region. Cattle were shipped from Calabasas, Sonoita, Huachuca Siding, and Hereford, which were two to thirty miles from the various ranges. The routes over which the cattle were driven were classified as "good, there being no charge for feed or water en route. With the exception of those permittees near the Mexican border the shipping points can be reached in from half a day to a day and a half's drive from their respective holding pastures."

According to Cooperrider and Hussey, permittees considered Forest Service restrictions regarding stocking requirements, water developments, salting, and the exclusion of sheep and goats as advantageous rather than detrimental. Regarding range handicaps, the authors stated that in the mineralized zone of the Patagonias, there were "itinerant prospectors and itinerant Mexican laborers who are accused of illegally killing a considerable amount of beef. This is particularly true around the Mining Settlements of Harshaw, Duquesne, Washington Camp, Mowry, and Hardshell. These Mexicans bring considerable numbers of unpermitted horses and burros on the Forest which consume a considerable amount of forage and are objectionable around salt grounds." Cooperrider and Hussey also claimed that many U.S. cattle were slaughtered when they slipped through the fence along the International Border into Mexico. Because of the presence of the Cananea Cattle Company, however, "depredations by Mexican cattle thieves are not as bad as on Tumacacori District, as the Company does not allow promiscuous settlement by Mexicans on their lands" (which included much of northern

Donora as well). They said that timber and woodcutting rarely affected the livestock industry, although a wood sale on the Lyle Range (outside the study area) in 1921 brought 125 pack animals onto the range for two months. Adjacent to Fort Huachuca, the Lyle Range supplied much of the fort's wood.

Concerning non-human predators, Cooperrider and Hussey said, "The Huachuca Mountains are a favorite wolf range and losses from these animals and lions are an annual occurrence, although the Biological Survey maintains a hunter on the unit a major portion of the time. Wolves also do some damage in the Patagonia Mountains, though to a less degree. Quite a few lions are to be found there, however, which are almost as destructive." Because the entire Division was a game preserve, hunters did not invade the region during open season. Nonetheless, the dense cover of oak brush made cattle hard to find and led to "a greater loss through screw worms during the summer months, particularly among the newborn calves, than is experienced in more open country." Cooperrider and Hussey (1924:44) estimated that the average annual loss from rustlers, predators, and disease was 4 to 5 percent.

ANALYSIS OF GRAZING ALLOTMENTS IN THE STUDY AREA

Appendix 7.1 presents the number of animals by both grazing allotment and permittee from 1925 to 1944. As the appendix reveals, coverage is uneven. Nevertheless, the figures provide a fairly accurate estimate of the intensity of grazing on National Forest land over a 20-year period. It should be kept in mind, however, that these Forest Service figures do not include excess or unpermitted stock. Moreover, there are discrepancies between the forms listing stock by permittee on the allotments and forms giving the total number of animals and animal months by allotment. In most cases, the forms listing total animals and animal months by allotment provide higher figures, which may include excess or unpermitted stock.

The range boundaries established in or before 1917 prevailed until the early 1930s, when most ranges were divided into smaller allotments (see Grazing Allotment Map 1941). At that time, allotments in the eastern portion of the study area were transferred to the jurisdiction of the Santa Rita Division of the Coronado National Forest. Because the Forest Service instituted a permit system in the early 1900s,

the study area was unaffected by the Taylor Grazing Act of 1934, which extended the permit system to other federal lands. As Hadley (1991) points out, that act had a major impact on the rest of the public domain.

RED ROCK RANGE

Red Rock (11,200 acres in 1937)

In 1925, the McPhersons were listed as permittees on this range, even though they did not appear as such in the 1924 Range Appraisal or on subsequent lists for Red Rock. The largest stockraisers in the area besides Vail & Ashburn, the McPhersons also ran stock on the Harshaw and San Rafael ranges. In 1929, Vail & Ashburn disappeared from the roster and the Chiricahua Company became the largest permittee. Because the size of their preference was similar, there may be some connection between the two outfits, or the Chiricahua Company may have bought out Vail & Ashburn. They dropped off the roster by 1939 (there were no available data for 1936-38). An individual named Jeffcott then became the largest permittee, even though the number of animal months he ran on the allotment fluctuated dramatically. Frank Siebold, and later his widow, ran cattle on Red Rock over the entire period in question, as did Richard Kunde.

The only change in the boundary of the range occurred in or before 1935, when the small allotment of Kunde (1,690 acres) was created. That left Red Rock with 11,200 acres. In contrast with many of the other allotments in the study area, Red Rock had strong ties to ranching interests to the north and west such as Vail & Ashburn. Beginning in 1942, the number of animal months on the unit significantly declined. During the early 1930s, the number of both animals and animal months on the allotment exceeded the estimated carrying capacity of the range. Beginning in 1935, totals by permittee fell below carrying capacity, but those figures may not include excess or unpermitted animals.

Kunde (1,690 acres in 1937)

Richard Kunde was the only permittee on this small allotment from its creation to 1944. The number of animals (70-84) or animal months (693-1,108) did not change much during the period in question.

It worked out to about 20–24 acres per animal, including exempt ones.

HARSHAW RANGE

The figures for Harshaw only include those permittees known to be within the study area. By 1932, the small allotments of Bergier and Best had been carved out of the northeast portions of the old Harshaw Range while Steen and Apache had been separated out of the southeastern part. All four ran less than 100 head apiece before the separate allotments were created. Thereafter, the Harshaw, Farrell, Bender, Weiland, and Red Mountain allotments remained outside the study area.

Bergier (2,370 acres in 1937)

From 1932–44, the Bergier allotment contained only one permittee—Pete Bergier. The same individual is listed as a permittee on the Harshaw Range from 1925–31. As Appendix 7.1 notes, he ran from 84 to 97 animals on the allotment for a total of 918 to 1,208 animal months. That worked out to 24–28 acres per animal, including exempt ones. According to Appendix 7.A, the total number of animal months exceeded the estimated carrying capacity of the range from 1932–34, 1939, 1942, and 1943.

Best (2,280 acres in 1937)

From 1932–44, the Best allotment contained only one permittee—Ernest Best. From 1925–31, Mrs. A. Best is listed as a permittee on the Harshaw Range. The total number of animals Best ran ranged from 56 to 102, while the total number of animal months ranged from 270 to 1,056. In 1935, the estimated carrying capacity of the range was 100 animals and 1,108 animal months. If Best was the only stockraiser on the allotment, then, the allotment was stocked below carrying capacity during the period in question.

Apache (980 acres in 1937)

The only permittee listed for this tiny allotment was Lloyd Gatlin in 1943 and 1944. According to the available data, the estimated carrying capacity of this allotment was revised upward from 343 animal months in 1935 to 588 animal months in 1938. Total animal months of actual stock exceeded those limits from 1935–38.

Steen (3,830 acres in 1937)

Steen was an allotment carved out of the old Harshaw Range in the heart of the mining region in the Patagonia Mountains. Beginning in 1939, it was lumped with the Duquesne allotment to the south. From 1932–35, Harry Steen was the only permittee listed. He was also a permittee from 1925–29 when the Steen allotment was included in the Harshaw Range. Steen also ran cattle on the Duquesne allotment. From 1931–35, the total number of animal months on the Steen allotment exceeded the estimated carrying capacity of the range.

DUQUESNE RANGE

Duquesne (4,850 acres in 1937)

The Duquesne Range surrounded the mining districts of Washington Camp and Duquesne and was one of the most overgrazed areas in the study area. Harry Steen, T.E. Heady, and Mrs. C. de la Ossa were among the permittees. In 1932, the large Hayfield and Lochiel allotments were separated from it. From 1931–35, Forest Service figures for the total allotment indicate that the total number of animal months fell below the estimated carrying capacity of the range. When animals and animal months by permittee are totaled, however, the figures rise considerably. Moreover, earlier reports mentioned the presence of many unpermitted animals belonging to miners. We therefore conclude that the number of animals exceeded the carrying capacity of the range during the 1930s as well.

Duquesne and Steen

From 1939–1944, available records reveal that either the two allotments of Duquesne and Steen were merged or that a new allotment combining portions of both was formed. Until 1944, the only two permittees were Harry Steen and Rosamel de la Ossa. The de la Ossa family were major stockraisers on the Lochiel allotment to the south as well. The available information suggests that Steen's permit was cut from over 200 to 170–75 animals in 1942.

Hayfield (5,635 acres in 1937)

Hayfield apparently was separated from the Duquesne Range in 1930. T.E. Heady and his wife were the only permittees from 1930–32. By 1939, the

permittee was Heady & Ashburn, who ran between 200–300 head on the allotment. According to available figures, the total number of animal months fell below or slightly exceeded the estimated carrying capacity of the range between 1932–35.

Lochiel (3,220 acres in 1937)

Lochiel also was separated from the Duquesne Range sometime in the early 1930s. It was dominated by the Ossa family, who ran from 96 to 150 animals on range for a total of 1,041 to 1,404 animal months.

PARKER CANYON RANGE

Parker Canyon (5,420 acres in 1937)

The old Parker Canyon Range (39,893 acres) was the largest in the Huachuca Division and had the most permittees, most of whom ran less than 100 head. The biggest outfit dominated the range, although permittees such as Mrs. J. Parker, Mrs. A. Gattrell, W.R. Lewis, and Mrs. R.A. Nye ran from 150 to more than 300 head. In 1931, the Parker Canyon Range was broken up, leaving only 5,420 acres along the lower stretches of Parker Canyon remaining under that designation. The new allotments carved out of Parker Canyon were the HQ, Bercich, Campini, Blacktail, Lewis, Nye, Pons Canyon, Tin Tanks, and Pons. From 1931–38, the total number of animals and animal months was below carrying capacity, at least according to Forest Service records. From 1931–44, there were only five permittees on the allotment, including Mrs. E. Parker who ran from 95 to 324 head on the range.

HQ (1,000 acres in 1937)

This small allotment was carved out of the old Parker Canyon Range in 1930 or 1931. It straddled Parker Canyon, bounded to the north and east by San Rafael de la Zanja land grant. Mrs. T.E. Heady was the only permittee, and she ran from 12 to 24 head on the allotment. Total animal months never exceeded 288.

Bercich (3,400 acres in 1937)

This allotment along the Mexican border was separated from the Parker Canyon Range in 1930. During the 1930s, it had only one permittee—N.A. Bercich—from a pioneer family in the region, who

ran from 135 to 156 head on the allotment. Available records reveal that the total number of animals and animal months was below or just around the estimated carrying capacity of the range.

Campini (4,320 acres in 1937)

This allotment, carved out of the old Parker Canyon Range, had only one permittee during the 1930s, and from 1933 until the end of the decade, that permittee was N.A. Bercich. He ran less than 100 head on the allotment, below or around the estimated carrying capacity of the range.

Bercich and Campini

In 1941, the Bercich and Campini allotments were apparently combined. N.A. Bercich was the only permittee in 1941 and 1942. He was succeeded by M. and George Bercich in 1943. The Bercich family ran from 205 to 260 head on the joint range.

Blacktail (7,760 acres in 1937)

One of the larger allotments carved from the Parker Canyon Range, Blacktail straddled the middle stretches of Sunnyside, Bodie, and Parker Canyons. During the 1930s and early 1940s, it had two to three permittees who ran from 284 to nearly 400 head on the range. The number of animals and animal months occasionally exceeded the estimated carrying capacity of the range, but not by much. J. Jones was the largest permittee during the period in question. He had been running cattle on the Parker Canyon Range at least as early as 1917.

Lewis (2,600 acres in 1937)

This allotment stretched across portions of Bodie and Sunnyside canyons and the northwest end of Lone Mountain. Blaine Lewis was the first permittee, followed by D.A. Jones. In 1934, the allotment must have been expanded because the estimated carrying capacity more than doubled from 88 animals and 1,056 animal months to 186 animals and 2,232 animal months. The number of stock more than doubled as well, from about 90 to more than 180.

Rand

This tiny allotment was carved out of Blacktail around 1943. Forest Service figures for 1943 and 1944

reveal that the only permit belonged to A.D. and L.A. Rand, who ran less than 40 head.

Hathaway

This tiny allotment was apparently carved out of Blacktail and Lewis about the same time as Rand. Neither Rand or Hathaway appears on the Allotment Map of 1941, but they are shown on the Grazing Map of 1949.

Nye/Sunnyside (3,440 acres in 1937)

This allotment sprawled across the upper reaches of Sunnyside Canyon and the southwestern slopes of the Huachucas. Part of it is now within the Miller Peak Wilderness. From 1930–1944, there was only one permittee—Mrs. R.A. Nye (1930–1940), followed by Mary Hathaway. The number of stock on the allotment ranged from 63 to 177, exceeding the carrying capacity of the range during the early 1930s, but falling within it later in the decade.

Collins Canyon (4,920 acres in 1937)

This large allotment centered around Collins Spring, where Parker Canyon Lake is now. The only permittee between 1932 and 1944 was J.W. Hathaway, who ran from 155 to 539 animals on the range, including an exceptionally large number of exempt animals. Forest Service figures for the 1930s show the permittee to be within or below the carrying capacity of the range, but the number of animals listed on other forms suggests a heavier impact.

Tin Tanks (3,340 acres in 1937)

This allotment stretched from the eastern border of the land grant across Jones Mesa to Neighbor Spring. The tin tanks themselves were located along a drainage in the western portion of the allotment. W.W. Rogers was the only permittee in the early 1930s. In 1935, the allotment was split between J. Jones and Francisco Pons, who also ran cattle on the adjoining Pons allotment. Total animals ranged from 156 to 254, while total animal months ranged from 1,684 to 2,772, occasionally exceeding the estimated carrying capacity of the allotment.

Pons (504 acres in 1937)

This tiny allotment was sandwiched between Tin Tanks and A-Draw and bordered the San Rafael de

la Zarja land grant. The only permittee was Francisco Pons who ran from 33 to 56 animals and generally stayed within the estimated carrying capacity of the range.

LONE MOUNTAIN RANGE

Lone Mountain (27,200 acres in 1937)

Of all the old ranges noted in Bryan's 1917 report, Lone Mountain was modified the least. The only new allotment created was the tiny Grubstake in the southeastern corner. The major permittee was Henry Lee, who ran from 700 to more than 1,000 head on the range between 1927 and 1944. Minor permittees included Blaine Lewis and Alex D'Albini, who also ran stock on the Grubstake allotment. According to Forest Service records in the 1930s, permittees generally stayed within the carrying capacity of the range.

Grubstake (1,440 acres in 1937)

This small allotment belonged to Lone Mountain until 1931. From 1931 to 1944, the only permittee was Alex D'Albini who ran between 36 and 63 head.

SAN RAFAEL RANGE

San Rafael (9,880 acres in 1937)

The San Rafael was a new range in 1917, when it contained 18,559 acres. It was halved in the 1930s when A Draw, Cherry Creek, Kennedy, Williamson, and Dickerman/Hutchinson were created. Nevertheless, Clyde McPherson remained the major permittee, running anywhere from 391 to 1,071 head on the range from 1927 to 1944. Forest Service records for the 1930s show that the number of animals and animal months occasionally exceeded the estimated carrying capacity of the allotment, especially in the early years of the decade.

A-Draw (4,000 acres in 1937)

A-Draw was created out of the San Rafael Range about 1931. R.H. Ellis was the major permittee until 1939, when Mrs. Meigs apparently took it over. Between 1931–34, Francisco Pons also ran between 25 and 39 head on the allotment. During the early 1930s, the number of stock and animal months exceeded

the estimated carrying capacity but were apparently brought within the limits later in the decade.

Cherry Creek (3,940 acres in 1937)

Cherry Creek was separated from the San Rafael Range around 1930. Bud Baldwin was the major permittee until 1942, when William Choate took over the permit. J.W. Williamson also ran less than 100 head on the allotment until 1934 or 1935, when the Williamson allotment was carved out of Cherry Creek. According to Forest Service records for the 1930s, the number of animals and animal months hovered within or slightly above the estimated carrying capacity of the range.

Williamson (2,132 acres in 1937)

Williamson was apparently created around 1935 to separate the cattle of J.W. Williamson from Bud Baldwin. Williamson remained the only permittee from 1935 to 1944 after Baldwin's permit for the allotment was disapproved. Williamson ran between 53 and 94 animals until 1943, when the numbers dropped below 40. For two of the four years of record in the 1930s, he slightly exceeded the estimated carrying capacity of the range.

Kennedy (685 acres)

This tiny allotment was created around 1939. It no longer existed in 1949. The only permittee in 1939 and 1940 was Charles Kennedy, who ran 60 head, a rather high number considering the allotment's size. That permit passed to Clyde McPherson in 1941, who apparently absorbed it into his San Rafael allotment.

Dickerman/Hutchinson (260 acres)

This tiny allotment was separated from the San Rafael around 1938. The only permittee was Mrs. Dickerman, who appeared on the San Rafael in 1935. She ran a handful of temporary head there until 1941, when the allotment was taken over by B. Hutchinson. Available records do not indicate whether or not small allotments like these were fenced off from the San Rafael or other surrounding ranges.

THE CREATION OF MODERN RANCHES IN THE SAN RAFAEL VALLEY

By the late 1920s, the influx of small ranchers and homesteaders had ended and a pattern of small-

holder sales to large owners began. As small ranchers found they could not make a living, they sought buyers for their homesteads and Forest leases. Their larger neighbors, anxious to acquire more private land and leases, were quick to buy them out whenever they could. Gradually, as the large ranches consolidated, the study area lost population. Today, the valley and the surrounding mountain slopes are dominated by a half dozen large ranches.

THE GREENE CATTLE COMPANY/SAN RAFAEL CATTLE COMPANY

The valley continued to be dominated by the San Rafael Ranch. In 1903, William C. Greene, the copper magnate who owned extensive mining and cattle interests in Sonora, acquired the San Rafael Ranch from Colin Cameron. (See Figs. 14 of Colin Cameron's house and barns at the San Rafael Ranch and Fig. 15 of Colonel Greene's house.) He had created the Greene Cattle Company on April 21, 1901 to act as a holding company for the family's ranching interests in Arizona. Shares of stock in the company were divided between Greene, his stepson Frank Moson, and Benjamin Sneed, husband of his stepdaughter Virginia. Moson was company manager for the next 10 years. Initially the company owned more cattle than land, but in 1902, Greene began acquiring the San Rafael del Valle grant immediately north of his ranch holdings in Sonora. The ranch, which straddled the San Pedro River, was known as the Palominas division. It included his "Hereford homestead," a piece of land that he had attempted to homestead, only to find that it was part of the grant and not open to homesteading. During the next five years, Greene went to court several times to have the grant approved and gradually was able to buy up the interests of the Camou family inheritors of the grant (Sonnichsen 1974:232-37).

In 1903, Greene acquired a second land grant when he purchased the larger San Rafael de la Zanja grant from Colin Cameron for a reported price of \$1,500,000. Greene evidently knew of the ranch through his brother who lived at Washington Camp, and who had looked into the Mexican land grants (Hathaway 1927). The San Rafael Ranch became the home of his herd of registered Herefords, which supplied bulls to all of his other ranch operations. His thoroughbred horses were also kept at the San Rafael Ranch (Sonnichsen 1974:232-37).

Greene set up a Mexican counterpart to the American company to hold his even more extensive ranches



Figure 14—Collin Cameron's house and barns at San Rafael Ranch, 1890s. (Pimería Alta Historical Society, Nogales.)

across the border in Sonora. The Cananea Cattle Company, created in Nogales, Sonora on May 10, 1901, contained seven divisions, and extended along the boundary line from slightly east of Naco to the west side of the Patagonia Mountains, an irregular area 68 miles east and west and 42 miles north and south. The seven divisions were actually separate ranches, held by the company in order to avoid violation of Mexican law that prohibited an individual from owning more than 10,000 hectares of land. The adjacent ranches on both sides of the border were organized into a cooperative operation. The San Rafael Ranch supplied high quality bulls to the Mexican divisions, while sale cattle from the Mexican grade herds crossed the line to rest on the Palominas division before being shipped to feed lots. In 1904, Greene's cowboys branded 35,000 calves on the Mexican ranches (Sonnichsen 1974:232-37).

Shortly after creating the Greene Cattle Company, Greene transferred the OR brand to the company. The OR brand had belonged to his wife, Ella Roberts

Moson, who had brought several fine Steeldust horses with her from Oregon to the lower San Pedro area. The horses were branded with the OR brand and when Greene put together the cattle companies he used the OR in Arizona and reversed the letters for the Mexican cattle, which were branded RO. At the San Rafael, the registered herd bore the brand ORO.

When Greene took over operation of the San Rafael Ranch, he continued many of Cameron's management policies as well as his preference for purebred Hereford cattle. Frank Moson (1878-1959) was president of the cattle company and supervised the operation of both ranches on the American side of the line from his headquarters near Hereford on the Palominas division. Tom Turner was the manager at the San Rafael Ranch, where he occupied the main ranch house with his family. The international boundary was already fenced when Greene acquired the ranch. Under the direction of Moson and Turner, the ranges were crossfenced into a series of smaller pas-



Figure 15—Colonel William Greene's house at San Rafael Ranch, circa 1905. (Pimería Alta Historical Society, Nogales.)

ures, which allowed particular areas to have rest periods without grazing. Greene also implemented some other conservation-minded practices. He stopped wood cutting on his property, fearing that the removal of trees would lead to loss of topsoil. He introduced arid-land grasses from Russia and Turkestan. Greene even continued breeding the Shetland ponies that Cameron had imported from the Shetland Islands in order to sell them to the local miners to haul ore out of the low, narrow mine shafts (Arizona Cattlelog 6/1957). Greene, on the other hand, raised the Shetlands to give them away to his friends and business associates (Sonnichsen 1974:238).

The San Rafael was considered to be a "show ranch," well watered, with 22,000 acres of fine grasslands, an elegant house built on one of the higher elevations of the ranch, and huge corrals with pasture fences leading into the corral like spokes of a wagon wheel. In addition to a mostly purebred Hereford herd of 5,000 head, the ranch ran approximately

500 head of registered Herefords (Axford 1969:152). Farming on the Santa Cruz River bottom lands, which had probably been initiated during the Mexican period, continued under both Cameron's and Greene's ownership. Although the size of the farm operation varied from year to year, at least 50 acres of land were under cultivation, using irrigation water from the Santa Cruz River. The fenced fields were planted in feed crops for the cattle and horses—corn, milo maize, and alfalfa being the most common crops.

In 1908, Tom Heady, who had been manager of the Cuitaca division in Sonora, took over the San Rafael. Mack Axford took over as farm superintendent at Palominas division, working under Frank Moson. After Greene's death in 1911, the Palominas division was sold to the Boquillas Land and Cattle Company, and Moson moved to his own ranch, the Y Lightning, on the eastern slopes of the Huachucas. Many of the OR cattle from the Palominas ranch were shipped to Cananea, where Harry Wiswold took over management of the ranches for Mrs. Greene.

The San Rafael Ranch continued under the management of Tom Heady for almost 40 years. Shortly after Greene's death, Wiswold made the decision to confine the San Rafael operation to registered cattle and to move the commercial herd to Mexico. The ranch was divided into smaller pastures that held up to 50 head of cows, and as many of the pastures as possible were fenced with access to the Santa Cruz River. Water was piped into those without access to the river. Once new corrals were built, Heady began buying select registered bulls from as far away as Indiana and culling all inferior cows. The herd was gradually built up to 1,400 registered cows, possibly the largest registered herd in the country. During the time that Heady managed the ranch, at least five steady cowboys were employed year long. Frank Carron, Frank Vaughan, Frank Meyers, Chico Castillo and Viviano Estorga were among those who stayed the longest (Ashburn 1994).

After Heady retired, San Rafael manager Marshall Hartmann initiated the use of irrigated permanent pastures. Depending on the time of year, the pastures were used for breeding pastures, weaning pastures, or for dry hay production. Pumping costs were low because the land lay along the headwaters of the Santa Cruz River. Fields were irrigated every 10 days. Each permanent pasture field was connected to various range pastures, so that at certain seasons of the year cattle had free choice between range or pasture. Calving normally began in January and cows with calves were given the choice of range or pasture feed from January through late spring. Calves, weaned in October, were placed on the permanent pasture fields until winter. During the summer, the grass was machine mowed and stored in a hayshed. This management technique proved to be cost effective. One 22-acre field provided 7,625 pasture days per year at a cost of \$200 a month for labor and \$216 a month for pumping. The commercial multiple variety pasture mix was refined by selecting seed from the varieties that grew most successfully on the ranch (Arizona Cattlelog 12/1953).

THE HALE RANCH (BEST, FARRELL, PART OF HARSHAW ALLOTMENTS)

Just north of the study area, at Harshaw, is the Hale Ranch, which merits discussion in this section because the history of the ranch is significant for this report and includes the Best and Farrell allotments on the National Forest. The ranch was first home-

steaded by Richard Farrell, maternal grandfather of Norman Hale, the present owner. Farrell, a native of Ireland who went to California during the Gold Rush, filed his homestead in 1912, but like many other homesteaders had occupied his homestead for many years before he made his ownership of the land legal. Norman Hale bought the Archie Best homestead in 1956 and combined it with his grandfather's homestead, creating a ranch that had permits for 65 head on the Farrell permit and 85 head on the Best permit (Richard Farrell, Homestead application #787910, May 18, 1912, T23S, R16E, secs 1 & 2).

THE SANTO NIÑO RANCH (UX RANCH: STEEN, DUQUESNE, PART OF HARSHAW ALLOTMENTS)

The ranch presently known as the Santo Niño Ranch includes the former townsite and mine at Mowry. It was owned for many years by Harry Steen, the U.S. Customs inspector at Lochiel. The ranch includes the former homesteads of the Callahans, the Schaffers, and Harry Steen himself. Steen ran about 200 head on the ranch and rented land along Mowry Wash to several farmers, who farmed on a share crop basis (Accomazzo 1985: 49-53). (See Chapter 8 for information on dry farming on the ranch and on the irrigated farms on Mowry Wash.)

THE HEADY ASHBURN RANCH (SAN ANTONIO RANCH: HAYFIELD, PART OF DUQUESNE AND LOCHIEL ALLOTMENTS)

While working for the Greene Cattle Company, both Tom Heady and his father William Heady filed on homesteads on land immediately west of the San Rafael Ranch. When Mr. Heady died at the age of 96, he left his homestead to Tom. William Heady was a skilled brick mason who had practiced that trade for many years in Kansas City. After construction of the Greene's house at the San Rafael, many bricks were left over, stacked near the kiln where they had been fired between the Santa Cruz River and the house. Mr. Heady purchased these bricks and constructed two elegant houses on his homestead and another close by on his son's homestead.

In 1914, Tom started seriously building the J-I Ranch, later known as the Heady-Ashburn, through the purchase of any small holdings that became available near his homestead. Heady bought the Panick, Leehan, Everett, and Southerland homesteads. He

eventually was able to acquire a Forest lease and continued to acquire land as homesteaders moved out of the valley. Each of the pastures, or waters, on the ranch is named for the homesteader who originally settled at that place. By the 1930s the ranch had reached its largest extent, with the exception of the Paul Schiller homestead, the Murietta homestead, and the Hayfield Allotment, all of which were added after Heady-Ashburn sold the ranch. The homesteads on the ranch include those of Harold Lehan; Jim Sutherland; George Everett; Grace Everett; Arthur Moody; Mary Vaughan; Arthur Wilson; Perry Wilson; Arthur Panick (Tom Heady's brother-in-law); William Heady; Tom Heady; Paul Schiller; and Frank Bennett (who was married to a Parker).

The ranch was stocked with a grade herd until 1929 when Heady went into partnership with his son-in-law, Marshall Ashburn; Heady owned the ranch while Ashburn stocked it with registered Herefords. In 1931, Marshall Ashburn purchased 75 bred cows and one herd bull. The ranch ran approximately 400 head of cattle on both Forest and private land. The herd became well known for its high quality cattle, with special buyers coming from California, Texas and Mexico to purchase breeding stock. The partnership lasted until the 1950s when Marshall Ashburn bought Heady out (Ashburn 1994).

The ranch had no springs of any type; all water came from wells that operated with windmills. Each windmill, like the pastures on the ranch, bore the name of the original homesteader. Mrs. Marshall Ashburn recalled the drought of the 1930s. Although most of the wells on the ranch held up, the feed was very scarce. Every rancher in the valley lost cattle. On some ranches, cattle on the range starved. Ranchers who could afford the feed, fed their cattle. At the Heady-Ashburn, the herd was cut in half. During wet years, the ranch employed George Bercich and Albert Kinsley to mow the range grass on Moody Flat. When rains were adequate, Bercich and Kinsley took contracts to cut and stack range grass throughout the valley (Ashburn 1994).

Heady and Ashburn initiated a diversified range restoration program during the late 1920s. On six sections that were badly eroded, overgrazed, and weed-infested, they built simple spreader dams and pulled out cockle burrs and other noxious weeds that had overgrown the land. They divided the ranch into nine pastures and constructed thirty water tanks and catch basins. The program eventually paid off as eroded gullies grassed over and sodded up and the

ground regained its ability to retain moisture. The native grasses gradually returned and by the 1950s the rated carrying capacity was at over thirty head to the section. During wet years, Heady and Ashburn never increased their cattle to take advantage of extra feed, and instead allowed the grass to seed out (Arizona Cattlelog, 12/1953). Range management specialist Robert Humphrey considered the Heady-Ashburn to be the best managed ranch in the valley (Humphrey p.c.). According to Mrs. Marshall Ashburn, several attempts were made to control the spread of brush. During the late 1950s the manzanita was chained, but it came back as thick as before. Many ranchers credit fire suppression with the large increase in brushy species throughout the valley (Ashburn 1994).

During the 1960s, the Heady-Ashburn ranch was sold to Albert Weatherhead of Cincinnati, Ohio. The Weatherhead company mainly used the ranch for corporate meetings, but continued to operate it as a cattle ranch. In 1967, Kerr McGee Corporation purchased the ranch. The company also bought the Ki He Kah and the Sorrells Ranch. In 1992, it was purchased by Emily Stevens.

THE DE LA OSSA RANCH

Antonio de la Ossa was another of the early arrivals in the San Rafael Valley. Born in Los Angeles in 1838, Antonio was a descendant of several of California's earliest settlers and soldiers. In 1842-43, Antonio's father, Vicente de la Ossa, had acquired the land grant for the Providencia Ranch in present south Burbank and Forest Lawn. In 1851 he acquired a portion of another grant, the Rancho El Encino, in the San Fernando Valley, today's Encino, California. After California became a state, Vicente's fortunes declined and by 1859 he was forced to operate his elegant, 11 room house at Rancho Encino (now a California historical monument) as an inn. His son Antonio went into the freight hauling business and in 1880 he came to Arizona as a freighter for the Southern Pacific Railroad. When the railroad construction was completed, he went into the freighting business at Harshaw and later hauled ore between the Blue Nose Mine and the smelter at La Noria.

According to family lore, Antonio had intended to move to Guaymas. However, his wife, Carolina Yanos of La Paz, Baja California, was tired of the frequent moves and made the decision to remain in La Noria (Hathaway 1994). In 1886, Antonio purchased thirty

heifers from Coqueque, Sonora and started ranching at La Noria. The boundary with Mexico was still unfenced, and the de la Ossas had property and ran cattle on both sides of the border. For the first few years, de la Ossa sold his cattle in Tombstone and in later years in Nogales. In addition to the cattle ranch, de la Ossa farmed and had a large remuda of horses. He also operated a butchering business in La Noria and sold meat to the mines at Mowry and Washington Camp. According to de la Ossa descendants, while Colin Cameron was at the San Rafael Ranch, he frequently attempted to drive the de la Ossas out of the valley. However, his attempts were without success (Schaus 11/1973).

In addition to the original de la Ossa ranch, several of the sons took out their own homesteads. The adobe house that was the headquarters of the de la Ossa ranch is still standing in the town of Lochiel. In 1902, Antonio died in a horse accident a mile south of the border. After his death, Carolina experienced many problems running the ranch. She once recounted to Helen Ashburn that during the big drought of the 1890s, all of the waters with the exception of the sloughs on the Santa Cruz River dried up. The waters in the Patagonia (Washington Camp) Mountains were among the first to go dry, so the de la Ossa cattle came down from the mountains, mixed with the cattle of many other owners on the open range, and headed for the river bottoms, where they were still able to drink. In their weakened condition they were unable to climb up the banks and many became stuck in the mud and died. When the drought was over (1904), the de la Ossas only had one head left and were forced to start all over again (Ashburn 1994).

Rosamel de la Ossa, born in 1895 and second to the youngest of the thirteen children, provided his mother with the most constant assistance. Like the rest of the de la Ossa boys, Rosamel was sent to St. Michael's School in Santa Fe. While he was away, rustlers, who were active along the border, stole a large herd of cattle. When Rosamel returned from school, he took over much of the ranch operation. Carolina had obtained a Forest allotment north and west of Duquesne and another common allotment with Rosamel. However, she lost the Duquesne Forest permit to the Hathaways and Harry Steen (R. de la Ossa 1994). In 1938, after Carolina's death, the family gave up the Mexican portion of the ranch. The Heady-Ashburn, later the San Antonio Ranch, acquired a portion of the Forest permit along with some

of the smaller homesteads of other de la Ossa children. Descendants of the de la Ossa family still run the ranch today.

THE PARKER RANCHES

Near Parker Canyon, the cattle ranges were dominated by several families of Parkers. William Parker Sr., wagon master for his wagon train, had passed through the San Rafael Valley in 1849 on his way to California. According to family stories, Apaches attacked the wagon train near Santa Cruz. After failure in the gold fields, Parker returned to Arizona in 1868, moving to Yuma, Prescott, and Phoenix. In 1881 one of William's sons, James Parker, moved his family from Phoenix to the canyon that soon bore their name. According to family memoirs (Parker ms. n.d.) James and his wife Emily Coggins and their two eldest children traveled by ox wagon through Evan's Camp in Lyle Canyon and the Collins place in Collins Canyon until they arrived in Parker Canyon. The road through the pass was little more than a trail and required road work to make it passable to the ox drawn wagon. En route, they camped at the spring near the Igo Ranch. At the upper spring in Parker Canyon they found an abandoned log house available for "squatting." Farther downstream James found a more desirable location, where a three room log house was occupied by a settler who wanted to sell his squatter's rights to the place. The lower log cabin had been used as a "deer shanty" and was strewn with antlers from deer and antelope that had been sold to the butcher at the Mowry mines (Parker ms. 118). On April 24, 1881, (first birthday of their son, Duke Parker) the family moved into the deer shanty.

When James went back to Phoenix for his cattle his parents William and Jane Parker moved to the canyon with him. The elder Parkers, who had not seen the San Rafael Valley since 1849, moved into the abandoned house James had found upstream in Parker Canyon, where they are both buried. (See: PC Ranch.) Other members of the large Parker clan soon followed James and William to Parker Canyon, including William's other sons John, William A. "Uncle Billy" Parker, and daughters Elizabeth (Fenter), Nancy (Bennett), and Melvina (Sorrels) and their families.

James enlarged the house and constructed a barn, milk house, and blacksmith shop. Initially, the Parkers traveled over the Huachucas to Charleston

purchase groceries. James soon planted a large yard and a substantial garden, however, using ace irrigation from the spring above the house grow corn, pumpkins, and beans, which he shed by means of a horse on a circular threshing and. Mrs. Parker sold butter to the store inshaw. The Parkers even experimented with a goat for supplemental income, first using Leandro, a chore man, to herd the goats. When that proved unsatisfactory, they employed a "real" goat herder, but the goat experiment failed and Parker returned to an exclusive cattle operation.

In 1883, James founded a school at Parker Canyon and was appointed clerk of the board of trustees. Because he had 12 children who needed a school, he purchased for the building materials, constructed Parker Canyon's first schoolhouse, and made all the furniture for it. Unfortunately, the lumber was green and the boards promptly shrank, leaving large gaps that allowed wind to enter the building. A second schoolhouse of adobe was constructed soon after the first. It is the only one of the study area's seven former schoolhouses still standing. Residents held dances in the schoolhouse to help defray construction costs. In 1891, the Parkers constructed a new, six room schoolhouse of adobes made on the site with lumber from a sawmill in Tanner canyon (Parker ms.).

By 1900, several members of the second and third generations of Parkers were operating separate cattle ranches in Parker Canyon and in other parts of the study area. George, Duke, and Frank Parker ran cattle ranches either in the Parker Brothers partnership in the northern portion of the study area (at the present headquarters of the Ki He Kah Ranch). Each brother homesteaded separately. Lee Parker and his family homesteaded a ranch in the Huachucas (near the Parker Canyon dam), where Lee was government trapper after the Forest Reserves were established (Parker ms. 274). James Parker ranched near Sunnyside. The daughters (Bennett, and Sorrels) were all in the cattle business near the San Rafael Valley (PAHS file). On various Parker ranches, James Parker ran 300 to 400 head of cattle; his sons had smaller ranches with 100 to 300 head on each. All cooperated in bi-annual cowboys and took their cattle to the sale together, although each of the Parkers had his separate brand (Parker ms. 1994).

James Parker, who arrived in the valley two years before Colin Cameron acquired the San Rafael Ranch, was one of the few settlers who got along with the "cattle baron." Cameron respected Parker's

knowledge of cattle and sent him to the Midwest to select bulls for the San Rafael Ranch. Despite some good will between the two men, descendants recall that Parker's cattle operation suffered when Colin Cameron finally settled the litigation surrounding the size of the land grant. After the settlement, Cameron fenced his holdings, severely diminishing the ranges where Parker cattle could graze. Like many of the old time open range ranchers, Parker also resented the formation of the Forest Reserves, and disliked having to inform the government of the number of cattle he had (Parker ms. 272).

By the early 1900s, the Parker family lived in considerable comfort. Their home was equipped with a concert grand piano and all of the Parker girls traveled to Sunnyside for piano lessons at the religious colony. A stuffed egret, a curiosity that had wandered into the valley and was promptly shot, sat in a glass case on top of the piano. A description of George Parker's wedding to Bessie Smith, the teacher at the Parker Canyon School, makes it clear that the Parker family had achieved considerable local prominence. George was the first of James Parker's children to marry and the family made his wedding the social event of the decade. The wedding ceremony, performed by Judge M. M. Trickey of Washington Camp, took place in the Parker home at noon. Immediately after the ceremony, the 150 guests sat down under a large pavilion to a "sumptuous feast" prepared by Mrs. Parker. After dinner, the guests engaged in games and amusements until evening when they were served supper and an orchestra arrived for dancing until the "wee small hours." The *Border Vidette* article (n.d.), which reappeared in the bride's hometown newspaper, even included a list of guests and wedding gifts. The gifts included a parlor clock from W. J. Cushing, a set of initialed silverware from General Wardwell, and other elegant items that would seem incompatible with the present stereotype of frontier life (clipping provided by Vera Parker Hopkins).

The closest neighbors to the Parkers were Jim Ike Jones and his twin sons, John and Dave Jones, who had moved from Rock Springs, Texas, to Parker Canyon in 1907. Each of the Joneses had homesteaded and had Forest permits. One of the Jones homesteads was at the location formerly occupied by Mr. and Mrs. William Parker, who had died in 1891 and 1893 respectively and are buried on the site. The Joneses ran a medium-sized herd of cattle together, initially in Parker Canyon, although the sons later moved to separate ranches near Sunnyside Canyon. Another

neighbor from Texas was Bee Lewis, who arrived shortly after 1900. Several families of Parkers, the Jones family, and the Lewis family made up the little Parker Canyon settlement, although in later years, John McIntyre of Sunnyside ran a store and a post office in Parker Canyon.

Eventually the Parker ranches were absorbed by larger spreads. James Parker's ranch is now part of the Lone Mountain Ranch. The George and Duke Parker, or Parker Brothers' ranch, became part of the present Ki He Kah. Jim Parker's ranch near Sunnyside went through a series of owners, including George Parker, Jr. and Jim Hathaway. The William Parker homestead passed to the Jones family and later to Joanne Kane, eventually becoming part of the Lone Mountain Ranch.

THE BERCICH RANCH (BERCICH, PART OF CAMPINI ALLOTMENTS)

In 1885, Nicholas and Katherine Bercich, natives of Austria, purchased the Bradshaw property a half mile north of the international boundary and nine miles east of La Noria for a selling price of \$1,000. The headquarters of the ranch is situated in a well watered canyon with nearby flats covered with willow trees. Members of the Bercich family believe that the original name of the ranch, variously stated as Hanita or Jarrolitas, was given to it during the Mexican period for the willow or ash trees that grew in the flat near the headquarters. In addition to running cattle, the Bercichs operated a farm with between 40 and 80 acres under cultivation, and had an orchard with 400 fruit trees. They dry farmed beans and other grains. Only the orchard was irrigated from the spring in the nearby canyon. The Bercichs sold fruit, vegetables, butter, eggs, and chickens to the miners in the surrounding camps, to the soldiers at Fort Huachuca, and to Mexican citizens at La Noria (Bercich 1994).

During the years that Colin Cameron owned the San Rafael Ranch, Bercich was frequently harassed by Cameron's "men"—Campini, Sidney Thomas, and Constable Broderick (Oasis 3/19/1898). Nicholas Bercich died in 1899 after breaking his back when the youngest of his six children was only a few months old. Nevertheless, Mrs. Bercich continued to run the ranch. At first the children rode 12 miles to attend school at La Noria. After the Parker Canyon School was established, they went to the closer school.

Both of the Bercich sons, George and Nick, went into the cattle business at their mother's ranch. Two

of the Bercich daughters married local homesteaders and remained in the immediate area, filing homesteads on surrounding lands. Both the Davidovitch homestead in School Canyon and the Lacy homestead, closer to the Bercich Ranch, were incorporated into the Bercich Ranch. In 1926, the brothers obtained a Forest allotment for 200 head. Nicholas Bercich worked for the Greene Cattle Company both in Arizona and Mexico, was a champion rodeo rider, and later worked for the U.S. Border Patrol, stationed at Lochiel, Patagonia and Nogales. After Nicholas's death in 1939 (ADS 10/18/1939), his brother George bought out his portion of the ranch. During World War II, when Henry D. Lee, owner of the Lone Mountain Ranch, joined the armed services, George took over management of that ranch, a position which he kept for thirty years until Lee's death in 1972, when the ranch was sold to John Kendall (Pioneer Stockmen, vol. 1, 1978).

THE LONE MOUNTAIN RANCH (GRUBSTAKE, LONE MOUNTAIN, PARKER CANYON, LEWIS, COLLINS CANYON, SUNNYSIDE/NYE, TIN TANKS, PART OF CAMPINI ALLOTMENTS)

During the 1880s and 1890s, many squatters and homesteaders operated small ranches on the western slopes of the Huachuca Mountains, where they ran a few head of cattle. Many of these early settlers also did some prospecting. Among the earliest settlers were Jack Burke, John Hand, Fred Horn, Jim Sutherland, and J. G. Peterson. John Hand, a gunsmith from New York who had constructed the landmark stone house at Calabasas on the Santa Cruz River, homesteaded in Bear Canyon. In the 1880s, Fred Horn, a native of Germany who had worked in the Aguillar Mine in Sonora, established a small ranch in the Huachucas. Horn constructed the stone house, owned by John Chapman after 1907, at the location that became the headquarters of the Lone Mountain Ranch. (See Fig. 16 of John Chapman's stone house.) Chapman ran more cattle than any of his neighbors, sometimes shipping as many as 600 head (Lewis 1994). After 1915, Walter Morris operated a ranch in Lone Mountain Canyon. By the early 1920s, the area around Lone Mountain had enough population to support a school near Campini Mesa in School Canyon. The school operated for several years following the closure of the Sunnyside school, and the teacher usually boarded with John Hand (Lewis 1994).

The present Lone Mountain Ranch, owned by John Kendall, consists of many of these former homesteads

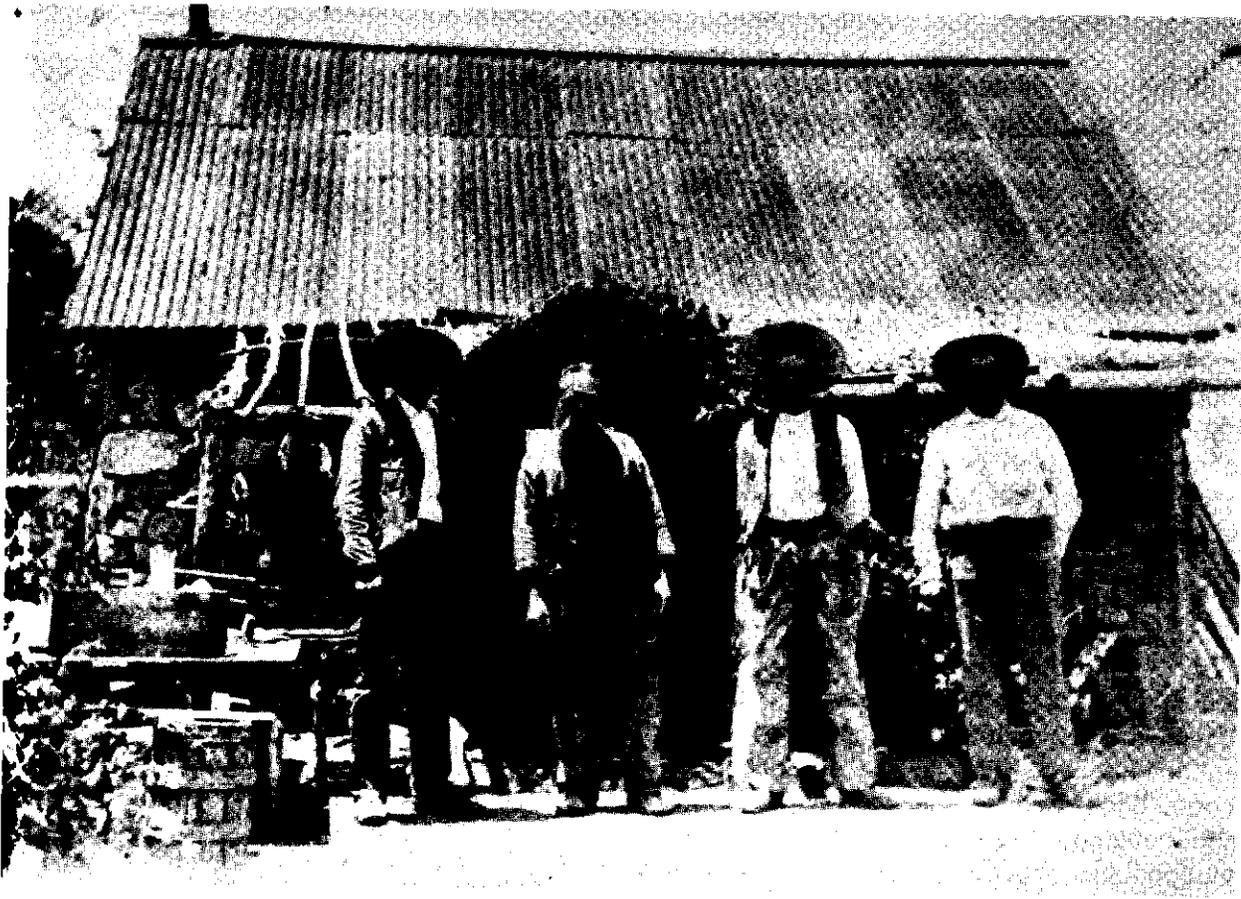


Figure 16—George Parker, John Chapman (?), Fred Parker, Duke Parker. At John Chapman's stone house near the present headquarters of the Lone Mountain Ranch, circa 1905-1907. (Courtesy of Helen Ashburn.)

and smaller ranches. The purchases of smallholdings began during the early 1920s, when Henry D. Lee, a member of his family, purchased the Chapman, Guthard, and Peeples homesteads. In 1927, Henry Lee acquired a Forest permit for 520 head, including 30 head from John Chapman and 20 head from Fred Hogg. In 1932, Lee bought the private property contained in the Hand Ranch (Homestead Entry Survey #302, homesteaded in 1921, for 159 acres in T24S, R10E, secs 12, 13, and 14) from John and Carmen Guthard. In 1933, he increased the permit to 650 head with the purchase of 20 head from Nicholas and Claude Bercich and 110 head from Graydon L. Guthard. In addition, Lee bought out Bill Pearce and Frank Hopkins on Campini Mesa (Arizona Department of Water Resources files). During the 1940s and 1950s, the ranch ran about the 600 head. Some grazing improvements were attempted during the 1960s, including the chaining of junipers near the ranch headquarters. Residents claimed the chaining did not

permanently diminish the number of junipers (Ashburn 1994).

After John Kendall acquired the Lone Mountain Ranch, subsequent purchases of smaller ranches increased the number of cattle he could run. Later ranch purchases included: the Sunnyside or Blaine Lewis Ranch, the PO Ranch (a former Parker ranch owned at the time of purchase by Mrs. Joanne Kane), the Bootjack Ranch (the former d'Albini Ranch), and the Campini homestead. Sketches of the previous ownership of some of these ranches are presented below.

The Sunnyside or Blaine Lewis Ranch, is two miles below the old Sunnyside townsite in Sunnyside Canyon and does not include any part of the townsite of that former religious community. First owned by Mexican army General Juan Cabral, the ranch was unoccupied for many years. Cabral, who only remained at the ranch for a short time after the death of his wife (whose grave is at the entrance to the ranch headquarters), moved to Nogales after his marriage

to Eulalia Miller. In 1915, Cabral sold the ranch to Ben Brooks, who formally homesteaded the base land. In 1925, Brooks sold the homesteaded land and Forest permit to Blaine Lewis, who had been raised in Parker Canyon where his parents ran a ranch adjacent to James Parker and the Jones families. The Forest permit for 238 head is known as the Sunnyside allotment. In 1926, Lewis and his wife, Laura Dunham, bought the adjoining Lane and John Jones homesteads. Lewis branded the H Spear, a brand that he had purchased from J. C. Holland in 1924.

The Sunnyside Ranch had an adobe house and a hand dug well 30 feet deep. Lewis raised two or three acres of corn for cattle feed and occasionally planted sorghum for hay. In years with good rain, he mowed wild hay and stacked it for his horses. Lewis ran up to 300 head on the ranch. During the early 1930s, Lewis was "caught between the drought and the depression." In 1933, when the rains failed and the cattle market fell, he could not afford to buy cottonseed cake to feed his cattle and was forced to sell them at \$12 a head. That same year, Lewis sold his ranch to Dave Jones, his childhood neighbor from Parker Canyon and brother of John Jones, whose homestead Lewis had incorporated into the ranch. The subsequent chain of ownership included Lincoln Hathaway, Sewell Goodwin, George Searle, the Roses, and the present owners, the Lone Mountain Ranch (Hathaway 1995).

The PO Ranch was originally owned by members of the Parker family. Mr. and Mrs. William Parker, who died in 1891 and 1893 respectively, are buried above the house. While the Parkers owned it, the ranch was known as the JP or James Parker Ranch. After the deaths of the senior Parkers, members of the Jones family—Ike Jones and his twin sons, Dave and John—homesteaded the ranch. In 1935, John had acquired his brothers' interest in the original homestead and ranch, trading it for the Blaine Lewis ranch, described above. In that same year, John Jones purchased the adjacent Rogers homestead and ranch. In 1944, Jones purchased half of the Jim Parker (JP Ranch), and in 1947, he purchased the other half of the ranch. By 1947, John Jones had assembled a ranch that consisted of five former homesteads with accompanying Forest permits for 400 head. John Jones constructed dirt tanks, cross-fenced the ranch, and developed springs. He drove his cattle 25 miles to Patagonia, where they were shipped on the train. In 1971, Inez Jones sold the ranch to Mrs. Joanne (Friedman) Kane, wife of Bob Kane (Jim Kane's

brother), who changed the name of the ranch to the PO, for the Kane brand. After Joanne Kane's death her son Michael Elliston inherited it. Sewell Goodwin, operating as Parker Canyon Ranch Incorporated, acquired the ranch, which was subsequently purchased by the Lone Mountain Ranch.

Farther east, the D'Albini or Bootjack Ranch consisted of the former homesteads of Jim Sutherland who arrived in the area in 1885 and for whom Sutherland Peak in the Huachucas is named, and the Hazel homestead, dating from 1920. Most of the cattle on the D'Albini Ranch were run on the Grubstake grazing allotment, which carried a permit for 13 head. Prior to 1935, Alexander and Clara d'Albini bought the ranch and members of the family retained ownership until it was sold to the Lone Mountain Ranch during the 1970s.

SUNNYSIDE TOWNSITE (SUNNYSIDE/NYE ALLOTMENT)

From the old buildings at the Sunnyside township Mrs. Laura Nye operated a ranch for many years after the religious community ceased to exist. In 1924 Laura O'Hara Nye, one of the original members of the community, inherited the townsite from Mr. Albert Gattrell, wife of one of the colony's founders. Between the late 1880s and 1910, the townsite had been home of the religious community directed by Gattrell and Sam Donnelly. Sunnyside had several dozen residents, who supported themselves by mining at the Copper Glance and milling lumber at Sunnyside. After the religious colony lost its population, Mrs. Nye operated a ranch with the assistance of cowboy John Merritt, using Mrs. Gattrell's former home as headquarters. Mrs. Nye used the existing wells at the townsite for domestic purposes, stock water, and irrigation. The Mill well, near the corral at Sunnyside, dated from 1898; a second well across the canyon dated from 1903. Mrs. Nye acquired Forest permit for approximately 86 head year long with a summer permit for 120, to include the calf crop. In 1941, Mrs. Nye sold the ranch to William Hathaway, a descendant of one of the original community members. During the 1960s, another former community member, John McIntyre, acquired a lifetime lease on 10 acres, constructed a house, and acted as caretaker for the townsite that he hoped to preserve and restore. After McIntyre's death, however, the structure deteriorated severely. The Sunnyside townsite is now owned by William Hathaway's son, James Hathaway.

THE SUNDOWN RANCH (BLACKTAIL ALLOTMENT)

The Sundown Ranch is located across from Campini Mesa. Early settlers in this area included the Bodies and Menefees, whose names are commemorated by Bodie Wash and Menefee Canyon. The Sundown Ranch was first owned by Captain Alister McNab and his Filipino wife. During the early 1840s, McNab, a retired army officer and veteran of the Spanish American War, sold the ranch, which included the Blacktail allotment for 100 head, to William Hathaway (Hathaway 1995). In 1944, Hathaway purchased the Sunnyside townsite from Mrs. Laura Nye, adding the Sunnyside allotments to the present ranch. Properties owned by William Hathaway in Sunnyside Canyon, extending from the Machucha Military Reserve to the Mexican border, included: the Peterson, or Sylvania Ranch in Scotia Canyon, three miles north of Sunnyside Canyon, the former ranch of Pete Gustave Peterson and Jeff Alton at Peterson/Milton/Sylvania Spring; the Sunnyside townsite; the Sunnyside or Lewis Ranch; the Guthrie Ranch; the Ralph McIntyre homestead (not owned by Hathaway); and the Sundown Ranch.

THE VACA (CLYDE MCPHEARSON) RANCH (A DRAW, CHERRY CREEK, KENNEDY, SAN RAFAEL, WILLIAMSON, PART OF RED ROCK ALLOTMENTS)

The present Vaca Ranch is another of the San Rafael Valley ranches that was created by assembling many smaller ranches. The core of the ranch is made up of the homesteads of James Gatlin and his two sons, Clyde, Josie, and Charles McPhearson. The homesteads incorporated into this ranch were filed between 1906 and 1923, but many of the homesteaders may have occupied the land long before they filed. The present headquarters of the Vaca Ranch are on the James and Jesse Lee Gatlin homesteads. In 1864, the two Gatlin brothers came to the San Rafael Valley from Reserve, New Mexico, with their father, James Gatlin, driving a herd of cattle with them. James Gatlin, Sr., a Texas Ranger from 1869 to 1872, had herded cattle on the Chisholm Trail, reportedly left New Mexico in 1903 to avoid difficulties with the newly established Forest Reserves (Arizona Geologic 1/73). Gatlin first settled in Harshaw, but for his sons obtained their homesteads, the elder Gatlin purchased 200 RO heifers from Clyde

McPhearson, who was working for the Greene Cattle Company at the time, and began to ranch near the headwaters of the Santa Cruz. During the 1920s and 1930s, Clyde McPhearson, whose ranch bordered the Gatlins', began purchasing smaller ranches and homesteads, including the homesteads of the Gatlin brothers and other early settlers such as Bud Baldwin, Marion Frances, Lewis Nievas, John Lawless, Grace Van Ausdale, and Theodore Dunham. Considerable farming was done on the Vaca, since many of the small homesteaders were principally farmers. After McPhearson began consolidating a larger ranch, the farming continued but on a sharecropping basis. Forage crops were planted using irrigation water from the Santa Cruz River and silage was stored in pit silos.

After McPhearson's death in 1944, subsequent owners increased the size of the ranch, changed the type of operation, and gave it the name Vaca. The Vaca subsequently passed through several owners including Bill Janns of Los Angeles; Wirt Bowman, a Nogales banker; and William Titcomb, owner of the Titcomb Bearing Company. Today the Vaca consists of approximately 22,000 acres, with 6,000 acres of deeded land. In the past the Vaca has run up to 900 head of Herefords, at other times 500 head of Brahmas (Ashburn 1994; Hunt 1994).

THE KI HE KAH RANCH (PARKER BROTHERS' RANCHES; PONS, A DRAW, CHERRY CREEK ALLOTMENTS)

Located at the headwaters of the Santa Cruz River, the present Ki He Kah Ranch is made up of the former ranches of the Parker brothers, George, Frank and Duke, and the Francisco Pons homestead. (See Fig. 17 of the George Parker Ranch.) Smaller homesteads were also incorporated into the present ranch, including those of the Solanos, Martínez, Cot, and Milam Schullenburg. A spring by the house and access to the Santa Cruz River provides abundant water for the ranch. While the Parkers operated the ranch, they did a considerable amount of farming in the river bottoms. One of the early occupants ran a dairy. Old open pit silos for storage of ensilage are still visible on the ranch. The silage was packed down into the pits for storage and curing (Hunt 1994).

To supplement income, Duke Parker opened a butcher shop in Duquesne, where he was deputy sheriff. Duke butchered at the ranch and hauled the beef to Duquesne as needed (Parker ms. 256). The



Figure 17—George Parker Ranch, near headwaters of Santa Cruz River (present Ki He Kah Ranch). (Courtesy of Helen Ashburn.)

drought and depression that followed World War I caused the Parker Brothers Ranch to go bankrupt. The bank in Nogales called in the note on their cattle and the Parkers were forced to sell all their holdings (Harris 1994). Mrs. Dorothea Meigs bought the Parker Ranch and operated it as a guest ranch, known as the San Rafael Valley Ranch or Meigs Guest Ranch. The Meigs family ran approximately 150 head in addition to a large herd of horses for the dude string. The next owners, Phillips Petroleum, gave Cherokee names to all the company's land holdings and promptly named the ranch Ki He Kah, reportedly for a Cherokee chief. After World War II, Phillips Petroleum sold the ranch to the Weatherhead Corporation, owners of the Heady-Ashburn.

During the mid-1960s, the Pruitt and Wray Cattle Company bought the ranch. During the years that Pruitt and Wray operated the ranch, neighbors became concerned about overgrazing and damage to the cottonwoods along the Santa Cruz River. Pruitt and Wray also announced company plans for a real

estate development, which initiated the formation of a valley-wide landowners organization. During the 1970s, Kerr McGee Corporation, which also purchased the Heady-Ashburn and Osborne ranches, bought the Ki He Kah. After six or seven years Kerr McGee sold the ranch to its present owners, Ferdinand van Galen and Tom Hunt. The private land on the Ki He Kah consists of 2,600 acres with a 143 head permit on a Forest allotment (Hunt 1994).

THE LITTLE OUTFIT RANCH (DICKERMAN/ HUTCHINSON OR U-D ALLOTMENT)

Located near the headwaters of the Santa Cruz and Canelo Pass, the Little Outfit is one of the smallest ranches in the valley. Created from three former homesteads, the ranch was operated as a school for several years. In 1913, J. W. Guthrie of Parker Canyon obtained a 60-acre homestead with a Forest permit for 50 head of cattle and five horses. In 1917, Harry B. Fryer obtained a 160 acre homestead, which

became the core of the ranch. One other smaller homestead is included in the ranch. In 1935, Maude Dickerman purchased the ranch from the Guthrie heirs. In 1940, Buel and Kit Hutchinson of Chicago bought the ranch, named it the "Little Outfit" for a remark that a neighbor made about Kit's clothes, and started a boy's boarding school. Although the ranch contained adobe buildings and wooden sheds built by Fryer and Dickerman, most of the structures date from the period when the school was in operation. New buildings included the school house, the dairy and milk barns, a dormitory, tennis courts, rifle and archery ranges, and a swimming pool. The school could take up to 20 students, with more attending a camp during summer. Each of the students had his horse to care for and a daily round of chores, which included work in the dairy. Slim Meigs, who was operating the nearby Meigs Guest Ranch (Ki He Kah), helped the Hutchinsons with their horses and the few head of cattle they ran. The Hutchinsons sold the ranch during the early 1950s.

In 1969, Larry Robbins purchased the Little Outfit, which had a permit for 20 head at the time. The ranch is currently running registered Herefords, using a Savory Grazing Method management plan. The ranch has many cultivated fields. Over the years, the lowest cattle run on the ranch was eight head and 11 horses in 1935, and the highest number was 88 head of cattle and 21 horses in 1943. For several years, the ranch was issued a non-use permit. The major source of water is Pass Spring at the head of Meadow Valley on the National Forest. The spring is in one of the two main headwater tributaries to the Santa Cruz River. The other branch of the headwaters is on the Igo Ranch (Accomazzo 1985: 103-09).

THE IGO (PYEATT) RANCH

During the 1890s John and V. H. Igo had a ranch on the western slopes of the Huachucas, five miles west of Fort Huachuca and approximately five miles from the town of Canille (Canelo). Although much of the ranch is outside the study area, the Igos and subsequent owners, the Pyeatts, were important early settlers in the area and their ranch deserves mention in the report.

The Igos, who arrived during the 1880s, raised horses (branded the MX brand), some of which were descendants of the many bands of wild horses that ranged between the Whetstone and Huachuca mountains. Igo planted an extensive orchard on his land,

which in 1896 was considered to be one of the best orchards in Arizona Territory. Although late killing frosts had prevented successful fruit growing in other parts of the Huachucas, the Igo orchards were in a location that was not susceptible to frost. Peaches, apricots, and grapes were abundant. A spring on the ranch fed a pond, which was popular as a spot for picnics, boating, and swimming. The pond eventually dried up, however, and the spring water was diverted to a stock dam on the ranch.

James Henry Pyeatt arrived in Arizona in 1884, living first at the Slaughter Ranch in Cochise County and later in Palominas. Pyeatt had worked for B.A. Packard, the Douglas banker who owned the Turkey Track Ranch in Sonora and Arizona, and was a partner of William Greene until 1908. In 1890, Henry acquired a ranch at Hereford, which he sold to Greene in 1897. In 1899, Henry Pyeatt purchased the Igo Ranch (Arizona Cattlelog 7/68). The adobe house on the ranch was constructed in 1917, and has 18-inch thick walls and 11-foot ceilings. From prior to World War II until the army stopped leasing the military reserve for cattle grazing, the Pyeatts leased the 40,000 acre Huachuca Military Reserve. After his mother's death in 1949, Buster Pyeatt inherited the ranch (Accomazzo 1982:37-39).

ENVIRONMENTAL IMPACTS OF GRAZING

The San Rafael Valley has undergone less ecological damage than other similar river valleys in southern Arizona. In comparison to the Santa Cruz Valley between Nogales and Tucson and the San Pedro Valley between the border and Mammoth, rangeland in the San Rafael appears to be in considerably better condition with a less severe brush invasion and healthier stands of native bunch grasses. In part this is a result of the climatic and soil conditions described in Chapter 1 of this report and in Burgess (1994). Nonetheless, the course of human history in the valley has contributed to the condition of the San Rafael's grasslands. The San Rafael Valley has traditionally had fewer owners of larger units of land. Several operators of the larger ranches employed more conservative stocking practices and had greater resources for the installation of improvements. Some of the smaller ranchers blamed the local "cattle baron" for range deterioration. Two of James Parker's granddaughters recalled his often repeated complaint: "These danged big cattlemen gobble up all the land, callin' them grants, then runnin' so much

stock on 'em they're destroyin' the range" (Parker ms:187). Parker was expressing his resentment over the study area's first closing of the open range, which in reality may have resulted in preservation of rangeland rather than the perceived destruction. As can be seen from the Water Resources Appendix 7.2, a substantial number of wells and stock tanks were installed at a surprisingly early period. Although the San Rafael Valley suffered from the "tragedy of the commons," overstocking within the study area was probably less severe than in other parts of southern Arizona.

Despite the early penetration of highly capitalized ranching, however, the study area did undergo periods of severe stress. The most important factor in alteration of the grassland ecology has been drought. Three major droughts—the first in the 1880s and 1890s, the second following World War I between 1918 and 1921, and the third at the onset of the Great Depression in 1933–34—did considerable damage to San Rafael rangelands. The first drought was more

severe, lasted longer, and came at a time when ranchers in southern Arizona had little understanding of arid lands cattle ranching and no plans or ability to enact an emergency offtake strategy. (See Fig. 18 of the San Rafael Valley during the drought of 1893.) In 1885–86, 1892, and again in 1902, large numbers of cattle starved to death on the range. During this drought, many ranchers in the study area lost the majority of their cattle. Mrs. de la Ossa lost all but one head (Ashburn 1994). James Parker lost such a high percentage of his herd that he had to "start over again." Parker family memoirs recall that by June 1885, many cattle in the valley were dying. When rain finally came, watercourses flooded and the floodwaters carried away many of the weakened, starving cattle.

After two "good years" in 1888 and 1889, the drought returned. This time, some of the area ranchers were better prepared. Parker's granddaughter, Mary Fenter, was married to Tom Turner, foreman of the Vail and Gates cattle company. Before the drought

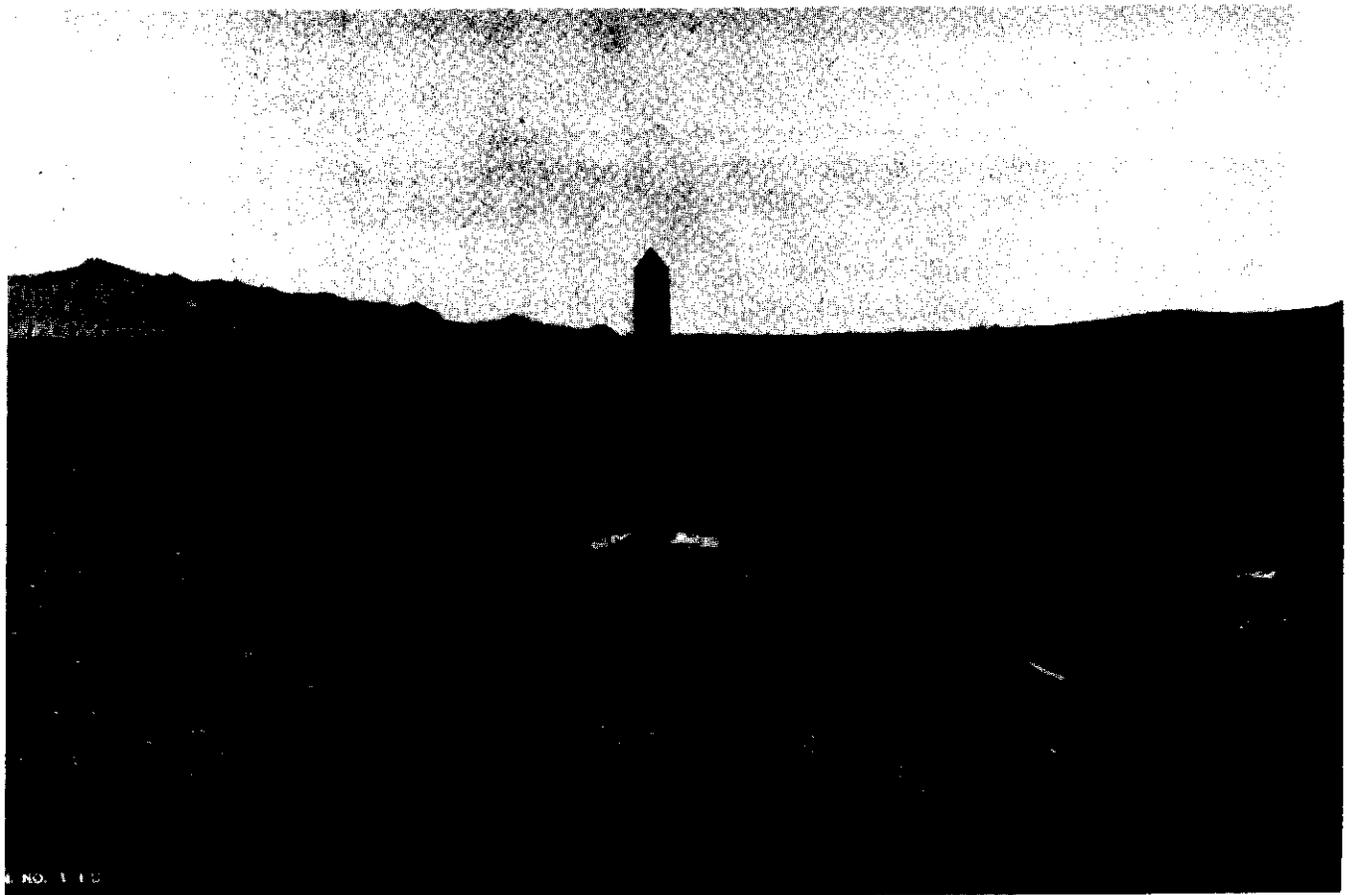


Figure 18—San Rafael Valley, looking east from Monument 110. From the 1893 U.S. Boundary Survey Report. (Note: small portion of fence at left of photo, possibly along the international boundary, and evidence of overgrazing during the drought.)



Figure 19—San Rafael Valley. 1917. U.S. Forest Service. Exact location unknown, probably north end of study area, near Meadow Valley.

ached its peak in 1892, Turner left for California, trail
ding approximately 1,700 steers. He encouraged
er cattlemen to do the same, thereby avoiding exor-
ant railroad shipping charges (Parker ms: 183–87).
Despite some limited off-take, however, damage
he valley in 1892 was severe. With no fences, cattle
wded around the few remaining sources of wa-
particularly the Santa Cruz River, where many
them died. Two of James Parker's granddaugh-
 recalled that the "heavy clumps of sacaton and
s, which had regrown since the first drought,
re eaten into the ground." Water holes had become
s, which trapped the weakened cattle. "Bleached
es of horses and cattle were strewn over the val-
 and hills and along the road sides, a grim re-
der for years of that great tragedy." When the
s finally returned, flooding performed the much
ded service of washing cattle corpses and bones
of watercourses (Parker ms: 181–188).
uring the drought, ranchers employed many tac-
to save their cattle. James Parker drove all the

cattle that could walk into the foothills of the
Huachucas and then sent his sons George and Duke
to set up a camp in the hills so that they could cut
any tender growth from the oak and ash trees to feed
the cattle on a daily basis. The Parkers recalled that
the cattle "followed them like dogs from tree to tree."
They also recalled "tailing up" the cattle that were
too weak to walk. James Parker even made a swing
to support them on their feet (Parker ms: 181–88). After
the drought of the 1880s–1890s, many former springs
and cienegas disappeared. Although ranchers had done
considerable work to drain some of the cienegas, the
drought contributed to the drying process.

The second and third droughts caused more range
deterioration. The post World War I drought coin-
cided with a depression. Many ranchers did not have
the financial resources to buy feed for their cattle,
leaving the animals entirely dependent on range for-
age. After this drought, George and Duke Parker lost
their ranch. Ranchers believed that the misinformed
generation of homesteaders, who arrived in 1915 and

1916, expecting to practice nonirrigated farming, contributed to the process of range deterioration. The drought hit two to three years after most of these homesteaders had arrived. They had cleared large areas of "farm" land, primarily for planting beans and corn. Many of these farms were abandoned during the subsequent drought and depression. In the absence of rain, the areas that had been plowed and cleared of all the original vegetation were not able to recover the former growth of native grasses (Parker ms: 281). (See Fig. 19 of the San Rafael Valley at the beginning of the drought.)

By the time of the next major drought, 1933-34, ranchers were better prepared to withstand the crisis, with more sophisticated offtake strategies, including the ability to remove cattle quickly by truck. Moreover, the Forest Service was controlling stocking rates on allotments while ranchers were developing stock tanks and other water sources on private land. Those water developments allowed cattle to spread out and utilize more areas of the range rather than crowding along the Santa Cruz and other limited water sources, as they had in previous droughts. Despite these improvements, the 1933-34 drought did considerable damage to San Rafael rangelands.

The San Rafael/Lone Mountain area went through three distinct stages in which the patterns of cattle grazing varied. Stage 1, the open range period prior to 1900, was unquestionably the stage in which grazing had the most severe negative impacts on the study area's grasslands. During this period, stocking was essentially unregulated and competitive overstocking was practiced by many of the area's ranchers. During Stage 2 (approximately 1906 until the 1930s), which began with the creation of the Forest Reserves, a steady decrease in cattle numbers accompanied a steady increase in the number of fences, water sources, and other improvements that modified the impacts of grazing. Despite two significant droughts, the study area's rangeland recovered to some degree at this time. During Stage 3, which began with the drought and depression of the early 1920s and accelerated with the Great Depression, many of the smallholders left the study area and the consolidation of larger ranches began. During this period, more modern ranching practices were initiated, with several ranches, notably the Heady-Ashburn, adopting practices that were well ahead of their time.

Appendix 7.1

Coronado National Forest Grazing Allotments

RED ROCK RANGE

Allotment 1—Kunde allotment (1690 acres).

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1935	Kunde, R.	70	0	7	77	693
1939	Kunde, R.	80	0	0	80	96
1940	Kunde, R.	80	0	2	82	984
1941	Kunde, R.	42	38	0	80	891
1942	Kunde, R.					
1943	Kunde, R.	76	0	8	84	1108
1944	Kunde, R.	80	0	0	80	960

Allotment 2—Red Rock allotment (11,200 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity	565	565	565	559	559					
Animal Months	7200	6780	6780	6780	6715	6715				
Total # Animals	714	707	630	690	474					
Total # Animal Months	6822	6888	7316	6970	7070	4266				

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1935	McPherson, C.	346	20	0	366	
	McPherson, Mrs. J.	30	10	0	40	
	Selbold, F.	35	0	0	35	
	Kunde, R.	23	0	0	23	
	Henderson, A.	disapproved				
	Vail & Ashburn	402	0	0	402	
	Total	836	30	0	866	
1936	McPherson, C.	270	143	0	413	
	McPherson, Mrs. J.	30	11	0	41	
	Total	300	154	0	454	
1937	Kunde, R.	33	13	0	46	
	Selbold, F.	58	4	10	72	
	Vail & Ashburn	0	502	0	502	
	Total	91	519	10	620	
1938	Kunde, R.	33	0	2	35	
	Selbold, F.	78	0	8	86	
	Chiricahua Co.	402	0	0	402	
	Henderson, A.					
	Total	513	0	10	523	

Continued on next page

Table 2—Continued.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1931	Kunde, R.	33	8	7	48	
	Chiricahua Co.	402	150	0	552	
	Selbold, F.	77	0	10	87	
	Henderson, A.					
	Total	512	158	17	687	
1932	Chiricahua Co.	402	75	13	490	5130
	Kunde, Richard	33	27	7	67	804
	Selbold, Frank	50	20	10	80	960
	Total	485	122	30	637	6894
1933	Chiricahua Co.	382	0	0	382	4584
	Kunde, Richard	43	32	7	82	984
	Selbold, Frank	70	50	6	126	1162
	Total	495	82	13	590	6730
1935	Chiricahua Co.	347	0	0	347	3123
	Selbold, Est. of Fortune, Mrs. A.	70 disapproved	0	6	76	3483
	Total	417	0	6	423	6606
1939	Jeffcott	200	0	0	200	2400
	Selbold, Est. of Kunde, R.	100 24	30 43	6 0	136 67	1542 637
	Total	324	73	6	403	4579
1940	Jeffcott	175	200	0	375	2700
	Selbold, Est. of Kunde, R.	130 50	0 0	0 0	130 50	1560 600
	Total	355	200	0	555	4860
1941	Jeffcott	0	375	0	375	2625
	Selbold, Est. of Kunde, R.	100 50	30 0	6 1	136 51	1632 612
	Total	150	405	7	562	4869
1942	Jeffcott	402	0	0	402	4824
	Selbold, Est. of Kunde, R.	103 102	0 10	6 8	109 120	1308 1410
	Total	607	10	14	631	7542
1943	Jeffcott	0	294	0	294	1176
	Selbold, Mrs.	118	0	6	124	1488
	Kunde, R.	41	0	0	41	492
	Total	159	294	6	459	3156
1944	Jeffcott	0	200	0	200	1118
	Selbold, Mrs.	130	0	6	136	1560
	Kunde, R.	44	18	0	62	636
	Total	174	218	6	398	3314

HARSHAW RANGE

3—Apache allotment (980 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity						43	43	49	49	
Animal Months						343	516	588	588	
# Animals						100	48	48	62	
# Animal Months						500	576	576	726	

Livestock Approved

Permittee	Livestock Approved			Exempt	Total Animals	Total Animal Months
	Yearlong	Temporary				
Gatlin, Lloyd A.	0	83		0	83	498
Gatlin, Lloyd A.	0	83		0	83	415

4—Bergler allotment (2370 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity			86	86	89	84				
Animal Months			1032	1032	1068	1032				
# Animals			97	142	99	88				
# Animal Months			1164	1456	1058	801				

Livestock Approved

Permittee	Livestock Approved			Exempt	Total Animals	Total Animal Months
	Yearlong	Temporary				
Bergler, Pete	50	42		5	97	1164
Bergler, Pete	84	0		0	84	
Bergler, Pete	84	0		4	88	
Bergler, Pete	74	10		5	89	1208
Bergler, Pete	54	30		0	84	918
Bergler, Pete	54	30		5	89	918
Bergler, Pete	84	0		0	84	1068
Bergler, Pete	84	0		0	84	1008
Bergler, Pete	84	0		0	84	1008

Table 5—Best allotment (2280 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity						100				
Animal Months						1108				
Total # Animals						83				
Total # Animal Months						747				

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1932	Best, Ernest	31	19	6	56	270
1933	Best, Ernest	62	23	4	89	934
1935	Best, Ernest	76	3	4	83	747
1936	Best, Ernest	76	22	4	102	
1939	Best, Ernest	85	0	3	88	1046
1940	Best, Ernest	85	0	3	88	1056
1941	Best, Ernest	58	22	4	84	810
1942	Best, Ernest	60	6	3	69	810
1943	Best, Ernest	68	0	0	68	816
1944	Best, Ernest	67	11	0	78	892

Table 6—Harshaw allotment.

Year	Permittee	Livestock Approved			Total Animals
		Yearlong	Temporary	Exempt	
1925	Bergler, P.	30	0	0	30
	Best, Mrs. A.	0	20	0	20
	Steen, Harry	45	0	0	45
	Total	75	20	0	95
1928	Steen, H.	62	0	0	62
	Bergler, P.	64	7	3	74
	Best, Mrs. A.	40	1	4	45
	Kunde, R.	10	0	2	12
Total	176	8	9	193	
1929	Bergler, P.	72	0	3	75
	Best, Mrs. A.	50	7	2	59
	Kunde, R.	10	11	0	21
	Steen, H.	75	0	0	75
Total	207	18	5	230	
1930	Bergler, P.	92	0	5	97
	Best, Mrs. A.	62	2	3	67
	Kunde, R.	21	0	0	21
	Total	175	2	8	185
1931	Bergler, P.	92	0	5	97
	Best, Mrs. A.	62	6	4	72
	Kunde, R.	21	4	0	25
	Kennedy, C.	25	11	0	36
Total	200	21	9	230	

Table 7—Steen allotment (3830 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		123	123	123	158	158				
Animal Months		1476	1476	1476	1896	1896				
Total # Animals		150	154	180	146	170				
Total # Animal Months		1708	1498	1674	1758	1530				

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1932	Steen, Harry	67	85	2	154	1498
1933	Steen, Harry	67	107	6	180	1590
1936	Steen, Harry	90	45	0	135	

DUQUESNE RANGE

Table 8—Duquesne allotment (4850 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		303	303	303	256	135				
Animal Months		3636	3636	3636	3273	1620				
Total # Animals		517	351	321	290	198				
Total # Animal Months		2962	2620	3812	3360	1174				

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1925	Everett, Geo.	48	0	0	48	
	Gang, You	11	0	0	11	
	Heady, T.E.	100	0	0	100	
	Steen, H.	37	0	0	37	
	Peterson, A.C.	0	175	0	175	
	de la Ossa, C.	135	0	0	135	
	Peterson, K.	0	84	0	84	
	Total	331	259	0	590	
1927	Gang, You	5	0	0	5	
	Everett, Geo. J.	25	23	0	48	
	Heady, T.E.	100	0	0	100	
	Ossa, Mrs. C.	120	28	0	148	
	Peterson, K.	56	53	0	109	
	Peterson, Mrs. M.	100	75	0	175	
	Steen, H.	23	25	0	48	
	Total	429	204	0	633	
1928	Gang, You	6	0	7	13	
	Everett, Geo. J.	25	23	0	48	
	Heady, T.E.	100	0	0	100	
	Ossa, Mrs. C.	135	28	0	163	
	Peterson, K.	0	0	0	0	
	Steen, H.	23	25	0	48	
	Total	289	76	7	372	
1929	Peterson, K.	234	20	0	254	
	Ossa, Mrs. C.	135	10	5	150	
	Heady, T.E.	125	48	0	173	
	Total	494	78	5	577	
1930	Ossa, de la, Mrs.	135	50	5	190	1780
	Peterson, Karl	234	20	0	254	2032
	Steen, Harry W.	23	25	0	48	596
	Gang, You	6	6	8	20	232
	Total	398	101	13	512	4640

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Table 8—Continued.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1931	Ossa, De la, Mrs.	122	100	6	228	1737
	Peterson, Karl	140	24	0	164	1872
	Steen, Harry W.	23	0	0	23	276
	Gang, You	6	24	7	37	272
	Total	291	148	13	452	4157
1932	Ossa, De la Mrs.	122	80	9	211	1732
	Peterson, Karl	140	260	0	400	3044
	Steen, Harry	23	0	0	23	276
	Gang, You	6	19	5	30	264
	Total	291	359	14	664	5316
1933	Ossa, De la Mrs.	122	0	6	128	1536
	Peterson, Karl	non-use				
	Steen, Harry	23	0	0	23	276
	Gang, You	6	14	0	20	200
	Total	151	14	6	171	2012
1935	Peterson, Karl	119	0	0	119	1071
	Gang, You	6	12	0	18	1215
	Total	125	12	0	137	2286

Table 9—Duquesne & Steen allotment.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1939	Steen, Harry	209	0	0	209	3129
	Ossa, Rosamel	6	12	2	20	240
	Total	215	12	2	229	3369
1940	Steen, Harry	209	0	7	216	2704
	Ossa, Rosamel	6	12	2	20	240
	Total	215	12	9	236	2944
1941	Steen, Harry	115	94	7	216	3349
	Ossa, Rosamel de la	6	12	2	20	240
	Total	121	106	9	236	3589
1942	Steen, Harry	148	20	7	175	2560
	Ossa, Rosamel de la	18	4	2	24	272
	Total	166	24	9	199	2832
1943	Steen, Harry	150	20	0	170	1960
	Ossa, Rosamel de la	18	0	2	20	216
	Total	168	20	2	190	2176
1944	Robinson, Douglas	107	0	0	107	1284
	Ossa, Rosamel de la	18	12	0	30	288
	Total	125	12	0	137	1572

Table 10—Hayfield allotment (5635 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		256	256	256	273	256				
Animal Months		3072	3072	3072	3272	3072				
Total # Animals		204	202	202	250	239				
Total # Animal Months		2448	3096	2424	3000	2157				

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1930	Heady, T.E.	125	25	0	150	1800
	Heady, Mrs. T.E.	0	12	0	12	144
	Total	125	37	0	162	1944
1931	Heady, T.E.	125	75	4	204	2448
1932	Heady, T.E.	200	0	2	202	2424
1939	Heady & Ashburn	200	90	0	290	3354
1940	Heady & Ashburn	200	103	0	303	3086
1941	Heady & Ashburn	200	71	0	271	2604
1942	Heady & Ashburn	200	71	0	271	3252
1943	Heady & Ashburn	200	71	0	271	3252
1944	Heady & Ashburn	200	71	0	271	3252

Table 11—Lochiel allotment (3220 acres).

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1935	De la Ossa, Mrs. C.	122	0	8	130	
	De la Ossa, Abel	disapproved				
	De la Ossa, Maria	disapproved				
	De la Ossa, R.	disapproved				
	Total	122	0	8	130	
1936	De la Ossa, Mrs. C.	122	0	7	129	
1939	De la Ossa, Mrs. C.	88	0	7	96	1041
1940	Estate of Ossa, Mrs. de la	72	40	7	119	1268
1941	Estate of Ossa, Mrs. de la	85	52	7	144	1520
1942	Ossa & DeSheeter	100	10	9	119	1388
1943	Ossa & DeSheeter	86	8	7	101	1116
1944	Ossa & DeSheeter	88	58	4	150	1404

PARKER CANYON

Table 12—Bercich allotment (3400 acres)

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		173	173	173	143	143	146	143	143	
Animal Months		2076	2076	2076	1716	1716	1752	1716	1716	
Total # Animals		156	135	136	147	141	146	143	143	
Total # Animal Months		1872	1620	1632	1764	1269	1752	1716	1716	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1930	Bercich, N.A.	58	96	0	154	1554
1931	Bercich, N.A.	58	96	2	156	1872
1932	Bercich, N.A.	58	74	3	135	1620
1933	Bercich, N.A.	58	74	4	136	1632
1934	Bercich, N.A.	58	85	4	147	1764
1935	Bercich, N.A.	132	9	0	141	1512
1936	Bercich, N.A.	132	11	3	146	1752
1938	Bercich, N.A.	132	11	0	143	1716
1939	Bercich, N.A.	132	11	0	143	1752
1940	Bercich, N.A.	157	60	39	256	2832

Table 13—Bercich & Campini allotment.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1941	Bercich, N.A.	157	64	39	260	2601
1942	Bercich, N.A.	157	48	3	208	2403
1943	Bercich, M. & Geo	157	55	3	215	2544
1944	Bercich, M. & Geo	157	45	3	205	2374

Table 14—Black Tail allotment (7760 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		318	318	318	316	316	316	316	316	
Animal Months		3816	3816	3816	3790	3790	3792	3792	3792	
Total # Animals		291	284	306	393	314	316	352	316	
Total # Animal Months		3278	3408	3560	3992	2853	2792	3852	3783	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1932	Jones, J.	115	83	2	200	2400
	MacNab, A.M.	37	23	2	62	744
	Menefee, C.	0	16	3	19	228
	Total	152	122	7	281	3372
1933	Jones, J.	150	66	3	219	2612
	MacNab, A.M.	37	35	0	72	864
	Menefee, C.	0	10	5	15	180
	Total	187	111	8	306	3656
1934	Jones, J.	150	138	0	288	2672
	Menefee, C.	10	4	5	19	228
	MacNab, A.M.	37	49	0	86	1032
	Total	197	191	5	393	3932
1935	Jones, J.	150	45	0	195	1755
	Menefee, C.	10	18	3	31	279
	MacNab, A.M.	60	30	0	90	810
	Total	220	93	3	316	2844
1937	Jones, J.	150	69	0	219	2280
	Menefee, C.	31	0	0	31	372
	MacNab, A.M.	90	12	0	102	1200
	Total	271	81	0	352	3852
1939	Jones, J.	150	31	26	207	2196
	Rand, A.D. and L.A.	33	0	0	33	372
	MacNab, A.M.	90	7	0	97	1164
	Total	273	38	26	337	3732
1940	Jones, J.	150	31	52	233	2220
	Rand, A.D. and L.A.	31	0	0	31	372
	MacNab, A.M.	90	7	0	97	1164
	Total	271	38	52	361	3756
1941	Jones, J.	150	31	0	181	2172
	Rand, A.D. and L.A.	31	0	104	135	468
	MacNab, A.M.	90	7	0	97	1164
	Total	271	38	104	413	3804

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Table 14—Continued.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1942	Jones, J.	150	0	2	152	1908
	Rand, A.D. and L.A.	31	0	8	39	372
	MacNab, A.M.	90	0	0	90	1164
	Total	271	0	10	281	3444
1943	Jones, J.	150	0	0	150	1600
	MacNab, A.M.	90	7	0	97	1164
	Total	240	7	0	247	2764
1944	Jones, J.	181	0	2	183	2172
	MacNab, A.M.	90	7	5	102	1164
	Total	271	7	7	285	3336

Table 15—Campini allotment (4320 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		79	79	79	77	77	77	75	75	
Animal Months		948	948	948	922	922	924	922	922	
Total # Animals		71	81	95	79	77	77	77	76	
Total # Animal Months		812	892	855	948	693	924	924	912	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1930	Southard, G.	25	68	0	93	876
1931	Southard, G.	25	46	5	76	812
1932	Southard, G.	25	51	4	80	892
1933	Bercich, N.A.	20	75	0	95	855
1934	Bercich, N.A.	25	54	0	79	948
1935	Bercich, N.A.	25	52	0	77	693
1936	Bercich, N.A.	25	52	0	77	924
1937	Bercich, N.A.	25	52	0	77	924
1939	Bercich, N.A.	25	48	0	73	876

Table 16—Collins Canyon allotment (4920 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		252	252	271	281	281	282	282	282	
Animal Months		3024	3024	3252	3379	3379	3384	3384	3384	
Total # Animals		206	205	258	222	282	282	182	219	
Total # Animal Months		1872	2148	3096	2544	2538	3384	2184	2028	

Year	Permittee	Livestock Approved			Exempt	Total Animals	Total Animal Months
		Yearlong	Temporary				
1932	Hathaway, J.W.	96	25		12	133	2148
1933	Hathaway, J.W.	200	50		8	258	3096
1934	Hathaway, J.W.	200	12		10	232	2664
1935	Hathaway, J.W.	200	58		10	268	2538
1937	Hathaway, J.W.	158	14		130	302	484
1938	Hathaway, J.W.	400	9		130	539	2028
1939	Hathaway, J.W.	174	0		0	174	2208
1940	Hathaway, J.W.	103	0		130	233	1290
1941	Hathaway, J.W.	53	70		120	243	1170
1942	Hathaway, J.W.	135	10		10	155	1670
1943	Hathaway, J.W.	108	41		10	159	1665
1944	Hathaway, J.W.	121	45		10	176	2072

Table 17—HQ allotment (1000 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		22	22	22	24	24	24	24	24	
Animal Months		264	264	264	283	283	288	283	288	
Total # Animals		15	15	22	22	24	24	24	24	
Total # Animal Months		180	180	264	264	216	288	288	288	

Year	Permittee	Livestock Approved			Exempt	Total Animals	Total Animal Months
		Yearlong	Temporary				
1931	Heady, Mrs. T.E.	12	0		3	15	180
1932	Heady, Mrs. T.E.	12	0		3	15	180
1933	Heady, Mrs. T.E.	12	10		0	22	264
1934	Heady, Mrs. T.E.	12	10		0	22	264
1935	Heady, Mrs. T.E.	12	12		0	24	216
1936	Heady, Mrs. T.E.	12	12		0	24	216
1937	Heady, Mrs. T.E.	12	12		0	24	288
1939	Heady, Mrs. T.E.	12	11		0	23	276
1940	Heady, Mrs. T.E.	12	4		0	16	192
1941	Heady, Mrs. T.E.	12	0		0	12	144
1942	Heady, Mrs. T.E.	12	0		0	12	144
1943	Heady, Mrs. T.E.	12	0		0	12	144
1944	Heady, Mrs. T.E.	12	0		0	12	144

Table 18—Lewis allotment (2600 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		88	88	88	186	186	186	186	186	
Animal Months		1056	1056	1056	2232	2232	2232	2232	2232	
Total # Animals		91	90	92	191	186	188	186	186	
Total # Animal Months		1048	1020	1056	2256	1714	2256	2232	2232	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1931	Lewis, Blain	75	6	3	84	1020
1933	Lewis, Blain	75	14	3	92	1056
1934	Jones, J.A. and D.A.	60	25	0	85	1056
1935	Jones, D.A.	108	78	0	186	1674
1938	Jones, D.A.	108	78	0	186	2232
1939	Jones, D.A.	130	55	0	185	2175
1940	Jones, D.A.	130	56	0	186	2169
1941	Jones, D.A.	130	55	39	224	2052
1942	Jones, D.A.	130	15	3	150	1695
1943	Hathaway, L.	0	156	3	159	1404

Table 19—Pons allotment (504 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity						33	33	33	33	
Animal Months						297	396	396	396	
Total # Animals						33	33	33	33	
Total # Animal Months						297	396	396	396	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1935	Pons, Francisco	25	8	0	33	302
1937	Pons, Francisco	33	0	0	33	396
1939	Pons, Francisco	33	0	0	33	396
1940	Pons, Francisco	33	0	0	33	396
1941	Pons, Francisco	33	0	0	33	396
1942	Pons, Francisco	33	0	0	33	396
1943	Pons, Francisco	29	3	0	32	375
1944	Pons, Francisco	0	56	0	56	336

Table 20—Parker Canyon allotment (5420 acres)

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		266	266	266	274	274	274	273	273	
Animal Months		3192	3192	3192	3285	3285	3288	3278	3276	
Total # Animals		235	206	242	273	272	253	249	240	
Total # Animal Months		2616	2460	2674	3054	2409	2117	2988	2814	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1925	Lane, O.P.	30	0	0	30	
	Lewis, W.B.	72	0	0	72	
	Bercich, N.A.	0	25	0	25	
	McNab, A.M.	21	0	0	21	
	McIntyre, R.C.	0	11	0	11	
	McIntyre, J.R.	4	0	0	4	
	Merritt, J.H.	55	0	0	55	
	Parker, R.L.	47	0	0	47	
	Parker, J. Mrs.	140	0	0	140	
	Guthrie, J.W.	75	0	0	75	
	Gatfrell, Mrs. A.	138	39	0	177	
	Baldwin, B.	104	0	0	104	
	Finley, J.L.	36	14	0	50	
	Williamson, J.W.	0	30	0	30	
	Southard, G.	0	16	0	16	
	Jones, J.I.	110	0	0	110	
	McKinney, D.C.	0	50	0	50	
Madsen, J.C.	0	100	0	100		
Total		832	285	0	1117	
1926	McNab, A.M.	21	3	0	24	
	Finley, Jas. L.	36	0	0	36	
	McKinney, D.C.	0	30	0	30	
	Williamson, J.W.	20	30	0	50	
	Merritt, J.H.	55	20	0	75	
	McIntyre, R.C.	15	4	0	19	
	Baldwin, B.	104	2	0	106	
	Guthrie, J.W.	66	0	0	66	
	Gatfrell, Mrs. (Est)	138	47	0	185	
	Parker, R.L.	40	0	0	40	
	McIntyre, J.R.	3	0	0	3	
	Southard, G.	0	25	0	25	
	Jones, J.I.	115	0	0	115	
	Parker, Mrs. J.	140	10	0	150	
	Bercich, N.A.	0	40	0	40	
	Pons, F.	0	25	0	25	
	Madsen, J.C.	100	0	100		
Lewis & Gray	135	184	0	319		
Williamson, J.W.	0	30	0	30		
Total		888	550	0	1438	

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Table 20—Continued.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1927	Baldwin, B.	104	19	0	123	
	Baldwin, C.	0	15	0	15	
	Bercich, N.A.	0	58	0	58	
	Gattrell, Mrs. (Est.)	138	54	0	192	
	Guthrie, J.W. (Est.)	52	0	0	52	
	Guthrie, L.	20	0	0	20	
	Heady, Mrs. T.E.	0	12	0	12	
	Jones, J.I.	115	24	0	139	
	Lewis, W.R.	135	234	0	369	
	MacNab, A.M.	21	4	0	25	
	McIntyre, J.R.	4	3	0	7	
	McIntyre, R.C.	15	4	0	19	
	Merritt, J.H.	55	21	0	76	
	Parker, Mrs. J.	140	44	0	184	
	Parker, R.	cancelled				
	Pons, F.	0	25	0	25	
	Southard, G.	25	0	0	25	
	Sullivan, J.J.	0	150	0	150	
	Williamson, J.W.	20	30	0	50	
Total		844	697	0	1541	
1928	Baldwin, B.	104	81	0	185	
	Baldwin, C.	0	94	0	94	
	Bercich, N.A.	25	50	0	75	
	Guthrie, J.W. (Est.)	38	0	0	38	
	Guthrie, L.	20	5	3	28	
	Heady, Mrs. T.E.	0	12	0	12	
	Jones, J.I.	115	35	0	150	
	Lewis, W.R.	135	45	0	180	
	MacNab, A.M.	21	12	13	46	
	McIntyre, J.R.	4	5	2	11	
	Merritt, J.H.	0	0	0	0	
	Nye, Mrs. R.A.	138	76	0	214	
	Parker, Mrs. J.	140	54	0	194	
	Pons, F.	25	0	0	25	
	Sullivan, J.J.	0	163	0	163	
Williamson, J.W.	20	40	4	64		
Total		785	672	22	1479	
1929	Heady, Mrs. T.E.	12	0	0	12	
	Pons, F.	25	0	0	25	
	Williamson, J.W.	50	10	4	64	
	Baldwin, B.	130	45	0	175	
	Baldwin, C.	0	69	0	69	
	Parker, Mrs.E.	143	7	0	150	
	Jones, J.I.	115	94	0	209	
	McIntyre, J.R.	0	0	0	0	
	MacNab, A.M.	37	0	7	44	
	Nye, Mrs. R.A.	163	54	0	217	
	Southard, G.	113	7	10	130	
	Lewis, B.	85	0	0	85	
	Sullivan, J.J.	133	0	0	133	
	Bercich, N.A.	108	0	0	108	
	Hathaway, J.W.	100	55	0	155	
	Lewis, W.B.	150	0	0	150	
	Total		1364	341	21	1726

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Table 20—Continued.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1930	Menefee, Crayton	disapproved				
	Parker, Mrs. E.	140	60	8	208	2288
	Parker, J.D.	disapproved				
	Jones, J.I.	115	165	8	288	2276
	Biggs, J.O.	135	11	8	154	1804
	McNab, A.M.	25	19	4	48	576
	Lewis, Blain	85	52	0	137	1228
	Hathaway, Jas. W. McIntyre, John R.	75 non-use	80	5	160	1920
	Total	575	387	33	995	10092
1931	Parker, Mrs. E.	35	50	10	95	2500
	McIntyre, J.R.	4	1	10	15	176
	Total	39	51	20	110	2676
1932	Parker, Mrs. E.	175	17	10	202	2424
	McIntyre, J.R.	4	5	5	14	168
	Total	179	22	15	216	2592
1933	Parker, Mrs. E.	175	40	8	223	2596
	McIntyre, J.R.	4	5	10	19	192
	Total	179	45	18	242	2788
1934	Parker, Mrs. E.	175	64	8	247	2776
	McIntyre, J.R.	4	10	10	24	278
	Total	179	74	18	271	3054
1935	Parker, Mrs. E.	175	55	3	233	2062
	McIntyre, J.R.	6	18	9	33	293
	Total	181	73	12	266	2355
1936	Parker, Mrs. E.	175	55	3	233	2757
	McIntyre, J.R.	20	0	10	30	360
	Total	195	55	13	263	3117
1937	Parker, Mrs. E.	175	41	39	255	2628
	McIntyre, J.R.	20	0	130	150	360
	Total	195	41	169	405	2988
1939	Parker, Mrs. E.	168	18	130	316	2298
	Parker, J.D.	20	15	0	35	
	Total	188	33	130	351	2298
1940	Parker, Mrs. E.	178	16	130	324	2352
	Parker, J.D.	20	20	0	40	450
	Total	198	36	130	364	2802

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Table 20—Continued.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1941	Parker, Mrs. E.	149	14	0	163	2034
	Parker, J.D.	20	18	0	38	471
	Total	169	32	0	201	2505
1942	Parker, Mrs. E.	130	0	10	140	1560
	Parker, J.D.	40	0	0	40	480
	Total	170	0	10	180	2040
1943	Parker, Mrs. E.	141	0	0	141	1692
	Parker, J.D.	40	12	0	52	624
	Total	181	12	0	193	2316
1944	Parker, Emma.	96	0	10	106	1152
	Jones, John A.	36	67	3	106	1102
	Total	132	67	13	212	2254

Table 21—Rand allotment.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1943	Rand, A.D. and L.A.	31	0	8	39	372
1944	Rand, A.D. and L.A.	31	0	3	34	372

Table 22—Sunnyside/Nye allotment (3440 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		109	109	109	119	119	119	108	108	
Animal Months		1308	1308	1308	1429	1429	1428	1296	1296	
Total # Animals		111	124	148	177	99	53	66	72	
Total # Animal Months		1296	1448	1776	1724	882	618	792	864	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1930	Nye, Mrs. R.A.	109	0	0	109	1656
1931	Nye, Mrs. R.A.	107	0	6	113	1692
1932	Nye, Mrs. R.A.	111	10	3	124	1448
1933	Nye, Mrs. R.A.	138	5	5	148	1636
1934	Nye, Mrs. R.A.	132	40	5	177	1724
1935	Nye, Mrs. R.A.	96	0	3	99	2855
1936	Nye, Mrs. R.A.	50	0	3	53	618
1937	Nye, Mrs. R.A.	63	0	0	63	792
1939	Nye, Mrs. R.A.	78	0	39	117	972
1940	Nye, Mrs. R.A.	67	0	0	67	759
1941	Hathaway, Mary L.	58	20	0	78	876
1942	Hathaway, Mary L.	98	0	0	98	1176
1943	Hathaway, Mary L.	85	0	2	87	1020
1944	Hathaway, Mary L.	63	50	0	113	1290

Table 23—Tin Tanks allotment (3440 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		213	213	213	216	216	216	216	216	
Animal Months		2546	2546	2556	2595	2595	2592	2592	2592	
Total # Animals		183	178	172	156	216	231	241	202	
Total # Animal Months		2136	2136	2064	1872	1944	2772	2737	2424	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1932	Rogers, W.W.	146	27	5	178	2136
1933	Rogers, W.W.	146	26	0	172	2064
1934	Rogers, W.W.	146	10	0	156	1872
1935	Jones, J.	135	43	0	178	1684
	Pons, Francisco	0	23	0	23	225
	Total	135	66	0	201	1909
1937	Jones, J.	131	70	0	201	2057
	Pons, Francisco	25	15	0	40	480
	Total	156	85	0	241	2537
1939	Jones, J.	131	31	26	188	1968
	Pons, Francisco	25	15	0	40	480
	Total	156	46	26	228	2448
1940	Jones, J.	131	11	0	142	1704
	Pons, Francisco	40	0	0	40	480
	Total	171	11	0	182	2184
1941	Pons, Francisco	40	0	0	40	480
	Jones, J.	131	31	52	214	1992
	Total	171	31	52	254	2472
1942	Pons, Francisco	40	0	0	40	480
	Jones, J.	131	9	0	140	1680
	Total	171	9	0	180	2160
1943	Pons, Francisco	0	32	0	32	160
	Jones, J.	127	0	0	127	1524
	Total	127	32	0	159	1684
1944	Pons, Francisco	0	56	0	56	336
	Jones, J.	100	0	2	102	1200
	Total	100	56	2	158	1536

LONE MOUNTAIN RANGE

Table 24—Grub Stake allotment (1440 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		39	39	39	42	42	42	42	42	
Animal Months		468	468	468	506	506	504	504	504	
Total # Animals		41	41	39	39	42	42	36	63	
Total # Animal Months		492	492	468	468	378	504	432	504	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1931	D'Albini, Alex	41	0	0	41	492
1932	D'Albini, Alex	41	0	0	41	492
1933	D'Albini, Alex	39	0	0	39	468
1934	D'Albini, Alex	39	0	0	39	468
1935	D'Albini, Alex	42	0	0	42	378
1936	D'Albini, Alex	42	0	0	42	504
1937	D'Albini, Alex	36	0	0	36	432
1938	D'Albini, Alex	63	0	0	63	504
1939	D'Albini, Alex	63	0	0	63	504
1940	D'Albini, Alex	63	0	0	63	504
1941	D'Albini, Alex	63	0	0	63	504
1942	D'Albini, Alex	63	0	0	63	504
1943	D'Albini, Alex	0	72	0	72	504
1944	D'Albini, Alex	0	72	0	72	504

Table 25—Lone Mountain allotment (27,200 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		962	962	962	856	856	856	856	856	
Animal Months		11544	11544	11544	10269	10269	10272	10272	10272	
Total # Animals		1017	1011	984	897	856	924	911	804	
Total # Animal Months		11552	11484	11564	9944	7704	10478	10344	9297	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1925	Chapman, J.	500	212	0	712	
	Kellogg, F.	20	0	0	20	
	Southard, G.	0	16	0	16	
	Total	520	228	0	748	
1926	Kellogg, F.	20	1	0	21	
	Chapman, J.	500	155	0	655	
	Southard, G.	0	25	0	25	
	Total	520	181	0	701	
1927	Lewis, B.	0	40	0	40	
	Southard, G.	0	35	0	35	
	Lee, H.	500	213	0	713	
	Total	500	288	0	788	
1928	Lee, H.	520	193	0	713	
	Lewis, B.	0	50	0	50	
	Southard, G.	25	68	0	93	
	Total	545	311	0	856	
1929	Lewis, B.	64	0	0	64	
	Lee, H.	672	46	15	733	
	Total	736	46	15	797	
	1930	Southard, G.	25	50	4	79
Lee, H.D.		500	198	0	698	8466
Lewis, Blain		50	60	0	110	1032
D'Albini, Alex		0	71	0	71	642
Total		575	379	4	958	11088
1931	Lee, Henry	520	199	12	731	8420
	Lewis, Blain	60	79	0	139	1448
	Southard, G.	25	70	0	95	1060
	D'Albini, Alex	0	44	0	44	528
	Total	605	392	12	1009	11456
1932	Lee, Henry	520	164	12	696	8284
	Lewis, Blain	60	55	3	118	1416
	Southard, G.	25	108	5	138	1064
	D'Albini, Alex	0	59	0	59	108
	Total	605	386	20	1011	10872

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Table 25—Continued.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1933	Lee, Henry	650	117	12	779	9144
	Lewis, Blain	60	60	3	123	1436
	D'Albini, Alex	2	80	0	82	984
	Total	712	257	15	984	11564
1934	Lee, Henry	650	45	12	707	8568
	James, J.A. and D.A.	48	55	0	103	1204
	D'Albini, Alex	2	117	5	124	1376
	Total	700	217	17	934	11148
1935	Lee, Henry	650	111	0	761	6849
	D'Albini, Alex	58	37	0	95	855
	Total	708	148	0	856	7704
1936	Lee, Henry	650	141	18	809	9484
	D'Albini, Alex	88	27	0	115	1218
	Total	738	168	18	924	10702
1937	Lee, Henry	650	146	234	1030	9180
	D'Albini, Alex	88	0	117	205	1164
	Total	738	146	351	1235	10344
1938	Lee, Henry	528	160	234	922	7982
	D'Albini, Alex	67	89	117	273	1315
	Total	595	249	351	1195	9297
1939	Lee, Henry	649	132	234	1015	8882
	D'Albini, Alex	67	74	78	219	1128
	Total	716	206	312	1234	10010
1940	Lee, Henry	637	116	234	987	8419
	D'Albini, Alex	61	79	78	218	1186
	Total	698	195	312	1205	9605
1941	Lee, Henry	644	222	234	1100	9879
	D'Albini, Alex	68	81	78	227	1235
	Total	712	303	312	1327	11114
1942	Lee, Henry	500	233	18	751	8132
	D'Albini, Alex	114	23	6	143	1598
	Total	614	256	24	894	9730
1943	Lee, Henry	561	98	0	659	7538
	D'Albini, Alex	41	97	10	148	1179
	Total	602	195	10	807	8717
1944	Lee, Henry	544	113	18	807	7658
	D'Albini, Alex	39	112	10	161	1228
	Total	583	225	28	968	8886

SAN RAFAEL RANGE

Table 26—A Draw allotment (4000 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		143	143	143	97	106	106	106	159	
Animal Months		1716	1716	1716	1164	954	1272	1272	1272	
Total # Animals		190	225	180	106	106	106	106	159	
Total # Animal Months		2228	2450	1860	1272	954	1272	1272	1272	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1931	Ellis, R.H.	100	13	0	113	1664
	Pons, Francisco	25	12	2	39	468
	Total	125	25	2	152	2132
1932	Ellis, R.H.	130	65	3	198	1560
	Pons, Francisco	25	0	2	27	854
	Total	155	65	5	225	2414
1933	Ellis, R.H.	130	0	0	130	1560
	Pons, Francisco	25	25	0	50	300
	Total	155	25	0	180	1860
1934	Ellis, R.H.	106	40	0	146	1272
	Pons, Francisco	25	0	0	25	520
	Total	131	40	0	171	1792
1935	Ellis, R.H.	106	0	0	106	954
1937	Ellis, R.H.	106	0	0	106	1272
1939	Melgs, Mrs.	0	300	0	300	700
1940	Melgs, Mrs.	106	0	0	106	1272
1941	Melgs, Mrs.	106	0	0	106	1272
1942	Melgs, Mrs.	106	0	0	106	1272
1943	Melgs, Mrs.	106	0	6	112	1272
1944	Melgs, Mrs.	105	0	6	111	1260

Table 27—Cherry Creek allotment (3940 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		211	211	211	125	125	125	125	125	
Animal Months		2532	2532	2532	1504	1500	1500	1500	1500	
Total # Animals		211	224	218	130	125	130	125	169	
Total # Animal Months		2412	2608	2616	1560	1125	1560	1500	1566	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1930	Baldwin, Bud	104	22	0	126	1456
	Williamson, J.W.	45	0	5	50	660
	Total	149	22	5	176	2116
1931	Baldwin, Bud	104	35	3	142	1624
	Williamson, J.W.	50	16	5	71	812
	Total	154	51	8	213	2436
1932	Williamson, J.W.	50	30	3	83	916
	Baldwin, Bud	104	34	3	141	1656
	Total	154	64	6	224	2572
1933	Williamson, J.W.	50	25	0	75	940
	Baldwin, Bud	104	29	0	133	1596
	Total	154	54	0	208	2536
1934	Williamson, J.W.	50	20	0	70	896
	Baldwin, Bud	104	26	0	130	1560
	Total	154	46	0	200	2456
1935	Baldwin, Bud	125	0	0	125	1124
1936	Baldwin, Bud	125	0	0	125	1500
1937	Baldwin, Bud	125	0	0	125	1500
1939	Baldwin, Bud	56	119	0	175	1579
1940	Baldwin, Bud	169	0	0	169	1560
1941	Baldwin, Bud	46	116	0	162	1496
1942	Choate, Wm.	125	0	0	125	1380
1943	Choate, Wm.	99	80	6	185	1988
1944	Choate, Wm.	181	0	6	187	2172

Table 28—Dickerman allotment (260 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity						15	15	20	20	
Animal Months						129	180	240	240	
Total # Animals						20	20	20	20	
Total # Animal Months						100	240	240	240	

Year	Permittee	Livestock Approved			Exempt	Total Animals	Total Animal Months
		Yearlong	Temporary				
1938	Dickerman, Mrs.	0	20		0	20	240
1939	Dickerman, Mrs.	0	16		0	16	192
1940	Dickerman, Mrs.	0	31		0	31	334

Table 29—Hutchinson allotment (260 acres).

Year	Permittee	Livestock Approved			Exempt	Total Animals	Total Animal Months
		Yearlong	Temporary				
1941	Hutchinson, B.	0	70		39	109	176
1942	Hutchinson, B.	76	0		0	76	
1943	Hutchinson, B.	20	0		0	20	240
1944	Hutchinson, B.	2	23		0	25	208

Table 30—Kennedy allotment (685 acres).

Year	Permittee	Livestock Approved			Exempt	Total Animals	Total Animal Months
		Yearlong	Temporary				
1939	Kennedy, Chas.	60	0		0	60	480
1940	Kennedy, Chas.	60	0		0	60	480
1941	McPherson, Clyde	60	0		0	60	720
1942	McPherson, Clyde	480					

Table 31—San Rafael allotment (9880 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity		765	765	765	775	775	775	700	700	
Animal Months		9180	9180	9180	9307	9307	9300	8400	8400	
Total # Animals		975	1138	1065	949	1005	791	1004	921	
Total # Animal Months		10020	9662	10588	9198	7299	7962	8456	8282	

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1927	McPherson, C.	346	45	0	391	
	McPherson, Mrs. J.	30	10	0	40	
	Total	376	55	0	431	
1928	McPherson, C.	346	50	0	396	
	McPherson, Mrs. J.	30	17	0	47	
	Total	376	67	0	443	
1929	Buchanan, J.W.	disapproved				
	McPherson, Mrs. J.	30	10	0	40	
	McPherson, C.	395	157	0	552	
	Total	425	167	0	592	
1930	McPherson, Josie	30	30	2	62	624
	McPherson, Clyde	270	325	10	605	7484
	Total	300	355	12	667	8108
1931	Fryer, Mrs. M.A.	0	0	0	0	0
	McPherson, C.	460	250	10	720	7340
	McPherson, Josie	30	30	0	60	600
	Buchanan, J.W.	disapproved				
	Musgrave, M.C.	disapproved				
	Frances, Marlon	disapproved				
Total	490	280	10	780	7940	
1932	McPherson, C.	585	471	15	1071	9012
	McPherson, Josie	30	37	0	67	494
	Frances, Marlon	disapproved				
Total	615	508	15	1138	9506	
1933	McPherson, Clyde	585	381	2	968	9492
	McPherson, Josie	30	17	0	47	496
	Hale, Richard	disapproved				
Total	615	398	2	1015	9988	
1934	McPherson, Clyde	585	288	6	879	8568
	McPherson, Josie	30	30	0	60	630
	Hale, Richard	disapproved				
	Buchanan, J.W.	disapproved				
Total	615	318	6	939	9198	

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Table 31—Continued.

Year	Permittee	Livestock Approved			Total Animals	Total Animal Months
		Yearlong	Temporary	Exempt		
1935	McPherson, Clyde	585	202	6	793	6536
	McPherson, Josie	40	22	0	62	534
	Hale, Richard	disapproved				
	Buchanan, J.W.	0	15	0	15	135
	Williamson, J.W.	disapproved				
	Dickerman, Mrs.	0	10	0	10	90
	Dunham, T.G.	0	15	0	15	135
Total		625	264	6	895	7430
1936	McPherson, Clyde	585	66	20	671	7482
	McPherson, Josie	40	0	0	40	480
	Hale, Richard	disapproved				
	Fryer, H.B.	disapproved				
	Kennedy, C. H.	0	0	5	5	220
	Williamson, J.W.	0	5	0	5	60
	Dickerman, Mrs.	disapproved				
Total		625	71	25	721	8242
1937	McPherson, Clyde	585	290	0	875	7600
	McPherson, Josie	40	20	0	60	520
	Williamson, J.W.	0	5	0	5	60
	Hale, Richard	disapproved				
	Kennedy, C. H.	0	12	13	25	240
	Total		625	327	13	965
1939	McPherson, Clyde	585	203	0	788	7426
	McPherson, Josie	40	17	0	57	582
	Williamson, J.W.	5	0	0	5	60
	Kennedy, C.L.	60	0	0	60	240
	Dickerman, Maude	0	6	0	6	72
	Total		690	226	0	916
1940	McPherson, Clyde	585	0	0	585	7020
	McPherson, Josie	40	0	0	40	480
	Williamson, J.W.	5	0	0	5	60
	Kennedy, C.L.	60	0	0	60	240
	Dickerman, Maude					
	Total		690	0	0	690
1941	Williamson, J.W.	5	0	0	5	60
	McPherson, Clyde	585	0	156	741	7164
	McPherson, Josie	40	0	0	40	480
	Kennedy, C.L.	20	0	0	20	
	Total		650	0	156	806
1942	Williamson, J.W.	non-use				
	McPherson, Clyde	645	0	0	645	7740
	McPherson, Josie	40	0	0	40	480
Total		685	0	0	685	8220

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31—Continued.

Permittee	Livestock Approved			Total Animals	Total Animal Months
	Yearlong	Temporary	Exempt		
Williamson, J.W.	non-use				
McPherson, Clyde	645	0	12	657	7740
McPherson, Josie	40	0	0	40	480
Total	685	0	12	697	8220
Williamson, J.W.	non-use				
McPherson, Clyde	645	122	12	779	8106
McPherson, Josie	40	0	0	40	480
Total	685	122	12	819	8586

32—Williamson allotment (2132 acres).

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Carrying Capacity						70	70	70	70	
Animal Months						840	840	840	840	
# Animals						70	83	94	68	
# Animal Months						630	894	897	816	

Permittee	Livestock Approved			Total Animals	Total Animal Months
	Yearlong	Temporary	Exempt		
Williamson, J.W.	60	0	10	70	630
Baldwin, Bud	disapproved				
Williamson, J.W.	60	10	0	70	879
Baldwin, Bud	disapproved				
Williamson, J.W.	60	10	0	70	837
Williamson, J.W.	61	0	0	61	732
Williamson, J.W.	65	0	0	65	780
Williamson, J.W.	53	0	0	53	684
Williamson, J.W.	61	0	6	67	732
Williamson, J.W.	36	0	0	36	432
Williamson, J.W.	34	0	4	38	408

Appendix 7.2

Water Rights: San Rafael Watershed

Table 1—Early 1800s.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R17E S13 SE, SW	36-0104696 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S21 SW, SW	36-0104697 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S22 SE, SW	36-0104698 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S14 NW, NW	36-0104699 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S25 SE, SW	36-0104701 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S2 NW, NW	36-0104703 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S16 NE, SE	36-0104710 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S14 SE, SW	36-0104711 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S24 NW, SE	36-0104713 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S27 SW, NW	36-0104714 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S33 NE, NW	36-0104715 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S36 NE, NE	36-0104717 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S33 NW, SE	36-0104718 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S36 SW, SW	36-0104728 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R17E S26 SE, SW	36-0104734 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R18E S30 NE, NE	36-0104700 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R18E S19 NE, NE	36-0104712 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T23S; R18E S30 NE, SE	36-0104716 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.

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1-Continued.

Section	File Number	Type	Name	Capacity	Priority Date	Name of Holder
R19E SW	36-0104709 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E W, NW	36-0104702 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E W, NW	36-0104705 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E W, SW	36-0104706 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E W, SW	36-0104707 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E NW	36-0104720 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SE	36-0104721 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E NE	36-0104722 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SE	36-0104724 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SW	36-0104725 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SW	36-0104726 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SW	36-0104727 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SE	36-0104729 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SE	36-0104730 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SE	36-0104731 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E NW	36-0104732 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E NW	36-0104733 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E SE	36-0104735 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E NE	36-0104736 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
R17E NE	36-0104737 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.

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Table 1—Continued.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T24S; R17E S11 NW, SE	36-0104738 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T24S; R17E S11 SW, SE	36-0104739 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T24S; R17E S11 NW, SE	36-0104740 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T24S; R17E S11 SW, SE	36-0104741 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T24S; R18E S6 SW, NW	36-0104704 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T24S; R18E S6 NE, NW	36-0104719 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.
T24S; R18E S7 SE, SE	36-0104723 .0000	Stock tank, domestic reservoir and irrigation			1822	San Rafael Cattle Co.

Table 2 —1850s.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R17E S14 SW, SE	36-0063839 .0000	Stock tank and irrigation			1850	San Rafael Cattle Co.
T24S; R17E S13 NW, NW	36-0063838 .0000	Stock tank			1850	San Rafael Cattle Co.
T24S; R17E S12 NW, SW	36-0063840 .0000	Stock tank			1850	San Rafael Cattle Co.
T24S; R17E S11 NE, NE	36-0063841 .0000	Stock tank and irrigation			1850	San Rafael Cattle Co.
T24S; R17E S12 SW, NW	36-0063842 .0000	Stock tank			1850	San Rafael Cattle Co.

Table 3—1880s.

Section	File Number	Type	Name	Capacity	Priority Date	Name of Holder
33; R19E 10 SE, SE	36-0041140 .0000	Stock tank			1884	Lone Mountain Ranch
33; R19E 13 SW, SE	36-0041143 .0000	Stock tank			1884	Lone Mountain Ranch
33; R19E 10 SE, NW	36-0041144 .0000	Stock tank			1884	Lone Mountain Ranch
33; R19E 22 NW, NW	36-0041145 .0000	Stock tank			1884	Lone Mountain Ranch
48; R18E 14 NW, SW	36-0020959 .0000	Stock tank			1885	Bercich Cattle Co.
48; R18E 13 SW, NE	36-0043482 .0000	Stock tank			1885	Bercich Cattle Co.
48; R18E 14 SE, SW	36-0043484 .0000	Stock tank			1885	Bercich Cattle Co.
33; R16E 6 NW, SE	36-0102374 .0000	Stock tank			1889	Emily F. Stevens

Table 4—1890s.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T22S; R16E S33 SE, NE	36-0102367 .0000	Stock tank			1890	Kerr-McGee Corp.
T22S; R17E S19 SE, NW	36-0026737 .0000	Stock tank			1890	Kerr-McGee Corp.
T22S; R17E S19 SW, SE	36-0026738 .0000	Stock tank			1890	Kerr-McGee Corp.
T23S; R16E S25 SE, SE	36-0102371 .0000	Stock tank			1890	Emily F. Stevens
T23S; R16E S26 SE, SE	36-0102372 .0000	Stock tank			1890	Emily F. Stevens
T23S; R17E S25 SW, SW	36-0102370 .0000	Stock tank			1890	Emily F. Stevens
T24S; R17E S18 SE, SE	36-0102373 .0000	Stock tank			1890	Emily F. Stevens
T24S; R18E S14 SE, SW	36-0020960 .0000	Stock tank			1890	Bercich Cattle Co.
T23S; R19E S15 SE, NW	36-0015223 .0000	Stock tank and recreation			1893	J.D. Hathaway
T23S; R19E S3 NW, SE	36-0015225 .0000	Domestic reservoir, stock tank, irrigation and recreation			1899	J.D. Hathaway
T24S; R18E S13 NE, NE	36-0067210 .0000	Stock tank, domestic reservoir and irrigation			1899	J.D. Hathaway

Table 5—1900s.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R19E S31 SW, SW	36-0015226 .0000	Domestic res., stock tank, irrigation and recreation			1908	J.D. Hathaway

Table 6—1910s.

Location	File Number	Type	Name	Priority Date	Name of Holder
T24S; R18E §13 NW, NE	36-0043483 .0000	Stock tank		1910	Berlich Cattle Co.
T23S; R16E §14 NW, NE	36-0032812 .0000	Stock tank		1912	N.C. Hale
T23S; R18E §25 NE, SW	36-0049199 .0002	Stock tank		1912	Parker Canyon Ranch, Inc.
T23S; R18E §26 NE, SE	36-0049201 .0002	Stock tank, domestic reservoir and irrigation		1912	Parker Canyon Ranch, Inc.
T23S; R18E §21 SW, SE	36-0049202 .0002	Stock tank		1912	Parker Canyon Ranch, Inc.
T24S; R18E §4 SW, SW	36-0049200 .0002	Stock tank, domestic reservoir and irrigation		1912	Parker Canyon Ranch, Inc.
T24S; R18E §1 NE, SE	36-0067211 .0000	Stock tank		1912	J.D. Hathaway
T22S; R17E §23 NW, SE	36-0032088 .0000	Stock tank		1913	B.M. Robbins
T22S; R17E §23 SE, SE	36-0032089 .0000	Stock tank		1913	B.M. Robbins
T22S; R17E §25 SE, NW	36-0032090 .0000	Stock tank		1913	B.M. Robbins
T22S; R17E §25 SE, SW	36-0032091 .0000	Stock tank		1913	B.M. Robbins
T22S; R17E §24 NW, NW	36-0032092 .0000	Stock tank		1913	B.M. Robbins
T22S; R17E T23 SE, NE	36-0032265 .0000	Stock tank	North Forest Center Tank	1913	B.M. Robbins
T22S; R17E §24 SE, SW	36-0032266 .0000	Stock tank	North Forest East Tank	1913	B.M. Robbins
T22S; R17E §25 NE, SE	36-0032267 .0000	Stock tank		1913	B.M. Robbins
T23S; R16E §27 NW, NW	36-0064072 .0000	Stock tank		1915	C.Z. Clopton
T23S; R16E §28 SW, NE	36-0064073 .0000	Stock tank		1915	C.Z. Clopton
T23S; R16E §33 SE, SE	36-0064074 .0000	Stock tank		1915	C.Z. Clopton
T23S; R16E §34 NE, NE	36-0064075 .0000	Stock tank		1915	C.Z. Clopton
T24S; R26E §11 SW, SE	36-0014373 .0000	Domestic reservoir and stock tank		1915	J.M. Wilbourn

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Table 6—Continued.

Location	File Number	Type	Name	Priority Date	Name of Holder
T22S; R17E S25 SE, SW	36-0032268 .0000	Stock tank		1917	B.M. Robbins
T22S; R17E S36 NE, NW	36-0032807 .0000	Stock tank		1917	N.C. Hale
T22S; R17E S31 NW, SW	36-0032808 .0000	Stock tank	Saddle Mountain Green Tank	1917	N.C. Hale
T22S; R17E S31 SE, SW	36-0032809 .0000	Stock tank		1917	N.C. Hale
T22S; R17E S31 SW, NW	36-0032810 .0000	Stock tank	Saddle Mountain Dry Tank	1917	N.C. Hale
T22S; R17E S36 NE, SE	36-0032818 .0000	Stock tank		1917	N.C. Hale
T23S; R20E S30 SW, NE	36-0013515 .0000	Stock tank		1918	Lone Mountain Ranch
T24S; R18E S18 NW, NE	36-0021969 .0000	Stock tank		1919	M.F. Ashburn
T24S; R18E S18 NW, NE	36-0021970 .0000	Stock tank		1919	M.F. Ashburn
T24S; R18E S18 NW, NE	36-0021971 .0000	Stock tank		1919	M.F. Ashburn
T24S; R18E S18 SW, SW	36-0021972 .0000	Stock tank		1919	M.F. Ashburn
T24S; R18E S18 NW, NE	36-0046683 .0000	Stock tank, domestic reservoir and irrigation		1919	M.F. Ashburn
T24S; R18E S18 SW, SE	36-0046684 .0000	Stock tank, domestic reservoir and irrigation		1919	M.F. Ashburn
T24S; R18E S18 SW, SW	36-0046685 .0000	Stock tank, domestic reservoir and irrigation		1919	M.F. Ashburn

Table 7—1940s.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
38; R16E 31 SW, NW	38-0064079 .0000	Stock tank and wildlife	Forest No. 5 Tank	9'x140'	1946	C.Z. Clopton
38; R16E 33 NW, NE	38-0064081 .0000	Stock tank and wildlife	Forest No. 3 Tank	7'x235'	1946	C.Z. Clopton
38; R16E 34 NE, NE	38-0064082 .0000	Stock tank and wildlife	Pollywog Tank	5'x190'	1946	C.Z. Clopton
38; R16E 34 SE, SW	38-0064083 .0000	Stock tank and wildlife	Clopton Tank	6'x165'	1946	C.Z. Clopton
38; R16E 33 SE, NW	38-0064085 .0000	Stock tank and wildlife	Partnership Tank	13'x310'	1946	C.Z. Clopton
38; R17E 30 NE, SW	38-0064084 .0000	Stock tank	Apache Tank	4'x235'	1946	C.Z. Clopton
38; R17E 38 SW, SE	38-0065118 .0000	Stock tank and wildlife	Hale Tank	5'x235'	1946	Vaca Ranch
38; R18E 32 NW, NW	38-0049207 .0002	Stock tank and wildlife	Max Tank	11'x132'	1946	Parker Canyon Ranch, Inc.
38; R18E 33 SW, NW	38-0049209 .0002	Stock tank and wildlife	Rosemary Tank	17'x200'	1946	Parker Canyon Ranch, Inc.
38; R18E 32 NW, NE	38-0049210 .0002	Stock tank and wildlife	Lawrence Tank	6'x176'	1946	Parker Canyon Ranch, Inc.
38; R18E 37 SW, SW	38-0049212 .0002	Stock tank and wildlife	Jack Tank	8'x110'	1946	Parker Canyon Ranch, Inc.
38; R18E 35 NE, NW	38-0020966 .0000	Stock tank and wildlife	Huachuca Pond	12'x265'	1946	G. Berich
38; R18E 37 NE, NE	38-0049203 .0002	Stock tank and wildlife	Lower Tank	6'x155'	1946	Parker Canyon Ranch, Inc.
38; R18E 30 SW, SW	38-0049213 .0002	Stock tank and wildlife	Parker Tank	6'x400'	1946	Parker Canyon Ranch, Inc.
38; R18E 36 NE, NW	38-0049216 .0002	Stock tank and wildlife	Huachuca Tank	12'x265'	1946	Parker Canyon Ranch, Inc.
38; R18E 30 NW, SE	38-0049217 .0002	Stock tank and wildlife	John Tank	12'x161'	1946	Parker Canyon Ranch, Inc.

Table 8—1950s.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R16E S23 NE, NE	38-0064080 .0000	Stock tank and wildlife	Grennan Tank	9'x175'	1950	C.Z. Clopton
T23S; R19E S22 SW, NW	36-0041146 .0000	Stock tank			1950	Lone Mountain Ranch
T23S; R19E S29 NW, NW	36-0041151 .0000	Stock tank			1954	Lone Mountain Ranch
T24S; R18E S11 SE, NE	38-0067217 .0000	Stock tank	Kelly Pond	15'x168'	1955	J.D. Hathaway
T22S; R17E S10 SE, SW	36-0042443 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S15 NW, NE	36-0042444 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S15 NE, SE	36-0042445 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S20 SW, NW	36-0042446 .0000	Stock tank	Bergler Tank No. 2		1956	Vaca Ranch
T22S; R17E S20 NE, SW	36-0042447 .0000	Stock tank	Bergler Tank No. 1		1956	Vaca Ranch
T22S; R17E S21 NE, SW	36-0042448 .0000	Stock tank	First Tank Red Rock		1956	Vaca Ranch
T22S; R17E S23 NE, SW	36-0042449 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S26 SE, SE	36-0042450 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S27 NW, NE	36-0042451 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S27 NW, NW	36-0042452 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S31 SW, SE	36-0042453 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S33 NW, SE	36-0042454 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S34 NW, NE	36-0042455 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S34 NW, SW	36-0042456 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S35 NE, NW	36-0042457 .0000	Stock tank			1956	Vaca Ranch
T22S; R17E S35 NW, SE	36-0042458 .0000	Stock tank			1956	Vaca Ranch

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Continued.

Section	File Number	Type	Name	Capacity	Priority Date	Name of Holder
R17E NW, NW	36-0042459 .0000	Stock tank			1956	Vaca Ranch
R17E SE, SE	36-0042460 .0000	Stock tank			1956	Vaca Ranch
R17E NE, NE	36-0042461 .0000	Stock tank			1956	Vaca Ranch
R17E SW, NE	36-0042462 .0000	Stock tank	Little Williamson Tank		1956	Vaca Ranch
R17E SE, SE	36-0042463 .0000	Stock tank	Williamson Tank		1956	Vaca Ranch
R17E SE, SW	36-0067732 .0000	Stock tank			1956	Vaca Ranch
R17E NW, NE	36-0067733 .0000	Stock tank			1956	Vaca Ranch
R17E SW, NE	36-0067734 .0000	Stock tank			1956	Vaca Ranch
R17E NE, SW	36-0067735 .0000	Stock tank			1956	Vaca Ranch
R17E SE, SW	36-0067736 .0000	Stock tank			1956	Vaca Ranch
R18E SE, NW	36-0042465 .0000	Stock tank			1956	Vaca Ranch
R16E NE, NW	36-0042466 .0000	Stock tank			1956	Vaca Ranch
R17E SE, SE	36-0042467 .0000	Stock tank			1956	Vaca Ranch
R17E SE, NE	36-0042468 .0000	Stock tank			1956	Vaca Ranch
R17E NE, NE	36-0042470 .0000	Stock tank			1956	Vaca Ranch
R17E NW, NW	36-0042471 .0000	Stock tank			1956	Vaca Ranch
R17E NW, SE	36-0042472 .0000	Stock tank			1956	Vaca Ranch
R17E NW, NE	36-0042473 .0000	Stock tank			1956	Vaca Ranch
R17E SW, NE	36-0042474 .0000	Stock tank			1956	Vaca Ranch
R17E NW, SE	36-0042475 .0000	Stock tank			1956	Vaca Ranch

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Table 8—Continued.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R17E S17 NW, NE	36-0042476 .0000	Stock tank			1956	Vaca Ranch
T23S; R17E S17 SW, NE	36-0042477 .0000	Stock tank			1956	Vaca Ranch
T23S; R17E S18 NE, NW	36-0042478 .0000	Stock tank			1956	Vaca Ranch
T23S; R18E S4 SW, NE	36-0042479 .0000	Stock tank			1956	Vaca Ranch
T23S; R18E S5 NW, NW	36-0042480 .0000	Stock tank			1956	Vaca Ranch
T23S; R18E S5 SE, SE	36-0042481 .0000	Stock tank			1956	Vaca Ranch
T23S; R18E S6 NW, NE	36-0042482 .0000	Stock tank			1956	Vaca Ranch
T23S; R18E S7 NE, NW	36-0042483 .0000	Stock tank			1956	Vaca Ranch
T23S; R19E S32 SW, SE	36-0041138 .0000	Stock tank			1956	Lone Mountain Ranch
T23S; R19E S10 SE, NW	36-0041149 .0000	Stock tank			1956	Lone Mountain Ranch
T23S; R18E S35 SE, SE	38-0049204 .0002	Stock tank and wildlife	Inez Tank	10'x125'	1957	Parker Canyon Ranch, Inc.
T23S; R19E S30 NE, SW	36-0041153 .0000	Stock tank			1957	Lone Mountain Ranch
T23S; R19E S3 SW, SE	4A-0003796 .0000	Domestic res. and stock tank			1957	J.D. Hathaway
T23S; R18E S22 SW, SE	38-0049211 .0002	Stock tank and wildlife	Bill Woods Tank	6'x240'	1958	Parker Canyon Ranch, Inc.
T23S; R18E S35 SW, NE	38-0049218 .0002	Stock tank and wildlife Tank	Ranger Station	14'x290'	1958	Parker Canyon Ranch, Inc.
T23S; R18E S29 SE, NE	38-0049219 .0002	Stock tank and wildlife	Dan Tank	12'x169'	1958	Parker Canyon Ranch, Inc.
T23S; R19E S31 NW, SE	36-0041139 .0000	Stock tank			1958	Lone Mountain Ranch
T23S; R19E S30 SE, SE	36-0041142 .0000	Stock tank			1958	Lone Mountain Ranch
T23S; R19E S21 SW, SE	36-0041147 .0000	Stock tank			1958	Lone Mountain Ranch

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Table 6—Continued.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
33; R19E 01 NE, SW	36-0041148 .0000	Stock tank			1958	Lone Mountain Ranch
33; R19E 09 NW, SE	36-0041150 .0000	Stock tank			1958	Lone Mountain Ranch
33; R19E 09 NW, NW	36-0041152 .0000	Stock tank			1958	Lone Mountain Ranch
33; R19E 09 SE, SE	38-0013520 .0000	Stock tank	NR 2 Pond	9'x150'	1958	Lone Mountain Ranch
33; R19E 08 NW, NW	38-0013521 .0000	Stock tank	Sunnyside Ranch Tank	9'x150'	1958	Lone Mountain Ranch
33; R19E 00 NE, SE	38-0013523 .0000	Stock tank	Bodie Tank	9'x103'	1958	Lone Mountain Ranch
33; R19E 08 NW, NW	38-0085127 .0000	Stock tank	Sunnyside Ranch Tank 2	9'x145'	1958	Lone Mountain Ranch
48; R18E 08 SW, SW	38-0049214 .0002	Stock tank and wildlife	Arlene Tank	10'x205'	1958	Parker Canyon Ranch, Inc.
18; R16E 04 SW, NE	4A-0004419 .0000	Domestic and wildlife res.			1959	AZ Game & Fish Dept.
28; R17E 08 NW, NW	4A-0004418 .0000	Domestic and wildlife res.			1959	AZ Game & Fish Dept.
28; R18E 00 NE, SW	36-0042464 .0000	Stock tank	Second Tank		1959	Vaca Ranch
38; R17E 01 SE, SW	36-0028256 .0000	Domestic res. and stock tank			1959	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
38; R17E 01 SE, SW	36-0028257 .0000	Domestic res. and stock tank			1959	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
38; R17E 04 NE, SW	36-0028258 .0000	Stock tank and irrigation			1959	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
38; R17E 04 SE, NW	36-0028259 .0000	Stock tank and irrigation			1959	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
38; R17E 04 SE, NW	36-0028260 .0000	Stock tank			1959	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
38; R17E 07 NE, NW	36-0028288 .0000	Stock tank			1959	First Patagonia Capital c/o Terence W. Thompson

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Table 8—Continued.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R17E S9 SE, NW	36-0028291 .0000	Stock tank and domestic res.			1959	First Patagonia Capital c/o Terence W. Thompson
T23S; R17E S10 NW, SW	36-0028293 .0000	Stock tank			1959	First Patagonia Capital c/o Terence W. Thompson
T23S; R17E S11 SW, SE	.0000	Stock tank and irrigation			1959	First Patagonia Capital c/o Terence W. Thompson
T23S; R17E S14 NW, NE	36-0028296 .0000	Stock tank and irrigation			1959	First Patagonia Capital c/o Terence W. Thompson
T23S; R17E S12 SE, NW	36-0028298 .0000	Stock tank and irrigation			1959	First Patagonia Capital c/o Terence W. Thompson
T23S; R17E S12 SE, NE	36-0028299 .0000	Stock tank			1959	First Patagonia Capital c/o Terence W. Thompson
T23S; R17E S6 SE, NE	36-0042469 .0000	Stock tank			1959	Vaca Ranch
T23S; R17E S5 NW, NW	36-0067731 .0000	Stock tank			1959	Vaca Ranch
T23S; R17E S9 NW, NW	38-0028279 .0000	Stock tank and wildlife	Zimmerman Tank NR 2	10'x192'	1959	First Patagonia Capital c/o Terence W. Thompson
T23S; R17E S13 SW, NE	36-0028301 .0001	Stock tank			1959	Daniel England
T23S; R18E S15 SW, NW	36-0028271 .0000	Stock tank			1959	Ki He Kah Cattle Co. Ltd c/o Terence W. Thompson
T23S; R18E S18 NW, NW	36-0028303 .0001	Stock tank			1959	First Patagonia Capital c/o Terence W. Thompson

1960s.

Section	File Number	Type	Name	Capacity	Priority Date	Name of Holder
R18E NW, SE	38-0049208 .0002	Stock tank and wildlife	Jackie Tank	8'x125'	1960	Parker Canyon Ranch, Inc.
R18E NE, SE	38-0049215 .0002	Stock tank and wildlife	Mary Tank	12'x145'	1960	Parker Canyon Ranch, Inc.
R19E NE, SW	38-0067216 .0000	Stock tank	Anarosa Pond	13'x255'	1960	J.D. Hathaway
R18E W, NW	38-0049206 .0002	Stock tank and wildlife	Judy Tank	10'x156'	1960	Parker Canyon Ranch, Inc.
R19E W, SE	38-0067214 .0000	Stock tank	Little Jim Pond	19'x246'	1961	J.D. Hathaway
R19E W, NW	38-0067215 .0000	Stock tank	Harrison Pond	15'x156'	1961	J.D. Hathaway
R18E NE, NW	38-0020962 .0000	Stock tank	Kenny Tank	18'x155'	1965	G. Berich
R17E E, SE	36-0028265 .0000	Stock tank			1969	Trust under will of Donald R. Black
R17E E, NW	36-0028287 .0000	Stock tank			1969	First Patagonia Capital c/o Terence W. Thompson
R17E W, NE	36-0028289 .0000	Stock tank			1969	First Patagonia Capital c/o Terence W. Thompson
R17E W, NW	36-0028290 .0000	Stock tank			1969	First Patagonia Capital c/o Terence W. Thompson
R17E W, NW	36-0028292 .0000	Stock tank			1969	First Patagonia Capital c/o Terence W. Thompson
R17E W, SW	36-0028294 .0000	Stock tank			1969	First Patagonia Capital c/o Terence W. Thompson
R17E E, NE	36-0028297 .0000	Stock tank			1969	First Patagonia Capital c/o Terence W. Thompson
R17E E, NW	36-0028300 .0000	Stock tank			1969	First Patagonia Capital c/o Terence W. Thompson
R17E E, NE	36-0028302 .0001	Stock tank			1969	First Patagonia Capital c/o Terence W. Thompson
R17E E, NW	38-0028276 .0000	Stock tank and wildlife	Zimmerman Tank NR 1	12'x105'	1969	First Patagonia Capital c/o Terence W. Thompson
R17E W, NW	38-0028282 .0000	Stock tank and wildlife	Lower Brown Tank NR 2	10'x270'	1969	First Patagonia Capital c/o Terence W. Thompson
R18E E, SW	36-0028261 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
R18E E, SW	36-0028262 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson

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Table 9—Continued.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R18E 0S8 SW, SE	36-0028263 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S8 NE, SE	36-0028264 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S3 SE, SW	36-0028266 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S10 NE, SW	36-0028267 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S17 NW, SW	36-0028268 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S17 NW, SE	36-0028269 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S15 NE, SW	36-0028272 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S15 SE, SW	36-0028273 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S14 SE, SW	36-0028274 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S20 SE, NW	36-0028275 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S21 NW, NW	36-0028276 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S21 NW, NW	36-0028277 .0000	Stock tank			1969	Ki He Kah Cattle Co. Ltd. c/o Terence W. Thompson
T23S; R18E S20 SE, NW	38-0028240 .0000	Stock tank and wildlife	Dove Tank	12'x156'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
T23S; R18E S21 NW, NW	38-0028241 .0000	Stock tank and wildlife	Leslie Tank	16'x189'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
T23S; R18E S14 SE, SW	38-0028242 .0000	Stock tank and wildlife	Corneel Tank	10'x100'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
T23S; R18E S15 SE, SW	38-0028243 .0000	Stock tank and wildlife	Lower Forest Tank	10'x144'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
T23S; R18E S15 NE, SW	38-0028244 .0000	Stock tank and wildlife	Cement Dam	7'x45'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
T23S; R18E S16 NE, NW	38-0028245 .0000	Stock tank and wildlife	Bishop Tank	15'x129'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
T23S; R18E S17 NW, SE	38-0028246 .0000	Stock tank and wildlife	Gertrudis Tank	12'x192'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
T23S; R18E S17 NW, SW	38-0028247 .0000	Stock tank and wildlife	South Picnic Tank	18'x186'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson

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Continued.

Section	File Number	Type	Name	Capacity	Priority Date	Name of Holder
R18E NE, SW	38-0028249 .0000	Stock tank and wildlife	Bear Tank	20'x120'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
R18E NE, SW	38-0028250 .0000	Stock tank and wildlife	Apache Tank	15'x159'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
R18E NE, SW	38-0028251 .0000	Stock tank and wildlife	North Picnic Tank	8'x102	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
R18E NW, SE	38-0028253 .0000	Stock tank and wildlife	Corenela Pond	11.5'x50'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
R18E NE, SE	38-0028254 .0000	Stock tank and wildlife	Middle Tank	20'x150'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
R18E NE, SW	38-0028255 .0000	Stock tank and wildlife	North Upper Forest Tank	20'x102'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson
R18E NW, SE	38-0028252 .0000	Stock tank and wildlife	Middle 20 Tank	10'x120'	1969	Ki He Kah Cattle Co., Ltd. c/o Terence W. Thompson

Table 10—1970s.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T22S; R17E S25 NE, SW	3R-0002749 .0000	Stock tank	Little Outfit Pond	8.1 ac. ft.	1971	B.M. Robbins
T23S; R16E S24 NE, SE	38-0026703 .0000	Stock tank and wildlife	West Bennett Tank	15'x147'	1973	Emily F. Stevens
T23S; R17E S31 NE, NE	38-0026702 .0000	Stock tank and wildlife	East NR 4	15'x182'	1973	Kerr-McGee Corp.
T23S; R17E S32 SE, SW	38-0026714 .0000	Stock tank and wildlife	South 8	18'x201'	1973	Kerr-McGee Corp.
T23S; R17E S29 SE, SE	38-0026716 .0000	Stock tank and wildlife	Double Tank South	12'x141'	1973	Kerr-McGee Corp.
T24S; R17E S5 NW, SW	38-0026706 .0001	Stock tank and wildlife	NR 3 Trap Tank	8'x300'	1973	Emily F. Stevens
T24S; R17E S18 NW, NE	38-0026709 .0001	Stock tank and wildlife	South NR 13	10'x189'	1973	Emily F. Stevens
T24S; R17E S5 SW, SE	38-0026711 .0001	Stock tank and wildlife	East 10 Tank	6'x160'	1973	Emily F. Stevens
T24S; R17E S5 NE, SW	38-0026712 .0001	Stock tank and wildlife	West 10 Tank	6'x120'	1973	Emily F. Stevens
T24S; R17E S5 NW, SW	38-0026713 .0001	Stock tank and wildlife	South 9	8'x135'	1973	Emily F. Stevens
T24S; R18E S3 SE, SW	38-0049205 .0002	Stock tank and wildlife	Bellyache Tank	6'x214'	1973	Parker Canyon Ranch, Inc
T23S; R17E S25 SE, SW	33-0028603 .0000	Stock tank	Bull Pasture Draw Tank	1.0 ac. ft.	1974	San Rafael Cattle Co.
T23S; R17E S13 SE, SW	33-0028609 .0000	Stock tank	P NR Sixteen Tank	4.0 ac. ft.	1974	San Rafael Cattle Co.
T23S; R17E S21 SE, SW	33-0028610 .0000	Stock tank	P L Seventeen Tank	3.0 ac. ft.	1974	San Rafael Cattle Co.
T23S; R17E S22 SE, SW	33-0028611 .0000	Stock tank	E L Seventeen Draw Tank	2.5 ac. ft.	1974	San Rafael Cattle Co.
T23S; R17E S14 NW, NW	33-0028612 .0000	Stock tank	Upper Seventeen Draw Tank	3.0 ac. ft.	1974	San Rafael Cattle Co.
T23S; R17E S30 NE, NE	33-0028613 .0000	Stock tank	U Twenty -One Draw Tank	2.0 ac. ft.	1974	San Rafael Cattle Co.
T24S; R17E S16 NW, NW	33-0028604 .0000	Stock tank	P NR One	0.25 ac. ft.	1974	San Rafael Cattle Co.
T24S; R17E S4 NW, NW	33-0028605 .0000	Stock tank	P NR Three Draw Tank	1.75 ac. ft.	1974	San Rafael Cattle Co.
T24S; R17E S2 NW, NW	33-0028606 .0000	Stock tank	P NR Seven Tank	1.75 ac. ft.	1974	San Rafael Cattle Co.

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No 10—Continued.

Section	File Number	Type	Name	Capacity	Priority Date	Name of Holder
R17E NW, SW	33-0028616 .0000	Stock tank	P Twenty-Four Draw Tank	0.5 ac. ft.	1974	San Rafael Cattle Co.
R17E SW, SW	33-0028617 .0000	Stock tank	P Twenty-Six Draw Tank	7.0 ac. ft.	1974	San Rafael Cattle Co.
R18E W, NW	33-0028607 .0000	Stock tank	P NR Eleven Tank	0.75 ac. ft.	1974	San Rafael Cattle Co.
R17E SE, SW	33-0033041 .0003	Stock tank	House Tank	3.5 ac. ft.	1975	First Patagonia Capital c/o Terence W. Thompson
R17E NW, SW	33-0033042 .0003	Stock tank	Kl He Kah Well Tank	1.75 ac. ft.	1975	First Patagonia Capital c/o Terence W. Thompson
R17E NE, NW	33-0033043 .0003	Stock tank	Airplane Tank	4.5 ac. ft.	1975	First Patagonia Capital c/o Terence W. Thompson
R17E SE, NE	33-0033044 .0003	Stock tank	Lower Brown Tank	1.5 ac. ft.	1975	First Patagonia Capital c/o Terence W. Thompson
R17E SE, SW	33-0033046 .0002	Stock tank	Lower Six Tank	3.25 ac. ft.	1975	Emily F. Stevens
R17E NW, NE	33-0033047 .0003	Stock tank	Middle Brown Tank	1.5 ac. ft.	1975	First Patagonia Capital c/o Terence W. Thompson
R17E W, NW	33-0033052 .0003	Stock tank	Upper Brown Tank	1.5 ac. ft.	1975	First Patagonia Capital c/o Terence W. Thompson
R17E NE, NW	33-0033053 .0002	Stock tank	Upper Six Tank	3.75 ac. ft.	1975	Emily F. Stevens
R17E SE, NE	33-0033054 .0003	Stock tank	West Airplane Tank	3.5 ac. ft.	1975	First Patagonia Capital c/o Terence W. Thompson
R17E NE, NW	33-0033045 .0002	Stock tank	Lower No. One Tank	1.25 ac. ft.	1975	Emily F. Stevens
R17E W, NE	33-0033048 .0002	Stock tank	Middle Two Tank	1.75 ac. ft.	1975	Emily F. Stevens
R17E S, NW	33-0033049 .0002	Stock tank	New No. One Tank	7.25 ac. ft.	1975	Emily F. Stevens
R17E W, NE	33-0033050 .0002	Stock tank	South Two Tank	0.75 ac. ft.	1975	Emily F. Stevens
R17E W, NW	33-0033051 .0002	Stock tank	Tank Twelve	1.0 ac. ft.	1975	Emily F. Stevens
R17E W, NW	33-0033055 .0002	Stock tank	West Three Tank	0.5 ac. ft.	1975	Emily F. Stevens
R17E W, NW	33-0033056 .0002	Stock tank	West Two Tank	0.25 ac. ft.	1975	Emily F. Stevens
R19E NE, SE	38-0067213 .0000	Stock tank	Campnl Pond	10'x150'	1975	J.D. Hathaway

Continued on next page

Table 10—Continued.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T21S; R16E S36 SW, NE	36-0042195 .0000	Stock tank			1976	R.A. Rich
T21S; R16E S36 NE, NE	36-0042196 .0000	Stock tank			1976	R.A. Rich
T21S; R16E S36 NE, NE	38-0019599 .0000	Stock tank	Oak Grove Tank	15'x120'	1976	R.A. Rich
T24S; R17E S22 SE, NE	33-0035887 .0000	Municipal Reservoir			1976	City of Nogales
T22S; R17E S10 SE, SW	33-0042402 .0000	Stock tank	Lampshire Tank	0.03 ac. ft.	1977	Vaca Ranch
T22S; R17E S15 NE, SE	33-0042403 .0000	Stock tank	Down Under Tank	2.04 ac. ft.	1977	Vaca Ranch
T22S; R17E S15 NW, NE	33-0042404 .0000	Stock tank	NE Quarter Tank	.09 ac. ft.	1977	Vaca Ranch
T22S; R17E S20 NE, SW	33-0042405 .0000	Stock tank	Bergler NR 1	0.09 ac. ft.	1977	Vaca Ranch
T22S; R17E S20 NW, SW	33-0042406 .0000	Stock tank	Bergip Tank NR 2	0.02 ac. ft.	1977	Vaca Ranch
T22S; R17E S21 NE, SW	33-0042407 .0000	Stock tank	Red Rock Tank NR 1	2.04 ac. ft.	1977	Vaca Ranch
T22S; R17E S23 NE, SW	33-0042408 .0000	Stock tank	Meadow Valley Tank	2.03 ac. ft.	1977	Vaca Ranch
T22S; R17E S26 SE, SE	33-0042409 .0000	Stock tank	Fence Line Tank	0.07 ac. ft.	1977	Vaca Ranch
T22S; R17E S27 NW, NE	33-0042410 .0000	Stock tank	Division Tank	.05 ac. ft.	1977	Vaca Ranch
T22S; R17E S27 NW, NW	33-0042411 .0000	Stock tank	Cott Tank	10.75 ac. ft.	1977	Vaca Ranch
T22S; R17E S31 SW, SE	33-0042412 .0000	Stock tank	Kennedy Tank	24.08 ac. ft.	1977	Vaca Ranch
T22S; R17E S33 NW, SE	33-0042413 .0000	Stock tank	Bog Hole Tank	0.04 ac. ft.	1977	Vaca Ranch
T22S; R17E S34 NW, NE	33-0042414 .0000	Stock tank	North Sec. Line Tank	0.04 ac. ft.	1977	Vaca Ranch
T22S; R17E S33 NW, SW	33-0042415 .0000	Stock tank	East Kennedy Tank	0.01 ac. ft.	1977	Vaca Ranch
T22S; R17E S35 NE, NW	33-0042416 .0000	Stock tank	Spring Canyon Tank	1.03 ac. ft.	1977	Vaca Ranch
T22S; R17E S35 NW, NW	33-0042417 .0000	Stock tank	Airport Tank	2.06 ac. ft.	1977	Vaca Ranch

continued on next page

10—Continued.

Section	File Number	Type	Name	Capacity	Priority Date	Name of Holder
R17E S. SE	33-0042419 .0000	Stock tank	Big Upper Baldwin	10.75 ac. ft.	1977	Vaca Ranch
R17E N. NE	33-0042420 .0000	Stock tank	Fence Line Tank	8.02 ac. ft.	1977	Vaca Ranch
R17E W. NE	33-0042421 .0000	Stock tank	Little Williamson	4.03 ac. ft.	1977	Vaca Ranch
R17E S. SE	33-0042422 .0000	Stock tank	Williamson Tank	6.08 ac. ft.	1977	Vaca Ranch
R17E W. SE	33-0042487 .0000	Stock tank	Headquarters Tank	0.02 ac. ft.	1977	Vaca Ranch
R18E S. SW	33-0042423 .0000	Stock tank	2d Tank	2.07 ac. ft.	1977	Vaca Ranch
R18E S. NW	33-0042424 .0000	Stock tank	Lookout Tank	3.07 ac. ft.	1977	Vaca Ranch
R16E S. NW	33-0042425 .0000	Stock tank	Big Apache Tank	9.08 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042426 .0000	Stock tank	Baldwin Tank	10.75 ac. ft.	1977	Vaca Ranch
R17E S. W	33-0042427 .0000	Stock tank	Hunt Tank	3.63 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042428 .0000	Stock tank	Lawless Tank	1.07 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042429 .0000	Stock tank	Upper Antelope Tank	43.03 ac. ft.	1977	Vaca Ranch
R17E S. W	33-0042430 .0000	Stock tank	Lower Antelope Tank	3.07 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042431 .0000	Stock tank	Dunham Tank	10.75 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042432 .0000	Stock tank	Spreader-Dyke Tank	7.08 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042433 .0000	Stock tank	Farm Tank	0.09 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042434 .0000	Stock tank	Upper Farm Tank	1.01 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042435 .0000	Stock tank	Perry Wilson Tank	10.6 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042436 .0000	Stock tank	New Perry Wilson Tank	2.06 ac. ft.	1977	Vaca Ranch
R17E S.	33-0042437 .0000	Stock tank	Little Apache Tank	2.18 ac. ft.	1977	Vaca Ranch

on next page

Table 10—Continued.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R17E S9 NW, SW	36-0028286 .0000	Stock tank			1977	First Patagonia Capital c/o Terence W. Thompson
T23S; R18E S4 SW, NE	33-0042438 .0000	Stock tank	Cement Dam Tank	2.04 ac. ft.	1977	Vaca Ranch
T23S; R18E S5 NW, NW	33-0042439 .0000	Stock tank	Little Tank	2.07 ac. ft.	1977	Vaca Ranch
T23S; R18E S5 SE, SE	33-0042440 .0000	Stock tank	A Bar Draw Tank	10.01 ac. ft.	1977	Vaca Ranch
T23S; R18E S6 NW, NE	33-0042441 .00000	Stock tank	Woodchopper Tank	11.06 ac. ft.	1977	Vaca Ranch
T23S; R18E S7 NE, NW	33-0042442 .0000	Stock tank	Kheka Draw Tank	4.06 ac. ft.	1977	Vaca Ranch

File 11—1980s.

Section	File Number	Type	Name	Capacity	Priority Date	Name of Holder
R19E SW, SE	38-0084534 .0000	Stock tank	Lost Tank	6'x55'	1980	Lone Mountain Ranch
R19E NW, NW	38-0084535 .0000	Stock tank	West Tank	12'x120'	1980	Lone Mountain Ranch
R19E SE, SW	38-0084536 .0000	Stock tank	Border Tank	10'x120'	1980	Lone Mountain Ranch
R19E NE, SW	38-0084537 .0000	Stock tank	Little Tank	5'x50'	1980	Lone Mountain Ranch
R19E NE, NW	38-0084539 .0000	Stock tank	Middle Tank	20'x120'	1980	Lone Mountain Ranch
R19E NE, SW	38-0084543 .0000	Stock tank	Mennifee Tank	17'x150'	1980	Lone Mountain Ranch
R19E SW, NW	38-0084544 .0000	Stock tank	Doggie Tank	11.6'x125'	1980	Lone Mountain Ranch
R19E SE, SE	38-0084545 .0000	Stock tank	Cemetery Tank	8'x150'	1980	Lone Mountain Ranch
R19E SE, NE	38-0084546 .0000	Stock tank	Black Tail Tank	11'x60'	1980	Lone Mountain Ranch
R19E SW, NW	38-0084547 .0000	Stock tank	Lone Mountain Tank	10'x135'	1980	Lone Mountain Ranch
R19E NW, SE	38-0084548 .0000	Stock tank	No Name Tank	11'x100'	1980	Lone Mountain Ranch
R19E SE, SE	38-0084549 .0000	Stock tank	Oak Tank	12'x95'	1980	Lone Mountain Ranch
R19E SW, SE	38-0084551 .0000	Stock tank	Sunnyside Tank	3'x210'	1980	Lone Mountain Ranch
R19E SW, NW	38-0084555 .0000	Stock tank	Leo's Tank	10'x115'	1980	Lone Mountain Ranch
R19E SE, SW	38-0084764 .0000	Stock tank	Alamo Tank	20'x145'	1980	Lone Mountain Ranch
R18E NE, NE	38-0086598 .0000	Stock tank and wildlife	Wager Pond	10'x80'	1981	M.F. Ashburn
R18E NE, NE	38-0086599 .0000	Stock tank and wildlife	Upper Antelope Pond	13'x320'	1981	M.F. Ashburn
R18E NE, NE	38-0086600 .0000	Stock tank and wildlife	Tom's Tank	9'x200'	1981	M.F. Ashburn
R18E SW, NW	38-0086601 .0000	Stock tank and wildlife	Tanque Seco	9'x200'	1981	M.F. Ashburn
R18E SW, NE	38-0086602 .0000	Stock tank and wildlife	Lower Antelope Pond	13'x320'	1981	M.F. Ashburn

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Table 11—Continued.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R19E S18 NE, NW Partnership	33-0087632 .0000	Stock tank			1982	Collins Canyon Ltd.
T23S; R19E S32 NE, SE	33-0087738 .0000	Stock tank		3.0 ac. ft.	1982	J. McKennis
T23S; R19E S20 SW, SW	38-0088130 .0000	Stock tank	Kelly Tank	17'x180'	1982	Lone Mountain Ranch
T23S; R19E S8 NE, NW	38-0088132 .0000	Stock tank	Whitetail Tank	17.5'x157'	1982	Collins Canyon Land
T22S; R17E S34 SE, NE	33-0093092 .0000	Stock tank			1987	Don Dickes, et. al.
T23S; R17E S3 NW, SE	33-0093091 .0000	Stock tank			1987	Don Dickes, et. al.
T23S; R17E S5 NW, NW	33-0093093 .0000	Stock tank			1987	Don Dickes, et. al.
T22S; R16E S12 NE, NW	33-0093256 .0000	Stock tank			1988	Leslie Paul Kunde

Table 12—1990s.

Location	File Number	Type	Name	Capacity	Priority Date	Name of Holder
T23S; R16E S22 SE, SW	33-0096337 .0000	Stock tank		3.0 ac. ft.	1994	Brenda B. and Fred N. House

Chapter 8

Chapter 8

Agriculture, Woodcutting, and Other Land Uses

In arid and semiarid lands, agriculture and stock raising develop in symbiosis with each other because natural forage often is insufficient to keep stock alive during dry years or certain seasons of the year. As noted in Chapter 7, the critical period for most ranges in the study area was late winter and early spring, when ranchers often had to provide supplementary feed for their cattle. Ranchers with land along the upper Santa Cruz River and some of its major tributaries like Parker Canyon were able to irrigate some fields and pastures. Other stock raisers tried dry farming to raise fodder for their animals. Moreover, there was a dry farming boom in the western United States during the early 20th century that swept over the San Rafael Valley as well. That boom put considerable political pressure on the Forest Service to eliminate potentially arable land from its boundaries and make it available for homesteading.

As this chapter and Chapter 7 point out, however, that boom quickly went bust in the San Rafael Valley. Between 1915, when forest classification officer Rex King recommended more than 90,000 acres within the Huachuca Division for elimination, and 1919, when he re-examined that land, dry farming was already proving to be a losing proposition in the region. The Forest Service decided not to engage in wholesale eliminations. Instead, it came to the realization that dry farming alone could not provide an adequate living for settlers in the study area. With few exceptions, agriculture was simply a subsidiary to stock raising. Most forest homesteads were filed and taken over by people who also ran cattle. Nonetheless, the more intense, and more localized, ecological impact of agriculture merits treatment in a land-use history such as this. (See Appendix 8.1 for a list of all homesteads in the study area.)

IRRIGATED AGRICULTURE IN THE SAN RAFAEL VALLEY

Throughout the period covered in this report, almost all of the big ranches did some irrigated farming. The largest amount of farming took place in the well-watered bottom land along the Santa Cruz River, where boggy places had been such a problem. Early ranchers employed "bog riders" whose sole

duty was to pull cattle out when they became stuck in the soft mud along the river (Axford 1969). The sloughs near the Santa Cruz were the source of the malarial infestation that so troubled early settlers at La Noria and at Santa Cruz, described by many Forty-niners and other early travelers (Ashburn 1994; Browne 1974; Powell in Hannum 1931). The tules and sacaton grass grew so high near the sloughs that cattle could not be seen. They made a network of trails through the grass and during round-ups would enter the dense vegetation to hide. The bottom ground near the sloughs was porous and occasionally calves would fall into boggy holes and be lost (Bercich 1995). At the San Rafael, Colin Cameron intentionally drained much of the bottom land, using Fresno scrapers and long poles to break down the banks that retained the water in the sloughs.

By far the largest amount of irrigated farming was done at the San Rafael Ranch, where almost 100 acres were under cultivation. Colin Cameron had planted grain and forage crops along the river and employed Chinese gardeners to raise vegetables as well (Surveyors Field Notes, Book 1752). After William Greene took over the operation, farming increased. Under Tom Heady's management during the 1920s and 1930s, at least two men worked in the fields full time, and additional farm workers were employed when the season demanded additional help. The fields were fenced and at times as many as five men were employed as a fence crew. The San Rafael raised Johnson grass, sorghum, milo maize, and alfalfa for their cattle and horses. There were large underground silage pits at both the San Rafael and the Parker brothers ranch (the present Ki He Kah). Ranchers chopped corn and milo maize to store it for winter feed. Prior to construction of the pit silage system, the San Rafael had one or two large above-ground silos (Ashburn 1994; Hunt 1994). At the Vaca Ranch, at least 20 to 40 acres were under cultivation most of the time. Farmers named Ruiz and Chacón had several cultivated acres on the Santa Cruz near the international boundary.

After the river bottom, the largest amount of farming was done in Parker Canyon and along Mowry Wash. Most of the Parkers had small fields, irrigated from a spring by the house in Parker Canyon. Some of that acreage had been homesteaded under the

General Homestead Act. During the 20th century, however, most patented land originated as forest homesteads under the Forest Homestead Act of 1906.

EXTENSIVE LAND CLASSIFICATION IN THE HUACHUCA DIVISION

As noted in Chapter 7, Congress authorized the Forest Service in 1912 to classify all National Forest lands to determine which lands should remain under the administration of the Forest Service and which lands should be returned to the public domain and "listed" for homesteading and other forms of alienation. Rex King, a graduate of the University of Michigan School of Forestry who entered the Forest Service in 1909, made an initial, or "extensive," classification of the land in the Whetstone, Santa Rita, Huachuca, and Tumacacori divisions of the Coronado National Forest in 1914 and 1915 and made recommendations about land that should be eliminated. King's extensive classification divided the land into: (1) nonlistable, which was to remain within the National Forest, (2) intensive, which was to be investigated further, and (3) land recommended to be eliminated, i.e., returned to the public domain. He organized his report by units based upon township and range, which are summarized below.

The report begins with a general overview of the four divisions within Coronado National Forest itself. The classification process was being carried out at a time when the western United States was experiencing a boom in dry farming that brought thousands of settlers to semiarid portions of Arizona, New Mexico, Colorado, and other western states. In a section entitled "Necessity for a Land Classification," King placed heavy emphasis upon that development. In his words:

A large portion of the Forest consists of precipitous mountains, concerning the non-agricultural value of which there is no doubt. Another portion, which consists of the lower benches of the various mountain ranges, contains many tracts suitable for farming. Although the vicinity was one of the first portions of the United States to be settled, there was very little demand for the class of land within the Forest boundary until the wide advertising of dry farming possibilities that began five or six years ago. Since then the demand for the listing of the lower bench land has been steadily increasing and because of the unprecedented rainfall of last year [1914,

a year of tremendous floods], is bound to increase still more in the next few years. Much of the Forest is plainly nonlistable under the general principles for the classification of lands, but under the present procedure the cost of rejecting applications for worthless land is almost as great as for the listing of the agricultural areas. The present classification under the Act of August 12, 1912, is undertaken to segregate the manifestly non-agricultural land from that which is possibly agricultural and also to more fully weigh the various factors that bear upon the possible elimination of certain areas upon which Forest values are relatively very low. No attempt has been made to balance agricultural values against Forest values where the issue is at all in doubt, such areas having been left for intensive classification.

King then sketched the history of the various divisions and discussed their topography. The Huachuca Division was the largest, consisting of 285,970.50 acres lying along the Mexican boundary. The Patagonia Mountains formed the western boundary, the Huachucas the eastern boundary. The division was bounded on the north by the Canelo Hills. The study area falls completely within this division but does not include the eastern slopes of the Huachucas, which drain into the San Pedro River, the western slopes of the Patagonias, which drain into Sonoita Creek and the middle Santa Cruz River, the Harshaw district, which drains into Sonoita Creek, or the northern slopes of the Canelo Hills, which drain into Babocómari Creek, a tributary of the San Pedro. In King's words, "The main slopes of all the ranges are rocky and precipitous, with frequent cliffs, but north of the Canelo Hills and along certain of the present boundaries, particularly in the south-central part of the Division, the slopes decrease and the land becomes quite level, although still cut by numerous canyons. These portions contain almost all of the possibly agricultural land."

Within all four divisions, King noted that National Forest boundaries encompassed 684,305.39 acres, but 38,861.025 acres of that land had already been allocated: (1) 7,816.965 acres of homestead or script land taken up before creation of the Forest Reserve; (2) 21,871.16 acres of forest homestead land; and (3) 9,172.9 acres of patented mining claims. King noted that Forest Service records of mining claims were incomplete and that more patented mineral claims

might exist. He also stated that there was no record of unperfected claims. Of the remaining 645,444.355 acres of National Forest land, King classified 493,080.55 acres (76 percent) as nonlistable, including 57,049.78 acres of school land. That nonlistable land included: (1) 12,922 acres of timberland with a stand of 23,000 M.ft.B.M.; (2) 467,465.555 acres of woodland with a commercial stand of 1,112,380 cords; (3) 5,869 acres of brushland; and (4) 6,826 acres of grassland. He placed 61,672.62 acres (9.6 percent) under intensive classification requiring further investigation. And finally, he recommended that 90,691.19 acres (14 percent) be eliminated from the National Forest.

Regarding the nonlistable land, King reported that the only saw timber in the four divisions were light stands in the Santa Rita and Huachuca Mountains. The Patagonia Mountains also once had a scattering stand but it was practically all cut before the Forest was created, to supply the mines in the vicinity," he observed (King 1915:6). "The Huachuca stand which now totals about 4,920 M.ft.B.M. has been extensively culled over and there are places which were clear cut," King wrote. Most of the timber was Western yellow pine with occasional white and Douglas fir, some spruce, and white and Chihuahua pine. Later in his report, King (1915:7) stated that even though the timber resources of the four divisions were limited, "as a factor in the local demand it has considerable importance. It may be a long time before there will be a call for its manufacture into lumber, but there will always be a small, steady demand on it to furnish mining timbers, poles, construction timbers and various other uses required in ranching sections and small agricultural and mining towns."

Most of the woodland consisted of oaks, with juniper and occasionally pinyon on the upper slopes and mesquite on the lower slopes. King added, "Nearly all of the canyon bottoms have a narrow fringe of sycamore, cottonwood, ash, box elder, black walnut, alder and numerous other species." According to King:

The stand of cordwood varies from scattering to thickets of oak bearing as much as 20 cords per acre and some of the individual trees reach a diameter of three feet. No commercial use has yet been found for the oak except for fuel and fence posts, but the fuel value alone is a very large one when the numerous mines of the vi-

cinity and the huge surrounding area of open land now taken up by dry farmers are taken into consideration. A considerable area was cut over before the creation of the Forest, which at present is restocking by coppice [sic] growth into a better stand than the original one. Reproduction over the entire area is good. The present market for the sale of fuel is not large because of Mexican troubles [the Mexican Revolution] and the inactivity of the mines. Prospects for a resumption of work in most of the mining camps seems very good in which case there will be a large demand for wood and supervision of cutting will be necessary not only to insure a permanent supply but to prevent denudation.

Later in his report, King (1915:7) elaborated about the value of Forest Service woodland:

The value of the approximately 1,112,380 cords of wood does not at present appear as great as it really is because there is still a small supply of desert species such as mesquite, catsclaw, palo verde, etc., and also some oak left on areas more accessible to the settlements than the Forest lands. It is only a question of a short time until this supply will be exhausted and the significance of the Forest Service wood and the need of its protection will then become more apparent. It is not meant that there is no demand for National Forest wood, for during the fiscal year of 1914 the equivalent of 1,305,000 ft. B.M. was cut on the Forest, but the present use made of Forest wood is small compared to the total use and to the demand of the future. The price of wood for fuel averages about \$6.00 per cord and for posts about 40 cents apiece. The oak, of which the stand almost wholly consists, is used to some extent for mining timbers and it is possible that it may come to be used for railroad ties. On all of the divisions there are numerous mines nearly all of which are at present idle. Market conditions seem to forecast a strong activity in mining in the near future, particularly in copper. In that case, many properties on all divisions are bound to resume active operations and the demand for fuel wood and mining timbers will jump to large proportions.

Regarding the brushland and grassland, King reported that the primary use was grazing. He also pointed out that the brushland consisted of rocky

slopes that had to be protected from erosion and to regulate runoff. "The area left for intensive classification includes all tracts of farm unit size which are possibly agricultural and all smaller agricultural areas which, by reason of location near agricultural alienations, might be supposed to have some practical agricultural value," King stated. He went on to say, "The areas recommended for elimination are those which have low Forest values and in which there is a high percentage of alienated or agricultural land. The cost of aggregating and listing the agricultural portions, particularly in unsurveyed townships where entry surveys would have to be made, would be very high and much more than the value of the remaining Forest land."

King concluded his introduction by talking about the importance of water and watershed protection. "The greatest handicap toward growth and development with which southern Arizona has to contend, is lack of water," King (1915:8) observed. "With its long growing season, freedom from low temperatures and abundance of fertile land, it would become fully as attractive and productive as California if its water supply could be increased. Therefore, any procedure that not only will increase the available water but will insure the continuation of the present supply, even though by only a small percentage, is economically important." King estimated that "only a small percentage, not much over one-half of one percent of the precipitation, is saved and used." He wrote: "The reason why more is not available is that the evaporation is very high and that the rains are more or less torrential in character and the insufficient cover on the watersheds allows the water to escape as huge damaging floods. It is impossible, except in small side canyons, to develop any storage because of the lack of dam sites and the problem of silt. The only help remaining seems to be controlling the run-off and in bringing a steadier surface flow to the ditches of the farmers or a larger underground flow to the pumping stations."

To do that, it was vitally important for the Forest Service to retain control over the San Pedro and Santa Cruz watersheds. Regarding the Santa Cruz, King (1915:8) stated:

The total area of the watershed of the Santa Cruz is about 2,100 square miles, of which about one-half is within the National Forest. The portion inside the Forest is practically all above 4,000 feet elevation while the portion outside is nearly

all below that elevation and averages about 3,000 feet. The amount in the Forest, therefore, furnishes much more than half of the run-off and because of this and snowfall on the higher elevations and the heavier character of the rains, changes of cover or mistakes in management on the Forest will be registered in the valleys much more strongly than similar changes on the outside areas. At the same time, the outside land has little cover except a thin stand of grass and weeds and a scattering growth of desert brush species. This is partly due to the fact that the cover here was always thin and partly because the accessible portions have been cleared of woody growth for fuel and that the whole area has been over-grazed for years. Any method that will improve the grass and brush cover here, will assist in regulating the Santa Cruz, but the major portion of improvement in that direction must come upon the Forest lands.

King then described the Huachuca Division by township and range. His discussion provides invaluable information about the topography, settlement, economy, and land use of the study area. It reveals how the Forest Service viewed land management in the early 20th century, with an overwhelming emphasis being placed on economic use, particularly woodcutting, timbercutting, watershed protection, and agriculture. Only once does King mention a unit having recreational value. Interestingly enough, he makes no mention of grazing as a rationale to retain land within the National Forest and keep it from being released back into the public domain.

Township 22 S, Range 17 E

Most of this unit falls with the northern portion of the study area. The unit contained 22,992.89 acres within National Forest boundaries, 1,160 acres of which had already been alienated: 40 acres under general homestead, and 1,120 acres under forest homestead. King classified the remaining 21,832.89 acres of National Forest land into 15,719.53 acres of unlistable land, all of it woodland with a commercial stand of 60,000 cords. He listed 530 acres as intensive and recommended that 5,583.36 acres be eliminated, 800 acres of which were included in the alienated land above. According to King (1915:22), "The area recommended for elimination is principally level to gently sloping grassland, portions of which

agricultural. Because of obvious lack of Forest values, this land should no longer be retained in the Forest."

The woodland, on the other hand, should be retained. Consisting "almost wholly of oak, although some piñon and juniper are found The stand ranges from scattering to 12 cords per acre and averages about 4 cords. It is nearly all readily accessible and has a high value for wood and fence posts, both of which are in demand in the neighborhood. The production is good and shows signs of the benefits of stock regulation and fire protection." King also noted that the entire township had "a distinct watershed value." In his words: "All water leaving it, except the larger floods, is utilized at present. Any means that cut down the amount of flood waters and increase the water available for use in irrigating, should be adopted because an immense amount of water is lying idle along the lower valleys for lack of protection. The desired result can best be attained by protecting and increasing the cover on the watershed. Without supervision the area would be open to overgrazing, fires and exploitation by wood choppers to supply the mining wood markets."

Township 23 S, Ranges 16 and 17 E

This unit included most of the Patagonia Mountains as well as the northern portion of the San Rafael de la Zanja land grant. Because of the intense mining activity around Washington Camp, Mowry, and Harshaw, the unit was one of the most heavily exploited in the study area, even though the Harshaw District lies outside the study area itself. The unit contained 29,210 acres within National Forest boundaries, 2,815.45 acres of which had already been alienated: 674.16 acres of patented mining claims and 2,141.29 acres of forest homestead land. Of the remaining 26,394.55 acres of National Forest land, King classified 17,095.82 acres as nonlistable: 16,480.82 acres of woodland with a commercial stand of 50,000 cords, and 615 acres of brushland. He placed 3,276 acres in the intensive classification for further investigation and recommended that 6,022.73 acres—22.8 percent of the National Forest land—be eliminated. Most of that land was in canyon bottoms or on meadows. "On areas where soil and slope are favorable—particularly on bottom lands—crops of corn, grain, and fruit, etc. have been successfully grown," King (1915:26) observed, "and it is probable that on the favorable soil in the areas left for intensive classification and for elimination success can be had."

The woodland was largely oak. "The present stand averages about 3 cords per acre," King noted. "It was quite severely cut over a number of years ago to supply the mines but is favorably restocking."

He also noted: "There was originally considerable sawtimber, principally Western Yellow Pine, on the Patagonias, but it was practically all cut when the mines were being actively worked. Occasional trees are still to be found and there is fair reproduction. The stand was not continuous but consisted of scattered bunches on the favorable sites, usually at the upper ends of the larger canyons. . . . None of the mines are being actively worked at present but conditions seem to point to their resuming work on a large scale. There is besides considerable settlement on the unit on the agricultural claims, mostly in connection with the mining claims."

King concluded: "When the mines on this unit and in the vicinity resume active work, which is very probable in the near future, there will be an immense demand for wood and without protection the surrounding country will be rapidly denuded. The cover on the area plays a very important part in the regulation of run-off. Without a suitable cover the slopes would be rapidly eroded and the country below would suffer from floods."

Township 24 S, Ranges 16 and 17 E

This unit encompassed the southern end of the Patagonia Mountains and the San Rafael Valley. Most of the valley land was private, falling within the San Rafael de la Zanja land grant or the Heady-Ashburn Ranch. The area contained 16,395 acres within National Forest boundaries, 3,126.25 acres of which was already alienated: 40 acres of script land, 1,089.25 acres of patented mining claims, and 1,999.05 acres of forest homestead land. King concluded that 10,550.36 acres (79.5 percent) of National Forest Service land should not be listed because it was not suitable for agriculture. Nearly all of that land (10,431.36 acres) was classified as woodland, primarily oak with some pinyon and juniper. King estimated that the woodland supported a "commercial stand of 30,000 cords" averaging three cords per acre. He also noted, "A large part of the area was cut over a number of years ago to supply the mines at Washington and Duquesne. At the same time practically all of the saw timber was cut" (King 1915:27).

This region and the Harshaw area to the north supported the largest population in the study area.

"There is considerable settlement on the area principally in connection with the mines," King (1915:27) observed. "The towns of Washington and Duquesne were formerly fair-sized mining towns but at present have only about 100 people in each. The mines are now operated on a very small scale, but there seems to be a very strong probability that operations will assume larger proportions in the near future."

Because of those mines, intensive woodcutting had been carried out in the past, and King feared that demand for wood would increase in the future. "Without supervision of cutting, denudation will follow and the slopes will suffer from erosion," he warned (1915:27). "Floods will follow, which will do immense damage to the agricultural interests below. Under proper supervision, the present cover can be increased—just as it has increased in the past few years—and present conditions of both surface and sub-surface stream flow bettered. The classified land is unquestionably nonlistable."

Townships 23 and 24 S, Range 18 E

This unit bordered the eastern boundary of the San Rafael de la Zanja grant from the Canelo Hills in the northeast to the international boundary. The area was dissected by "numerous draws and canyons which vary in depth from a few feet to about 250 feet and flow southwest. The result is a series of long, narrow mesas, separated by canyons" (King 1915:28). National Forest boundaries enclosed 33,096 acres of land, 2,129.24 acres of which were already alienated—60 acres by regular homestead entry, 2,049.24 acres by forest homestead entry. Of the remaining 30,966.76 acres of National Forest land, King classified 10,365.57 acres as nonlistable woodland with a commercial stand of 60,000 cords. He classified 2,455 acres as intensive, and recommended that 18,246.19 acres be eliminated, including the 2,129.24 acres of previously alienated land. King argued that the woodland should be nonlistable not only because of its commercial value but also because it regulated runoff into the Santa Cruz.

Townships 23 and 24 S, Range 19 E

This unit encompassed the southeastern portion of the study area. The unit contained 34,040 acres within National Forest boundaries, 2,435.28 of which were already alienated: 144.61 acres of patented mining claims and 2,290.67 acres of forest homestead land. Regarding the 31,604.72 acres of National For-

est land, King classified 15,693.83 acres as nonlistable because 450 acres were timberland and 15,077.83 acres were woodland with a commercial stand of 45,000 cords. The remaining 166 acres were grassland. The Huachuca Mountains dominated the northeastern portion of this unit, with the Canelo Hills cutting across the northwestern part. Ridges of the Huachucas and the disconnected ridge of Lone Mountain stretched across the unit. King (1915:29) described the northern portion of the unit as "very broken and rough, with no land suitable for agriculture."

The southern portion, on the other hand, contained "a series of flat mesas, varying in width from a few yards to two miles and separated by the canyons. They are perfectly flat on top and have a good soil. They make up about 50 percent of the total area" (King 1915:29). These mesas included Campini Mesa. Many of the drainages themselves such as Bear Creek, Joaquin Creek, School Canyon, and Sunnyside Canyon, widened into relatively large valleys in places. They had been settled by ranchers and farmers like Chapman, Hand, Bercich, and Kellogg since the 1880s and 1890s. King estimated that precipitation there ranged from 16 to 18 inches based upon weather records at Canille and Fort Huachuca, and concluded that the "growing season is long enough to mature ordinary crops."

"It has been demonstrated that good crops can be raised on the bottom lands of this section, but no serious attempt has yet been made to farm the mesa type of land," King (1915:29) observed. "It is very probable, however, that moderate yields of grain hay, sorghum and corn can be obtained. The land is at least possibly agricultural and this together with a total lack of Forest value has resulted in the recommendation for elimination." King argued that 14,960.89 acres—47 percent of the total National Forest land within the unit—should be eliminated and returned to the public domain.

Township 22 S, Range 20 E Township 23 S and Ranges 20 and 21 E

About half of this unit falls within the study area, including the western half of the Huachuca Mountains. The unit contained 25,231.69 acres within National Forest boundaries, 3,417.19 acres of which had already been alienated: 1,000 acres of homestead and script land, 727.19 acres of patented mining claims, and 1,690 acres of forest homestead land. Of the remaining 21,814.5 acres of National Forest land, King classified 19,615.5 acres as nonlistable. That non-

Notable land included 4,467 acres of timberland, with a commercial stand of 10,000 M.ft.B.M., 15,068.5 acres of woodland with a commercial stand of 4,500 cords, and 80 acres of grassland. King left 1,000 acres for intensive classification and recommended that only 1,129 acres be eliminated. King (1915:30) noted that the area extensively classified is not cultivable and with the exception of some of the canyon bottoms, without agricultural characteristics. In these bottoms the soil is favorable but after the stream channel and roads are deducted, insufficient area remains for practical farm use. ... Quite recently it has been demonstrated that Persian walnuts can be grafted on the native black walnut, narrow fringes of which occur in all of the canyons. Once grafted, such trees produce high returns, but the native trees occur only as scattered growth, seldom more than 50 feet from the stream and on land that is otherwise entirely non-agricultural." He recommended that special use permits be granted to allow grafting, but the walnut-bearing lands should remain nonlistable.

King (1915:30) concluded:

The value of the timberland is unquestionably greater than the agricultural value of the land. The woodland, because of the scarcity of fuel and post material in the vicinity, has a very high value, at present higher than the timberland. Because of the elevation of the Huachucas they receive much more precipitation than is the average. For this reason the watershed value of the area is higher than other portions of the Forest area. All water that leaves the unit is used for irrigation and the wells of the lower valley are dependent for their permanency on the underground flow that comes from these mountains. The area is the only recreation ground within a large radius and is yearly patronized by residents of Tombstone, Bisbee, Douglas, Naco, etc. The value for this purpose alone is sufficient to retain it in public hands.

Township 24 S, Ranges 20 and 21 E

About one-third of this unit lies within the study area, while another one-third falls within the Coronado National Memorial. The unit contained 7,600 acres within National Forest boundaries, 2,64 acres of which had already been alienated: 1,64 acres of patented mining claims and 480 acres of forest homestead land. King classified 8,620.34

acres of the remaining 17,037.36 acres of National Forest land as nonlistable—all of it woodland with a commercial stand of 16,840 acres. He left 6,737 acres for intensive classification and recommended that 1,680 acres (9.9 percent of the total) be eliminated.

Concerning agriculture, King (1915:31) noted, "By means of irrigation from a spring, fruit and crops have been raised on a few acres at what is known as the '80' Ranch." He probably referred to the Eighty Spring northwest of Montezuma Pass. He continues by observing, "Moderate success has also been had on the homesteads in the southeastern corner, but as stated by Mr. Westover in his report, no attempt has yet been made to cultivate the character of land found in the southwestern portion of the unit."

That southwestern portion is within the study area. He concludes by stating, "The wood value of the area is higher than is at first apparent. The part on the west side of the Huachucas is at present shut off from market by Mexican troubles because it is necessary to transport it through Mexico to reach a market" (King 1915:31).

As noted earlier, King recommended that 90,691.19 acres (14 percent) be eliminated from Coronado National Forest within the four divisions of Tumacacori, Santa Rita, Whetstone, and Huachuca. Within those divisions, he blocked out eight major areas of elimination, designating them A through I. Only two of those blocks—D and E—fell within the study area, yet they were the two largest. Together, they would have removed 47,689.56 acres from the Huachuca Division, including 6,165.6 acres of school land and 8,382.69 acres of already alienated land.

Area D was a strip of land—in most areas two sections deep—along the northeastern, northern, and western boundaries of the San Rafael de la Zanja land grant. In King's (1915) words: "The western portion of Unit D is the lower, eastern slope of the Patagonia Mountains. It is a large bench gradually sloping to the east but cut by numerous canyons. A few sharp ridges extend into it. The canyons are usually narrow at their upper ends but flatten out toward the east. The intervening ridges are flat-topped and in many cases are really mesas, either level or slightly rolling. A large percentage is suitable to agriculture. The part of Unit D lying north of the Grant is very similar except that the slope is from the Canelo Hills and the country is more nearly level barring the extreme northern and northeastern edge of the proposed elimination."

Area E was a large tract of land along the international boundary east of the land grant. According to

King, "Unit E has the appearance of an original slightly inclined plane which as been dissected by draws from 50 to 200 feet deep flowing in a southerly direction. At the upper end the draws are diversified and the ridges narrow and sharp. Toward the south the drainage is more concentrated, the draws flatter and the ridges take the form of broad mesas. Both the draw bottoms and the mesas are arable."

King provided a legal description of both units as well, stating: "They are made up of Sections 27, 28, 29, 30, 31, 32, 33, 34, 35, and 36 of Township 22 S., Range 17 E. (surveyed); Section 31 of Township 22 S., Range 18 E., (surveyed); all the Forest portion of Township 23 S., Range 17 E. (surveyed); all the Forest portion of Township 24 S., Range 17 E. (surveyed); all of Township 24 S., Range 18 E. (surveyed); all of Township 24 S., Range 19 R., (unsurveyed); Secs. 6, 7, 18, 25, 26, 27, 28, 29, 32, 33, 34, 35, and 36 of Township 23 S., Range 18 E., (unsurveyed); and Secs. 28, 29, 30, 31, 32, and 33, Township 23 S., Range 19 E. (unsurveyed)."

King justified elimination by arguing that the value of the agricultural land was greater than the value of the woodland occurring on the two units. In a burst of optimism later years would crush, he also stated, "The principal industry is cattle grazing, although dry farming is coming into prominence and in the future will undoubtedly succeed grazing as the principal industry. The procedure will be to raise fodder to feed range stock part of the year. The active operation of adjacent mining camps, which seems imminent, will increase the incentive for farming as a local market will be created."

Regarding public sentiment, King contended, "The present sentiment toward the national Forest is very favorable and it is quite certain that stock users of the areas would protest this elimination. The farming element is more indifferent and would, in general, probably favor elimination."

In the final analysis, however, King recommended elimination for bureaucratic reasons. He admitted that elimination would reduce revenue from grazing fees and make the administration of grazing more difficult. Nonetheless, "continuous listings of farm units at great expense will eventually cut the area to a point where it will not be a desirable stock range and which will be harder to administrate." Moreover, the cost of "piece-meal listings under the Act of June 11, 1906 [allowing farm homesteads] and the subsequent entry survey of the agricultural land will be much greater than the value of the remaining Forest land."

King evidently believed that the wave of the fu-

ture in southeastern Arizona was dry farming, not ranching. His recommendations were based on that belief and designed to save the Forest Service time, effort, and expense as the transition took place.

In a Memorandum dated April 11, 1916, Assistant District Forester Frank Rook generally concurred with King's assessment. He noted that former Supervisor Bronson opposed the elimination of Units A, D, and H because it would "work a great hardship" on many of the forest users. He mentions a survey taken by Ranger Rogers of 36 such users on Units D and E. "Of the 26 names on the list, 6 favor the elimination, 11 oppose it, and 3 have previously expressed their views in writing. The balance, 16, have no real interest in the matter and could not be affected," Rogers reported. The major objection to elimination concerned water places on the land. Rook believed that the watering places could be withdrawn in some fashion to preserve access to them.

"As to the argument that we are under moral obligation to the settlers, I believe, after reading all the data submitted by the Supervisor, that the interests involved are small; that the damage to individuals would be comparatively light," Rook continued, "and even if it were admitted that theoretically we owed something to these settlers, as a matter of practical application, so little damage would be done that we should proceed with our plans."

Rook's only reservation was King's classification of the land. "Much of the land with agricultural soil, I personally believe to be without agricultural value, particularly the mesa lands," he argued, "but classification officer King is inclined to believe that we will have difficulty in supporting a non-agricultural classification with the data we can collect in the next year or so and of the two methods, wholesale or piecemeal elimination, I favor the former." He concluded with a classic bureaucratic statement: "Obviously, if we are ever to turn this land loose, it should be done now for each added year piles up the agencies that hamper us when it comes to boundary changes. Personally, I would hate to feel that we must forever think of that open, or very lightly wooded land along the Mexican boundary and draining into Mexico (true, the stream swings back into Arizona again) as part of our Forest area."

1919 INTENSIVE LAND CLASSIFICATION OF THE HUACHUCA DIVISION

Apparently, the Forest Service decided that King's proposals for elimination were far too ambitious. Four years later, when King wrote his "Intensive

and Classification, Huachuca Division, Coronado National Forest, Arizona," he noted, "Since the boundary study resulted in recommendations for retaining all of the area the land [proposed for elimination] has been treated the same as that which was held for intensive classification and no distinction is made between the two in this report. Of the total of 98,322.92 acres left for further examination by the extensive report 1,404.72 acres have been listed since the compilation of that report which brings the net acreage, here classified, down to 96,717.30 acres" (King 1919a:3).

King somewhat justified his earlier recommendations by stating, "At the time the extensive report was made there had been no comprehensive study of classification factors and there were very few available data on soils, soil moisture, crop production, etc., so that large areas were left in order to include all possibly agricultural land. We are now in possession of data that quite plainly show that certain grades of land are non listable and these grades include such a large percentage of the land left for further examination that there is no need for close detailed mapping of the whole area. The methods followed in the work are therefore semi-extensive."

King carried out the fieldwork for the intensive classification in July 1917 and June and July 1918. He broke the Huachuca Division into four "natural units" based upon drainage and topography: (1) the San Rafael Unit, the northern slopes of the Canelo Hills draining into the Babocómari; (2) the East Huachuca Unit, draining into the San Pedro; (3) the West Patagonia Unit, the western slopes of the Patagonias draining into the middle Santa Cruz; and (4) the San Rafael Unit, which contained the study area. Concerning settlement on the San Rafael Unit, he wrote:

The San Rafael Grant in the San Rafael Unit, has been kept intact and is used as a stock farm. To the north and south of it the land is held in homestead units which, when taken with the Forest homesteads shown on the maps, forms a settlement of considerable extent. The mining camps at Duquesne, Washington, Mowry, and Harshaw are small and fluctuating because the mines are only worked intermittently. At present there are probably 700 people in all of them. The portion of the unit lying east of the Grant has scattered homesteads over the greater portion of it and in places they fall into small groups. There are in addition scattered homesteads on the intervening portions of the Forest that were extensively

classified. From this it can be seen that although there are no towns, if the above mentioned mining towns are excepted, on the project area it is thickly enough populated to allow community life. The exceptions are the West Patagonia Unit that contains nonlistable land and the eastern end of the San Rafael Unit that will be taken up later. (King 1919a:2)

King (1919a:4) then discussed the division's climate, emphasizing the annual and seasonal uncertainty of the rainfall:

The entire project has long hot summers and comparatively mild winters. Snow occasionally falls on the higher portions but does not remain long. The summers, although hot, do not have temperatures high enough to interfere with living conditions, or ordinary systems of cropping, although they do greatly increase evaporation and make it more difficult to conserve soil moisture. Temperature records are not given since they have slight bearing except that they are favorable for the production of ordinary farm crops. Frosts are delayed in the fall so that the growing season is considerably extended and crops planted at the beginning of the summer rainy season have a chance to mature. Under this system, however, rains in September are important in order to mature the crop and the weather records show that such rains are by no means certain—in fact they are quite problematical. The most critical season for farming is the pre-summer drought during April, May and June. With good rains in June very good crops can be produced and they sometimes occur but they cannot be depended on nor can they be forecasted and crops planted on the supposition that there will be plenty of moisture in June are nearly a total loss if it does not come.

It is impossible to set any figure of precipitation above which farming can be successful and below which it will fail because of the variation of soil, both as to fertility and water holding capacity, the distribution of the rainfall, presence or lack of floodwaters, and methods of treatment of the soil. Nevertheless the rainfall is the limiting factor in agriculture here. [See Appendix 8.2 for climatological data concerning study area.]

King briefly reviewed the types of soils in the Division, which were largely determined by topogra-

phy and slope. He observed that even though the area was one of the first to be settled in the United States—an apparent reference to Spanish colonization—very little agriculture was carried out until “about 50 years ago when some of the land along Sonoita Creek came under cultivation. For a long time after this agriculture on the Huachuca Division was limited to small tracts in connection with stock raising and mining” (King 1919a:5). But then the dry farming boom began. In King’s words, “Quite recently the demand for land became large as a result of the wholesale advertisement of dry farming possibilities in southern Arizona. This demand reached its height several years ago and is now receding since the unfavorable results of the 4 or 5 year trial of dry farming are becoming generally known.”

According to King, farmers in the Huachuca Division tried the bottomlands first, and then tried to bring the lower slopes, first benches, and mesa lands under cultivation. Concerning irrigation, he wrote:

Except for a few garden patches there is no irrigated land on the project area. There are no year long streams and no springs large enough to offer irrigation possibilities. The only chance for future irrigation lies in pumping and storage of floodwaters. In the former there are but few localities where it is known that the watertable is near enough the (sic) surface to make it feasible, and these are all alienated now. Pumping is an expensive proposition at the best and where the water is at any considerable depth it is not profitable to carry on extensive farming. With the distance from market of this land it would undoubtedly not pay. Such irrigable values are therefore not considered. The storage of floodwaters appears to be more feasible but the construction of dams, etc. would be very expensive—more so than one or two units could stand and there are no sites available for large irrigation projects, particularly since the canyons are numerous, with small watersheds, and the precipitation is low. Storage possibilities are also not considered as feasible under present conditions.

King went on to say that the most successful farming took place on the canyon bottoms of the Canille Unit, where high water tables “sub-irrigated” the fields to some extent. “On the bottom lands which have no sub-irrigation, crops vary in different localities and with years and methods of cultivation to such an extent that average figures which mean anything

are impossible,” King observed, “but the experience has been that where good methods are used profitable crops are raised during average years and total failures are seldom experienced.”

Mesa lands were a different story. “Very little of the mesa land has been cultivated, but what has been shows a considerable difference between it and the bottomland,” King noted. “The results have not been conclusive and it may be that the best mesa land is productive enough to insure a living from farming but the present data rather points in the other direction; that in the long run none of the mesa land can be made to produce enough under the conditions of market to pay a fair rate of interest on the investment.”

Corn, sorghum, and beans were grown on ninety percent of the land under cultivation. The rest was devoted to grain and grain hay, peanuts, potatoes and other crops. Commenting on the psychology of dry farming, King (1919a:6) stated, “During the seasons of high precipitation, which come at intervals crops can be raised on even the poorer grades of land and it frequently happens that in the light of these yields the years of failure are forgotten. It must be remembered that the precipitation fluctuates and these good years make up but a relatively small percent of the total.” The principal export crop—“practically the only one”—was beans. The amount of beans produced in the Southwest exceeded local demand, so much of the crop was exported to the east.

Forage crops, on the other hand, were locally consumed, especially by troops stationed along the border (during the Mexican Revolution). King believed that the cost of hauling hay to Nogales and other railroad points was too high to make it very profitable. “The prospects for a future market if all of the present listed units are brought to maximum production is not good,” King concluded. “The purely local market will be more than supplied and the semi-local, e.g., surrounding towns cannot offer many possibilities for this land since they all have surrounding agricultural land and many are purely agricultural settlements. The general market must then be relied on, which will necessitate the production of certain crops and in particular those which can be easily handled. The natural and probable outlet will be a combination farming and stock growing system which will utilize the surrounding range.” In other words, stock raising supplemented by fodder production, not dry farming, was the future of the San Rafael Valley.

King then got down to the nitty-gritty. Of the 98,322.02 acres recommended for elimination or in-

tensive classification in his 1915 report, 1,604.72 acres had been listed, leaving 96,717.30 acres to be covered by his 1919a report. King quickly classified 92,043.61 acres—a whopping 95 percent—as unlistable because 66,152.73 acres were woodland and 5,890.88 acres were grassland. He considered the remaining 14,673.69 acres unlistable as well, classifying it as “non-segregated” grassland interspersed with woodland. King (1919a:7) stated, “The cordwood value of the woodland is large because it (except for the woodland on other Divisions of the Coronado) is the only wood and post supply in the southern part of the State. The demand during the last 5 years has been heavy because of the needs of the large number of troops stationed along the Border. From now on it is to be expected that it will be smaller but there will always be a steady small demand. At present only the dead wood is allowed to be removed.”

Concerning the homesteads in the Division, King (1919a:7) claimed that “about 82 percent are used for agriculture, although the degree of use varies from very slight in connection with stock growing to the sole means of livelihood for a family. Of the 18 percent that are not used for agriculture 11 [percent] are abandoned or were never filed on and 7 percent are used solely as stock headquarters. At least 50 percent give evidence of being permanently occupied and bona fide, an unusually high percentage in dry farming localities.” He concluded that the primary value of the National Forest land was watershed protection for the surrounding valleys, especially the Santa Cruz and San Pedro.

INTENSIVE LAND CLASSIFICATION: SAN RAFAEL UNIT

The bulk of King’s report consisted of detailed discussions of each of the four units in the Huachuca Division accompanied by maps showing tracts of potentially arable land. The study area falls within the San Rafael Unit. According to King (1919b:1):

As can be seen on the maps the greater portion of settlement and cultivation falls closely around the grant. This is not on account of community features attached to the Grant because it is held as a grazing unit, and is fenced, but because of the higher percentage of bottomland and better soil nearer the Santa Cruz River. This settlement falls into two divisions. That north of the Grant taken with the several sections out-

side the Forest—practically all of which has been taken up in homesteads, has community features, including a school and post office; that in T. 24 S., R. 17 E. when taken with the headquarters of the San Rafael Ranch, which is just south of the Grant, and the other ranches here outside the Forest, forms another community. The towns (shown on the map) of Duquesne, Washington, Mowry and Harshaw are small mining camps whose population fluctuates a great deal. In the past there have been long periods when the properties were not worked and the population sank to almost nothing, although at present there are about 700 people in all of them. They furnish an excellent small market for vegetables, fruit etc. and some forage, but because of the use of motor trucks, the latter is limited. Settlement is also quite thick in the western portion of T. 24 S., R. 18 E., enough so as to give community advantages, including a post office (Parker Canyon) and a school.

King also commented on transportation networks: “The entire Unit is well furnished with roads which, because of the topography and character of the soil, are easily traveled. The main outlet at present is Patagonia, down Harshaw Canyon, although most of the output of the mines is put on the train at Santa Cruz in Mexico south of Lochiel. The road over the Patagonia Mountains between Washington and Nogales is steep and in poor conditions [sic], so that it is not traveled a great deal. The one from the Unit to Canille through Canelo Pass is in good condition and used a great deal, but mostly for passenger traffic.”

King noted that almost all land being farmed in the Unit was bottomland. He also pointed out that even though it was Forest Service policy to “list bottomlands without question, . . . there are none left in tracts of farm unit and shape. . . .

“There are farms on the unit which are making good livings for the owners, and some of these, with the aid of more or less stock are good paying propositions,” King (1919b:2) observed, “but the majority of them are producing a bare living as far as farming goes. Stock raising is the largest interest of the country and it is so closely interwoven with farming that it is hard to separate them. In all cases where a living is being made from farming alone the land is bottomland of the first grade.”

King listed bottomland crops as “corn, sorghums, beans, grain hay, potatoes, peanuts, garden veg-

etables (the last named, however, are seldom successful without some irrigation). No yield figures are given because they have varied so much on different places and from year to year, that no averages are possible. The soil and climate are best adapted to corn, sorghums and beans."

Later on the page, King stated, "With the fact quite plain that general cultivation on the bottomlands results on the whole in very low grade livings the results of cultivation on land several degrees poorer is, therefore, very doubtful." Regarding those lands, King (1919:2-3) wrote:

There has never been a real trial of mesa land. During the past 2 seasons there have been a few examples on the best of the mesas but it has not been sufficient to finally judge the land and has been far from conclusive that the land is productive enough to maintain a living of ordinary grade. Some of the attempts have resulted in failures and in one or two cases fair crops have been raised. The seasons, however, have been above normal. The mode of living on the majority of the claims already initiated on all classes of land is of a low order and does not give an idea of permanency which casts a serious doubt over the poorer mesa land without the detailed consideration of the drawbacks of farming it. . . .

The weight of opinion of the farmers of the vicinity and others who are familiar with the land and conditions is that the mesas cannot be farmed profitably. The only claimants that they are listable are those who desire to secure listings for themselves, or a few who, living near bodies of this land, desire to have neighbors to increase community features and enhance the value of their own places.

King stated that most of the homesteads in the eastern part of the unit were stock headquarters, not working farms. He noted that the "commercial value of the cordwood was comparatively low" because of the openness of the unit and advised that "great care should be exercised in its removal" in order to protect vegetative cover. King concluded his general discussion of the unit by emphasizing watershed protection. "Certainly we should not list land here unless we are reasonably certain that it will be handled properly and not be abandoned after destruction of the present cover and allowed to erode," he argued. He went on to say: "With proper improvement of the watersheds it is not improbable that permanent

flow could be established in some of the water courses, the advantages of which would be apparent. It would be a step in the direction of permanent flow in the Santa Cruz and San Pedro and be of even more value locally. Irrigation could be practiced and even though the streams did not run the year long any equalization would render storage reservoirs in the canyons feasible with the same general results. Water for stock is at present very scarce and hard to develop and regulation of stream flow will benefit this, the ideal of course being many running streams."

Finally, King issued a warning about alienation and overgrazing. "The entire Unit has a high value for stock production because of the good forage and mild climate," he said. "If wholly or in large part outside of the Forest it would make the regulation and control of the remainder of the Division very much more difficult as was brought out in the general report and would prove disastrous to the cover because from its location and desirability it would unquestionably be destructively over grazed" (King 1919b:4).

The final part of King's report consisted of descriptions of 45 individual tracts of potentially arable land. Nearly all the tracts were too small, too rocky, or too irregularly shaped to be listed. King noted that Tract No. 35 on Campini Mesa might be listable in the future but that the Forest Service needed to wait and see how existing homesteads on the mesa produced. "The listings have only recently been filed on except that on No. 449 and on that cultivation has not been carried on long enough to arrive at any definite conclusion," King (1919b:7) stated. "One fair crop was raised in 1917 in a favorable year. Other indications are against a listable classification. In a few seasons the present listings should give a basis for final conclusions and if at that time the land appears agricultural its status can be changed. The listing of the entire mesa now in the face of the very low agricultural value could only result in misuse of the land."

DRY FARMING IN THE SAN RAFAEL VALLEY

As King's reports note, many settlers caught the dry farming fever sweeping the western United States during the first two decades of the 20th century. According to General Land Office Records of the BLM, 331 homesteads were filed in the study area (Fig. 20). Date of filing ranged from 1906 to 1931, but the vast majority of the homesteads were filed upon between 1908 and 1920 (Fig. 21). Approximately 21

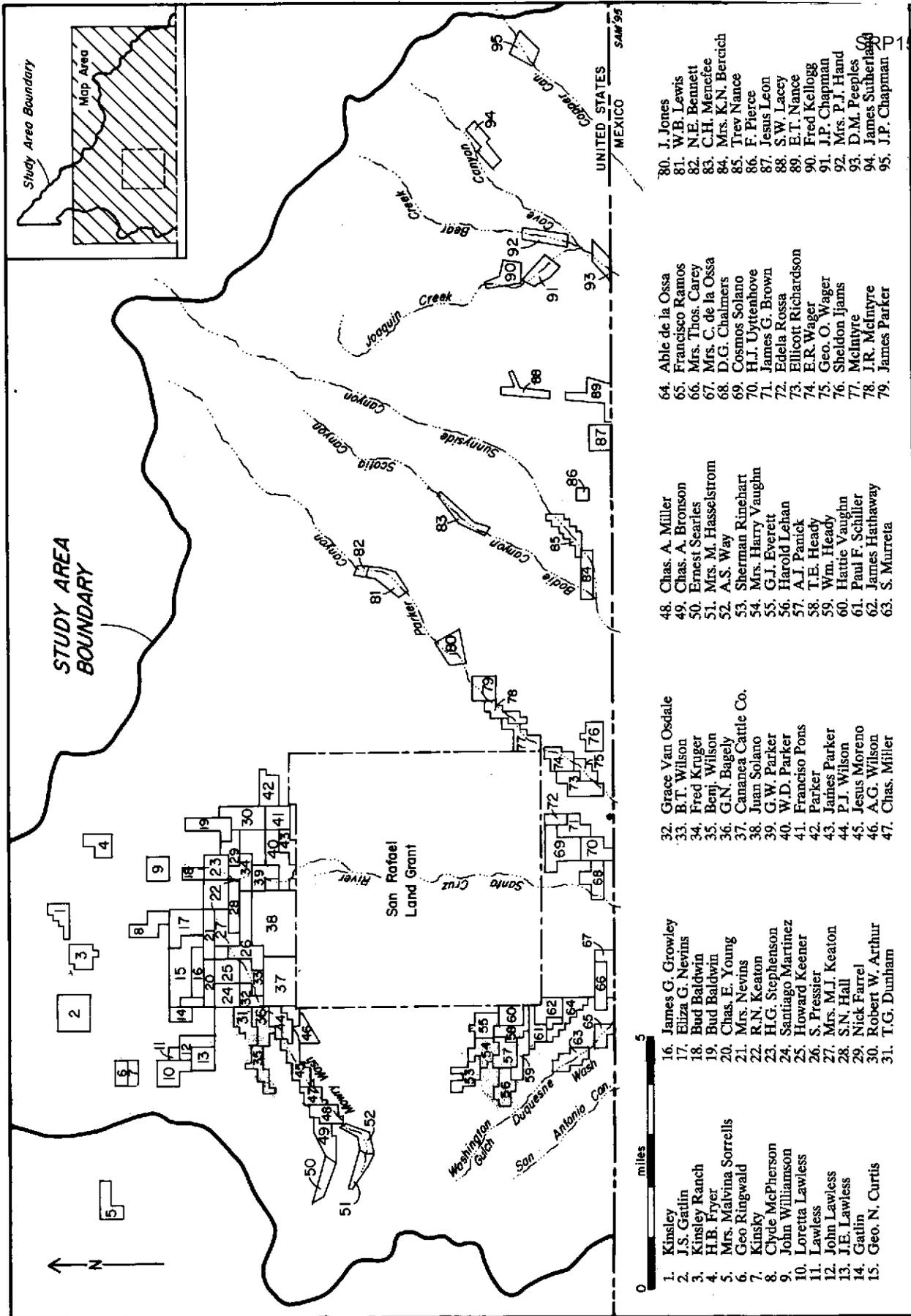


Figure 20—Homesteads in the study area.

percent (70) of those filings were relinquished or canceled. Many others passed out of the hands of the original homesteaders or their heirs as the dry farming experiment collapsed and ranches were consolidated (see Chapter 7). Nonetheless, homesteading was a major impetus to settlement in the San Rafael Valley during the first two decades of the 20th century.

The homesteads were not distributed randomly across the study area. On the contrary, the zone of most intense settlement was west, north, and south of the San Rafael de la Zanja land grant. The homesteads clustered along the Santa Cruz River or its western tributaries draining the Patagonia Mountains, particularly Mowry Wash, Adams Canyon, and the area surrounding the community of Lochiel (T23S R17E: 104 homesteads; and T24S R17E: 80 homesteads).

The second major zone of concentration was the southeastern sector of the study area, where numerous settlers homesteaded along watersheds draining the southwestern slopes of the Huachuca Mountains (T23S R18E: 16 homesteads; T24S R18E: 24 homesteads; T23S R19E: 23 homesteads; T24S R19E: 41

homesteads). Those watersheds included Parker Canyon, Bodie Canyon, Sunnyside Canyon, School Canyon, Joaquin Creek, and Bear Creek. There is little or no agriculture in the two zones today.

Until the droughts and depression of the 1930s, however, settlers practiced a limited amount of both dry and irrigated agriculture, producing corn, fodder crops, fruit, vegetables, and pinto beans. Almost all their produce was sold locally to neighboring ranchers or residents of the mining communities. No one attempted large-scale commercial agriculture in the San Rafael Valley, even during the dry farming boom. (See Appendix 8.2 for temperature and precipitation records.)

Dry farmers included a man named Howard Keener, who did a lot of farming and sold corn to the San Rafael (Ashburn 1994). Francisco Pons did some farming on his homestead on the northern border of the land grant. Nicolas Yourgules, a native of Greece who had married Josefa Martínez in Cananea, settled in Harshaw where he was in the vegetable and freighting business. He later moved to the San Rafael Valley where he dry farmed on a contract basis, selling all the grain he produced to the San Rafael and the Heady-Ashburn ranches (Yourgules 1994; Hathaway n.d.). During the 1920s and 1930s, at least four individuals had farms on Mowry Creek. The farmers used land owned by Harry Steen, the customs inspector from Lochiel who owned the ranch presently known as the Santo Niño Ranch. The farmers included Antonio Ochoa, Clemente Ozora, Juan Telles, and Rafael Velarde (Granillo 1994).

The Heady-Ashburn ranch is made up of several homesteads in addition to the William and Tom Heady homesteads. (See Fig. 22 of Tom Heady's house, constructed by his father William Heady.) Paul Schiller had a little ranch in the San Rafael Valley, which later became part of the Heady Ashburn ranch. Schiller, who came from a German farm family background and had immigrated to Arizona from Kansas in 1904 for his health, was first employed at the Greene ranch to do odd jobs at a rate of \$30 a month and board. After he recovered his health, he homesteaded a small farm and made a living by selling produce, eggs, poultry, rabbits, kid goats, and squabs to his neighbors. Schiller made deliveries by wagon and had set delivery routes to Patagonia and to different parts of the valley (Hathaway n.d.:319). In 1927, Sunnyside had several small agricultural plots in addition to a large orchard. The surveyors noted that the lands being farmed had good black, sandy loam

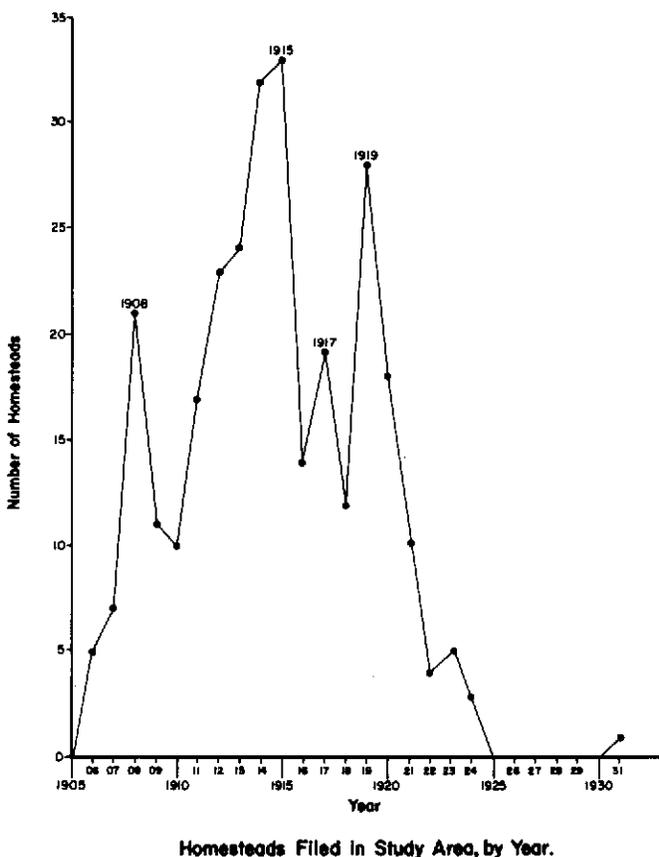


Figure 21—Homesteads filed in study area by year.

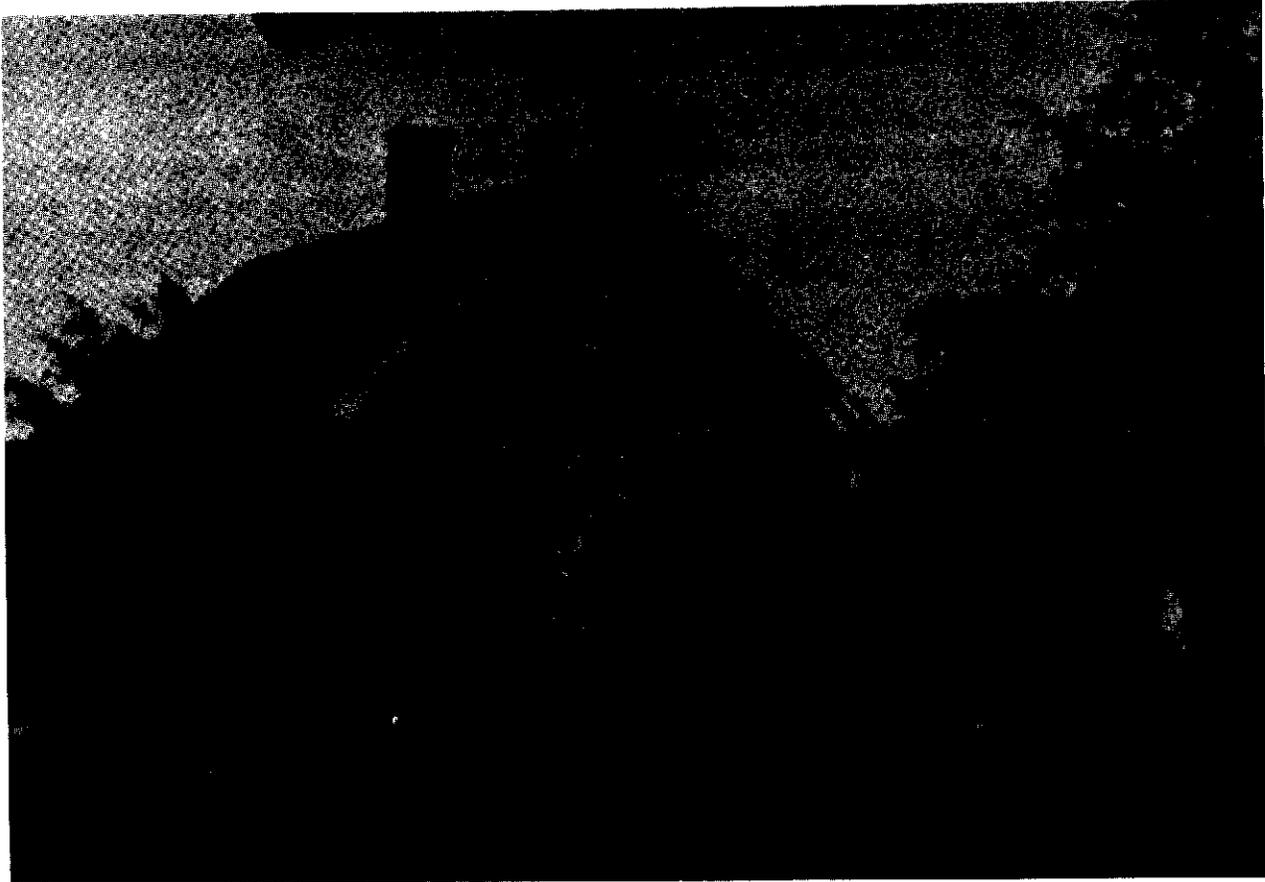


Figure 22—Tom Heady's house, constructed by William Heady on Tom Heady's homestead (later Heady-Ashburn ranch), circa 1905–1907. (Courtesy of Helen Ashburn.)

soil (Book 2826). The Bercich family had a large irrigated orchard with 400 fruit trees at their ranch. They also dry farmed between 40 and 60 acres of beans, corn, and forage crops. They planted the orchard prior to 1900 and sold fruit from it to people throughout the valley and from as far away as Santa Cruz (Bercich 1995).

As Chapter 7 notes, most of the private land alienated in the 20th century were forest homesteads. Walter Turley and C. A. Long were the U.S. Forest Service surveyors during most of the years between 1910 and 1918. When applications for a forest homestead were received, Turley, Long, or another forest surveyor surveyed the land. None of the surveys were done by the Arizona Surveyor General's office. A few samples of those homestead surveys convey the scale of agriculture within the study area.

In 1915, John Hand's homestead on Bear Creek at the foot of the Huachuca Mountains, one mile from the boundary of the military reservation (now part of Lone Mountain Ranch), had 20 acres under culti-

vation (Homestead Survey #302). In 1917, when his homestead was surveyed, Richard Farrell had 23 acres under cultivation in Sections 1 and 2 (T23S R16E) surrounded by two miles of wire fence (Homestead Survey #306). His farm, located on the Harshaw road only nine miles from the railroad, was conveniently located for transporting produce to market. R.R. Everhart of Mowry requested a survey of his farm in 1911, but it was not completed until 1915. Everhart was farming an unspecified amount of land along the floodplain in Mowry Wash, and had produced "good crops of small grains" during the years preceding the survey (Homestead Survey #307). (See Fig. 23 of farmland on Mowry Wash, 1917.)

In 1915, Arthur G. Wilson farmed nine acres of corn, sorghum, beans, and small grains at his homestead three miles from the San Rafael post office (Sections 17 and 20 T23S, R17E) (Homestead Survey #309). Fred Miller of Mowry applied to have his homestead surveyed in 1911. In 1914 the 69 acres on San Rafael Creek (sections 19 and 24, T23S R16E) were

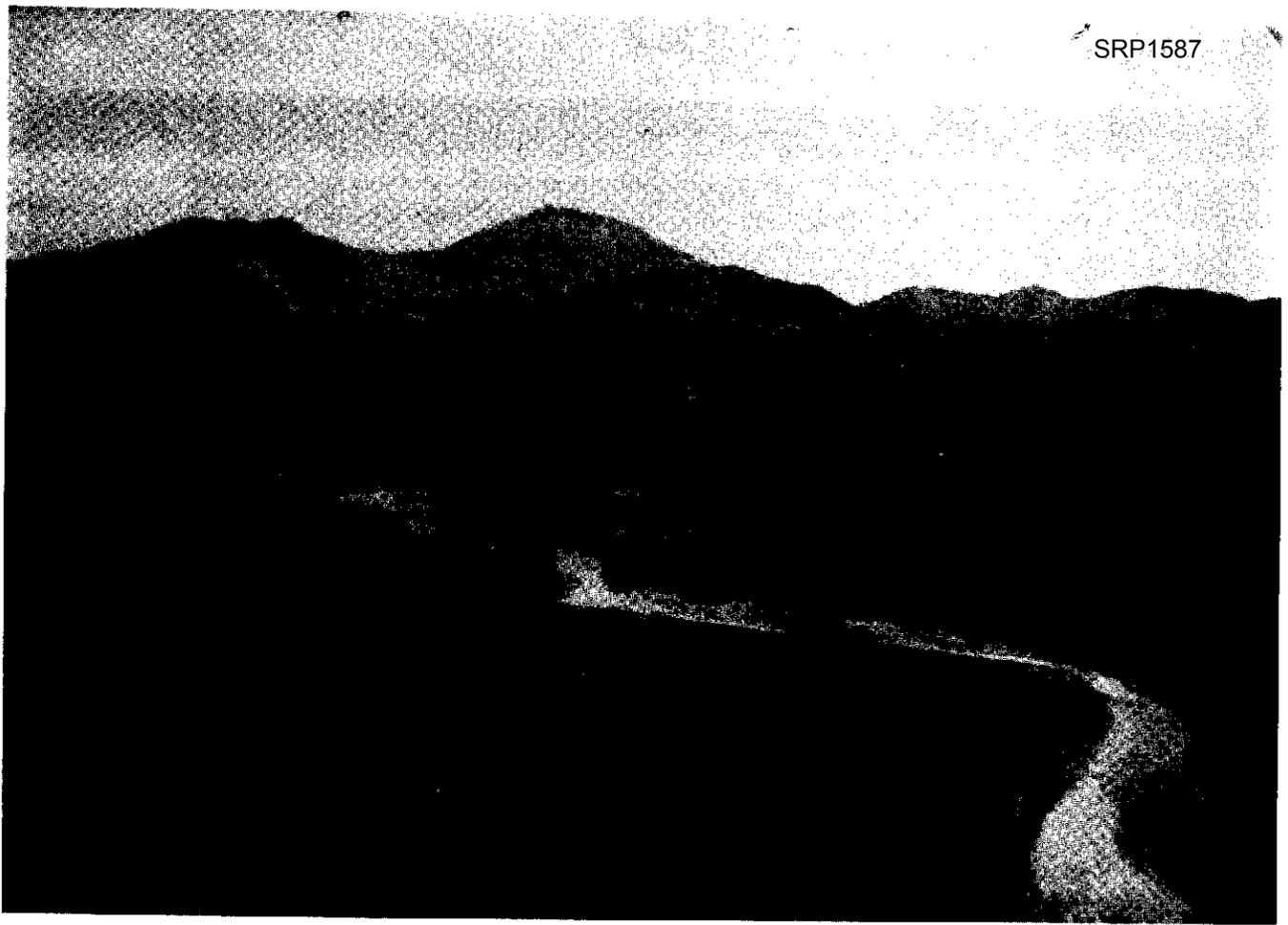


Figure 23—Farmland on Mowry Wash. 1917. U.S. Forest Service.

surveyed and his patent was granted. In addition, Miller had mining claims on the east slopes of the Patagonia Mountains. At the time of the survey he had five and a half acres under cultivation along the creek that ran a small stream of water. Miller had two wells, one 350 feet deep with a six inch casing and a windmill, the second 250 feet deep with a six inch casing (Homestead Survey #304).

In 1915, when Earnest Searles and R. R. Everhart of Mowry had their 112-acre homestead surveyed (Sections 22 and 23 T23S R16E), they were growing a "good crop of small grains" without irrigation on four acres of cultivated land. The homestead, which had an adobe building and a frame shed, had no source of water other than occasional flood waters of the nearby arroyo, from which water was hauled to the dwelling (Homestead Survey #307).

Most of the forest homestead surveys we reviewed noted that some improvements had been made. The majority of the houses were one or two room adobe, not larger than 20 x 40 feet, with several frame outbuildings. Nonetheless, agriculture often turned

out to be a passing phase in the land-use history of the homesteads themselves. Some settlers like Helen Wager Ellicott, who homesteaded in 1912 on widow's rights, dry farmed for a brief period, planting the number of acres (five) required to obtain a patent to the homestead. As soon as the deed had been issued, however, Mrs. Ellicott and other homesteaders found that stock raising was more profitable than dry farming, so they discontinued their planting (Ashburn 1994).

Many homesteaders entered the study area in 1915 and 1916. Former residents recall that many of these homesteaders had responded to advertisements that had been placed in newspapers in San Francisco and cities in the east. These ads announced that for a small fee, a locator would assist individuals who wished to find "free farmland" in Arizona. In other words, the promoter was a homestead real estate agent. According to Vera Parker Hopkins, George Parker's daughter, many of the people who responded were "city folks" who had no idea how to farm or to make a living in the country. The majority of them took up

land at the north end of the study area, near the Parker ranch. Their farming ventures were prompt failures and frequently the husbands left their wives and children on the homestead, "to make out however they could," while they went elsewhere to find jobs. Members of the Parker family blamed these dry farmers, who removed all the vegetative cover from the land, for the severe range deterioration that occurred during the drought of the early 1920s. The writers of the Parker manuscript recalled that during the Mexican revolution, while Pancho Villa was retreating into Sonora following his defeat at Agua Prieta, an alarm went throughout the San Rafael Val-

ley that Villa would cross the border. All of the homestead farmers, many of them women and children without a man in the house, gathered at the Parker Ranch and spent several sleepless nights waiting for Villa to leave the area (Parker ms.).

After the drought of the early 1930s, most dry farming ceased in the study area and many settlers were forced to sell their patented land. The consolidation into larger ranches began at this time, particularly at the north end of the valley. From then on, agriculture in the San Rafael Valley was a relatively minor activity and one that was clearly supplementary, and subsidiary, to stock raising.

Appendix 8.1

Homesteads and Miscellaneous Land Alienations

Table 1—T21S, R16E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S25, 26, 34-36		Withdrawn				Forest Proc. 11/6/1906
S36 all	206	School Indemnities	8/22/1940		IL Base	All 21S 22E
S25, 26, 34-36	Ar 020546		3/4/1959		Def. area PL 167	Posted 6/10/1964
S25, 26, 34-36	A 15687		6/15/1981	10056.46	OG Lease	Terminated 7/1985

Table 2—T21S, R17E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S1-12	PLC Pat. 31/2		5/16/1904		PLC	San Ignacio del Babocomari
Entire township	Proc. Wdl. Huac. For. Res.		11/6/1906			Changed by HNF Act 3/4/1907; name changed to Garces NF; EO 908 7/2/1908; New Bdy. Proc. 1023 4/21/1910; Part. Ellm. Proc. 1023 4/21/1910; Trfd. to Coronado NF Proc. 1121 4/17/1911
S1-12 (out of study area)		1023		4/21/1910		New Boundary for Garces NF
S29	012151	William Igo	9/15/1910	56		Relinquished 10/14/1914
S29	025887	William F. Nell	10/14/1914	56		Error—see 30/21S, 18E
S34 NE	PHX 027514		5/28/1915	155	HE	Amended, Relinquished 10/1/1917; contiguous, outside study area
S34 NE	PHX 041677		4/19/1919	135	HE	Relinquished 1/15/1920
S33						Restored 3/14/1920
S34						Restored 3/14/1920
S34 NE	925492	James A. Parker	12/4/1923	160	HE	
S32	074881	School Indemnities	4/9/1936	480		
S32 NW, SW	206	School indemnities	8/22/1940	480	IL Base	
S29-34	Ar 020546		3/5/1959		Def. area PL 167	Posted 6/10/1964; set completed 6/9/1964
S32, 33	A 14917		6/15/1981	2560	OG Lease	
S29-31, 34	A 14915		6/20/1981	2598.08		Terminated 7/1/1986

Table 3—T22S, R16 E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
lot 1	161	Rollin Richardson	2/3/1902	39.97	FX	Deeds to US 2/8/1938 Forest 12/30/1905
1-3, 11, 12		Withdrawn				
1-3, 11, 12		SO. Temp. Wdl. Huac. For. Res.		12/30/1905	All sections	SO. Temp. Wdl. Part. Wdl. Proc. 11/6/1906; changed to Huac. NF Act 3/4/1907; Part lost SO 2/19/ 1910
		Proc. Wdl. Huac. For. Res.	11/6/1906			Changed to HNF 3/4/1907; changed to Garces NF EO 908 7/2/1908; Part. Elim. Proc. 1023 4/21/1910; Trfd. to Coronado NF Proc. 1121 4/17/1911
11 NE	507212	Rollin Richardson	1/11/1916	40	FX	Deeds to US 2/8/1938
11 NE						
	507813	Rollin Richardson	1/13/1916	40 (S11) 40 (S3) 40 (S2)	FX	Deeds to US 2/8/1938 Pat. 3/23/1915
2	030775	Josie McPherson	4/29/1916	160		
2 NW	622663	Heirs of Julius Kunde	3/22/1918	160	HE	
1 NE						
lots 1, 2						
SW, SE;						
28, R17E	PHX 078440	Chiricahua Ranches Co.		2/8/1938	80 (S11) 80 (S3) 40 (S2)	FX deed to US
SW, SE	161	School Indemnities	4/19/1938	40	IL Base	Deficiency 15N 7W (T21S R16E)
3, 11, 12	Ar 020546		3/4/1959		Det. area PL 167	Posted 6/10/1964; def. comp. 6/9/1964
Pl. 1	3117		8/14/1964	39.14	IL Base	
	447		11/25/1968	29.39		
					80.70	80 IL Base
3, 11, 12	A 7465		10/26/1973	2056	Potassium permit	Partially relinquished 4/19/ 1976; closed 2/6/1991
3, 11, 12	A15788		6/15/1981	7898.18	OG Lease	Eff. 7/1/1981 - 7/1/1982

Table 4—T22S, R17E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S17 S33 SW,NW	S. Order		3/9/1908 5/25/1908	M&B, 17S 30E 240	SO Rev. FS SO Rev. FS	Date of action: 3/10/1919 EO 7/2/1908; Theodore Roosevelt changed names, date of action: 1/24/1914
S28	02134	Jesse Lee Gatlin	12/26/1908	160		Restored l1st 1789, 9/25/1908; Appl. J. L. Gatlin; F.C. 9/26/1912
S34 SE, NE	014819	Clyde McPherson	12/30/1911	160		F.C. 10/7/1912
S25 NW, SW	018352	Harry B. Fryer	6/29/1912	160		Pat. 612845 12/27/1917
S28	313829		2/8/1913	160	HE	
S34 SE, NE	397217	Charles McPherson	4/9/1914	160	HE	
S35 SE	026540	John W. Williamson	4/6/1915	160		Canceled 6/6/1921; F.C. 3/8/1923
S31 SE, NE	026573	George Ringwall	7/21/1915	160		F.C. 5/11/1920
S31 NE, SE	026568	Albert L. Kinsley	8/20/1915	160		F.C. 6/25/1919
S7	507813	Rollin Richardson	1/13/1916	197.19	FX	FX deeds to US 2/8/1938
S25 SW,NW	612845	Harry B. Fryer	12/29/1917	160	HE	
S17			3/10/1919			Withdrawn by section 3/10/1919
S32	042492	School indemnities	10/9/1919			
S32	042494	School indemnities	10/9/1919			
S31 SE, NE	721684	Albert L. Kinsley	11/28/1919	160	HE	
S18	048840	Daisell Mining and Milling Co.; Daisy Twin lodes	9/18/1920	0.5		
S31 NE						
S30 SE	774678	George Ringwald	9/24/1920	160	HE	
S32 NW	49	School indemnities	1/24/1922	80	IL Base	
S7	078440	Chiracahua Ranches Co.	3/20/1922	77		
S32 NW	55	School indemnities	3/22/1922	80	IL Base	
S35 SE	907587	John Williamson	5/25/1923	160	HE	
S33 NE, NW	073634	Alvin R. Weldon	8/30/1933			
S2	074671	School indemnities	4/16/1934	599		
S2		School indemnities	4/16/1934	40		
S36	075278	Indian school list	8/29/1934	640		
S7 SW	PHX 078440		2/8/1938	77.19	FX deed to US	Rejected 10/7/1935 Bargain and sale deed; Chiracahua Ranches Co.; exchange = value of timber
S2 all	193	School indemnities	10/28/1939	11,928.40	IL Base	
S16 all	206		8/22/1940	640	IL Base	
S36	Ar 020546		3/4/1959	480	Def. area PL 167	Posted 9/10/1964; Det. completed 6/9/1964
S36 all						
S32 NW,SW	466		6/2/1969	640	IL Base	6/3/1969
S30 - lots 1-4						
S19 - lots 1-4						
S18 - lots 1-4	A-7464			771.12	Potassium permit	Partially relinquished 4/19/1976; case closed 2/6/1991
S34, 36	A15636			10003.04		
	A15639			9589.85		
	A16090			200.00		
	A15637			2240.00		

Table 5—T22S, R18E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
§30-33	PHX 051860	Harry Demty	11/28/1921	2560	OG Per.	Canceled 5/25/1928
§29 all	PHX 051865	Grover Marsteller	11/18/1921		OG Per.	Canceled 12/1/1927
§19 all	PHX 051859	Joseph Weir	6/1/1922	2560	OG Per.	Canceled 10/6/1927
§32 all	206	School Indemnities	8/22/1940	640	IL Base	
§36 all	A16169		9/14/1981	9874.72	OG Lease	Effective 10/1/1981; Terminated 10/1/1985

Table 6—T22S, R19E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
§36		Babacomari grant	10/29/1881		Camp Huac. EO Wdl.	
§30-35			12/30/1905		SO Temp. Wdl. Huac. For.	Wdl. Proc. 11/6/1906
§31 M&B						
§32 M&B						
§33-35	4246	Executive order for Ft. Huachuca	6/5/1925		EO Wdl. Huac. Div. Coronado NF.	Amended EO 4278 7/31/ 1925
§34 M&B.						
§35 M&B	4278		6/5/1925		EO Amend. Huac. Div. Coronado NF; EO 424	Date of action 7/31/1925; Revoked 7/1/1929 EO 5757
§34 M&B.						
§35 M&B	5147		7/31/1925		EO Rev. Huac. Dist. of Coronado NF	Date of action 7/1/1929
§32		School indemnities	6/21/1934	640		
§32 all	214	School indemnities	3/3/1940	640	IL Base	School swap (all 8N 6W)
§31-35	Ar 030476		5/24/1961		FS area plan	Det. area plan; Det. completed 8/14/1968
§31-35	A 15478	Juana Maria Ramon	6/20/1981			Repeat allotment application; excluding military reservation

Table 7—T23S, R16E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
Lot 37	2002	Henry D. Bacon; Guajulote Mine	10/18/1876	10.33	ME	MC 10
Lot 37A, 37B (MS)	2837	APK Safford; John W. Hopkins; J.C. Handy; Thomas Gardener; R.N. Beatherwood; and J.D. Frye; French Mine and Mill site	5/11/1878	15.33	ME	MC 12
Lot 37 (MS)	2975	Edward Fish; Simon Silverberg; and D.A. Bennet; Enterprise Lode	9/6/1878	20.66	ME	MC 26; canceled 4/8/1880
Lot 37 (MS)	3884	Edward Fish; Simon Silverberg; and D.A. Bennet; Enterprise Lode	4/8/1880	20.66	ME	MC 26
Lot 38A	8635	D.S. Harshaw; John Long; and Michael Fagun; Alta Lode and Mill Site	1/10/1884	25.11	ME	MC 35
Lot 49 (MS)	10278	Harshaw Mining Co.; Hermosa Lode	12/4/1885	20.65	ME	MC 254
Lot 50 (MS)	10279	Harshaw Mining Co.; Bluff Lode	12/4/1885	20.07	ME	MC 255
Lot 48 (MS)	10614	Harshaw Mining Co.; Salvador Lode	6/11/1886	14.45	ME	MC 253
Lot 40A	12589	Silver Cloud Mining Co.; American Lode	10/22/1887	20.66	ME	MC 39
Lot 44 (MS)	14827	Edward Fish and Simon Silverberg; First Extension left of the Enterprise Lode	4/13/1889	18.3	ME	MC 409
Lot 43 (MS)	14828	Edward Fish and Simon Silverberg; Eastern Extension Enterprise Lode	4/13/1889	19.66	ME	MC 408
Lot 52 (MS)	19644	Andrew and Melville McGill; Norton Lode	2/6/1892	19.83	ME	MC 479
Lot 51	20515	Andrew McGill; January Lode	12/4/1894	20.66	ME	MC 407
Lot 49 (MS895)	40925	George Westinghouse Jr.; Pocahontas Lode	5/1/1905	20.66	ME	MC 477
	SO Temp. Wdl. Huac. For. Res.		12/30/1905			Huac. NF 3/4/1907; Garces 7/2/1908; EO 908; Coronado NF 4/17/1911; Wld. Proc. 11/6/1960

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Table 7—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
Lot 2027 (MS)	44789	Sellm Franklin; Francis Parks; Alexander Henderson; William Gonde; and Walter Savage; Golden Gate Lode	10/31/1906	13.761	ME	MC 161
MS 2190	45767	Mowry Mines Co.; Mowry Nos. 1-5; Mowry Camp; El Pueblo; Park; Mowry; Park View;	8/22/1907	238.496	ME	MC 268
MS 2193	45766	Juniper and Oak Lode Mowry Mines Co.; Ash and Cedar Lode	8/22/1907	29.525	ME	MC 267
MS 1404	44954	David Allen; Herbert Tenney; Mattie Davis; R.R. Richardson; the Pride of the West Co.; New York and Kansas Lodes	9/20/1907	33.987	ME	MC 186
MS 1405 (24S 16E)	44955	David Allen; Herbert Tenney; Mattie Davis; R.R. Richardson; Maine Lode	9/20/1907	17.465	ME	MC 187
MS 1406	44956	David Allen; Herbert Tenney; Mattie Davis; R.R. Richardson; Georgia Lode	9/20/1907	20.66	ME	MC 188
MS 1399	44950	David and Howard Allen; Posey Lode	9/20/1907	20.66	ME	MC 182
MS 1407	44957	David and Howard Allen; Ohio No. 2	10/25/1907	20.662	ME	MC 189
MS 892	45463		11/29/1907	16.86	ME	MC 252
\$15 (MS 2227)	387	Mowry Mine Co.	12/26/1907	6		
\$15 (MS 2225)	388	Mowry Mine Co.	12/26/1907	1		
\$22 (MS2364)	334	Merriette Phelps; Roadside Lode	3/19/1908	13		
MS 2226	46877	Mowry Mines; Refugio Lode	5/21/1908	19.295	ME	MC 386
MS 2364	2615	Mariette Phelps; Roadside Lode	7/16/1908	13.401	ME	
MS 2225	37180	Mowry Mine Co.; Knob Lode	12/28/1908	1.2	ME	
MS 2227	37181	Mowry Mines, Mowry No. 6	12/28/1908	6.1	ME	
\$35 (MS 2566)	06376	Duquesne Mining and Reduction Co.	11/12/1909	20		Pat. #160649 11/9/1910
MS 2566	160649	Duquesne Mining and Reduction Co.; Noonday Lode	11/9/1910	20.661	ME	
\$24	017953	F. John Miller	1/29/1912	148		Relinquished 5/20/1913
\$22	017205	Ernest Sanders	4/11/1912			
MS 2952	PHX 017953		6/29/1912	M&B	HE	Relinquished 5/20/1913
\$24	022489	Charles A. Miller	5/7/1913	148		F.C. 2/13/1918

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Table 7—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S26	025145	Nellie Elizabeth Hasselstoon	6/3/1914	78		F.C. 8/20/1919
MS 2952	437958	Valentine Valenzuela Jr.; Bonnie Carrie Lode	10/24/1914	17.61	ME	
S24	027025	Samuel R. Prority	3/22/1915	59		F.C. 4/24/1923
S24	026573	Charles A. Bronson	5/25/1915	160		F.C. 4/8/1921
S25	026512	Alvin S. May	7/18/1915	160		
S1 HES 306	700683	Richard Farrell; S1-2	7/29/1919	151.01	HE	
S2 HES 305	708785	Achsa Best, widow of Josiah Best; S1	9/27/1919	79.45	HE	
S1 HES 304	712267	Charles Miller; Corner No. 1, S19	10/11/1919	147.88	HE	
HES 307	714971	Ernest Seartes; S22, 23	10/25/1919	112.55	HE	
HES 314	724471	Nellie Hasselshom; S2, 3, 26	12/16/1919	106.54	HE	
HES 315 HE Pat. (no Sec. #)	724475	Ahrens - Way; S23-26	12/16/1919	116.32	HE	
	814536	Charles Bronson; S 23, 24	7/15/1921	159	HE	
S22	051802	Cons. Arizona Copper Mines Co.	8/11/1921	277		
S16	074854	School indemnities	4/19/1934	640		
S36	176	School indemnities	7/6/1938	14.71	IL Base	
S36	204	School indemnities	7/29/1940	381.29		
	Ar 020546		3/4/1959		Area PL 167	6/10/1964; Det. complete 6/9/1964
S10 (MS 4460)	121192	American Smelting & Refining Co.; Camden Mine, Camden No. 2; Hardshell Nos. 1, 15; Lode claims	8/5/1960	79.111	ME	8/9/1960
S36 NE	358	School indemnities	1/20/1967	84.80	IL Base	
S13-15	A 15533	School indemnities	8/27/1981	10240	OG Lease	Eff. 4/1/1981 - 9/1/1982; O/Sim 1984
S21-36 S24 all, less HES 304, 315 and 523	A 15532		2/17/1982	9736.98	OG Lease	Eff. 3/1/1982 - 2/1985

Table 8—T23S, R17E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
\$15	3233P	Salvador Murrietta	10/18/1902	320		
\$15	3252P	Simon Cameron	10/18/1902			
\$13-36 all; see description.			8/2/1905	17,474.06	PLC	San Rafael de la Zanja; other Tps.: 24S 17E
23S 18E 24S 18E \$1-3, 6, 7, 11, 12, 18, 19, 30, \$1 all; and parts of 15, 22.			12/30/1905		SO Temp. Wdl. Huac. For. Res.	Wdl. Proc. 11/6/1906
\$11 NW, NE \$12 NE, \$4 NW, SW	030258 PHX 03473	Nicholas Farrell Charles Pepper. Duquesne, AZ; cont: James E. Gattlin, case 1350, 6/8/1911, closed 9/1/1911; new case (1413) filed by Gattlin 9/1/1911	5/3/1906	160		
\$4 SW, SE \$9 NE \$10 NW	PHX 03484	Percy Wood; Mowry, AZ; notations to cont: Guadalupe Urquides, case 1278	8/20/1906	160	HE	Amended; Relinquished 5/5/1915
\$1, 5-8, 30-31 all; and parts of \$4, 9, 10, 17, 18, 20, 29, and \$2.			11/6/1906		Proc. wdl. Huac.	For. Res. Changed to Huachuca W.F. Act 3/4/ 1907; part rest. 2/26/1908; name changed to Garces N.F. EO 908, 7/2/1908; transferred to Coronado N.F., Proc. 1121, 4/17/1911.
\$10 NE, NW \$14 SE, SW \$11 NE, SW	401 616 PHX 03691	Percy Wood George W. Parker Margaret M. Gates; Mowry, AZ.	8/20/1906 2/13/1907 4/15/1907	160 160 160		Pat. 6/23/1913
\$3 SE, SW	PHX 01192	Oscar F. Wheeler; Duquesne, AZ.	7/24/1907	160	HE	Relinquished 9/27/1909
\$11 \$10 NE, NW \$4 \$9 NW \$20 SE	1093 1132 1184 1185	Robert N. Keaton Mary J. Keaton James A. Grawley Santiago Martinez	10/30/1907 11/19/1907 12/10/1907 12/10/1907	160 160 160 160		Pat. 1/20/1913
\$2, 3, 11, 12 all			1/24/1908		SO Wdl. FS Admin. S. SO Rest. Huac. NF SO 12/30/05.	Revoked SO 1/24/1914
\$2	01194	Bud Baldwin	8/20/1908	80		Open to entry Canceled 5/19/1915
\$3	01193	Lewis K. Nevins	10/9/1908	160		
\$2 SE	PHX 01194	Bud Baldwin; Canille; Mowry; San Rafael, AZ.	10/21/1908	80	HE	Canceled 2/12/1912

Continued on next page

Table 8—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S11 NE S12 NW	PHX 02409	Archie D. Smith; Mowry, AZ.; cont: Nicolas Farrell, case 1539, 1/19/1912, closed 3/6/1912	2/1/1909	160	HE	Relinquished 5/3/1916
S11 NE, SW	06887	Fred Kraeger	9/27/1909	160		
S14	488	Heirs of Frank Parker	11/12/1909	136		
S14 NE, SW, NW	489	Duke Parker	11/12/1909	148		
S12 NE	PHX 08218	James B. Gristy; Mowry, AZ.; 10/31/90 letter stating he can't go to claim because he is working for SPRR - Fresno, CA.	1/26/1910	160	HE	Partially Relinquished; Relinquished 5/4/1912
S9 SE, SW S4 SW, SE	010538 PHX 014298	Henry T. Wilson Vera J. Fulbright; Mowry, AZ.; applied for leave of absence 4/18/1912 - 4/15/1913; submitted Dr. certificate; leave granted 9/16/1912	6/5/1910	160		
S18	01418	Jesus Morano (?)	5/5/1911	160	HE	Relinquished 3/7/1913
S17	014824	Perry J. Williams	6/30/1911	160		
S12	015815	María L. Gilmore	10/6/1911	160		Pat. 4/12/1915 Pat. 9/22/1919
S13 NE	PHX 015795	James T. Parker; Mowry, AZ.	10/14/1911	160	HE	Relinquished 7/12/1919 Pat. 567413 2/14/1917 Pat. 3/9/1916
S4	016680	James Gatlin	2/10/1912	160		
S11 NE, NW	016456	Silas N. Hall	2/12/1912	160		
S11 SE, NE	01195	H.G. Stephenson	2/13/1912	160		
S14 NW	016703	Juan Solano	2/18/1912	148		Pat. 3/19/1919
S9 NE	016899	Howard Keener	3/8/1912	160		
S9 SW	016900	Grace Van Osdale	3/8/1912	120		Pat. 4/13/1916
S10 SW, SE S11 SW	PHX 016889	John B. Price; Tucson, AZ.; cont: Samuel J. Pressler 3/15/1915	3/18/1912	160	HE	Canceled 6/28/1915
S12 NE, SW	PHX 016805	Richard Farrel, Jr.; Patagonia, AZ	5/6/1912	160	HE	Relinquished 1/6/1914 Pat. 4/13/1916
S9 NW, SW S19 NW	016322 PHX 017953	Samuel J. Pressler Frederick J. Miller; Mowry, AZ.	6/12/1912	160		
S18 S11 SW, SE S14 NE	019859 PHX 311133	Benjamin Wilson	6/29/1912 11/8/1912	148.18		Relinquished 5/20/1913 Pat. 8/21/1916
S13 NE	020804	George W. Parker; PHX 03607	1/23/1913	160	HE	
S4 SE, SW	021563	Francisco Pons	2/1/1913	160		Pat. 7/3/1917
S8	021775	Charles F. Young Theodore G. Donhaue	3/7/1913	160		Pat. 567444 2/14/1917
S14 NE, NW	PHX 321347	Duke Parker; PHX 03533	3/19/1913 3/25/1913	159.9 148.34	HE	Pat. 6/30/1925
S3 SW, SE	339986	Lewis L. Nevins; PHX 01193	6/7/1913	160	HE	

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Table 8—Continued.

Section	Entry Number	Homesteader	Date	Acreage	Type	Description
Q 8W 011 NW	340987	Robert N. and Mary J. Keaton	6/12/1913	160	HE	PHX 03913
PHX 03935 (with 340988). 010 NE, NW	340988		6/12/1913	160	HE	PHX 03913
PHX 03935 (with 340987). 010 SW						PHX 03977
011 NW	340989	John A. Crawley	6/12/1913	160	HE	Pat. 2/10/1917
012 SW, SE	022604	Robert W. Arthur, Sr.	8/5/1913	160		
020 SW, SE			1/24/1914	285	SO Rev. FS Adm. 1/24/1908	
013 NW 014 - Lot 1	390344	Heirs of Frank M. Parker	3/7/1914	136.78	HE	PHX 03532
020	025175	Arthur G. Wilson	6/3/1914	156	HE	PHX 06887
011 NE, SW	412601	Fred Krager	6/11/1914	160	HE	PHX 010838
009 SW, SE	414477	Henry T. Wilson	6/17/1914	160	HE	
017					HE	PHX 014816
018 SE	417259	Jesus Moreno	6/24/1914	160	HE	PHX 01195
011 NE	433107	Harvey O. Stephenson	9/25/1914	160	HE	PHX 03978
009 NW	434327	Santiago Martinez	10/8/1914	160	HE	
003 NW, SE, 008W	026231	George Curtis	12/4/1914	160		Pat. 6/19/1919 Pat. 9/24/1920
017	026536	George N. Bayley	1/12/1915	160		Pat. 780736 11/9/1920
005 SW	026593	John Lowles	1/23/1915	160		
003 NE, SE	PHX 027643	Ella C. Nevins; San Rafael, AZ.	6/12/1915	160	HE	Relinquished 10/7/1916 Pat. 888533 11/19/1922
005 NW	027786	Margaret L. Lawless	7/13/1915	160	HE	PHX 01194
002 NE, SE	485994	Bud Baldwin	8/6/1915	80	HE	
014 - 3 lots	PHX 026233	George W. Du Bols; Nogales, AZ.	8/7/1915	124.9	HE	Canceled 6/6/1921
010 SW, SE 015 NE	PHX 026633	Daniel Sullivan; San Rafael, AZ.	8/10/1915	200	HE	Canceled 10/24/1917
012 NE, SE	028118	Robert W. Arthur, Sr.	8/20/1915	160	HE	PHX 016899
009 NE	494715	Howard Keener	10/21/1915	160		
001	028423	Bud Baldwin	10/30/1915	35		
001 SE 012 NE, NW	PHX 028888	Hazel Miller Stark; Mowry, AZ.	12/8/1915	120	HE	Relinquished 9/25/1916
015 NE, NW	505298	Trade SPRR - for Hopland	12/30/1915	353.4		Ind. Res. exchange.
010 NE					HE	PHX 016456
011 NW	518067	Silas N. Hall	3/9/1916	160	HE	PHX 016900
009 SW	524345	Grace Van Osedale	4/13/1916	120	HE	
009 SE					HE	PHX 016322
010 NW, SW	524344	Samuel J. Pressler	4/13/1916	160		Pat. 417053 9/19/1923
005 NW, SW	030272	John Lawless	5/5/1916	160		
007 SE 008 SW					HE	PHX 019859
018	544087	Benjamin Wilson	8/31/1916	160		
013 - lots	030944	Francisco Pons	9/7/1916	85		
001 SE 012 NE	PHX 031165	Victor H. Daniels; Douglas, AZ.	9/25/1916	80	HE	Canceled 8/11/1917 PHX 030255
012 NE, NW	560213	Nicholas Farrell	1/14/1917	160	HE	Pat. 8/18/1922
012 SE	031218	Charles W. Curtis	2/9/1917	120		PHX 021563
004 SW, SE	567444	Charles F. Young	2/14/1917	160	HE	

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Table 8—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S4 NW, SW S13 NE - lots 1-3	567413	James E. Gatlin	2/19/1917	160	HE	PHX 016680
S10 NW	590610	Francisco Pons	7/3/1917	245.16	HE	
S12 NE, SW	026760	Howard Keener	9/11/1917	40		PHX 020804, 030944
S3 NE, SE	607333	Robert W. Arthur, Sr.	11/10/1917	320	HE	Pat. 6/2/1919
S17 NE	030973	Jefferson D. Roundtree	3/18/1918	160		PHX 022604, 028118
S10 SW	624901		4/12/1918	160	HE	Pat. 7/18/1922
S3 NE, NW	028001	Samuel Pressler	7/6/1918	160		not found
S14 NW	034157	Jefferson D. Roundtree	8/10/1918	120		Pat. 8/21/1919
S10 NW	670597	Jose Solano	3/19/1919	148.26	HE	
S10 SW, SE	680810	Howard Keener	6/2/1919	40	HE	PHX 016703
S11 SW	703103					PHX 026760
S14 NE	707370	Samuel J. Pressler	8/21/1919	160	HE	
		Heirs or devisees of				PHX 028001
		Maria L. Gilmore	9/22/1919	160	HE	PHX 015805
S17-Lot 1, 5 S17	712267	Charles A. Miller	10/11/1919	77.95	HE	PHX 022489
S20 HES309 S4 NE, NW, SE	721682	Arthur G. Wilson	11/28/1919	159.91	HE	PHX 025175
S12	034405	Mary J. Keaton	1/8/1920	280		
S12 NE	036529	George W. Parker	3/7/1920	280		Pat. 806253 5/15/1921
S8 SE	048134	Charles W. Curtis	7/3/1920	40		
S17	774633	George G. Bagley	9/24/1920	160	HE	PHX 026536
S5 SW						
S6 SE	780736	John E. Lawless	11/9/1920	160	HE	
S4 NE, NW	806253	Mary J. Keaton	5/13/1921	280	SRHE	PHX 026593
S1	808973	Bud Baldwin	6/6/1921	35	HE	PHX 034405
S10 SW, SE						PHX 028423
S11 SW						
S12 NW						
S15 NE	811014	George W. Parker	6/22/1921	280	SRHE	PHX 036529
S3 NE, NW	872978	Jefferson D. Roundtree	7/18/1922	280	HE	PHX 030973, 034157
S12 NE, NW	876887	Charles W. Curtis	8/18/1922	160	HE	PHX 031218, 048134
S36 all	64		10/25/1922	640	IL Base	
S5 NW						
S6 NE	888522	Margaret Lawless	11/17/1922	160	HE	PHX 027786
S16 - parts	66		12/8/1922	45.68	IL Base	
S16 SW, SE						
S2 NE, SW	71					
240 (S2)	IL Base			160 (S16)		
S8 SE	910914	Theodore G. Dunham	6/30/1923	160	HE	PHX 021775
S5 NW, SW	917053	John Lawless	9/19/1923	160	HE	PHX 030272
S18 - 6 lots	929244	Samuel R. Prouty				
S14	059318	Charles E. Wiswall	1/16/1924	39.29	HE	PHX 027025
S14 - 3 lots	1003565	Charles E. Wiswall	4/12/1927	28		Pat. 6/9/1927
			6/6/1927	28.30	CE	PHX 059318

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Table 8—Continued.

Section	Entry Number	Homesteader	Date	Acreage	Type	Description
NE, SE	PHX 070526	Luis Lopez; Patagonia, AZ; protest filed Forest Service 9/18/1936; proof and publication rejected; insufficient information as to residence and cultivation (9/18/1936); refiled proof 10/6/1936; FS protest refiled 10/8/1936	7/29/1931 3/3/1941	80 132	HE IL Base	Canceled 8/15/1938
32 NW 32 NE, NW	214 Ar 019590	Joshua Haberman, Irving Diamond; Tucson, AZ.	3/1/1959	1778.28	OG Lease	Term. 3/1/1962; Subj. to apln. 3/19/1962
31 all	Ar 0195951	R.H. Richorn; Tucson, AZ.	3/1/1959	632.12	OG Lease	Term. 3/1/1962
1, 6-8, 17- 20, 29-32	Ar 020546	ASARCO	3/4/1959		Def. Area DL167	Def. Completed 6/9/1964
32 - part	279		1/11/1961	68.40	IL Base	
32 - part	407		12/15/1967	70.44	IL Base	10 N 31 E
32 NE, NW	466		6/2/1969	360	IL Base	
32 - part	486		10/20/1969	9.16	IL Base	

Table 9—T235, R18E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S17 M&B; 18 M&B; 19 all; 20 M&B; 29 M&B; 30 all; 31 all; 32 M&B S26 S1-36 all and 22S, 15E	0122	James H. Bennett	8/2/1905 7/14/1906 11/6/1906	155	PLC Proc. Wdl. Huac. Wat. Res.	San Rafael de la Zanja Name change Garces NF EO 908, 7/2/1908; name change to Coronado NF; Proc. 1121, 4/17/1911
S33 M&B	PHX 0121	Herbert B. Miller; Duquesne, AZ.	7/14/1908	124.70	HE	Relinquished 11/1/1909
S33 S26 M&B	0124 PHX 0122	Herbert B. Miller James H. Bennett; Duquesne, AZ.	7/14/1908 7/14/1908	124 155	HE	Relinquished 3/1/1909 Relinquished 3/24/1913
S34 M&B	PHX 01025	James J. Jones; Duquesne, AZ.	9/24/1908	112	HE	Canceled 4/15/1916
S34 M&B; S26 S26 M&B; S34 M&B; S35 M&B	014708 1537	Mrs J. H. Bennett James A. Lucas; deceased; Calahasas, AZ.	11/19/1908 8/4/1911 5/28/1912	214 40 124.70	So. Wdl. FS Admin. Eo. Temp. Wdl. FS Admin.	Rev. So. 11/22/1914 Canceled 10/15/1920 Rev. PLO 864 9/11/1952
S23 S26 S6 M&B	02283 023521 PHX 021879	Robert L. Parker William B. Lewis James H. Gould; Parker Canyon, AZ.	6/24/1913 10/9/1913 3/24/1914 11/22/1914	81 155 155 214	HE So. Rev. FS Admin.	Pat. 2/4/1920 Relinquished 10/9/1913 11/19/1908
S26 S24 S34 S34 HES 294 S35 HES 292 S6 HES 524 S34 SW, SE S33 SW	021879 028060 031645 711695 732943 808973 PHX 052186	John H. Gould John H. Merrett James J. Jones James J. Jones William B. Lewis Bud Baldwin Theodore Marsh; Nogales, AZ.	3/24/1915 8/14/1915 9/24/1917 11/28/1919 2/4/1920 6/6/1921 4/17/1923	155 22 159 159.86 159.96 77.5 320 (\$34)	HE HE HE HE HE HE	PHX 031645 PHX 023521 PHX 028423 PHX 045600
320 (\$33) S18 HES 614	OG PER 959787	Canceled 4/7/1928 Myra Soldate, widow of Tiburcio	5/23/1923	159.91	HE	
S32 S2 NE, NW S2 SE	145 164		8/28/1935 5/25/1938	80 525.38	IL Base IL Base	
S32 NE, NW 360 (\$32) S16 all S36 all S26, 34, 35 M&B	180 IL Base 203 214 864		9/6/1938 7/10/1940 3/3/41 9/11/1952	40 (\$2) 640 640 124.70	IL Base IL Base PLO Rev. FS Adm. EO 1537 5/28/1912	
S29 NE, NW S32 NE, SE	Ar 021736	Thomas H. Peterson; Tucson, AZ.	9/11/1959	2477.56	OG Lease	Term. 9/4/1962 subj. to adln. 9/17/1962

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Table 9—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
033 NE, SW 032 NW, SE	Ar 021737	David Kramer; Herman Goldstein; Jacob Smith; Tucson, AZ.	9/1/1959	640	OG Lease	Term. 9/4/1962 subj. to adln. 9/17/1962
024 all	Ar 021737	David Kramer; Herman Goldstein; Jacob Smith; Tucson, AZ.	9/1/1959	640	OG Lease	Term. 9/4/1962 subj. to adln. 9/17/1962
032 part	279		1/11/1960	3.08	IL Base	
01-5, 36 - all	Ar 030476	Eunice Eldridge	5/24/1961		Det. Area PL 167	Det. Comp. 8/14/1968
02 part	354		12/9/1966	38.03	IL Base	
032 NW, SW	466		6/2/1969	120	IL Base	
032						
02	486		10/20/1969	76.92 (32)		
41.22 (2)	IL Base A14925	Yonenso Ichikawa; Phoenix, AZ.;				
		private exchange	6/15/1981			
	A16169	Richard S. Lee; Phoenix, AZ.;				
		small tract	9/14/1981			
	A16168	Robert J. Clifford; Phoenix, AZ.;				
		small tract	8/31/1981			

Table 10—T23S, R19E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S1 all; 2; 11; 12 M&B; 13 M&B			10/29/1881		EO. Wdl. Camp Huac. Mil. Res.	
S2-10 all S11 NE, NW S12 - lots S13 NE, NW S14-36 all			12/30/1905		SO. Temp. Wdl. Huac. For. Res.	Wdl. Proc. 11/6/1906
S23 lot 2067	44678	Ashford Quarles; Roosevelt, AZ.	10/31/1906	61.983	ME	MC 156
S24 lot 2066	44677	B. Frank Durbrey; Pima, AZ.	10/31/1906	82.627	ME	MC 155
S2 S3-8 all S9-10 all S11 NE, NW S12 - lots S13 NE, NW S14-36 all			11/6/1906		Proc. Wdl. Huac. For. Res.	Changed to Huac. NF Act 3/4/1907; name change Garces NF EO 908 7/2/1908; Trfd. Coronado NF Proc. 1121 4/17/1911
S10 S31 SW	021793	Gustave Peterson	3/20/1913 10/15/1913	148		
S22 M&B			11/22/1913	250	SO Rev. FS Adm.; SO 10/26/1908 SO Rev. FS Adm.; SO 10/26/1908	
S8 M&B	PHX 025973	James E. Guthrie; Douglas, AZ.	10/30/1914	63	HE	Relinquished 9/6/1916
S10 S31	027392	Gustave Peterson	3/11/1915 9/14/1915	10	SO Rev. FS; 10/26/1908	
S7 M&B	PHX 027373	Kate M. Rice; Douglas, AZ	5/17/1915	45	HE	Relinquished 9/6/1916
S29 M&B	PHX 027599	Benjamin F. Brooks; Parker Canyon, AZ.	6/7/1915			Relinquished 1/31/1917
S20, 21 M&B	PHX 028201	Rudolph O. Russell; Sunnyside, Az.	9/1/1915	75.47	HE	Relinquished 2/7/1917
S21	032775	James C. Holland	2/8/1917	75		
S8	031012	James W. Guthrie	2/10/1917	63		Pat. 3/28/1921
S29	032596	John A. Jones	2/23/1917	56		
S31			3/10/1919	30	SO Rev. FS 10/26/1908	
S3 NW	684787	George N. Curtis	6/9/1919	160	HE	PHX 026231
S32	042540	Oliver P. Lane	7/25/1919	160		Pat. 944793 9/12/1924
S16 HES 303	720813		11/25/1919	52.26	HE	Not found
S10 HES 300	724465	Gustave J. Peterson	12/16/1919	55.23	HE	PHX 021793, 027392
S19 HES 291	724466	Robert L. Parker	12/16/1919	93.47	HE	WD 6/1/1961; PHX 022823
S18 HES 290	724481	John H. Merritt	12/16/1919	22.21	HE	PHX 028060
S31 HES 290	731102	Clayton H. Menefee	2/2/1920	134.30	HE	PHX 025006
S21 HES 536	799726	James C. Holland	3/16/1921	74.87	HE	PHX 032775
S29 HES 535	800971	James A. Jones	3/28/1921	58.48	HE	PHX 032596
S8 HES 537	800969	James W. Guthrie	3/28/1921	63.68	HE	PHX 031012
S23, 24 - parts; note on card: all of HES is						
23S; 16E	814536	Charles Bronson	6/15/1921			PHX 026537
S33 all						

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Table 10—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
\$34 all	PHX 050594	John O. Bender; Los Angeles, CA.	9/28/1921		OG Per.	Canceled 6/12/1928
\$6 HES 538	PHX 051843	Steve S. Ward; Sunnyside, AZ.	2/1/1922	44.76	HE	Relinquished 2/26/1924
\$7 HES 538	PHX 056459	Lee E. Ferguson; Sunnyside, AZ.	3/3/1924	44.76	HE	Canceled 8/19/1929
\$32 HES 620 MB - part lying W of watershed & S of foot of mts: 22S 19E; Amend EO 6278 7/31/1925	944773 4246	Olliver P. Lake	9/12/1924 6/5/1925	153.24	HE	PHX 042540 EO Wdl. Huachuca Dist. of Coronado NF
\$3	061232	Jeff Milton	6/30/1927	81		Pat. 1009210 11/8/1927
\$3 MS 4027	1009210	Pearl, Crescent, Copper Dog; Western Star Lode	11/8/1927	81.565	ME	PHX 061282
\$3	063016	Jeff Milton	9/6/1928	20		Pat. 1022169 6/5/1929
\$3 MS 4057	1022169	Jeff Milton; Sylvania Lode	1/5/1929	20.02	ME	
\$12 M&B	5147		7/1/1929			EO Rev. Huac. Dis. Coronado NF EO 4278 7/31/1925
\$10	072319	Mildred T. Milton; Silver Wolf lode	12/1/1932	19		
\$10 MS 4156	1071441	Mildred T. Milton; Silver Wolf lode	8/8/1934	19.41	ME	
\$32 - part \$6 - part 19.15 (6)	138 IL Base		5/29/1935	119.2(32)		
\$2 NE, SE	145		8/28/1935	120	IL Base	
\$2 NE, SE	150		3/25/1936	120	IL Base	
\$16 NW, SW	179		8/29/1938	240	IL Base	
\$2 - parts 1, 4, 5	180		9/6/1938	50.43	IL Base	
\$36 all	210		12/2/1940	640	IL Base	
\$16 NE, SE	214		3/3/1941	380.85	IL Base	
\$2 NE	242		5/29/1958	80	IL Base	
\$2 - part W	271		8/30/1960	141.06	IL Base	
\$32 - lot 6	354		12/9/1966	4.33	IL Base	
\$32 - parts 1, 6	421		3/12/1968	4.33	IL Base	
\$2	454		1/8/1969	90.54	IL Base	
\$2-36	A6216	Mark Baldwin; Phoenix, AZ.	8/28/1984			DES. Miller Peak Wld. Area PL 98-406 Wdn. from mining and mineral leasing
\$14, 23, 24; MS 2066	A19390	Bernard L. McGann; Yuma, AZ.	3/25/1986		WD to US	
\$7 SE \$17-18	A22642	Forrest A. Terry; Douglas, AZ.	9/20/1988	343.5	WD recon (FX)	
\$19 NE	AZA 26088	Nellie Collins; Albuquerque, NM.	12/27/1991			Proposed withdrawal (Parke Canyon Complex) These lands are separated from location and entry under US Mining laws; seg to term 12/ 26/1993

Table 11—T23S, R20E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S18 - lot 39	6800	Huachuca Mining Co., J.K.L. Lode	11/29/1882	20.21	ME	MC 96; EO Wdl. Camp Huachuca 10/29/1881
All sections	SO Temp. Wdl. Huac. For.		12/30/1905			Wdl. Proc. 11/6/1906
S29	275	Butte Arizona Copper Mine	7/30/1907	154		
S20, 21	938614	Louise de Vere Hamburg and Ella Stromburg; Keystone Lode	5/21/1924 7/31/1925	20.661	ME	
S18	4278				EO Amend. Huac. dist. Coronado NF; EO 4246 6/5/1925	Revoked EO 5147 7/1/1929
S32	180	School lands	9/6/1938	640	IL Base	All 18N 14E, S32
S18-20, 27-36	A-030476		5/24/1961	10121.65		Def. area PL 167; Def. complete 8/14/1968
S30	A 1905		3/7/1968			Apln. and 7/10/1968
S34, 35	A 1905	Warranty deed; Albert and Ursula Cant				
S27-35	A-6216	Mark Baldwin	11/4/1968 8/28/1984	101.895	FX WD Recon. Wld. PL 98-406	Accepted 12/30/1968 Wdn. from mining and mineral leasing; posted 2/13/1987
S18, 20	A-19390	Raymond Eddy; Coconino, AZ	3/25/1986		WD to US	Posted 2/13/1987

Table 12—T24S, R16E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
Lots 38A, 38B (MS)	1530	Belmont Mine & Mill site; San Antonio Mining Co.	11/15/1875	46.31	ME	MC 11; entered 8/24/1824; Min entry No. 11; unsurveyed land
Lots 39A, 39B (MS)	1971	San Antonio Mining Co.; San Antonio Mine & Mill site	9/23/1876	18.77	ME	MC 12
Lots 40A, 40B (MS)	2134	William C. Forbush and Stephen O'Connor on the Empire Mine & Mill site	2/17/1877	25.66	ME	MC 14
Lot 41 (MS)	5072	John M. Desloge; Silver Bell lode	11/17/1881	4.98	ME	MC 55; entered 5/30/1881; paid for claim; Patagonia Mining dist.
Lot 49 - MS 895	40925	George Westinghouse Jr.; Pocahontas lode	5/1/1905	20.66	ME	MC 477; entered 12/9/1890; Patagonia Mining dist.
Lot 50 - MS 896	40926	George Westinghouse Jr.; Evening Star lode	5/1/1905	17.21	ME	MC 478; entered 12/10/ 1890
Lot 45A (MS)	40923	George Westinghouse Jr.; Bonanza lode	5/1/1905	20.29	ME	MC 475; entered 12/5/1890
Lot 48 - MS 894	40924	George Westinghouse Jr.; Estelle and Lovise lode	5/1/1905	15.79	ME	Entered 12/8/1890
Entire township		Proposed Huac. For. Res.	12/30/1905		SO Temp. Wdl. Huac. For. Res.	Wdl. Proc. 11/6/1906
Lot 2035 (MS)	44021	Duquesne Mining & Reduction Co.; Annie lode claim	6/9/1906	9.35	ME	MC 83; entered 12/15/1905
Lot 2038 (MS)	44030	Duquesne Mining & Reduction Co.; Grasshopper lode	6/9/1906	9.777	ME	MC 86
Lot 2034 (MS)	44020	Duquesne Mining & Reduction Co.; Lead King lode	6/9/1906	20.661	ME	MC 82
Lot 2037 (MS)	44029	Duquesne Mining & Reduction Co.; Klondike, Contract and Montezuma lodes	6/9/1906	47.497	ME	MC 85

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Table 12—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
Lot 2036 (MS)	44028	Duquesne Mining & Reduction Co.;				
		Duble Standard and Mary Jane lode claims	6/30/1906	34.044	ME	MC 84
Lot 2032 (MS)	44026	Duquesne Mining & Reduction Co.;				
		Lauretta, Garnet, Mohawk, Indianapolls and Little Emma lode mining claims	10/6/1906	44.836	ME	MC 80
Lot 46A (MS)	44676	George Westinghouse Jr.;				
		Illinois lode	10/31/1906	5.06	ME	MC 154; entered 3/29/1906
Entire township			11/6/1906			Changed to Huac. NF Act 3/4/1907; name changed to Garces NF EO 908 7/2/ 1908; trfd. to Coronado NF Proc. 1121 4/17/1911; subj. to Proc. 5/27/1907
Lot 2057 (MS)	44032	Duquesne Mining & Reduction Co.;				
		Duquesne and Virginia lode claims	12/13/1906	32.565	ME	MC 89; entry on 12/19/1905
S3	249	Duquesne Mining & Reduction Co.;				
		Deuede and Imperial lodes	12/17/1906	14		Pat. 45460. 12/17/1908
Lot 2033 (MS)	44027	Duquesne Mining & Reduction Co.;				
		Golden Gate lode	5/4/1907 5/27/1907	17.572	ME Proc. Wdl. Public Res.	MC 81; entry on 12/15/1905
M&B						All land w/in 60 ft. of International boundary
MS 1405	44955	David Allen; Herbert B. Tenney; Mattie Davis; R.R. Richardson; and the Pride of the West Mining Co.;				
		Maine lode claim	9/20/1907	17.465	ME	MC 187; entered on 7/6/ 1906
MS 1406	44956	David Allen; Herbert B. Tenney; Mattie Davis; R.R. Richardson; and the Pride of the West Mining Co.;				
		George lode claim	9/20/1907		ME	MC 188
MS 1402	44952	David Allen; Herbert B. Tenney; Mattie Davis; R.R. Richardson; and the Pride of the West Mining Co.;				
		Texas lode claim	9/20/1907	18.875	ME	MC 184

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Table 12—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
MS 1400	44959		9/20/1907		ME	MC 191
MS 1403	44953		9/20/1907		ME	MC 185
MS 1407	44957	David Allen and Howard Allen;				
		Ohio No. 2 lode	10/25/1907		ME	MC 189
MS 1401	44951	David Allen; Herbert B. Tenney; Mattie Davis; R.R. Richardson; and the Pride of the West Mining Co.;				
		Arizona lode claim	10/25/1907		ME	MC 183
MS 2211	45461	Duquesne Mining & Reduction Co.;				
		Holland, Amsterdam and Little Joker lodes	11/29/1907		ME	MC 250
MS 2212	45466	Duquesne Mining & Reduction Co.;				
		Stewart lode	11/29/1907		ME	MC 255
MS 899	45464	Duquesne Mining & Reduction Co.;				
		Grant Republic lode	11/29/1907		ME	MC 253
S4 (MS 2210)	02399 (389)	Duquesne Mining & Reduction Co.;				
		Alaska lode	12/27/1907	10		Pat. 97947,
11/29/1909						
S11	390	Duquesne Mining & Reduction Co.;				
		Smuggler lode	12/27/1907			Pat. 258696
4/11/1912						
MS 2021	44025	Duquesne Mining & Reduction Co.;				
		Manzanita and Silver Jade lodes	3/2/1908	276.693	ME	MC 79
MS 1407	44957	David Allen and Howard E. Allen;				
		Slim Jim lode	3/19/1908	15.995	Supp. ME	MC 358 (Supp. to 189)
S12			6/11/1908			Adjusted, restored
MS 2215	8290	Duquesne Mining & Reduction Co.;				
		Turnpike lode	8/20/1908	19.584	ME	MC 254
MS 2214	8289	Duquesne Mining & Reduction Co.;				
		Meyer lode	8/20/1908	17.701	ME	MC 251
MS 2217	35229	Duquesne Mining & Reduction Co.;				
		Imperial and Divide lodes	12/17/1908	14.653	ME	MC 249
S2	06375	Pride of the West Mining & Milling Co.;				
		Wedge lode	11/12/1909	1		Pat. 160650, 11/9/1910; Survey 25031 and 2514
S2	06377	Pride of the West Mining & Milling Co.;				
		Duquesne Mining & Reduction Co.;	11/12/1909	33		
MS 2210	91947	Duquesne Mining & Reduction Co.;				
		Alaska lode	11/29/1909	8.135	ME	
MS 2406	92990	R.P. O'Connor;				
		Golden Granite lode	12/1/1909	20.661	ME	

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Table 12—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
MS 2402	92991	R.P. O'Connor; Joe Wheeler, Winnebago Chief, and Ivenhoe lode claims	12/1/1909	60.183	ME	
S3 (MS 2558)	07761	H.W. Skerry; Happy Thought lode	3/18/1910	20		Pat. 176591
2/18/1914 MS 2514	160650	Pride of the West Mining & Milling Co.; Wedge lode	11/9/1910	.092	ME	
MS 2503	171938	Pride of the West Mining & Milling Co.; Pride of the West, David Allen, and Pride of the West No. 2 lode mining claims	1/21/1911	33.974	ME	
MS 2558	176591	Harry W. Skerry; Happy Thought lode	2/8/1911	20.509	ME	
MS 2556	192120		4/24/1911	11.441	ME	
MS 2216	258696	Duquesne Mining & Reduction Co.; Smuggler lode	4/11/1912	17.245	ME	
MS 2894	295315	Elizabeth O'Connor; Line Boy lode	10/7/1912	20.574	ME	
S9 (MS 3113)	036210	Southern Copper Mine	12/22/1917	5		
MS 3113	674073	Southern Copper Mining Co.; Santo Niño No. 2, Santo Niño, and Santo Niño No. 1 lode claims	4/12/1919	57.027	ME	
S2 (MS 2556)	07164	Duquesne Mining & Reduction Co.; Iron Cow lode	1/31/1920 1/5/1923	11 19.89	HE	
HES 522 S9	892256 056656	Southern Copper Mine; Santo Niño lode	6/28/1924	17		
S9	056655	Southern Copper Mine; Santo Niño lode	6/28/1924	19		Pat. 942558
MS 3907	942558	Southern Copper Mining Co.; Santo Niño No. 3 lode	8/8/1924	17.874	ME	
MS 3916	947366	Southern Copper Mining Co.; Santo Niño No. 5 lode	11/4/1924	19.577	ME	
S10	1013990	John F. Campbell; Justice lode	3/23/1928	20.661	ME	
S10	058696	John F. Campbell; Justice lode	6/20/1928			Pat. 1013990
S16 all	176	School indemnities	7/6/1938	640	IL Base	
S2 all	074865	School indemnities	4/19/1939	640		
S2 all	206		8/22/1940	640	IL Base	
S1-18 all	Ar 020546		3/4/1959		Def. area PL 167	
S2 MS 4423	1223142		10/4/1961	30522	ME Base	
S1-18 all	A15640		7/15/1981	9464.735	OG Lease	

Table 13—T24S, R17E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
Lots 40A, 40B \$23 NE, NW \$14 NE, SW	2134 PHX 0826	Salvador Murietta; Lochiel, AZ;	2/17/1877 10/18/1902	25.66 333.06	ME DLE	MC 14 Add. payment 9/11/1908; contest affidavit filed by Arthur Weeds (?) and M. Sam Mott 2/6/1909; contest affidavit - Abel de la Ossa, Duquesne, AZ 2/8/1909; contest affidavit - Victor Wager, Duquesne AZ 3/8/ 1909; application to contest rejected 6/15/1910; relinquishment filed 9/12/ 1910; relinquished 9/20/1910
\$23 \$14 \$14 NW, SW	3253 3252 PHX 0825	Salvador Murietta Simon Cameron Heirs of Simon Cameron	10/18/1902 10/18/1902 10/18/1902	333 320		
					DLE	Add. payment 9/11/1908; Colin Cameron advised by mail 11/28/1908; Rel. filed, Cameron files power of attorney (M.E. Leverich) 11/ 30/1908; contest affidavit (Gilber Weeks and M. Sam Mott) 2/6/1909; contest affidavit (Charles T. Harrison, Duquesne, AZ) 2/15/1909; all 3 contests rejected 7/29/ 1909; 5 separate rel. filed by Colin Cameron 10/25/1909
\$14 NE, SE \$13 NW \$11 - lot 1, 2	PHX 01940	Charles A. Montgomery; Lochiel, AZ; M.E. Leverich, Attorney	11/18/1902			
					DLE	M.E. Leverich files power of attorney 12/12/1908; app. for return of purchase money 12/12/1908; relinquished 3/10/1908
\$11 \$14 SW \$1-4 all \$5 M&B \$8-12 M&B	3234 05346	Charles A. Montgomery Aztec Land & Cattle	11/28/1902 3/23/1904	240 80		
						Pat. 3/6/1911
\$19 all; 22S 15 E; \$6, 7, 18 all	San Rafael de la Zanja Wdl. Proc. 11/6/1906		8/2/1905 12/30/1905	17474.06	PLC	San Rafael de la Zanja
					SO Temp. Wdl. Huac. For. Res.	Wdl. Proc. 11/6/1906
\$21 NE \$20 \$1	370 (03463) 371	Carolina de la Ossa Thomas Carey Withdrawn	6/9/1906 7/9/1906 11/6/1906	140 160		Huac. For. Res.

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Table 13—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S20 all; 22S 15E; S17-19 all; S8 all but part of NE, and SE - lot 1- 4; S6, 7 all; S5 -lot 1-7			11/6/1906			Proc. Wdl. Huac. For. Res. Changed to Huac. NF Act 3/4/1907; subj. to Proc. 5/ 27/1907; name changed to Garces NF EO 908 7/2/1908; trfd. to Coronado NF Proc. 1121 4/17/1911; all land within 60 ft International boundary; 19S 1E
S14 NW, SW S22 - lot 3, 4 S10 - lot 2, 3 S22 NE S15 NE, SE	529 14621 PHX 04427	Oswaldo de la Ossa Henry Miller; Duquesne, AZ.	12/7/1906 11/6/1907 1/10/1908	160 83.76 160	 FX HE	 Affidavit of contest (Diana de la Ossa) 2/13/1909; case closed, entry canceled 5/ 25/1910; canceled 5/25/ 1910 Canceled 4/7/1908
S13 S13 NE (all)	PHX 04427	Charles Montgomery Jose O. Garcia;		240		
S15 NW,SW	PHX 0999	Duquesne, AZ. Thomas J. Turner;	6/15/1908	160	HE	Canceled 12/31/1910
S13 NE, NW S13 S13 SW S24 NW S23 NE S14 SE	01057 01056 PHX 01058	Lochiel, AZ. Cosma Solano Delfina Solano	9/23/1908 9/24/1908 9/24/1908	160 160 160	HE HE	Relinquished 3/23/1909 Pat. 3/9/1914
S14 NE, NW S24 NE, NW S13 SW, SE	01067 PHX 01233	Mary A. Chalmers; Lochiel, AZ. Carlos Zamora	9/24/1908 9/25/1908	160 160	HE HE	Relinquished 10/1/1909 Pat. 2/16/1911
S13 NW,SW	PHX 01250	Tom G. Chalmers Pastora Gallego; Lochiel, AZ.	10/14/1908 10/15/1908	160 160	HE HE	Placed of record 10/14/ 1908; relinquished 10/1/1909 Placed of record 10/15/ 1908; notice record unclaimed 10/10/1910; GLO cancels entry 12/7/1910; canceled 12/3/1910 Pat. 2/6/1911
S14 NE, SE S22 NE - lot 1, 2; S23 - lot 3, 4	01346 PHX 02600	Francisco Zamora Frank Rechief	10/23/1908 1/21/1909	120 138.14	 HE	 App. filed / entry placed of record 1/18/1909; relinquished 3/23/1909
S10 - lot 4 S9 - lot 1-4	PHX 02560	Thomas Ewing; Duquesne, AZ.	1/18/1909	78.8	HE	App. filed/ entry placed of record 1/18/1909; Relinquished 3/23/1909

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Table 13—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
85	06636	Andrew S. Russell	4/19/1909			Pat. 53676 7/6/1916
\$15 NW	PHX 06719	B.G. Carey	9/1/1909	80	HE	App. filed 9/1/1909; letter from Clairmont says physical disability prevents her going on land in time, asks for instructions 6/10/1910; advised 6 mos. for establishing residence cannot be extended 6/11/1910; app. to contest (Paul Schiller) 9/8/1911; canceled 1/10/1912
\$22 NE \$15 NE, SE	PHX 010906	Diana de la Ossa; Lochiel, AZ.	6/15/1910	160	HE	Allowed 2/15/1910; relinquished 12/6/1910 Pat. 7/17/1916
\$23 NW, NE	012185	Donald G. Chalmers	9/26/1910	160		
\$23	012638	Thomas Thompson	11/21/1910	100		
\$22	012736	Victor J. Wager	12/6/1910	160		
\$23 NE \$24 NW \$14 SE \$13 SW	PHX 012872	Joseph Schwartz; La Noria	12/19/1910	160	HE	App. filed 12/19/1910; allowance returned unclaimed 6/9/1911; app. contest (Thomas G. Chambers #1611) 4/8/1912; #1611 contest closed 5/15/ 1912; contest #1705 (Thomas G. Chalmers) 6/7/ 1912; case #1705 close 7/ 29/1912; app. to contest #2052 (Thomas G. Chambers) 8/28/1912; #2052 closed 2/3/1913; app. to contest #2325 (Thomas G. Chambers) 2/6/ 1913; #2325 closed 5/31/ 1913; canceled 2/7/1914
\$21 NE - lot 1-4	171437	Caroline de la Ossa	1/19/1911	140.32	HE	
\$15 NE, SE	175681	Francisco Zamora	2/6/1911	120	CE	
\$15 NE, NW	178375	Carlos Zamora	2/16/1911	160	CE	
\$15 SW	181894	Exchange by Aztec Land & Cattle Co. for tract within San Francisco Mtns. Reserve.	3/6/1911	80	FX	
\$13 NW,SW	182460	Delfina Solano	3/9/1911	160	CE	
\$14 NE, SE \$14 SW	192334	Charles Montague, assignee of Price A. Howe, widow of John V. Howe	4/24/1911	80	HE	
\$9	014667	Charles L. Montague	6/5/1911	47		

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Table 13—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S14 NW	211090	Charles L. Montague, assignee of Ethan A. Dansmon, administrator of estate of Charles E. Rogers	6/24/1911	80	HE	
S8	014400	Mattie Lee Vaughn	6/29/1911	160		F.C. 5/23/1917
S17	014830	Abel de la Ossa	7/1/1911	160		Pat. 3/26/1917
S11	07097	Charles L. Montague	8/1/1911	46		Pat. 10/26/1911
S10 - lot 1						
S11 - lot 3, 4	231763	Charles L. Montague, assignee of Charles O. Hildreth; Elizabeth Schneiderheinze, widow of John Schneiderheinze; David O. Crooks, guardian of Charles H. Clarkson, insane heir of Thomas Clarkson; Leverett S. Slove; and Lovina Frost, widow of Charles S. Frost				
S12 - lot 1	10/26/1911 PHX 016291	46.92 Ernest de la Ossa; La Noria	HE 1/11/1912	158.9	HE	App. filed, suspended because not paid in acceptable form 12/26/ 1911; proper fee filled, allowed 4/11/1912; app. to amend entry 5/17/1912; entry amended 1/18/1913; pub. In Oasts, Nogales 4/6/ 1915; recd. patent #86028 8/16/1915; recd reg. - pat. mailed to claimant 8/23/ 1915; relinquished 4/29/1912
S14 SW	252104	Charles L. Montague, assignee of Ellen A. Calkins, widow of Anson M. Calkins; and George W. Brown				
S13 NW, SW	3/7/1912 PHX 016993	40 Harold Brown; Nogales, AZ.	HE 3/20/1912	160	HE	Filed, allowed 3/10/1912; notice of absence 12/19/ 1912; relinquished 4/4/1913
S24	017050	William G. Brown	3/27/1912	160		

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Table 13—Continued

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
\$24 NE	PHX 017056		3/27/1912	120 amended to 160		App. filed 3/27/1912; app. to amend rejected in conflict w/ Hd. 016291 6/21/1912; rel. filed 7/9/1912; deeds to make profit, app. for amend recd. 7/31/1912; app. for amendment filed 8/12/1912; entry amended 12/10/1912; notice of absence 11/17/1913; returns to Hd. 4/14/1914; M.E. Levrich, power of attorney 5/15/1914; notice intent to be absent 11/30/1915; 3 yr. proof filed 3/1/1916; proof filed 4/14/1916; patent given to attys. 7/27/1916; relinquished 7/9/1912
\$9	016061	John H. Page, assignee of the heirs of Peter Torix	7/31/1912	31		
\$14	3253	Salvador Murrieta	10/18/1912	320		
\$9 - lot 3, 4	296992	John H. Page, assignee of the heirs of Peter Torix	10/18/1912	31.6	HE	
\$15 NW	296993	John H. Page, assignee of the heirs of Peter Torix	10/18/1912	80	HE	
\$22	019923	Santa Fe Railroad	11/13/1912	40		
\$9	021510	Santa Fe Railroad	3/4/1913	47		
\$17	021646	Charles F. Hanson	3/22/1913	159		Pat. 5/18/1919
\$13 SW, SE	022033	James G. Brown	4/4/1913	160		
\$5	021286	George Everett	4/30/1913	150		F.C. 7/18/1916
\$14 NE, SE	342348	Nattie Solano	6/19/1913	120	CE	
\$5 SW	022921	George Everett	7/11/1913	10		F.C. 7/18/1916
\$22 NE	348934	Exchange by Santa Fe Pacific RR Co. for land in San Francisco Mtns. For. Res.	7/31/1913	40	FX	
\$6 NW	PHX 023060	James H. Bennett; Duquesne, AZ.	8/18/1913		HE	App. filed, \$16 allowed 8/8/1913; rel. filed 4/27/1914
\$24 NW \$23 NE \$14 SE \$13 SW	PHX 024641	Thomas G. Chalmers; Nogales, AZ.	3/19/1914	160	HE	App. filed, allowed 3/19/1914; erroneously allowed 4/11/1914; relinquished 1/22/1915
\$8	024730	Thomas E. Heady	4/25/1914	160		F.C. 2/13/1918; Pat. 652767 11/5/1918
\$6	024988 4/28/1914	Arthur E. Woody 160			F.C. 4/27/15	
\$8	024730	James A. Layman	4/30/1914	160		Relinquished 9/29/1914

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Table 13—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S8 - partial S7 NE S6 - partial S5 - partial	PHX 024925	James A. Layman; Duquesne, AZ.	4/30/1914	160	HE	App. filed, suspended 4/21/ 1914; app. filed, allowed 4/ 30/1914; rel. filed, canceled 9/29/1914
S21 NE, NW S20 NE	404989	Clotilde B. Corey, widow of Thomas Corey	5/13/1914	160	He	
S10 - lot 4 S9 - lot 1, 2	411482	Exchange by Santa Fe Pacific RR Co. for tract within San Francisco Mtns. For. Res.	6/5/1914	47.38	FX	
S13 NW S14 NE S7 S22 NW S15 SW S8	425351 025629 427316 025792	Cosma Solano Harold G. Lehan Osabella de la Ossa Arthur J. Parich	8/12/1914 8/22/1914 8/26/1914 10/2/1914	160 160 160 160	HE HE HE HE	F.C. 8/25/1921 F.C. 4/9/1918; Pat. 686569 6/ 6/1919
S22 NE S15 NE, SE S23 - lot 2-4 S22 lot 1 S17 S24 S20 S8	434347 434345 025917 024644 021564 026589	Victor J. Wager Thomas P. Thompson Paul F. Schiller Henri Uyttaue Francisco Ramos William M. Heady	10/8/1914 10/8/1914 11/4/1914 3/3/1915 3/15/1915 6/22/1915	160 100.59 161 160 122 130	HE HE HE HE HE HE	Pat. 9/24/1920 Pat. 5/28/1919 Pat. 3/27/1917 F.C. 4/26/1917; Pat. 612223 12/21/1917
S13 NE S12 - lot 2-4 S6 - partial S22 - lot 2 S14 NW S12 - lot 1	486028 490838 494160	Ernest de la Ossa Arthur K. Moody Exchange by Frank Hereford for tract within San Bernadino For. Res. in CO	8/6/1915 9/22/1915 10/16/1915	158.9 160 24.24 (22)	HE HE HE	
80 (14) 15.76 (12) S24 NE, NW - lots 1-4	FX 505298	Exchange by Santa Fe Pacific RR Co. for land within Moqui Indian Reservation	12/30/1915	101	Ind. Res. Exchange	
S5 - partial S6 - partial	536767	Heirs or devisees of Andrew Russell	7/6/1916	100	HE	
S23 NE, NW S14 SW S13 NE, SE S13 NW, SW S5 SW, SE	537060 537071 541729 570329	David G. Chalmers William G. Brown James G. Brown George J. Everett	7/7/1916 7/7/1916 8/11/1916 3/2/1917	160 160 160 160	HE HE HE HE	

continued on next page

Table 13—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S17	573694	Abel de la Ossa	3/26/1917	160	HE	
S20 NW - lot 3; S18 - partial;						
S17 - partial	573997	Francisco Ramos	3/27/1917	122.44	HE	
S8 - partial						
S7 - partial	612223	William M. Heady	12/21/1917	130	HE	
	624901	Perry J. Wilson	4/12/1918	160		
S8 NE - lot 1, 2; S5 - lot 7, 9						
S13	630402	Hattie L. Vaughn	5/15/1918	160.85	HE	
S8 NW	029850	William G. Brown	6/30/1918	40		
S5 - partial	652767	Thomas E. Heady	11/5/1918	160	HE	
S13 NE	661261	William G. Brown	1/22/1919	40	CE	
S8 SE						
S17 NE	676856	Charles F. Hanson	5/8/1919	159.85	HE	
S24 NW						
S23 NE						
S14 SE						
S13 SW	679490	Winifred B. Uyttaue	5/28/1919	160	CE	
S8 NW -partial						
S7 NE						
S6 SW						
S5 SE, SW	686569	Arthur J. Patrick	6/16/1919	160	HE	
S18 NE, SE	728469	Salvador Murleta	1/17/1920	160	HE	
S17 SW						
S18 NW, NE	774677	Paul F. Schiller	9/24/1920	161.6	HE	
S2	053441	School Indemnities	3/17/1922	160		
S2	053386	School Indemnities	3/17/1922	480		
S23	053843	Winifred B. Uyttaue	6/9/1922	26		Pat. 8/29/1941
S23 - lot 1	877786	Winifred B. Uyttaue	6/9/1922	26.81	CE	
S7 NW lot 1						
S6 NW lot 9	8992256	Harold G. Lehan	1/5/1923	158.9	HE	
S2 SE	71	School Indemnities - list of sections selected by state of AZ	4/23/1923	160	IL Base	
S2 NE, NW	73	School indemnities	5/31/1923	480	IL Base	
S20 - lot 1, 2	7940	Transfer of Coronado NF land to Treasury Dept. for Customs offices	8/2/1938		EO Wdl. Customs Ins. Station	Extended Act of 6/20/1910 to Min. lands; subj. to prior rights; subj. to Proc. 5/27/ 1907 Det. completed 6/9/1964
	Ar 020546		3/4/1959 6/10/1964		Det. area PL 167	
S5-8, 17-20	A 16944		6/22/1982	2235.965	OG Lease	Custom Ins. Station 8/2/1938

Table 14—T24S, R18E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S12 SW	2800	Collin Cameron	3/9/1900	40		
S13 NE	2800	Collin Cameron	3/12/1900	40		Amend. to S13 NE
S8 M&B						
S7 M&B						
S6 all						
S5 M&B	San Rafael de la Zanja Grant		8/2/1905	17,474.06	PLC	
S1-4, 9-17, 20-24 all; S8 - most S5 - most	Forest Wdl.		12/30/1905		SO Temp. Wdl. Huac. For. Res.	Wdl. Proc. 11/6/1906
S1-4, 9-17, 20-24 all; S5 - most S8 - most S7 - lots 1-4			11/6/1906		Proc. Wdl. Huac. For. Res.	Changed to Huac. NF Act 3/4/1907; subj. to Proc. 5/27/1907; name changed to Garces NF EO 908 7/2/1908; trfd. to Coronado NF Proc. 1121 4/17/1911
S24 M&B; all land within 60 ft of international boundary			5/27/1907		Proc. Wdl. Public Res.	
S14	0852	Katherine N. Bercich	6/23/1908	160		Pat. 5/17/1909
S4 SW	0502	James Parker	8/15/1908	160		
S1 NE			10/26/1908	40		
S14 SW, SE	62631	Katalina Bercick	5/17/1909	160	SO Wdl. FS Adm. S	Revoked SO 10/15/1913
S4 SW	75867	James Parker	8/16/1909	160	HE	
S13 NE	172832	Exchange by Collin Cameron for land within Sierra For. Res.	1/23/1911	40	FX	Proc. creating Coronado NF 4/17/1911; Elim. certain lands from Coronado NF 6/19/1912; includes map of Coronado NF 1912
S18 NE	PHX 017450	Jeremiah Crowley; Phoenix, AZ.	4/29/1912	160	HE	App. filed, suspended, refilled 4/18/12; app. to contest, Robert L. Thompson #2193 12/11/1912; contest closed 3/17/1913 Pat. 583082 5/7/1917
S13	021088	Mitar Davidovich	3/18/1913	160		
S8	022136	John McIntyre	4/12/1913	160		
S18 NE	PHX 021753	Robert L. Thompson; Duquesne, AZ.	4/16/1913		HE	Filed/rejected because of conflict w/ Hd. 17450 made by Jeremiah Crowley 3/17/1913; relinquishment adjusted, app. allowed 4/16/1913; relinquishment filed 7/25/1913; relinquished 7/25/1913

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Table 14—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S18 NE	PHX 023004	Charlie N. Cox; Duquesne, AZ.	7/25/1913	160	HE	Applied 7/25/1913; relinquished 4/15/1914; Pat. 686564 6/6/1919
S19	023120	George O. Wager	9/17/1913	149	SO 10/26/1908; SO Rev. FS Adm. S	Pat. 639771 7/8/1918
S1 NE			10/15/1913	40		
S18	027697	Edward R. Wager	4/29/1914	160	HE	App. allowed 2/6/1915; allowance erroneous - land in Coronado NF 11/18/1915; relinquished - repayment app. filed 5/10/1916 Pat. 686564 6/6/1919
S18 NW, SW	PHX 026670	Helen A. Ellicott; Parker Canyon, AZ	2/6/1915	200		
S18	028954	George O. Wager	12/4/1915	10	HE	File 8.30 acres 2/24/1917; relinquished 6/21/1920
S18	027697	Helen A. Ellicott	5/12/1916	160		
S20 NW	PHX 033146	Sheldon Ijams; Wilcox, AZ.	2/26/1917	120	HE	
S13, 14, 20	583082	Mitar Davidovich	5/7/1917	160	HE	
S18	639771	Elwood R. Wager	7/8/1918	160	HE	
S19 - lot 1					HE	
S18	686564	George O. Wager	6/16/1919	159.58	HE	
S16	042495	School indemnities	10/9/1919	560		
S4 - lot HES					HE	
294	721695	James I. Jones	11/28/1919	159.86	HE	
S8					HE	
S5	722107	James R. McIntyre	12/1/1919	160	HE	
S1 HES 295	731102	Clayton H. Menefee	2/2/1920	134.3	HE	
S12 HES 296	731066	Alister M. McNab	2/2/1920	159.65	HE	
S20 NW						
S19 NE						
S18 SE						
S17 SW	PHX 047879	Paul L. McIntyre; Parker Canyon, AZ.	7/27/1920	160	HE	Filed, suspended, needed affidavit re. native born or naturalized 6/21/1920; native born, allowed 7/27/ 1920; for. supervisor advises entryman was killed 11/11/ 1921 w/out having established residence; canceled 7/29/1926
S18 NW, SW						
- lots 3, 4	808819	Helen A. Richardson, formerly Helen A. Ellicott	6/3/1921	159.04	HE	
S16 NE, NW	49	Shoot Indemnities	1/24/1922	560	IL Base	
S23 - Frac.						
S24 - Frac.						
S15 all						
S14 all						
S11 SW, SE						
S10 SW, SE	PHX 053767	Mrs. George Fielder; Nogales AZ.	1/10/1923	2300	OG Per.	Filed, suspended for 30 days 5/11/1922; canceled 4/25/1928

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Table 14—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S10 NE, NW S9 NE, NW S3 all	PHX 052186	Theodore Marsh	4/17/1923		OG Per.	Filed, suspended for evidence as to marital status and evidence of citizenship 10/24/1921; completed 12/1/1921; canceled 4/7/1928
S36	072141	School indemnities	6/21/1932	640		
S16	075195	School indemnities	7/19/1934	80		
S16 NW (28N 6W)	185	School Indemnities	11/3/1938	80	IL Base	
S2 all (21S 22E)	206	School indemnities	8/22/1940	640	IL Base	
S21 NE, NW	Ar 019589		3/1/1959	1465.72	OG Lease	Term. 3/1/1962; subj. to apln. 3/19/1962
S17 NE, NW S16 all S2, 9-11 all	Ar 021716		3/2/1962 9/1/1959	2560	OG Lease	Term. 9/4/1962; subj. to apln. 9/17/1962
S22-24 NE, NW	Ar 021734		9/4/1962 9/1/1959	804.08	OG Lease	Term. 9/4/1962; subj. to apln. 9/17/1962
S15 all	Ar 021739		9/4/1962 9/1/1959	640	OG Lease	Term. 9/4/1962; subj. to apln. 9/17/1962
S1-24 all	Ar 030476		9/4/1962			
S1	A 16167		5/24/1961		Def. area PL 167	Def. completed 8/14/1968
S1-24	A 16166		8/14/1981	608.62	OG Lease	
			8/26/1981	9821	OG Lease	Eff. 9/1/1981; term. 9/1/1985; OG Sim.

Table 15—T24S, R19E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
Entire township			12/30/1905		SO Temp. Wdl. Huac. For. Res.	Wdl. Proc. 11/6/1906
			11/6/1906		Proc. Wdl. Huac. For. Res.	Changed to Huac. NF Act 3/4/1907; name changed to Garces NF EO 908 7/2/1908; trfd. to Coronado NF Proc. 1121 4/17/1911; subj. to Proc. 5/27/1907 Rev. SO 10/15/1913
S6 NW S2	PHX 06597	Frederick Horn, Duquesne, AZ	10/6/1908	80	SO Wdl. FS Adm. S	
			8/12/1909	150.75	HE	Filed 4/12/1909; writes to attorney, Santa Cruz, for naturalization papers 12/2/1909; certified copy of becoming a citizen 12/10/1909; app. to contest (John P. Chapman #3436) 8/20/1912; canceled 11/16/1915 Canceled 11/16/1916
S2 S16 M&B	06597 PHX 011918	Frederick Horn Rafael Leon, Sr.; Parker Canyon, AZ.	1/20/1910	159		
			8/11/1910	60	HE	App. allowed 8/11/1910; notice intent to make final 5 yr. proof 7/27/1914; proof cannot be made until survey made 8/21/1914; M.E. Leverich files authority to appear 2/6/1915; requests govt. recog. entryman as citizen 2/6/1915
S21 M&B	PHX 011946	Rafael Leon, Jr.; Parker Canyon, AZ.	8/17/1910	100.43	HE	App. allowed 8/17/1910; Intent to make final 5 yr. proof 8/27/1914; need for 2nd survey 8/21/1914; M.E. Leverich authority 2/6/1915; affidavit of citizenship 2/6/1915; relinquished 12/23/1915
S13 S11 S6 NW	012357 014655	Peter J. Ward Fred Kellog	6/29/1911 6/29/1911 10/15/1913	156 60	SO	Pat. 793363 2/3/1921 Pat. 731096 2/2/1920 Rev. FS Adm. S. SO 10/26/1908
S18 S18 S6 S24 S9 S9 S20 M&B S17	024893 024894 025006 025707 025873 PHX 02583	Edward McFarlane Sister MacRae McNab Clayton H. Menefee David J. Peeples Benigno Yañes	4/27/1914 4/29/1914 4/30/1914 9/10/1914 10/27/1914 10/27/1914	154 160 106 102 106 106	HE	Pat. 81661 7/28/1921 Pat. 731102 2/2/1920 Pat. 814533 7/15/1921 Relinquished 1/31/1916
	PHX 025952	Jesus Leon; Parker Canyon, AZ.	10/27/1914	160	HE	Relinquished 8/20/1918
S8 S21 M&B S16	027659 PHX 029087	Robert McIntyre Olin W. Wolf; Bisbee, AZ.	7/8/1915 12/23/1915	128 160.43	HE	Relinquished 6/12/1916
S9 S2	029301 029158	Samuel Loey John P. Chapman	2/16/1916 7/7/1916	106 159		Pat. 814544 7/15/1921

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Table 15—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S16 M&B S21	PHX 031436	Ezquei T. Nance; Parker Canyon, AZ.	8/6/1917	160.43	HE	Relinquished 11/13/1940
S20 HES 531 S17	PHX 040269	Martin Bigelow; Patagonia, AZ.	8/21/1918	159.92	HE	Filed, rejected 8/1/1918; entry allowed, various motives 8/21/1918; "C" receives area of cultivation to 12 acres 11/20/1923; letter rec'd from William M. Claydon, stating Mrs. Martha Bigelow died 12/23/ 1924 and that her crippled son M.E. Bigelow lives on land 12/27/1924; "C" allows 60 days to finish; canceled 9/28/1926
S19 NW, SW S18	PHX 041008	Dora Kane, now Claydon; Parker Canyon, AZ	12/19/1918	160	HE	Filed, allowed 12/19/1918; amended 4/28/1926; unclaimed letter 9/27/1928; FS called on for address 10/ 6/1928; FS writes address unknown 10/19/1928; canceled 2/9/1929 Amended
S18	042191	Frank Hopkins	7/25/1919	160		
S18	042194	William Pierce	7/25/1919	159		
S11 HES 301	731096	Fred Kellogg	2/2/1920	159.94	HE	
S18 HES 296 (24 S 18E)	731066	Alister M. McNab	2/2/1920	157.03	HE	
S6 HES 295 (24S 18E)	731102	Crayton H. Menefee	2/2/1920	134.3	HE	
S17 M&B	PHX 047056	Vernon J. Kinney; Parker Canyon, AZ.	7/17/1920	160	HE	Filed 5/14/1920; allowed 7/ 17/1920; notice of absence 4/21/1921; app. filed for leave of absence for 1 yr. from 2/1/1922 because of excessive drought and because of death of mother
S21 M&B S16	PHX 049818	D. Walker; Parker Canyon, AZ.	11/13/1920	160.43	HE	Relinquished 2/21/1921
S13 HES 302 S12	793363	John Peter Hand and Carmen Hand, minor orphan children of Peter J. Hand	2/3/1921	159.73	HE	
M&B (no S given)	PHX 050648	Jesse Wright; Parker Canyon, AZ	3/9/1921	160.43	HE	Contested by George A. Bereich 3/7/1922; canceled 12/12/1922

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Table 15—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
\$19 M&B \$18	PHX 050906	David A. Jones; Parker Canyon, AZ.	3/21/1921	158	HE	Relinquished 2/10/1923
\$8 HES 534	800966 3/28/1921	Ralph C. McIntyre 126.75	HE			
\$4 HES 533 \$8-9	808974	Samuel W. Lacey	6/6/1921	135.36	HE	
\$14 HES 539 \$11	814544	John P. Chapman	7/15/1921	158.76	HE	
\$24 HES 532 \$23						
\$13-14 \$8 HES 297	814533	Daniel M. Peeples	7/15/1921	148.47	HE	
\$7 \$3-4	816612 PHX 050594	Edward McFarlane John Bender; Los Angeles, CA.	7/28/1921 9/28/1921	158.94 631.61 (4)	HE	
640.64 (3)	OG Per.	Filed 2/15/1921; bond furnished 8/15/1921; canceled 6/12/1928				
\$13 all except HES 532 \$12 all except HES 302	PHX 050593	Albert Morgan; Los Angeles, CA.	5/22/1922		OG Per.	Canceled 3/26/1927
\$16-21 HES 298-299	PHX 054893	George Berclch; Parker Canyon, AZ.	1/27/1923 7/15/1923	160.43 160	HE	Relinquished 2/10/1923
\$21 \$5 HES 620 (23S 19E)	055544 944773 4246	Graydon Southard Oliver P. Lane Creation of Huac. NF district; transfer of land from Ft. Huac.	9/12/1924 6/5/1925	33.9	HE	EO Wdl. Huac. dist. of Coronado NF Part lying N of watershed 22S 19E; amend. EO 4278 7/ 31/1925
	4278		7/31/1925		EO amend. Huac. dist. of Coronado NF EO 4246 6/5/1925	Part lying N of watershed 21S 19E
\$18 NE, NW - lot 7	1008930	William F. Pierce	10/26/1927	158.46	HE	
\$18 NE partial	1010056	Frank C. Hopkins	12/13/1927	174.26	HE	
\$21 - lot 6 \$20 - lot 4 \$16-17 Part deficit	1018038	Graydon L. Southard	8/1/1928	161.73	HE	
10N 5W	148	School Indemnities	11/2/1935	634.76	IL Base	
\$2 - lot 5-10	156		11/12/1937	239.86	IL Base	
\$16 SE	182		9/28/1938	435.13	IL Base	
\$2	206		8/22/1940	1.5	IL Base	
\$2 NE, NW \$16 NW 3 (\$16) \$1-24 Part deficit (9N 30E)	207 IL Base Ar 030476 298		9/10/1940 5/24/1961 11/9/1962	400 (S2)		Det. area PL 167 Det. completed 8/14/1968

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Table 15—Continued.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
S16	346		6/3/1966	.02	IL Base	
S16	421		3/12/1968	.02	IL Base	
S16 NE, NW	466		6/2/1969	200	IL Base	
S19-24	A 16001		6/15/1981	849.76	OG Lease	
S1-18	A 15534		8/27/1981	9941.35	OG Lease	

Table 16—T24S, R20E.

Location	Entry Number	Homesteader	Date	Acreage	Type	Description
Lot 1274 (MS)	31367		8/2/1899	41.32	ME	MC 615
Lot 1280 (MS)	31366		8/2/1899	20.66	ME	MC 614
Lot 1279	31368		8/2/1899	20.66	ME	MC 616
Entire township					SO Temp. Wdl. Huac. For. Res. Proc. Wdl. Huac. For. Res.	Wdl. Proc. 11/6/1906; changed to Huac. NF Act 3/4/1907; name changed to Garces NF EO 908 7/2/ 1908; trfd. to Coronado NF Proc. 1121 4/17/1911
\$2, 16, 32, 36 all			6/20/1910		SG	Title to state to fix on approval of survey; subj. to prior right
\$6 MS 3641	09115	James Sutherland	10/2/1915	160		
\$12-13	840849	Bruce Doredor; Parry No. 3 Lode claim	1/4/1922	84.307	ME	
\$11-14 MS 642	861696	Bruce Doredor; Z.T. Parker, chief, fraction, rubio, tunnel site, Miss. stake, Grub stake No. 2, and Grub stake No. 3; lode mining claims	5/4/1922	156.581	ME	
\$7, 18 all	PHX 050593	Albert Morgan; Los Angeles, CA.	5/22/1922	128	OG Per.	Canceled 3/26/1927
	4246		6/5/1925		EO Wdl. Huac. dist. of Coronado NF - part lying N. of watershed	
	4278		7/31/1925		EO Elim. Huac. dist. of Coronado NF EO 4246 6/5/1925	
Part deficit						
\$5 13E	124		11/3/1934	640	IL Base	
\$6 SHC 37	1073231		11/14/1934	160	SHC	
\$2, 16	204		7/29/1940	200 (\$2)		
640 (\$16)	IL Base					
\$12 MS 4281	1124430	Josephine Johnson and Charles Morgan; Nugget # 1; lode mining claim	1/10/1949	20.661	ME	
\$13 MS 4335A, 4335B	1132758	Grace Sparkes; state of Texas No. 2, lode mining; state of Texas mill site; state of Texas No. 2 mill site		8/14/1951	30.591	ME
\$10, 11, 13- 15, 22-24	2995		11/5/1952			Proc. Wdl. Coronado Nat. Mem.
\$13	PHX 086976	Sulphur Springs Valley Elec. Coop.	10/12/1954		R/W Trans. line	Approved by FS
\$13, 14	86-689		9/2/1960		Elim. Coronado Nat. Mem. Public land	
\$1-21	Ar 030476		5/24/1961		Det. area PL 167	Rights rec. under PL 167 to various mines

Appendix 8.2

Climate in the San Rafael Valley and Surrounding Areas

Table 1—Monthly and annual precipitation.

Station	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Fort Buchanan														
	1857	—	—	—	—	—	—	—	—	—	—	—	—	—
	1858	1.97	0.51	0.29	1.46	0.00	0.48	—	10.60	4.76	1.07	0.00	0.69	—
	1859	0.54	2.36	0.00	0.50	0.00	0.20	3.21	3.50	1.32	0.60	0.16	2.58	16.08
	1860	2.35	2.92	0.49	0.44	0.00	0.65	3.30	6.67	0.74	2.33	2.84	0.40	25.82
	1861	1.01	0.25	T	0.00	0.55	1.96	—	—	—	0.64	1.36	0.93	18.25
	Means	1.47	1.51	0.20	0.60	0.14	0.82	5.25	6.16	2.03	1.16	1.09	1.15	21.58
Crittenden														
	1889	—	—	—	—	—	—	2.17	2.32	1.70	0.30	0.00	—	—
	1890	—	—	—	—	—	—	6.00	5.95	2.60	1.42	—	—	—
	Means	—	—	—	—	—	—	4.08	4.14	2.15	—	—	—	—
Fort Huachuca														
	1886	1.18	1.94	0.20	T	0.00	0.00	1.41	4.24	1.46	0.84	T	0.20	11.47
	1887	0.00	1.30	0.00	0.00	0.00	0.72	4.08	2.00	3.48	0.74	1.16	1.80	15.28
	1888	0.10	0.30	0.96	0.00	0.60	1.06	7.96	2.05	0.96	2.12	2.78	1.06	19.95
	1889	1.90	1.55	2.71	0.22	0.00	0.16	3.66	1.80	2.46	0.04	0.14	0.75	15.39
	1890	1.50	0.10	T	0.34	0.00	T	4.38	4.49	4.68	0.37	1.04	2.70	19.60
	Means	0.80	1.27	0.97	0.11	0.15	0.39	4.29	2.92	2.61	0.94	1.02	0.95	16.42
Huachuca Mountain (near base, south side)														
	1888	—	—	—	—	—	0.76	4.45	2.41	0.50	0.49	3.46	1.42	—
	1889	2.37	0.34	2.61	0.14	T	0.55	5.44	0.54	3.04	0.63	T	0.21	15.87
	1890	2.51	0.16	0.03	0.32	0.00	0.00	3.33	4.46	2.25	0.69	1.37	—	—
	Means	2.44	0.25	1.32	0.23	T	0.44	4.41	2.47	1.93	0.56	1.73	0.82	16.60
Lochiel														
	1888	—	—	—	—	—	1.00	8.03	0.40	3.10	1.00	2.00	1.60	—
	1889	1.90	—	1.91	0.10	0.00	1.55	3.77	1.67	2.17	0.55	0.00	0.65	—
	1890	3.06	0.43	0.02	0.20	1.07	0.10	4.87	7.18	4.53	0.88	1.11	3.45	—
	Means	2.48	0.43	0.96	0.10	0.00	0.88	5.90	1.04	2.64	0.78	1.00	1.12	17.43

Table 2—Annual average precipitation by month.

Station	Length of Records	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Canelo RS	1910-53	1.20	1.34	0.90	0.49	0.21	0.85	4.76	4.20	1.67	0.77	0.90	1.41	18.70
Elgin	1912-53	1.04	1.02	0.60	0.34	0.17	0.64	3.47	3.20	1.59	0.64	0.72	1.04	14.47
Patagonia	1921-53	0.98	1.09	0.84	0.45	0.18	0.57	4.26	3.99	1.87	0.70	0.82	1.28	17.03
San Rafael	1923-53	1.00	1.12	0.91	0.50	0.13	0.73	4.54	4.20	1.76	0.72	0.80	1.25	17.66

Table 3—Daily extremes of precipitation at Arizona stations.

Station	Altitude (ft)	Years of Record	Inches	Date
Patagonia	4,044	1921-53	4.45	Sept. 1946
San Rafael Ranch	4,741	1923-53	3.50	Sept. 1926

Table 4—Total precipitation (Inches).

Station	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Canelo	1931	0.85	5.06	0.05	0.76	0.18	3.58	3.83	8.28	2.85	0.11	2.30	1.19	29.04
	1932	1.81	2.09	0.30	0.06	0.00	0.28	9.76	2.39	0.66	0.52	0.00	2.53	20.40
	1933	1.62	1.06	0.00	0.06	0.00	1.95	2.90	3.74	4.02	1.76	2.00	0.02	19.13
	1934	0.69	1.08	0.20	0.86	0.38	0.33	3.57	5.61	0.40	0.60	0.81	3.00	17.53
	1935	1.39	3.63	0.90	0.15	0.13	0.06	3.24	6.36	2.77	0.00	2.12	1.35	22.10
	1936	1.04	1.01	0.20	0.00	0.10	0.62	4.16	5.29	2.27	2.02	1.54		
	1937	1.92	0.25	1.40	0.10	0.01	1.50	2.26	4.08	2.00	1.11	T	2.18	16.81
	1938	0.80	0.92	1.26	0.15	0.22	1.51	2.88	4.08	2.15	T	T	1.93	15.90
	1939	0.77	1.24	0.59	0.11	0.00	0.40	2.55	4.52	2.80	1.10	0.55	0.67	15.30
	1940	0.65	3.51	0.20	0.30	0.09	3.40	2.25	4.17	1.27	0.60	0.99	3.05	20.48
	1941	2.03	1.59	0.78	1.28	0.32	0.41	1.17	3.41	2.14	0.48	2.69		
	1942	0.87	1.43	0.21	2.06	0.00	0.06	2.81	2.70	0.85	0.83	0.00	0.87	12.69
	1943	0.88	0.17	0.49	0.00	T	1.74	2.71	6.17	0.97	0.64	T	1.33	15.10
	1944	1.05	1.32	1.38	0.52	0.00	0.19	3.99	3.66	2.47	0.87	1.76	1.55	18.76
	1945	1.10	0.32	1.32	0.28	0.00	0.00	3.54	5.97	1.02	2.30	0.00	0.15	16.00
	1946	2.30	0.10	0.50	0.07	0.00	0.15	6.44	6.13	2.57	1.16	0.65	0.61	20.68
	1947	0.46	0.47	0.12	0.16	0.42	0.04	2.00	6.66	0.75	0.68	0.82	0.72	13.30
	1948	T	1.90	0.83	0.00	0.00	0.42	3.96	5.47	2.20	0.55	T	1.86	17.19
	1949	3.01	0.80	0.35	0.11	0.00	1.11	4.10	3.72	3.03	1.62	0.10	2.01	19.96
	1950	0.74	0.92	0.29	0.00	T	1.25	10.02	1.13	T	0.04	0.00	0.00	14.39
	1951	1.56	0.37	0.32	2.50	0.00	0.00	5.30	5.99	0.67	1.58	2.18		
	1952	1.24	0.42	2.72	1.82	0.58	1.16	3.51	3.68	0.49	0.00	1.90	1.83	19.35
	1953	T	1.50	1.00	0.08	0.00	T	3.34	1.08	0.00	0.10	0.02	0.15	7.27
	1954	3.01	0.17	2.29	0.00	0.53	0.84	2.44	7.66	3.18	0.70	0.00	0.02	19.01
	1955	0.74	0.47	0.31	0.00	0.04	0.00	6.47	8.85	0.06	1.25	0.22	0.26	19.86
	1956	0.91	0.36	0.00	0.20	0.00	0.52	7.45	3.26	0.00	0.30	0.08	0.33	13.41
	1957	2.69	0.18	1.16	0.10	0.28	0.81	3.39	4.92	0.07	1.73	0.37	0.52	16.22
	1958	0.08	1.62	3.27	0.44	0.00	4.89	6.75	4.52	2.53	0.92	0.87	0.00	25.89
	1959	0.00	1.52	0.00	0.12	0.00	0.69	6.70	5.51	0.24	2.12	1.33	1.72	19.95
	1960	2.58	0.52	0.16	0.00	0.00	0.17	2.71	4.53	1.51	1.57	T	0.72	14.47
	1961	1.00	0.30	0.10	0.00	0.00	2.24	3.15	4.50	2.07	2.89	0.51	2.55	19.31
	1962	2.08	0.26	1.28	0.05	0.00	0.10	3.06	0.34	2.36	0.70	0.32	1.65	12.20
	1963	0.80	1.00	0.26	0.39	0.00	0.00	6.21	4.91	1.70	0.65	2.21	0.61	18.74
	1964	0.32	0.02	0.74	0.26	0.00	0.20	7.65	4.46	4.87	1.26	0.83	0.35	20.96
1965	0.44	0.68	0.49	0.49	0.19	0.14	3.46	4.03	0.69	T	0.35	8.21	19.17	
1966	1.61	1.74	0.09	0.12	0.18	0.17	4.35	5.31	3.48	0.08	0.65	0.48	18.26	
1967	0.04	0.52	0.19	0.32	0.31	1.46	4.97	3.22	3.03	2.03	0.53	5.19	21.81	
1968	0.96	1.69	1.69	0.55	0.00	0.00	4.06	3.89	0.04	0.12	0.62	1.24	14.85	
1969	0.55	1.21	0.44	0.03	0.37	0.03	7.44	6.49	0.99	0.18	0.91	0.39	19.03	
1970	0.02	0.55	1.67	0.34	0.00	0.04	4.33	3.47	1.98	0.02	0.00	0.61	13.03	
1971	0.11	0.97	0.00	0.36	0.00	T	4.07	5.92	2.41	2.04	0.48	2.03	18.39	
1972	0.03	0.00	0.00	0.00	0.48	1.55	1.82	2.35	2.27	2.81	1.32	0.84	13.47	
Patagonia	1931	0.74	5.18	0.12	0.50	0.06	2.35	4.19	7.83	2.41	0.02	2.38	0.67	26.45
	1932	1.01	1.11	T	0.23	0.00	T	6.67	2.82	0.64	0.61	0.00	1.96	15.05
	1933	2.25	0.50	0.00	0.14	0.00	0.42	2.87	3.57	2.72	1.00	1.32	0.14	14.93
	1934	0.75	0.73	0.18	0.13	0.11	0.41	3.47	4.18	0.64	0.03	0.99	2.67	14.28
	1935	1.29	1.65	1.10	0.00	0.51	0.00	2.56	8.57	1.86	0.00	2.77	1.58	21.89
	1936	0.96	1.21	0.27	0.00	T	T	5.52	4.75	2.21	0.12	1.17	1.08	17.29
	1937	2.60	0.08	0.75	0.00	0.14	0.46	3.06	3.94	1.89	1.15	0.00	1.51	15.58
	1938	0.78	1.26	1.11	0.13	0.12	1.21	2.22	4.91	0.86	0.00	0.00	1.32	13.92
	1939	1.04	1.98	0.18	0.13	0.00	0.25	2.96	4.55	1.64	1.11	0.59	0.76	15.19
	1940	0.61	3.05	0.26	0.20	0.33	2.33	3.49	3.50	2.48	0.10	1.16	3.77	21.28
	1941	1.52	1.77	0.71	1.56	0.39	0.35	2.82	2.59	3.47	0.76	0.22	2.39	18.55
	1942	0.78	1.23	0.26	2.07	0.00	0.00	2.01	1.49	1.15	0.91	0.00	0.14	10.04
	1943	1.47	T	0.34	0.00	0.00	1.10	2.42	5.86	1.88	0.51	0.00	0.86	14.44
	1944	0.68	2.06	1.90	0.46	T	0.26	1.46	3.85	1.63	0.58	1.92	2.11	16.91
	1945	0.94	0.18	1.48	0.10	0.00	0.00	3.65	5.26	0.88	2.26	0.00	0.17	14.92
1946	2.13	T	0.57	0.32	0.00	0.00	4.69	2.91	6.74	0.90	0.73	0.07	19.06	
1947	0.41	0.35	0.32	0.10	0.53	0.00	2.43	3.38	1.25	0.40	1.05	0.65	10.87	

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Table 4—Continued.

Nation	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	1948	0.00	2.05	0.41	0.00	0.00	0.08	5.58	4.48	2.00	0.44	0.01	1.63	16.68
	1949	3.03	0.92	0.46	0.14	0.00	0.49	6.07	2.25	3.19	0.72	0.28	2.18	19.73
	1950	0.81	0.95	0.11	0.00	0.04	0.44	9.60	1.48	1.35	T	0.00	T	14.78
	1951	1.93	0.21	0.36	1.49	0.04	0.00	3.31	5.75	1.67	2.54	1.56	1.96	20.82
	1952	1.06	0.22	3.14	1.82	0.64	0.87	3.48	6.87	1.15	0.00	1.82	1.15	22.22
	1953	0.19	1.40	0.91	0.06	0.17	0.23	6.84	2.19	0.00	0.28	0.13	0.12	12.52
	1954	1.36	0.11	2.75	0.00	1.20	1.06	9.26	5.28	0.66	0.37	0.00	0.03	22.08
	1955	3.10	0.35	0.12	0.00	0.00	0.00	6.87	7.16	0.18	0.31	0.09	0.31	18.49
	1956	0.89	0.49	0.00	0.21	0.05	0.13	5.78	1.48	0.01	0.27	0.09	0.25	9.57
	1957	3.06	0.29	1.39	0.42	0.42	0.11	3.27	4.17	0.13	1.97	0.18	0.70	16.11
	1958	0.02	1.68	3.84	0.38	T	1.12	5.42	3.08	2.22	1.10	1.28	0.00	20.14
	1959	0.00	1.13	T	0.23	0.00	0.53	6.11	3.07	0.56	1.88	2.24	1.84	17.59
	1960	3.28	0.44	0.63	0.00	0.00	0.03	3.15	6.47	1.56	2.68	0.15	0.73	19.12
	1961	1.18	0.11	0.25	0.00	0.00	1.10	3.30	6.12	2.43	3.37	0.23	3.02	21.11
	1962	2.14	0.51	1.14	0.09	0.00	0.12	2.84	0.99	1.76	0.43	0.48	1.71	12.21
	1963	0.97	1.18	0.27	0.47	T	0.00	4.94	5.89	2.53	0.69	2.20	0.53	19.67
	1964	0.44	0.08	0.71	0.42	0.00	0.43	4.84	4.74	8.13	1.43	1.27	0.52	23.01
	1965	0.20	0.66	0.41	0.50	T	0.09	4.30	2.30	3.18	0.19	0.70	8.62	21.15
	1966	2.02	2.26	0.07	0.02	0.07	0.08	5.79	5.82	3.97	0.55	0.95	0.82	22.42
	1967	0.02	0.35	0.23	0.35	0.65	0.87	4.33	3.93	1.80	0.55	0.67	6.80	20.55
	1968	0.66	2.00	1.43	0.39	0.00	0.00	3.29	3.31	0.14	0.23	0.50	1.09	13.04
	1969	0.86	0.98	0.47	0.09	0.42	0.00	5.66	5.86	0.83	0.01	0.75	0.87	16.80
	1970	0.00	0.82	2.11	0.05	0.05	0.40	4.39	2.89	2.34	0.44	0.00	0.56	14.05
	1971	0.22	1.20	0.00	0.43	0.00	0.94	4.94	6.20	1.97	2.45	1.12	2.26	21.73
	1972	0.07	0.00	0.05	0.00	0.23	2.59	2.38	2.15	3.51	3.92	1.64	1.08	17.62
San Rafael Ranch														
	1931	0.58	4.60	0.00	0.65	0.00	1.89	3.69	7.82	4.46	0.00	2.47	1.28	26.64
	1932	2.05	1.94	0.44	0.45	0.00	0.88	5.92	2.34	0.83	0.29	0.00	2.53	17.67
	1933	2.84	0.91	0.00	0.08	0.00	1.87	2.98	4.36	1.70	1.54	1.69	0.00	17.97
	1934	0.79	0.64	0.12	0.49	0.31	0.74	4.64	7.38	0.76	0.32	1.00	2.71	19.90
	1935	1.36	2.39	1.19	0.34	0.14	0.00	3.34	5.98	0.74	0.15	2.70	1.57	19.90
	1936	0.87	1.02	0.40	0.00	0.00	0.28	5.75	2.09	2.68	0.08	1.47	1.48	16.12
	1937	1.51	0.30	1.18	0.00	0.10	0.54	2.49	4.33	1.32	1.45	0.00	1.58	14.80
	1938	0.58	1.18	1.45	0.12	0.11	0.73	3.64	2.50	0.75	0.00	0.00	1.90	12.96
	1939	0.62	1.11	0.15	0.25	0.00	0.30	5.01	5.27	2.13	1.15	0.55	0.48	17.02
	1940	0.87	2.59	0.13	0.03	0.18	1.35	3.87	4.65	1.40	0.25	0.67	2.85	18.84
	1941	1.71	2.40	1.45	1.02	0.00	0.14	1.54	6.03	2.63	0.17	0.17	1.51	18.77
	1942	0.95	1.61	0.46	2.04	0.00	0.10	2.86	2.92	1.78	1.91	0.00	0.17	14.80
	1943	1.28	0.37	0.69	0.00	0.00	2.71	2.23	6.96	3.01	1.00	0.00	1.17	19.42
	1944	0.75	1.48	2.54	0.58	0.00	0.68	3.02	3.59	1.32	1.33	1.47	1.50	18.26
	1945	1.16	0.30	1.81	0.20	0.00	0.00	3.96	2.85	1.10	0.98	0.00	0.08	12.44
	1946	1.94	0.05	0.24	0.10	0.03	0.07	6.42	3.34	2.58	1.05	0.33	0.50	16.65
	1947	0.56	0.19	0.09	0.12	0.66	0.00	3.17	5.37	0.85	0.29	0.96	0.80	13.06
	1948	0.00	1.92	0.75	0.00	0.00	0.18	2.12	3.93	1.54	0.50	T	1.93	12.87
	1949	2.41	0.72	0.49	0.10	0.00	0.66	4.90	2.64	2.42	0.37	0.05	1.80	16.56
	1950	0.70	0.89	0.36	0.00	0.04	0.56	11.08	0.63	0.11	T	0.00	0.01	14.38
	1951	1.18	0.29	0.88	1.83	0.00	0.00	4.39	8.30	1.10	1.17	0.85	2.26	22.25
	1952	1.08	0.30	2.01	3.08	0.24	1.39	2.90	5.54	1.30	0.00	1.28	1.12	20.24
	1953	0.00	1.40	0.80	0.09	0.00	0.25	5.26	2.54	0.00	0.31	0.20	0.11	10.96
	1954	1.60	0.25	2.78	0.11	0.42	0.40	7.89	3.88	2.49	0.35	0.00	0.03	20.20
	1955	1.88	0.32	0.41	0.00	T	0.00	7.26	5.88	0.48	1.20	0.30	0.19	17.92
	1956	0.93	0.36	0.00	0.18	T	0.34	5.85	1.92	0.00	1.12	0.00	0.12	10.82
	1957	2.90	0.29	1.15	0.13	0.10	0.24	3.51	2.48	0.10	1.46	0.02	0.59	12.97
	1958	0.00	1.31	3.40	0.32	T	1.11	7.02	5.63	2.41	0.81	0.56	0.00	22.57
	1959	0.00	1.10	0.00	0.22	0.00	1.09	3.70	3.59	0.27	1.54	1.45	1.74	14.70
	1960	2.58	0.30	0.12	0.00	0.00	0.19	1.70	4.32	2.32	1.79	0.09	0.87	14.28
	1961	1.43	0.11	T	0.00	0.00	1.08	3.18	5.16	3.48	2.56	0.52	2.16	19.68
	1962	0.05	0.00	0.03	3.07	1.57	1.55	0.32	1.21					
	1963	0.34	0.74	0.23	0.41	0.00	0.00	4.83	3.31	1.21	0.50	2.12	0.62	14.31
	1964	0.00	0.18	0.88	0.18	0.00	0.76	4.19	4.32	4.71	1.08	0.91	0.12	17.33
	1965	0.47	0.38	0.39	0.30	0.15	0.06	3.91	3.30	1.27	T	0.21	5.89	16.33
	1966	1.43	1.20	T	0.00	0.00	0.21	7.16	8.71	2.21	0.61	0.62	0.38	22.53
	1967	0.08	0.28	0.30	0.00	0.30	1.30	6.40	2.10	2.13	0.28	0.75	4.95	19.17
	1968	0.79	1.43	1.50										

Table 5—Average number of days with 0.01 inch or more of precipitation at Arizona stations.

Station	Length of Records	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Canelo RS	1910-53	5	5	4	3	1	3	13	12	6	3	3	5	63
Elgin	1912-53	3	3	2	2	1	3	11	10	5	2	2	3	47
Patagonia	1921-53	3	4	3	2	2	2	12	11	5	3	3	3	53
San Rafael	1923-53	4	4	3	2	1	2	15	13	6	3	2	4	59

Table 6—Mean monthly and annual snowfall (inches).

Station	Length of Records	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Canelo RS	1910-53	3.5	2.7	1.6	T	T	T	0	0	0	T	0.4	2.1	10.7
Elgin	1912-53	2.1	1.5	0.8	0.3	T	0	0	T	0	T	0.2	0.9	5.8
Patagonia	1921-53	0.9	0.5	0.4	0.1	T	0	T	T	T	T	0.1	0.5	2.5
San Rafael	1923-53	0.9	0.7	0.4	0.2	0	T	0	0	0	0	0.1	0.2	2.5

Table 7—Mean temperatures.

Station	Record Dates	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Canelo	1920-53													
Mean Max.		57.6	61.6	66.6	74.1	81.9	90.2	88.3	84.7	84.4	77.4	66.2	58.1	74.2
Mean Min.		23.3	26.3	26.2	35.4	41.1	50.4	58.5	57.2	51.2	39.7	29.2	24.6	38.6
Mean		40.4	44.0	46.4	54.8	61.5	70.3	73.4	71.0	67.8	58.6	47.7	41.4	56.4
Highest														
Mean Max.		67.1	67.5	76.3	81.8	87.5	95.0	93.7	91.2	91.6	84.1	74.1	69.0	—
Highest														
Mean Min.		29.1	33.0	36.4	44.4	47.1	60.0	62.2	61.0	55.0	43.7	35.5	32.6	—
Lowest														
Mean Max.		45.9	54.6	54.3	63.8	75.2	85.8	77.9	79.8	74.7	68.4	51.6	43.9	—
Lowest														
Mean Min.		17.6	19.6	21.9	31.3	36.6	42.3	51.3	53.8	46.5	34.9	21.4	17.5	—
San Rafael														
Ranch	1950-53													
Mean Max.		63.1	62.5	64.8	71.7	81.7	91.4	87.6	89.0	89.7	83.3	70.2	62.9	76.5
Mean Min.		24.9	22.6	27.2	34.3	38.7	48.6	59.1	57.9	49.5	42.4	31.2	22.9	38.3
Mean		44.0	42.6	46.0	53.0	60.2	70.0	73.4	73.4	69.6	62.8	50.7	42.9	57.4

Table 8—Extreme temperatures.

Station	Length of Records	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Canelo RS	1910-53	5	5	4	3	1	3	13	12	6	3	3	5	63
Canelo	1920-53													
Highest		81	86	85	99	100	105	109	97	97	94	86	78	109
Lowest		-6	4	8	16	19	30	40	46	28	19	6	2	-6
Avg. Hi.		70.4	74.3	77.9	86.2	92.1	98.9	96.9	92.1	91.5	87.1	78.2	71.5	—
Avg.Low		10.7	13.9	17.6	23.0	30.4	38.1	49.5	50.4	40.5	28.1	16.6	12.3	—
San Rafael Ranch	1950-53													
Highest		79	80	80	85	100	102	102	101	103	94	85	80	103
Lowest		11	4	13	22	20	29	40	43	40	25	5	1	1

Table 9—Dates of killing frost in spring and autumn and length of growing season.

Station	Avg. Date of Elevation	Ave. Length Years of Record	Date of Last Spring Frost	Date of First Autumn Frost	of Growing Season	Killing Frost In Spring	Killing Frost In Autumn
Canelo RS	5,000	1910-23, 1924-47	May 1	Oct. 18	170	June 4	Sept. 24
Elgin	4,780	1922-38	Apr. 21	Oct. 7	164	June 5	Oct. 1
Patagonia	4,044	1921-38	Apr. 14	Oct. 26	195	June 1	Sept. 20
San Rafael Ranch	4,741	1923-40	Apr. 12	Nov. 2	203	May 9	Oct. 1

Table 10—Yearly precipitation for Canelo, Arizona.

Year	Precipitation (Inches)	Year	Precipitation (Inches)
1910	13.77	1937	16.81
1911	20.28	1938	15.90
1912	20.84	1939	15.30
1913	17.25	1940	20.48
1914	30.92	1941	16.61
1915	16.31	1942	12.69
1916	17.92	1943	15.10
1917	15.74	1944	18.76
1918	15.32	1945	16.00
1919	25.54	1946	20.68
1920	20.55	1947	13.30
1921		1948	17.24
1922		1949	19.96
1923		1950	14.39
1924	10.89	1951	
1925	15.89	1952	
1926	23.63	1953	
1927	19.96	1954	
1928	21.38	1955	19.86
1929	22.73	1956	13.41
1930	22.69	1957	
1931	29.04	1958	25.89
1932	20.40	1959	19.95
1933	19.13	1960	14.47
1934	17.53	1961	19.31
1935	22.10	1962	12.20
1936		1963	

Table 11—Yearly temperatures for Canelo, Arizona.

Year	Temperature (°F)	Year	Temperature (°F)
1920		1942	
1921		1943	
1922		1944	
1923		1945	
1924	52.7	1946	
1925		1947	
1926		1948	
1927		1949	
1928	57.4	1950	
1929	55.8	1951	
1930		1952	
1931		1953	
1932		1954	
1933		1955	
1934		1956	
1935		1957	55.0
1936		1958	
1937		1959	57.6
1938		1960	58.0
1939		1961	57.3
1940		1962	57.7
1941		1963	58.1

Table 12—Yearly precipitation for Patagonia, Arizona.

Year	Precipitation (Inches)	Year	Precipitation (Inches)
1922		1943	14.44
1923	22.32	1944	16.91
1924	13.37	1945	14.92
1925	15.03	1946	19.06
1926	20.11	1947	10.87
1927	20.59	1948	16.68
1928	13.54	1949	19.73
1929	17.17	1950	14.78
1930	22.43	1951	20.82
1931	26.47	1952	22.22
1932	15.05	1953	12.52
1933	14.93	1954	22.08
1934	14.28	1955	18.49
1935	21.89	1956	9.57
1936	17.29	1957	16.11
1937	15.58	1958	20.14
1938	13.92	1959	17.59
1939	15.19	1960	19.12
1940	21.28	1961	21.11
1941	18.55	1962	12.21
1942	10.04	1963	

Table 13—Yearly precipitation for San Rafael Ranch, Arizona.

Year	Precipitation (Inches)	Year	Precipitation (Inches)
1893		1940	18.84
1894		1941	18.77
1895		1942	14.80
1896		1943	19.42
1897	16.14	1944	18.26
1898		1945	12.44
1899		1946	16.65
1923		1947	13.06
1924	12.63	1948	12.87
1925		1949	16.56
1926	25.54	1950	14.38
1927	20.79	1951	22.25
1928	14.31	1952	20.24
1929	19.44	1953	10.96
1930	20.47	1954	20.20
1931	26.64	1955	17.92
1932	17.67	1956	10.82
1933	17.97	1957	12.97
1934	19.90	1958	22.57
1935	19.90	1959	14.70
1936		1960	14.28
1937	14.80	1961	19.68
1938	12.96	1962	
1939	17.02	1963	

Table 14—Yearly temperatures for San Rafael Ranch, Arizona.

Year	Temperature (°F)	Year	Temperature (°F)
1950		1957	
1951		1958	58.3
1952	56.9	1959	
1953		1960	
1954	56.8	1961	
1955	54.8	1962	
1956		1963	

Chapter 9

Conclusions

Each of the previous chapters concluded with a brief discussion of the environmental impact of the particular time period or economic activity upon the study area. In this chapter, we weave those different threads together by discussing the cumulative environmental impact of American Indian, Spanish, Mexican, and Anglo-American mining, ranching, agriculture, woodgathering, burning, wild plant gathering, hunting, and other pursuits upon the relevant subregions within the San Rafael/Lone Mountain area. These subregions are: (1) the San Rafael de la Zanja land grant; (2) the Northern Valley, including the headwaters of the Santa Cruz River as well as Red Rock and Lampshire canyons, which drain into Harshaw Creek, a tributary of Sonoita Creek (the old Red Rock and San Rafael ranges); (3) the Eastern Slopes and Foothills of the Patagonia Mountains, including the Mowry and Washington Camp/Duquesne mining districts and Lochiel; (4) the Southwestern Slopes and Foothills of the Huachuca Mountains south of the Canelo Hills, including Parker, Bodie, and Sunnyside canyons (the old Parker Canyon Range); and (5) Lone Mountain (the old Lone Mountain Range). With the exception of the northern portion of subregion 2, all of the subregions are part of the upper Santa Cruz watershed. Although all of the subregions share certain geological, hydrological, and botanical characteristics, each has a somewhat distinct pattern of historical settlement and land use that sets it apart from the others.

SAN RAFAEL DE LA ZANJA LAND GRANT

The heart of the San Rafael Valley is the San Rafael de la Zanja land grant, which straddles the upper Santa Cruz River for more than five miles. The grant consists of more than 25 sections of relatively well-watered plains grassland dominated by perennial grasses such as the gramas (*Bouteloua* spp.), plains lovegrass (*Eragrostis intermedia*), threeawn (*Aristida longiseta*), bluestems (*Andropogon* spp.), plains bristlegrass (*Setaria macrostachya*), and galleta (*Hilaria jamesii*) (Bahre 1991). Cattle ranching has therefore been the most important economic activity since Spanish colonial times. Irrigated agriculture has also been carried out along this stretch of the Santa Cruz,

but that agriculture has always been subsidiary to stock raising.

At present, there is no evidence that either the Sobaipuri O'odham or the Chiricahua Apaches ever settled along the upper Santa Cruz during the late 17th, 18th, or 19th centuries. More intensive archaeological survey and excavation may reveal such occupations, but the historic Sobaipuri apparently preferred the middle Santa Cruz and San Pedro watersheds. Consequently, we doubt that American Indians had much of a direct impact upon the floodplain of the upper Santa Cruz itself.

American Indians passed through the subregion on their way to other destinations and may have done a limited amount of wild plant gathering there. Key species would have included mesquite (for pods and perhaps firewood), beargrass (for basketry), and yucca (for basketry and food), but we doubt those gathering activities significantly affected the distribution or frequency of plains grassland or riparian species. Hunting may have been a more important activity, especially when it involved fire drives. Anthropogenic fires by American Indians, in fact, probably were the most significant human modifications of the plains grassland until the late 19th century. Those fires were set for a variety of reasons including raiding and warfare as well as hunting. They suppressed the invasion of shrubs and trees such as mesquite and promoted the growth of perennial grasses, maintaining their nearly continuous cover in the valley.

The second major impact of American Indians, particularly the Apaches, was the periodic curtailment of nonindigenous settlement along the upper Santa Cruz. As Chapter 3 indicates, there were three distinct periods of Hispanic settlement along the Santa Cruz south of the study area. During those three periods (the late 1600s, the 1720s–1760s, the 1780s–present), Spanish and Mexican stockmen undoubtedly drove their herds, or let their herds drift, onto the lush grasslands of the upper Santa Cruz. O'odham unrest restricted Hispanic expansion during the first period. Apache raiding drove out Spanish settlers during the 1760s. Beginning in the 1820s, Mexican *parcioneros* (shareholders) from the pueblo of Santa Cruz attempted to occupy the upper Santa

Cruz watershed after the Republic of Mexico awarded the San Rafael de la Zanja land grant to "Don Ramón Romero and other associated residents" of Santa Cruz in 1825. At their height, in the early 1830s, the shareholders in the grant ran perhaps as many as 5,000 cattle and numerous horses in the San Rafael Valley. By 1834, however, Apache raids had grown so intense that the number of stock declined and families no longer could establish themselves in the valley with any degree of security. The occupation of the land grant largely came to an end in 1843, when Apaches killed about 30 settlers at La Boca de la Noria near modern Lochiel. The San Rafael Valley was not reoccupied until the late 1850s, when a small number of Anglo-American and Mexican stock raisers drifted into the upper Santa Cruz watershed once again.

Because of Apache raids, Hispanic settlement of the grant lasted less than two decades. The grant was communal open range, shared by the 20 to 30 *parcioneros* from Santa Cruz who paid taxes on the grant in proportion to the numbers of stock they ran. The number of cattle apparently fluctuated from a high of perhaps 5,000 to about 2,000 head when the massacre of 1843 occurred. These animals were not confined to the four square leagues of the grant itself, however. No fences existed at that time and the animals undoubtedly ranged across the valley on the so-called "overplus" lands Colin Cameron fought so hard to control half a century later.

Hispanic settlement itself clustered at La Noria (modern Lochiel). The *parcioneros* built homes and corrals there. Some of them also may have occupied a place in the center of the valley known as "la Zanja" (ditch) where, in the words of Santa Cruz resident José María Montoya, "the water first rises in the river." Two Anglo settlers named Slaven and Fleming had a field there, and it is interesting to speculate that some of the *parcioneros* may have farmed there as well. Anglo-American visitors in the early territorial period also reported slag heaps and the remains of smelters at La Noria and behind the main house on the San Rafael Ranch. At present, however, we do not know when those smelters were in operation or who operated them.

The defining period of settlement began in the 1870s, when Anglo-American and Mexican settlers reoccupied the upper Santa Cruz watershed in earnest and the era of the open range began. That era was dominated by the San Rafael Cattle Company under Colin Cameron. He and his eastern investors

bought the land grant from Rollin Richardson in 1883. For the next two decades, Cameron used lawsuits, intimidation, political influence, and perhaps even arson and murder to drive all but a few small ranchers and farmers from the San Rafael Valley. Cameron's ruthless efforts to claim 152,899 acres instead of 17,474 acres ended in 1900, when the U.S. Supreme Court ruled that the grant Cameron purchased was for four square leagues, not four leagues square. He sold the ranch to Colonel William C. Greene two years later. Nonetheless, Cameron undoubtedly impeded settlement in the valley during the cattle boom of the 1880s and early 1890s, which may have kept the valley from being as overstocked as other grassland ranges. Moreover, when the droughts hit and the boom collapsed, Cameron reduced his herds. He also improved his stock by introducing Hereford bulls, strung fences to better regulate grazing, developed artificial water sources to spread cattle more evenly across the range, and lobbied strenuously to keep woodcutters from cutting down trees on land claimed by the San Rafael Cattle Company. Ironically, Cameron's ruthlessness may have moderated the worst excesses of the boom and bust years that devastated so many other Arizona ranges in the late 19th century.

His successor, William C. Greene, confined himself to the grant boundaries within the study area. At the same time, however, he incorporated the grant into a ranching empire that encompassed San Rafael del Valle grant along the San Pedro and seven contiguous ranches in northern Sonora as well. Greene kept his herd of 500 registered Herfords on the San Rafael, using it to supply his other ranches with high-quality bulls. Under managers Tom Turner and Tom Heady, the San Rafael Ranch continued Cameron's innovations by crossfencing the ranch into smaller and smaller pastures to regulate grazing and periodically rest each range. The San Rafael also drained malarial *ciénegas* along the Santa Cruz, halted woodcutting to prevent erosion, and planted 50 to 100 acres of irrigated land in fodder crops such as corn, milo maize, and alfalfa. Later, under manager Marshall Hartmann, the San Rafael even irrigated permanent pastures and connected them to range pastures to give cattle a choice between range or pasture year-round. Because the grant was owned by the Greene family and managed as a single unit from the early 1900s until the present, it apparently avoided much of the overstocking that plagued other portions of the study area. Interestingly enough, two other large

ranches in the study area—the Heady Ashburn/San Antonio and the Vaca—were started by Tom Heady and Clyde McPherson, both of whom worked for the San Rafael.

NORTHERN VALLEY

The Northern Valley subregion stretches from the Canelo Hills on the northeast to Redrock Canyon on the northwest. North of the San Rafael de la Zanja land grant, it is drained by the headwaters of the Santa Cruz and its northernmost tributaries as well as tributaries of Harshaw Creek flowing through Red Rock and Lampshire canyons. Prominent features include Meadow Valley and the lower stretches of Mowry Wash on the west and Cherry Creek on the east. This subregion contains the old Red Rock and San Rafael ranges and the northeastern portions of the old Harshaw Range.

Although there were several small mines in Red Rock Canyon and Meadow Valley, stock raising was the most significant economic activity. In their 1924 range evaluation for the Forest Service, Cooperrider and Hussey noted that most of the study area was overstocked “prior to the protective cuts made in 1921 and the drought of 1921 of the same year.” According to them, “Large portions of the Red Rock, Parker Canyon and Lone Mountain ranges are considered to have been damaged by past overgrazing.”

During the early 20th century, the Red Rock area—part of the Sonoita Creek watershed—was dominated by Vail and Ashburn, a large outfit that ran the Monkey Springs (later Rail X) and Empire ranches to the north as well. East of them, Clyde McPherson, a former employee of Greene, was the largest permittee, reportedly running more than a thousand head at times. Although the Red Rock area did not have many homesteaders, some settlers attempted dry farming during the 1915–16 period. Nearby, the headwaters of the Santa Cruz and the lower stretches of Mowry Wash were a zone of intense homesteading; T23S R17E had the largest number of homesteads (104) in the study area, most of them located immediately north and northwest of the grant. Many of these homesteaders practiced dry farming or irrigation agriculture along the Santa Cruz, storing fodder in pit silos. McPherson purchased many of these homesteads in the 1920s and 1930s. At the same time, however, he allowed some of the farmers to continue cultivating the land on a sharecropping basis. McPherson began the process of consolidation that

resulted in the Vaca Ranch, which now contains about 22,000 acres, 6,000 of which are deeded land.

The Parker brothers—George, Frank, and Duke—did the same just north of the grant along the headwaters of the Santa Cruz. They also farmed along the river bottoms and stored their silage in pits that are still visible. The depression following World War I forced them to sell their holdings and the ranch passed through a series of owners including the Meigs family, who ran it as a dude ranch known as the San Rafael Valley Ranch, and Phillips Petroleum, which named it the Ki He Kah (a Cherokee word supposedly meaning chief). During the 1960s, the Pruitt and Wray Cattle Company bought the ranch, prompting their neighbors to complain about overgrazing and the destruction of riparian habitat, including large cottonwoods, along the Santa Cruz. The present owners have subdivided a portion of their 2,600 acres of deeded land. In response, the other ranches in the valley have revived the San Rafael Valley Association to explore ways to prevent further subdivisions and to keep the valley in ranching. The Parker brothers may have done some intentional bog drainage on the upper stretches of the Santa Cruz near their ranch because portions of this area had been considered a cienega prior to the 1890s drought.

EASTERN SLOPES AND FOOTHILLS OF THE PATAGONIA MOUNTAINS AND LOCHIEL

The most intense and destructive human activities in the study area occurred along the eastern slopes of the Patagonia Mountains. The highly mineralized Patagonias attracted Spanish, Mexican, and Anglo-American prospectors, and their discoveries led to the establishment of major mining camps that developed into small towns. As Chapter 5 points out, the actual removal of ore from the ground was one strand in the web of ecological impacts mining had on the environment. Related timbercutting, fuelwood cutting, water extraction, road construction, and the creation of waste dumps and slag heaps—not to mention the demand for wood, water, and produce by the miners themselves—affected the vegetation communities and watercourses of the study area in more far-reaching ways than any other economic activity, including ranching.

Although the evidence is ambiguous, Mexican and perhaps even Spanish mining may very well have taken place in many of the locations that later became important mining districts in the late 19th cen-

ture, including: San Antonio (south of Washington Camp/Duquesne), Corral Viejo (Patagonia/Mowry), Durazno (Harshaw). When Anglo-American miners moved into the area, they adopted many of the techniques employed by Mexican miners such as using *arrastras* (mule powered mills) to crush the ores and adobe smelters to reduce them. The smelters were inefficient heat producers and required enormous quantities of charcoal. Woodcutters were therefore as important to the mining process as miners, and the impact upon stands of fuelwood, particularly oak and juniper, was immense.

The demand intensified when Anglo-American miners introduced steam powered stamp mills to crush ores and steam-powered pumps to regulate water levels in the mines themselves. The first mining district to develop during the Territorial period was Mowry, where the Patagonia (later the Mowry) Mine became one of the two largest mining operations in Arizona during the 1850s (the other being Samuel Heintzelman and Charles Poston's Sonora Exploring & Mining Company in Tubac and Arivaca). It was followed by the Harshaw District just north of the study area, and by Washington Camp and Duquesne in the southern Patagonias. Although it is impossible to quantify the number of cords of oak, juniper, and mesquite consumed by these mines, photographs of mining camps in the early 20th century reveal denuded hills while mining reports complain about shortages of fuelwood and water. These shortages undoubtedly accelerated the replacement of steam engines and boilers by electric-, gasoline-, and diesel-powered machinery. The adoption of this more modern machinery did not take place until the early 1900s.

Mowry, the first important mining district in the study area, still shows evidence of local disturbance at the mill and smelter site. Nonetheless, vegetation on the surrounding hills appears to have recovered, and there is little evidence of human habitation or impact along Mowry Wash. In the Washington Camp/Duquesne area, on the other hand, the topography, drainages, and vegetation still show the scars of sustained mining. The population of the Washington Camp/Duquesne district was three times larger than Mowry and mining lasted 30 years longer. And since the washes of the southern Patagonias drain into Mexico, the systemic effects of leaching and leakage from waste dumps and slag heaps are not confined to the study area itself. Outside investment by national mining concerns, including a subsidiary of

the Westinghouse Company, led more extensive development in the Washington/Duquesne area. The larger scale of mining also attracted the greatest number of residents to any location within the study area. Higher population levels at mining camps in the Patagonias, particularly at Washington Camp, had the effect of depleting wildlife. Even during the earliest period of mining at Mowry, hunters maintained a "deer shanty" in order to supply venison and antelope meat to miners.

Because of their ability to crown sprout, oaks have an enormous capacity to regenerate. Pines, Douglas firs, and other conifers, in contrast, do not bounce back as quickly. Foresters in the early 20th century reported that scattered stands of timber in the Patagonias had long ago been cut down for mining timber. Those stands have never recovered.

Another indirect impact of mining along the eastern slopes and foothills of the Patagonias was overgrazing. In their 1924 Range Appraisal, Cooperrider and Hussey (1924:42) noted, "The Duquesne Range has had exceedingly heavy use at some former period, as is evidenced by a replacement of the original grama stands by annual grasses. This must have occurred a good many years ago as the area has been stocked far below its carrying capacity for some time past." They also observed that in the mineralized zone of the Patagonias, there were "itinerant prospectors and itinerant Mexican laborers who are accused of illegally killing a considerable amount of beef. This is particularly true around the Mining Settlements of Harshaw, Duquesne, Washington Camp, Mowry, and Hardshell. These Mexicans bring considerable numbers of unpermitted horses and burros on the Forest which consume a considerable amount of forage and are objectionable around salt grounds."

Earlier, in 1917, Bryan criticized the stock methods on both the Harshaw and Duquesne ranges, where many of the stock raisers were miners who ran a few head of cattle as a subsidiary activity rather than as full-time ranchers, a situation in which they were unable to manage their livestock adequately. In his words, "The rough and broken nature of this Range [Harshaw] complicates the handling of stock for the owner in this vicinity. In most cases, the stock are just turned loose on the range and rarely seen except on the Range. There are very few corrals and salting places except at the home ranches and the stock is none too tame." He went on to say, "The Duquesne Range was originally grazed only by

stockmen from Lochiel community. More recently, men connected with the mining towns of Washington and Duquesne have entered the stock business and soon we can expect applications from the numerous settlers between the Grant fence and the main road" (Bryan 1917:20). In 1917, Bryan estimated that the total of 787 head on the Duquesne Range exceeded the practical carrying capacity (563) by 224. According to Bryan, "There are a considerable area of homesteads and the large holdings of the Duquesne Mining and Reduction Company to which both permitted and free stock have access, which account for the large excess of stock with the small overgrazed area. The entire mining property is decidedly overgrazed and all the southern portion of the Range is overstocked."

Grazing in the Lochiel area and the eastern foothills of the Patagonias was better managed, particularly after Tom Heady, the manager of Greene's San Rafael Ranch, began consolidating homesteads and forming his own ranch, which became the Heady Ashburn. Next to the Northern Valley, more homesteads were filed in this subregion than any other in the study area. T24S R17E, for example, had 80 homesteads, second only to T23S R17E's 104 homesteads (See Appendix 8.1.). T24S R17E encompassed Adams Canyon, the lower stretches of Duquesne Wash, Lochiel, and the San Rafael Valley south of the grant. By the 1930s, Heady and his partner Marshall Ashburn owned most of the private land along Adams Canyon, instituting an ambitious range restoration program to grass over eroded gullies, eliminate weedy species, and encourage the return of native grasses. By the 1950s, land that had been badly overgrazed in the early 20th century had a carrying capacity of 30 head per section, and range management specialist Robert Humphrey considered Heady Ashburn the best managed ranch in the valley.

Another important impact, which probably took place throughout the study area during the open range era but has only been documented in this subregion, is the cutting of native hay. During the Geronimo campaign army horses at Bigelow's camp at Mowry subsisted during the winter on native hay. Initially it was cut with a mowing machine by Mr. Sydow, the principal army hay contractor, owner of stores in Harshaw and Lochiel. After Mexican customs officials at La Noria confiscated Sydow's mower, he supplied native hay that had been chopped with hoes (Bigelow 1968:103). Using hoes to chop native grasses for hay was a particularly de-

structive procedure, which disturbed root systems and prevented regeneration. Its destructiveness was recognized prior to 1900 when army officials ordered its discontinuation.

SOUTHWESTERN SLOPES AND FOOTHILLS OF THE HUACHUCAS (OLD PARKER CANYON RANGE)

There were a few mines on the southwestern slopes of the Huachucas, but none of them developed into major enterprises or attracted many settlers except for the Copper Glance. During the 1890s, the Copper Glance was operated by the Protestant religious community of Sunnyside under the direction of Samuel Donnelly. By 1896, 80 persons resided at the mine, which produced a railroad car worth of ore a month. As production declined, however, most of the community moved the "lower camp" where the community sawmill was located. By the turn of the century, the sawmill provided most of the community's income and the Copper Glance and several less productive mines were sold to a Tombstone company. Mining continued intermittently at the Copper Glance until the 1930s, but the Sunnyside mines never rivaled the mining districts of the Patagonia Mountains in either production or population.

By 1907, Sunnyside itself was all but abandoned. After statehood, a few former members of the community homesteaded in the area, and the school and post office resumed operation, but population never exceeded 20 persons. With the exception of Sunnyside, settlement in the rest of the subregion was restricted to ranches located along the wide bottoms of drainages such as Parker, Bodie, and Sunnyside canyons. Cattle ranching was the most important economic activity, followed by farming, lumbering, and mining.

Together, the Parker Canyon and Lone Mountain subregions constituted the second major zone of homesteading in the study area (T23S R18E: 16 homesteads; T24S R18E: 24 homesteads; T 23S R19E: 23 homesteads; T24S R19E: 41 homesteads). In his Intensive Land Classification of the San Rafael unit, Rex King (1919b) noted that most of the homesteads in the eastern part of the unit were stock headquarters rather than working farms. According to King (1919b:2), "There are farms on the unit which are making good livings for the owners, and some of these, with the aid of more or less stock are good paying propositions, but the majority of them are

producing a bare living as far as farming goes. Stock raising is the largest interest of the country and it is so closely interwoven with farming that it is hard to separate them."

The Parker Canyon subregion also had the largest concentration of small but full-time stock raisers in the study area—ranchers like the Parkers, Joneses, McIntyres, and Berciches. The terrain was ideal cattle country—broad and open mesas dissected by wide and shallow canyons—but as early as 1917, Bryan commented on one major weakness of the subregion. "The forage is good except for the large Feather Grass areas," he noted, "but the entire Range is handicapped by the lack of any browse or early spring growth."

That weakness was not restricted to the southwestern foothills of the Huachucas alone. Most of the study area, even the plains grassland, is dominated by warm weather grasses like sideoats and hairy grama and Plains lovegrass. These grasses carry out what plant physiologists call C4 photosynthesis and do not produce green matter until later in the spring. By early spring, the cured grasses have become progressively less nutritious, forcing many cattlemen to provide supplementary feed for their cattle or to remove them to winter and early spring ranges outside the study area.

The lack of early spring growth may have been one of the reasons why Cooperrider and Hussey noted that the cattle on both the Parker Canyon and Lone Mountain ranges were "noticeably deficient in size." Another reason they mentioned was inbreeding, which may have occurred because the small stock raisers of the subregion could not afford to practice selective breeding or continually upgrade their herds the way larger ranches in the study area could. A final problem was overgrazing, with Cooperrider and Hussey classifying Parker Canyon (the old range encompassed the subregion) as one that had been "damaged by past overgrazing."

Unlike other subregions in the study area, consolidation of homesteads on the old Parker Canyon Range did not begin in the 1920s and 1930s. On the contrary, small ranchers continued to dominate the range until after World War II. That may have made the job of regulating grazing harder for Forest Service personnel; in 1917, Bryan commented, "Many strong opposers of the Forest Service are among the permittees on the Division." Nonetheless, Forest Service grazing allotment records show that most allotments were not exceeding their carrying capacities

by the late 1930s. Unreported animals may still have been a problem, but stockmen and stockwomen on the eastern margins of the study area did not abuse the range the way the stock raiser-miners of the Patagonia mining districts did.

Because of the smallholders, the subregion maintained a rich cultural life until the postwar period. At different times, there were two post offices and three schools in the subregions, and those schools provided the focus for social activities including dances and community gatherings for national holidays. Unlike other portions of the study area, settlers in this subregion were able to attend religious services or take music lessons at the Sunnyside townsite. For years, Parker Canyon had a store, and many settlers came to Sunnyside and to the Bercich ranch to purchase fruit and vegetables. The study area definitely lost some of its vitality when families like the Parkers finally moved away after World War II.

LONE MOUNTAIN

Lone Mountain was the most isolated subregion in the study area, with very little mining. According to Bryan (1917:27), "This has been the far away, little known, and little used area of the Division." Seven years later, however Cooperrider and Hussey remarked that parts of Lone Mountain had suffered from overgrazing in the past. In 1917, there were only four permittees, even though Bryan noted that stock from Parker Canyon permittees drifted onto the Lone Mountain Range. By the early 1930s, the number of permittees had dropped to three, with Henry Lee running about 90 percent of the stock.

Lee and his mother began the process of homestead consolidation in the 1920s, purchasing the Chapman, Southard, and Peoples places. That process continued during the 1930s; by 1935, Alex D'Albini was the only other permittee. John Kendall, who bought the Lone Mountain Ranch from Lee's estate in 1975, not only added D'Albini's former ranch (the Bootjack Ranch) to Lone Mountain but expanded onto the old Parker Canyon Range as well. Lone Mountain is now the largest and one of the best managed ranches in the study area.

Until World War II, the San Rafael Valley was, in many respects, a microcosm of rural development in Arizona. Like the rest of the territory, its economy did not expand until the military conquest of the Apaches allowed both Anglo and Mexican settlers to turn its natural resources into commodities and

the construction of the transcontinental railroad (the Southern Pacific and its feeders, in this case) allowed those commodities to be shipped out of the territory for processing someplace else. Silver, lead, zinc, manganese, copper, and, to a much lesser extent, gold ore were the first resources to be extracted and turned into commodities. Grasses transformed into cattle were the second. Fuelwood cutting was another major activity that affected the environment, but the wood—oak followed by juniper and mesquite—was consumed locally, primarily by the mines.

Mining brought the most settlers into the study area, with production and population peaking during various booms in the late 19th and early 20th centuries. Nonetheless, mining districts in the Patagonias remained minuscule in comparison to the great copper mining communities like Bisbee, Globe-Miami, Clifton-Morenci, Jerome, or Ajo in other parts of Arizona. Most large operations had been abandoned by the 1930s. Small-scale mining continued into the 1950s, but little or no mining is carried out in the study area today.

Cattle ranching was more sustainable with fewer and less violent fluctuations. The era of the open range in the late 19th century threw thousands of head onto the San Rafael Valley. Like other Arizona ranges, the boom years of the 1880s were followed by the bust years of the 1890s as drought and a national depression took their toll. Portions of the study area were severely overgrazed at that time. Once the San Rafael de la Zanja land grant was confirmed, however, the heart of the valley was managed conservatively by the Greene family and avoided the excesses that plagued other Arizona ranges until the 1930s.

The creation of the Huachuca Forest Reserve in 1906 brought grazing regulation to the rest of the study area as well. Cattle ranching has gone through three major stages in the San Rafael Valley during

the past century: (1) the era of the open range during the late 19th century; (2) the proliferation of small ranching operations based on forest homesteads and grazing allotments on national forest land during the early 20th century; and (3) the failure of the forest homestead program and the consolidation of ranches beginning in the 1920s. The so-called dry farming "boom" of the second and third decades of the 20th century was never a boom at all in the San Rafael Valley. Nearly all homesteaders who tried to make a living from either dry or irrigated farming alone failed. Most others quickly learned that farming in the study area was, at best, a supplemental activity to stock raising.

No other industry ever took root in the area. The Sunnyside religious community operated a sawmill for about a decade, but lumbering never developed into a major activity on the southwestern slopes of the Huachucas. A few spreads like the Meigs Ranch ran dudes as well as cows, but tourism never flourished. By the 1930s, the inexorable economic trend in the San Rafael Valley was toward relatively large-scale cattle ranching with significant capital investments in fencing, selective breeding, grazing rotation, and the development of additional water sources. That trend has continued to the present day.

Interestingly enough, the San Rafael Valley has largely escaped the transformations that have changed the economic, cultural, and physical landscapes of so many other rural areas of Arizona since World War II. There are no retirement communities in the study area and only one nascent subdivision. Unlike Sonoita, the San Rafael Valley has not yet become a commuter community of Tucson or Ambos Nogales. The overwhelming majority of ranchers have not sold off their patented land to developers. The San Rafael Valley therefore remains a beautiful anomaly in an era of rapid urbanization and suburban sprawl.

Bibliography

Bibliography

- n.a. n.d. Marks, brands and counter brands. Original brand books, Pima County Records deposited in the Division of Special Collections, University of Arizona Library, Tucson.
- n.a. n.d. Brands and marks of cattle, horses, sheep, goats, and hogs. 1 vol. Phoenix, AZ: Livestock Sanitary Board.
- n.a. n.d. Map showing approximate location of the principal mines and claims in Patagonia District, Santa Cruz County, Arizona. Tucson: Arizona Historical Society.
- n.a. n.d. Mexican land grant documents translated from the Spanish for the Arizona Pioneers' Historical Society. Tucson: Arizona Historical Society.
- n.a. Minutes of the Live Stock Sanitary Board, January 28, 1897 to April 11, 1912. Arizona Pioneers' Historical Society. Tucson: Arizona Historical Society.
- n.a. 1875, List of original and patent applicants of lands donated by Congress, February 5, 1875. Tucson: Arizona Historical Society.
- n.a. 1904. Official Cochise County map. Tucson: Arizona Historical Society.
- n.a. 1969. Across the San Rafael Valley. *Arizona* 58–63 (June 8).
- Accomazzo, Betty (ed.). 1982, 1985, 1987. *Arizona ranch histories*. Arizona National Cattle Growers Association: Phoenix.
- Aldrich, Lorenzo D. 1851. *A journal of the overland route to California! and the gold mines*. Lansingburg, NY: Lorenzo D. Aldrich.
- Altschuler, C.W. 1983. *Chains of command: Arizona and the army, 1856–1875*. Tucson: Arizona Historical Society.
- Ames, C. 1967. A history of the Forest Service. *The Smoke Signal* 16. Tucson, AZ: Tucson Corral of the Westerners. [Includes information on Coronado National Forest and its earlier incarnations.]
- Ames, C.R. 1977. Along the Mexican border—then and now. *Journal of Arizona History* 18:431–446.
- Anonymous. 1849. Diary of an overland journey from Albuquerque to Santa Cruz, New Mexico. (Formerly called Casper Ricks' diary.) Manuscript in the Bancroft Library.
- Arno, S.F., and K.M. Sneck. 1977. A method for determining fire history in coniferous forests in the mountain west. *USDA Forest Service General Technical Report INF-42*.
- Arizona Geological Survey. n.d. Individual mine files of newspaper clippings. Tucson.
- Ashburn, Helen. 1994. Recorded interview. Ashburn-Goodwin Ranch, San Rafael Valley, Arizona. On file with U.S. Forest Service, Tucson, Arizona.
- Austin, L.W. 1883. Silver mining in Arizona. *Transactions of the American Institute of Mining Engineers* 11:91–106.
- Axford, J. 1969. *Around western campfires*. Tucson: University of Arizona Press. [Reminiscences of a cowboy who worked as a cowboy and mine superintendent for W.C. Greene and his family.]
- Babb, G.D. 1993. Sprouting response of *Quercus arizonica* and *Quercus emoryi* following fire. Master's thesis, University of Arizona.
- Bahre, C.J. 1977. Land-use history of the Research Ranch, Elgin, Arizona. *Journal of the Arizona Academy of Science* 12(supplement 2):1–32.
- . 1984. Effects of historic fuelwood cutting on the semidesert woodlands of the Arizona-Sonora borderlands. In K.H. Steen (ed.), *A History of sustained-yield forestry: a symposium* 101–110. Portland, OR: Forest History Society of America.
- . 1985. Wildfire in southeastern Arizona between 1859 and 1890. *Desert Plants* 7(4):190–94.
- . 1987. Wild hay harvesting in southern Arizona: a casualty of the march of progress. *Journal of Arizona History* 28:69–78.
- . 1991. *A legacy of change: historic human impact on vegetation of the Arizona borderlands*. Tucson: University of Arizona Press. [A key analysis of historic land use—livestock grazing, fire, fuelwood cutting, agriculture, logging, and hay cutting—in southeastern Arizona and its impact on native vegetation. Includes information on San Rafael Valley.]
- Bahre, C.J., and C.F. Hutchinson. 1985. The impact of historic fuelwood cutting on the semidesert woodlands of southeastern Arizona. *Journal of Forest History* 29:175–186.
- Baker, R.D.; R.S. Maxwell; V.H. Treat; and H.C. Dethloff. 1988. Timeless heritage: a history of the Forest Service in the southwest. *USDA Forest Service* FS-409.
- Ball, E. 1970. *In the days of Victorio: recollections of a Warm Springs Apache*. Tucson: University of Arizona Press.

- Bancroft, H.H. 1889. *History of Arizona and New Mexico, 1530–1888*. San Francisco: The History Co.
- Bannon, J.F. 1955. *The mission frontier in Sonora, 1620–1687*. New York: The United States Catholic Historical Society.
- . 1974. *The Spanish borderlands frontier, 1513–1821*. Albuquerque: University of New Mexico Press.
- Barnes, Thomas, Thomas Naylor, and Charles Polzer. 1981. *Northern New Spain: A research guide*. Tucson: University of Arizona Press.
- Barnes, W.C. 1960. *Arizona place names*. Tucson: University of Arizona Press.
- Barr, F.R. 1940. The Detroit Copper Mining Company of Arizona, 1875–1919. Unpublished manuscript, Arizona Historical Society, Tucson, AZ.
- Barrows, J.S. 1978. Lightning fires in southwestern forests. *Intermountain Forest and Range Experimentation Station Final Report* 16–568-CA.
- Bartlett, J.R. 1854. *Personal narrative of explorations and incidents in Texas, New Mexico, California, Sonora and Chihuahua*. 2 vols. New York: D. Appleton & Co. [Key source on Arizona-Sonora borderlands in the mid-nineteenth century. Perpetrated the myth that Spanish and Mexican land grants ran huge herds of horses and cattle on the grasslands of southeastern Arizona, including the San Rafael Valley.]
- Beck, H.H. 1952. The Camerons of Donegal. *Papers read before the Lancaster County Historical Society* 56(4):87–105. Lancaster, PA.
- Beeching, William. 1850. Unpublished manuscript. San Marino, CA: Huntington Library.
- Bell, J.G. 1932. A log of the Texas-California cattle trail, 1854. *Southwestern Historical Quarterly* 35:290–316.
- Bercich, Bud. 1995. Recorded interview. Bercich Ranch, San Rafael Valley, Arizona. On file with U.S. Forest Service, Tucson, Arizona.
- Betancourt, J.L. 1990. Tucson's Santa Cruz River and the arroyo legacy. Ph.D. diss., University of Arizona. [Documents late-nineteenth century entrenchment of the Santa Cruz River.]
- Betancourt, J.L., and R.M. Turner. 1985. *History of the Santa Cruz River*. In preparation. Tucson, AZ: U.S. Geological Survey.
- Bieber, R.P. (ed.). 1937. From Texas to the gold mines. In *Southern Trails to California in 1849*. Vol. 5, pp. 260–280. Glendale, CA: The Arthur H. Clark Company.
- . 1937. Through Mexico to California, letters and journals of John E. Durivage. *Southern Trails to California in 1849*. Vol. 5, pp. 159–255. Glendale, CA: The Arthur H. Clark Company.
- Bigelow, J., Jr. 1968. *On the bloody trail of Geronimo*. Los Angeles: Westernlore Press.
- Bock, J.H., and C.E. Bock. 1992. Vegetation responses to wildfire in native versus exotic Arizona grassland. *Journal of Vegetation Science* 3:439–446.
- Bolton, H.E. (trans. and ed.). 1919. *Kino's historical memoir of Pimería Alta*. Cleveland, OH: A.H. Clark.
- . 1936. *Rim of Christendom*. New York: Macmillan.
- . 1939. *Outpost of empire*. New York: Alfred A. Knopff, Inc.
- . 1949. *Coronado, knight of pueblos and plains*. New York: Whittlesey House.
- . (ed.). 1952. *Spanish exploration in the southwest*. New York: Barnes and Noble.
- . 1960. *The mission as a frontier institution in the Spanish-American colonies*. El Paso, TX: Academic Reprints.
- . 1963. *The padre on horseback*. Chicago: Loyola University Press.
- Bourke, J.G. 1971. *On the border with Crook*. Glorieta, NM: The Rio Grande Press.
- Box, Capt. James. 1869. *Adventure and explorations in New and Old Mexico (ten years of travel and research)*. New York: James Miller, Publisher.
- Bradfute, R.W. 1975. *The court of private land claims: the adjudication of Spanish and Mexican land grant titles, 1891–1904*. Albuquerque: University of New Mexico Press.
- Brady, P.R., n.d. Manuscript 89. The Brady Collection. Arizona Historical Society, Tucson, AZ.
- Brandes, R. 1960. *Frontier military posts of Arizona*. Globe, AZ: Dale Stuart King.
- . 1962. Don Santiago Kirker, king of the scalp hunters. *Smoke Signal* 6:2. Tucson Corral of the Westerners.
- Brewster, J.W. 1966. The San Rafael Cattle Company: a Pennsylvania enterprise in Arizona. *Arizona and the West* 8:133–153. [Documents Colin Cameron's attempts to control San Rafael Valley in the late nineteenth century. Adapted from her thesis. See Wayland 1964 below.]
- Brown, C.S. 1881. An Arizona mining district. *The Californian* 5:49–57.
- . 1893. An adventure in the Huachucas. *Overland Monthly* 21:524–528.
- Browne, J.R. 1867. *Reports on the mineral resources west of the Rocky Mountains*. Washington: US Government Printing Office.

- . 1974. *Adventures in the Apache country: a tour through Arizona and Sonora*. Tucson: University of Arizona Press.
- Bryan, Hugh. 1917. Grazing working plan for the Huachuca division of the Coronado National Forest, July 1917. Field work March and April 1916. Book 11, Coronado National Forest, Tucson, Arizona.
- Bufkin, D.H. 1983. The making of a boundary between the United States and Mexico. *The Cochise Quarterly* 1-2:3-30.
- Burgess, Tony. 1994. "An Ecological History of the San Rafael and Red Rock Canyon Watersheds." Tucson: University of Arizona, Department of Geosciences, Desert Laboratory. Unpublished manuscript.
- Burrus, Ernest, S.J. 1971. *Kino and Manje: Explorers of Sonora and Arizona*. Rome: Jesuit Historical Institute.
- Cameron, C. 1848-1911. Defendant-appellant. In the Supreme Court of the United States, October term, A.D. 1892: Colin Cameron, appellant, vs. the United States, no. 42: appeal from the Supreme Court of the Arizona Territory: brief of appellant in reply. Special Collections, University of Arizona Library. [Concerns Cameron's attempts to claim "overplus" lands of San Rafael de la Zanja land grant.]
- . 1896. Report of Colin Cameron, Esq. In U.S. Congress, House, Annual Report of the Governor of Arizona, 1896. *House Executive Document* 5. 54th Congress, 2nd session. Serial 3490, 222-231. [Cameron's observations concerning the overgrazing of Arizona's rangelands during the 1880s and 1890s.]
- Cananea Cattle Company, S.A. *Libro de actas y acuerdos*, vol. 1.
- Canty, Michael J., and Michael N. Greeley (eds.). 1987. *History of Mining in Arizona*. Tucson: Mining Club of the Southwest Foundation.
- Carpenter, M.M. 1940. Mine operations in the Patagonia district. *Mining Journal* 24(3):3-5.
- Chapman, T.G. (ed.). 1962. *The Mineral Industries of Arizona: A Brief History of the Development of Arizona's Mineral Resources*. Tucson: University of Arizona Press.
- Christiansen, L.D. 1988. The extinction of wild cattle in southern Arizona. *Journal of Arizona History* 29:89-100.
- . 1990. Major Graham's Road. *The Cochise Quarterly* 19(4).
- Clarke, A.B. 1852. *Travels in Mexico and California: comprising a journal of a tour from Brazos Santiago, through central Mexico, by way of Monterey, Chihuahua, the country of the Apaches, and the River Gila, to the mining districts of California*. Boston: Wright and Hasty's Steam Press.
- Cluff, C.B., and F. Putman. 1981. Applications of the compartmented reservoir in Arizona. Office of Water Research and Technology Report W81-00265.
- Coleman, E. 1973. Nesters, rustlers and outlaws. *Journal of Arizona History* 14:177-184.
- Cooke, P. St. G. 1938. Cooke's journal of the march of the Mormon Battalion, 1846-1847. In R.P. Bieber and A.B. Bender (eds.), *Exploring southwestern trails* 63-240. Glendale, CA: Arthur H. Clark Co.
- Cooke, P., Lt. Col. 1848. Report of Lieut. Col. St. George Cooke of his march from Santa Fe, New Mexico to San Diego, Upper California. Thirtieth Congress, First Session. Ex. Document 41:549-563.
- Cooke, R.U., and R.W. Reeves. 1976. *Arroyos and environmental change in the American south-west*. Oxford: Clarendon Press. [Thorough survey of arroyo-cutting in the nineteenth century Southwest, including southern Arizona. The authors critically examine the various hypotheses advanced to explain the incision of Southwestern floodplains and then develop several hypotheses of their own that focus upon human impacts on the floodplains themselves.]
- Cooper, C.F. 1960. Changes in vegetation, structure, and growth of southwestern pine forests since white settlement. *Ecological Monographs* 30:129-164.
- Cooperrider, C.K., and R.W. Hussey. 1924. Range appraisal report for the Coronado National Forest. Book 8, Coronado National Forest, Tucson, Arizona.
- Cordell, L. 1984. *Prehistory of the southwest*. Orlando, FL: Academic Press.
- Cordell, L., and G. Gumerman. 1989. *Dynamics of southwest prehistory*. Washington, D.C. Smithsonian Institution Press.
- Coronado National Forest, Tucson Office. 1917. Book 11. "Grazing Working Plan for the Huachuca Division of the Coronado National Forest, July 1917." [Field work done in March and April 1916. Contains general overview of Stock Industry; Forest Grazing Area, including geography, climate, settlement, mines, forage, menaces to stock; Forage Type Map; Objects of Management; Management Proposals; Ranges Divions (sic) and Fence Map; maps

- of each range classified into grazing types; and Working Plan Summary.]
- . 1935–1939. Book 12. "Rangers' Grazing Reports, Form 438, 1935–39." [Forms by district, including Huachuca District, Whetstone Division, by unit. Includes earlier forms for 1924–28 and 1930–34.]
- . 1938–1944. Book 13. "Grazing Permit Record, Forms G–10, 1938 to 1944. [Gives allotments/permittees, number of livestock approved and grazing periods.]
- . 1941–1947. Book 14. "Summary of Range Survey Data." [Gives estimate of under- and overstocking for each allotment.]
- . 1924–1939. Book 15. "Annual Grazing Reports, 1924 to 1939. Commensurability Data." [Grazing reports give total number of cattle, horses, and animal months. Commensurability Data discusses dry farming and cultivated land. Provides land tenure data and lists tons of feed purchased.]
- . 1919. Book 19. "Intensive Classification: Dragoon, Huachuca, Santa Rita, Tumacacori, Whetstone Divisions." [Discusses alienated land, land under cultivation, cordwood value of woodland. Includes a soil survey. Broken into tracts of potential agricultural land. Includes photos of *temporal* (rainfall-dependent, non-irrigated) agriculture.]
- . 1919(?). Book 20. "Extensive Land Classification Whetstone, Santa Rita, Huachuca and Tumacacori Divisions, Coronado National Forest, Arizona District," by Rex King.
- . 1938–1939. Book 27A. USGS Quads. [See Nogales, Patagonia, and Hereford quads.]
- . 1930–1940. Book 28. "Status of Range Management By Allotments, Forms 438-A, 1930–1940." [Lists: acres, estimated carrying capacity in cow months, cow months by permit, cow months by trespass, game population. Notes whether season of use satisfactory, percentage of total area utilized properly/improperly, percentage in good/overgrazed condition, salt grounds, drift fences, water development, cooperation of permittees ranging from E-G-F-P.]
- . 1929, 1931. Book 34. "G-Survey Coronado Reconnaissance Compilations Extensive 1929: Tumacacori, Chiricahuas, Animals, Peloncillo, Dragoon, Whetstone, Huachuca, and Santa Rita." [Also includes "Township Summary of Grazing Types" and "Summary of Grazing Reconnaissance by Allotments or Ranger Districts, 1931."]
- . 1908. Book 38. "Forest Atlas, Coronado."
- . 1908. Book 39. "Forest Atlas, Garces National Forest."
- Cortner, Hanna J.; Margaret A. Shannon; Mary G. Wallace; Sabrina Burke; and Margaret A. Moote. 1994. Institutional barriers & incentives for ecosystem management: A problem analysis. *Water Resources Research Center Issue Paper* 16. December 1994. Water Resources Research Center: Tucson, Arizona.
- Cox, Gustavo. 1893. Map of the World's Fair Group of Mines. Tucson: Arizona Historical Society.
- Cox, J.R.; A. Alba-Avila; R.W. Rice, and J.N. Cox. 1993. Biological and physical factors influencing *Acacia constricta* and *Prosopis velutina* establishment in the Sonoran Desert. *Journal of Range Management* 46: 43–48.
- Cox, J.R., M.H. Martin R., F.A. Ibarra F., and H.L. Morton. 1986. Establishment of range grasses on various seedbeds at creosotebush [*Larrea tridentata*] sites in Arizona, U.S.A. and Chihuahua, Mexico. *Journal of Range Management* 39:540–546.
- Cox, J.R., and H.L. Morton. 1986. Big sacaton (*Sporobolus wrightii*) riparian grassland management: annual winter burning, annual winter mowing, and spring-summer grazing. *Applied Agricultural Research* 1:105–111.
- . 1986. The effects of seasonal fire on live biomass and standing crop in a big sacaton (*Sporobolus wrightii*) grassland. In *Rangelands: A Resource Under Siege*, edited by P.J. Joss, P.W. Lynch, and D.B. Williams. New York Cambridge University Press. 596–597.
- Cremony, J.C. 1954. *Life among the Apaches*. Tucson: Reprinted by Arizona Silhouettes.
- Crosby, W.O. 1906. The limestone-granite contact deposits of Washington Camp, Arizona. *American Institute of Mining Engineers Transactions* 36:626–646.
- Cruse, T. 1941. *Apache days and after*. Caldwell, ID: The Caxton Press.
- Cunningham, Bob. 1985. Pennsylvania's Camerons in bloodshed on the border. *Journal of the Lancaster County Historical Society* 89(3):74–85.
- . 1994. A Pennsylvanian in Patagonia: The Arizona career of Rollin Rice Richardson. *Journal of Arizona History* 35(1):47–62.
- Cutler, B. and D.T. Jennings. 1985. A revision of the *Metaphidippus arizonensis* group (Araneae, Salticidae). *Journal of Arachnology* 13: 1–8.
- Danforth, B.N. 1991. Female foraging and intranest behavior of a communal bee, *Perdita portalis* (Hy-

- menoptera: Andrenidae). *Annals of the Entomological Society of America* 84(5):537–548.
- Danson, Edward. 1946. An archaeological survey of the Santa Cruz River Valley from the headwaters to the Town of Tubac in Arizona. Unpublished master's thesis, Department of Anthropology, University of Arizona, Tucson.
- Davis, G.P. 1982. *Man and wildlife in Arizona: the American exploration period, 1824–1865*. Phoenix, AZ: Arizona Game and Fish Department.
- Davis, S.R. 1975. The Hardshell silver deposit, Harshaw mining district, Santa Cruz County, Arizona [abs.]. In W.R. Seager (ed.), *Guidebook of the Las Cruces country* 336–337. New Mexico Geological Society.
- Dean, S.A. 1982. Acid drainage from abandoned metal mines in the Patagonia Mountains of southern Arizona. Master's thesis, University of Arizona.
- Denney, P.P. 1968. Geology of the southeast end of the Paleozoic portion of the Canelo Hills, Santa Cruz County, Arizona. Master's thesis, University of Arizona.
- De Wet, J.M.J., D.E. Brink, and C.E. Cohen. 1983. Systematics of *Tripsacum section fasciculata gramineae*. *American Journal of Botany* 70(8):1139–1146.
- Dewey and Co. 1881. Map of Arizona Territory. Tucson: Arizona Historical Society.
- Dillon, R.H. (ed.). 1984. *The Gila Trail. The Texas argonauts and the California gold rush*. Norman: University of Oklahoma Press.
- Dinsmore, C.A. 1909. The Patagonia district, Arizona. *Mining World* 31:2224.
- DiPeso, Charles. 1956. *The Upper Pima of San Cayetano del Tumacacori: An archaeological reconstruction of the Ootam of Pimería Alta*. Amerind Foundation Publication 7. Dragoon, Arizona.
- . 1979. Prehistory: O'otam. In *Handbook of North American Indians*. Vol. 9: Southwest, edited by Alfonso Ortiz, pp. 91–99. Washington: Smithsonian Institution.
- Dobyns, H.F. (ed.). 1961. *Hepah! California! The journal of Cave Johnson Cousts from Monterey, Nuevo Leon, Mexico to Los Angeles, California during the years 1848–1849*. Tucson, AZ: Arizona Pioneers' Historical Society.
- . 1963. Indian extinction in the Middle Santa Cruz River Valley, Arizona. *New Mexico Historical Review* 38:163–181.
- . 1988. Piman Indian historic agave cultivation. *Desert Plants* 9:49–53.
- Dockets of the Court of Private Land Claims, 12–17. Microfilm 177 (1667), National Archives, in the collections of the Arizona Historical Society, Tucson, AZ.
- Donohue, John. 1969. *After Kino: Jesuit missions in northwestern New Spain, 1711–1767*. Rome: Jesuit Historical Institute.
- Doyel, D. 1979. The prehistoric Hohokam of the Arizona desert. *American Scientist* 67:544–554.
- . 1989. The transition to history in northern Pimería Alta. In *Columbian consequences Vol. I: Archaeological and historical perspectives on the Spanish Borderlands West*, edited by David Hurst Thomas. Washington: Smithsonian Institution Press.
- . 1991. Hohokam cultural evolution in the Phoenix basin. In *Exploring the Hohokam*, edited by George Gumerman, pp. 231–278. Albuquerque: University of New Mexico Press.
- . 1991. The transition to history in the Pimería Alta. In *Columbian consequences, vol. I: archaeological and historical perspectives on the Spanish borderlands west*, 39–158. Washington, D.C. Smithsonian Institution Press.
- Dumke, G.S. (ed.). 1945. *Mexican gold trail, the journey of a Forty-niner*. San Marino, CA: The Huntington Library.
- Dunning, Charles H. 1959. *Rock to Riches*. Phoenix: Southwest Publishing Co.
- Dusenberry, W.H. 1963. *The Mexican mesta, the administration of ranching in colonial Mexico*. Urbana: University of Illinois Press.
- Elsing, Morris J., and Robert E.S. Heineman. 1936. Arizona metal production. *Arizona Bureau of Mines Bulletin* 140.
- Emory, W.H. 1856. Report on the United States and Mexican boundary survey. 2 vols. *Senate Executive Document* 108.
- . 1951. *Lieutenant Emory reports; a reprint of Lieutenant W.H. Emory's notes of a military reconnaissance*. Albuquerque: University of New Mexico Press. [Basic source on Arizona-Sonora borderlands in the mid-nineteenth century.]
- Esposito, D.M.; D. Armstrong; D. Eaker; and G.A. Brinsko. 1989. Wastewater recharge; water quality and operations. In A.I. Johnson, and D.J. Finlayson, *Proceedings of the International symposium on Artificial recharge of ground water*. Arvada, CO: A. Ivan Johnson.
- Etter, P.A. (ed.). 1986. *An American odyssey. The autobiography of a 19th-century Scotsman, Robert Brownlee*. Fayetteville, AR: University of Arkansas Press. Original (1897) held by Arkansas Territorial

- Restoration, Little Rock. Typescript copy in the Bancroft Library.
- Ezell, Paul. 1963. Is there a Hohokam-Pima cultural continuum? *American Antiquity* 29(1):61-66.
- Felger, Richard, Gary Nabhan, and Thomas Sheridan. 1976. Ethnobotany of the Río San Miguel, Sonora Mexico. Report prepared for the Centro Regional del Noroeste del Instituto Nacional de Antropología e Historia.
- Ffolliott, P.F.; W.O. Rasmussen; T.K. Warfield; and D.S. Borland. 1979. Supply, demand, and economics of fuelwood markets in selected population centers of Arizona. *Arizona land marks* 9. Flagstaff, AZ: Arizona State Land Department.
- Font, P. 1913. *The Anza expedition, 1775-1776: diary of Pedro Font*. Berkeley: University of California Press.
- Foster, K.E. 1978. Alternatives for managing a finite groundwater supply in an arid region. *Journal of Arid Environments* 1(3):275-287.
- Forbes, J.D. 1960. *Apache, Navajo, and Spaniard*. Norman: University of Oklahoma Press.
- Forsyth, G.A. 1900. *Thrilling days in army life*. New York: Harper.
- Forsyth, J.R. Diary. Manuscript in the Peoria, Illinois Public Library. Microfilm copy at the Bancroft Library.
- Fulton, R.W., and C.J. Bahre. 1967. Charleston, Arizona: a documentary reconstruction. *Arizona and the West* 9 (Spring):41-64.
- Gale, J.C. 1980. Lebo in pursuit. *Journal of Arizona History* 21(1).
- . n.d. Captain Hatfield under Fire. *Journal of Arizona History*.
- Gardner, H. 1954. Cooke's report. *Utah Historical Quarterly* 22(1).
- Gelt, J. 1992. Land subsidence, earth fissures change Arizona's landscape. *Arroyo* 6(2):8.
- Gerald, R.E. 1968. Spanish presidios of the late eighteenth century in northern New Spain. *Museum of New Mexico Research Records* 7. Albuquerque, NM: Museum of New Mexico Press.
- Gilkey, M.M., and Robert T. Beckman. 1963. Water requirements and uses in Arizona mineral industries. *Bureau of Mines Information Circular* 8162.
- Gillis, A.M. 1991. Should cows chew cheatgrass on commonlands. *Biological Sciences* 41:668-675.
- Goetzmann, W.H. 1959. *Army exploration in the American west, 1803-1863*. New Haven, CN: Yale University Press.
- Golder, F.A. 1928. *The march of the Mormon Battalion*. New York and London: The Century Company.
- Goodwin, G. 1969. *The social organization of the western Apache*. Tucson: University of Arizona Press. [Finest ethnography of an Apache group, based upon years of intensive fieldwork.]
- Governor of Arizona. 1863-1887. Executive Records. Special Collections, University of Arizona Library.
- . 1864-1909. *Messages of territorial governors to 1st - 25th territorial legislature*. Special Collections, University of Arizona Library.
- . 1883-1905. *Report to the Secretary of the Interior*. Washington DC: Government Printing Office. Special Collections, University of Arizona Library.
- Graham, J.D. 1853. Report of Lt. Col. Graham on the subject of the boundary line between the United States and Mexico. *Senate Executive Document* 121. 32nd Congress, 1st session.
- Granger, B.H. 1960. *Will C. Barnes' Arizona place names. Revised and enlarged*. Tucson: University of Arizona Press.
- Granillo, Cuco. 1994. Recorded interview. Washington Camp, Arizona. On file with U.S. Forest Service, Tucson, Arizona.
- Gray, A.B. 1963. *Survey of a route on the 32nd parallel for the Texas Western Railroad, 1854. The A.B. gray report and including the reminiscences of Peter R. Brady who accompanied the expedition*. Los Angeles: Westernlore Press.
- Grebinger, P.F., II. 1971. Hohokam cultural development in the middle Santa Cruz Valley, Arizona. Ph.D. diss., University of Arizona.
- Greeley, Michael N. 1987. The early influence of mining in Arizona. In Michael J. Canty and Michael N. Greeley (eds.) *History of Mining in Arizona*, Tucson: Mining Club of the Southwest Foundation, pp. 14-15.
- Greever, W.S. 1957. Railway development in the southwest. *New Mexico Historical Review* 32:151-203.
- Griffen, W.B. 1969. Culture change and shifting populations in central northern Mexico. *Anthropological Papers of the University of Arizona* 13. Tucson: University of Arizona Press.
- . 1979. Indian Assimilation in the Franciscan area of Nueva Vizcaya. *Anthropological Papers* 33. Tucson: University of Arizona Press.
- . 1983. The Compass: a Chiricahua Apache family of the late 18th and early 19th centuries. *The American Indian Quarterly* 7(2).
- . 1985. Apache Indians and the northern Mexican peace establishments. In Charles H. Lange (ed.), *Southwestern Culture History: Collected Papers*

- in Honor of Albert H. Schroder*. Santa Fe: University of New Mexico Press.
- . 1988. *Apaches at war and peace: the Janos Presidio, 1750–1858*. Albuquerque: University of New Mexico Press.
- . 1988. *Utmost good faith: patterns of Apache-Mexican hostilities in northern Chihuahua border warfare, 1821–1848*. Albuquerque: University of New Mexico Press. [Detailed ethnohistorical analyses of Apache-Mexican relations from the late colonial period to the Mexican War and the Gadsden Purchase. Griffen makes extensive use of Mexican archival sources and concentrates upon Chiricahua Apaches.]
- Griffiths, D.A. 1901. Range improvement in Arizona. *USDA Bureau of Plant Industry Bulletin* 4.
- Gumerman, G. 1991. *Exploring the Hohokam: prehistoric desert peoples of the American southwest*. Dragoon, AZ: Amerind Foundation, and Albuquerque: University of New Mexico Press.
- Gumerman, George, and Emil Haury. 1979. Prehistory: Hohokam. *Handbook of North American Indians*. Vol. 9: Southwest, edited by Alfonso Ortiz. Washington: Smithsonian Institution.
- Gustafson, A.M. (ed.). 1966. *John Spring's Arizona*. Tucson: University of Arizona Press.
- Hadley, D. 1986. Cattle and drought in Arizona Territory, 1885–1903. Unpublished manuscript in possession of the author.
- . 1991. *Environmental change in Aravaipa, 1870–1970: an ethnoecological survey*. Safford, AZ: Bureau of Land Management.
- Hale, Kenneth, and David Harris. 1979. Historical linguistics and archeology. In *Handbook of North American Indians* Vol. 9: Southwest, edited by Alfonso Ortiz, pp. 170–177. Washington: Smithsonian Institution.
- Hale, Ruth and Norman. 1994. Recorded interview. Hale Ranch, Harshaw, Arizona. On file with U.S. Forest Service, Tucson, Arizona.
- Haley, J. Evetts. 1979. *The diary of Michael Erskine*. Midland, TX: The Nita Haley Memorial Library.
- Hamilton, P. 1884. *Resources of Arizona*. San Francisco: A.L. Bancroft and Co. [Early promoter of Arizona and its mineral and agricultural possibilities.]
- Hammond, G.P. 1940. *Coronado's seven cities*. Albuquerque: United States Coronado Exposition Commission.
- Hammond, G.P., and A. Rey. 1940. *Narratives of the Coronado expedition, 1540–1542*. Albuquerque: University of New Mexico Press.
- Hannum, A.P. (ed.). 1930. *A Quaker forty niner*. University of Pennsylvania Press.
- Hanson, R.T., S.R. Anderson, and D.R. Pool. 1990. Simulation of ground-water flow and potential land subsidence, Avra Valley, Arizona. *U.S. Geological Survey Open File Report AZ053*.
- Harrington, M.G. 1987. Predicting reduction of natural fuels by prescribed burning under ponderosa pine in southeastern Arizona. *USDA Forest Service Rocky Mountain Forest and Range Experiment Station RM-472*.
- Harris, L.B. 1926. Letters to brother. *Southwestern Historical Quarterly* XXIX:215–223.
- Harris, Richard. 1994. Unrecorded interview.
- Harris, T.D. (ed.). 1963. *Negro frontiersman: the western memoirs of Henry O. Flipper, first Negro graduate of West Point*. El Paso: Texas Western Press.
- Harshaw Mining Company. 1880–1882, 1908. Records. Arizona Bureau of Mines.
- Haskett, B. 1935. Early history of the cattle industry in Arizona. *Arizona Historical Review* 6:3–42.
- . 1936. History of the sheep industry in Arizona. *Arizona Historical Review* 7:3–49. [Early syntheses of Arizona's livestock industries. Hackett was one of the foremost proponents of the myth of the great herds on Arizona's Spanish and Mexican land grants.]
- Hastings, J.R., and R.M. Turner. 1965. *The changing mile: an ecological study of vegetation change with time in the lower mile of an arid and semiarid region*. Tucson, AZ: University of Arizona Press. [Classic study of vegetation change in southern Arizona through the use of repeat photography.]
- Hathaway, Judge James. 1995. Personal communication with authors.
- Hathaway, M.L. 1972. *An album of memories*. Arizona Historical Society, Tucson.
- Haury, Emil. 1945. The excavation of Los Muertos and neighboring ruins in the Salt River Valley, southern Arizona. *Papers of the Peabody Museum of Archaeology and Ethnology* 24. Cambridge: Harvard University Press.
- . 1950. *The stratigraphy and archaeology of Ventana Cave, Arizona*. Tucson: University of Arizona Press.
- . 1976. *The Hohokam: desert farmers and craftsmen. Excavations at Snaketown, 1964–1965*. Tucson, AZ: University of Arizona Press.
- Haverty, M.I., J.P. Lafage, and W.L. Nutting. 1974. Seasonal activity and environmental control of foraging of the subterranean termite, *Heterotermes aureus* (Snyder), in a Desert Grassland. *Life Science* 15(6):1091–1101.

- Hayden, Julian. 1970. Of Hohokam origins and other matters. *American Antiquity* 38:87-93.
- Hayes, Marjorie Tisdale Wolcott (ed.). 1929. *Pioneer notes from the diaries of Judge Benjamin Hayes, 1849-1875*. Los Angeles.
- Hecht, M.E., and R.W. Reeves. 1981. *Atlas of Arizona*. Tucson, AZ: Office of Arid Lands Studies, University of Arizona.
- Herbert, R.A. 1977. Effect of illuviated deposits on infiltration rates and denitrification during sewage effluent recharge. *Hydrology and Water Resources in Arizona and the Southwest* 7:183-190.
- Hereford, F.H. Papers, 1888-1929. Special Collections, University of Arizona Library, Tucson. [Tucson attorney who represented the San Rafael Cattle Company.]
- Hickerson, Nancy. 1988. The linguistic position of Jumano. *Journal of Anthropological Research* 44(3):311-326.
- Hinton, John B. n.d. Dictation. Unpublished manuscript in Bancroft Library.
- Hinton, R.J. 1878. *The Handbook to Arizona*. San Francisco: Payet, Upham and Co.
- Hodge, H.C. 1877. *Arizona as it was*. Chicago: Rio Grande Press.
- Holzer, T.L. 1977. Elastic expansion of the lithosphere caused by groundwater withdrawal in south-central Arizona. In C.A. Whitten, R. Green, and B.K. Meade, Recent crustal movements *Tectonophysics* 52(1-4):304.
- Hopkins, Vera Parker. 1995. Unrecorded interview. Douglas, Arizona.
- Houck, B., and S. Ambrose. 1978. Fuelwood inventory and management plan. Unpublished report, Coronado National Forest, Douglas, AZ.
- Huete, A.R.; G. Hua; J. Qi; A. Chehbouni; and W.J.D. Van-Leeuwen. 1992. Normalization of multidirectional red and NIR reflectances with the SAVI. *Remote Sensing Environment* 41:143-154.
- Humphrey, R.R. 1987. *Ninety years and 535 miles: vegetation changes along the Mexican border*. Albuquerque, NM: University of New Mexico Press.
- Hunt, Tom. 1994. Recorded interview. Rail X Ranch, Patagonia, Arizona. On file with U.S. Forest Service, Tucson, Arizona.
- Hunter, W.W. 1849. Diary - Journal of events on a journey from Missouri to California. Manuscript in the University of Arizona Special Collections Library, Tucson.
- International Boundary Commission (United States and Mexico, 1882-1896). 1898. Views of the monuments and characteristic scenes along the boundary between the United States and Mexico west of the Rio Grande, 1891 to 1896. *Senate Document 247*. 55th Congress, 2nd session.
- John, Elizabeth A.H. 1975. *Storms brewed in other men's worlds: The confrontation of Indians, Spanish, and French in the Southwest, 1540-1795*. College Station: Texas A&M Press.
- Johnson, R.R. 1978. Hydrologic factors affecting groundwater management for the city of Tucson, Arizona. *Hydrology and Water Resources in Arizona and the Southwest* 8:1-8.
- Jones, T.R.; J.P. Collins; T.D. Kocher, and J.B. Mitton. 1988. Systematic status and distribution of *Ambystoma tigrinum stebbinsi* Lowe (Amphibia: Caudata). *Copeia* 1988 3:621-635.
- Jordan, G.L., and M.M. Maynard. 1970. The San Simon watershed: revegetation. *Progressive Agriculture in Arizona* 22(6):4-7.
- Journal of Private Land Grants*, Vol. 1. Surveyor General's Office, State Archives, State of Arizona, Phoenix, Arizona.
- Kane, Mary Gardner. n.d. Unpublished manuscript. Tucson: Arizona Historical Society.
- Karpiscak, M.M., and O.M. Grosz. 1979. Dissemination trails of Russian thistle (*salsola kali*) in recently fallowed fields. *Journal of the Arizona-Nevada Academy of Science* 14:50-52.
- Keith, S.B. 1973. Index of mining properties in Cochise County, Arizona. *Arizona Bureau of Mines Bulletin* 187.
- . 1975. Index of mining properties in Santa Cruz County, Arizona. *Arizona Bureau of Mines Bulletin* 191.
- Kenney, W.R., J.H. Bock, and C.E. Bock. 1986. Responses of the shrub, *Baccharis pteronioides*, to livestock enclosure in southeastern Arizona. *American Midland Naturalist* 116:429-431.
- Kessell, J.L. 1970. *Mission of sorrows: Jesuit Guevavi and the Pimas, 1691-1767*. Tucson: University of Arizona Press.
- . 1976. *Friars, soldiers, and reformers: Hispanic Arizona and the Sonora mission frontier, 1767-1856*. [Most comprehensive treatments of Jesuit and Franciscan missions in the Santa Cruz Valley. Both works contain considerable information on outlying areas as well.]
- King, Rex. 1915. Extensive land classification, Whetstone, Santa Rita, Huachuca, and Tumacacori divisions, Coronado National Forest, Arizona district. Book 20, Coronado National Forest, Tucson, Arizona.

- . 1919. Intensive classification, Dragoon, Huachuca, Santa Rita, Tumacacori, Whetstone divisions, Coronado National Forest. Book 19, Coronado National Forest, Tucson, Arizona.
- Kinnaird, L. 1958. *The frontiers of New Spain. Nicolas LaFora's description, 1766–1768*. Berkeley, CA: The Quivera Society.
- Komarek, E.V. 1968. The nature of lightning fires. In *Proceedings - Tall Timbers Fire Ecology Conference* 7:5–41.
- Kroodsma, D.E. 1985. Geographic variation in songs of the Bewick's wren (*Thryomanes bewickii*): A search for correlations with avifaunal complexity. *Behavioral Ecology and Sociobiology* 16(2):143–150.
- Krebs, C.K., J. Ruiz, and W.R. Dickinson. 1986. Geochemistry of the Canelo Hills volcanics and Glance conglomerate and implications for the Mesozoic tectonic history of southeastern Arizona. In *The Geological Society of America, 99th annual meeting. Geological Society of America Abstracts with Programs* 18(6):662.
- Kroeber, Alfred. 1934. Uto-Aztec languages of Mexico. *Ibero-Americana* 8. Berkeley: University of California.
- Kupfer, D.H. 1965. Santo Niño mine. In H. Kirkemo, C.A. Anderson, and S.C. Creasey, *Investigations of molybdenum deposits in the conterminous United States, 1942–60. US Geological Survey Bulletin* 1182-E.
- Lacy, John C. 1987. Early history of mining in Arizona: Acquisition of mineral rights 1539–1866. In Michael J. Canty and Michael N. Greeley (eds.) *History of Mining in Arizona*, Tucson: Mining Club of the Southwest Foundation., p. 6.
- Lamma, R. 1982. *A place called Sunnyside*. Tucson: A & W Limited Editions.
- Laney, R.L. 1976. Water-level declines, land subsidence, and earth fissures in south-central Arizona. 20th annual Arizona watershed symposium, proceedings. *Arizona Water Commission, Report*. 8:30–39.
- Lauver, Mary Ellen. 1938. A history of the use and management of the forested lands of Arizona, 1862–1936. Unpublished master's thesis, Department of History, University of Arizona, Tucson.
- Lenon, Robert. 1950, 1962, and 1969. Lenon's map of Santa Cruz County, Arizona. Compiled and sold by Robert Lenon, Patagonia, Arizona. Tucson: Arizona Historical Society.
- . 1994. Unrecorded interview. Patagonia, Arizona.
- Lewis, Blaine. 1994. Recorded interview. Patagonia, Arizona. On file with U.S. Forest Service, Tucson, Arizona.
- Lockwood, F.C. 1932. *Pioneer days in Arizona*. New York: Macmillan.
- . 1938. *The Apache Indians*. New York: The Macmillan Co.
- Maase, Bruce. 1981. A reappraisal of the protohistoric Sobaipuri Indians of southeastern Arizona. In *The Protohistoric Period in the North American Southwest, A.D. 1450–1700*, edited by David R. Wilcox and W. Bruce Maase, pp. 28–56. *Anthropological Research Papers* 24. Tempe: Arizona State University.
- Macuistion, Sunny and Nancy. 1994. Unrecorded interview. San Antonio Ranch, Lochiel, Arizona.
- Manje, J.M. 1954. *Luz de tierra incognita (Unknown Arizona and Sonora 1693–1721)*. Translated by H.J. Karns and Associates. Tucson, AZ: Arizona Silhouettes.
- Marcy, R.R. 1859. *The prairie traveler: a handbook for overland expeditions*. Williamston, Mass.: Corner House Publishers.
- Martin, M.E. 1925–1926. From Texas to California in 1849. *Southwestern Historical Quarterly* XXIX:36–50, 128–146, 201–223.
- Marzolf, J.E. 1987. The Lower and Middle Jurassic of the Western Interior; fluvial-eolian-marine deposition behind an emerging volcanic arc. *Abstracts. Society of Economic Paleontologists and Mineralogists, Annual Midyear Meeting* 4:52–53.
- Mathiasen, R.L. 1979. Distribution and effect of dwarf mistletoes parasitizing *Pinus strobiformis* in Arizona, New Mexico, and northern Mexico. *Southwestern Naturalist* 24(3):455–461.
- Matson, R.G. 1991. *The origins of southwestern agriculture*. Tucson: University of Arizona Press.
- Mattison, R.H. 1946. Early Spanish and Mexican settlements in Arizona. *New Mexico Historical Review* 21:273–327.
- . 1967. The tangled web: the controversy over the Tumacacori and Baca land grants. *Journal of Arizona History* 8(2). [Key sources on Spanish and Mexican land grants in Arizona.]
- McCarthy, George. 1927. Reminiscences of George McCarthy, as told to Mrs. Geo. F. Kitt, August 19, 1927. George McCarthy Biographical File, Arizona Historical Society.
- McCarty, K. 1976. Desert documentary: the Spanish years, 1776–1821. *Historical Monograph* 4. Tucson, AZ: Arizona Historical Society.
- McGuire, Randall. 1991. On the outside looking in: The concept of periphery in Hohokam archaeol-

- ogy. In *Exploring the Hohokam: Prehistoric desert peoples of the American Southwest*, edited by George Gumerman. Albuquerque: University of New Mexico Press.
- Mead J.L., C.V. Haynes, and B.B. Huckell. 1979. A late Pleistocene mastodon (*Mammot americanus*) from the Lehner site, southeastern Arizona. *Southwestern Naturalist* 24(2):231-238.
- Meyer, J.W. 1989. First year coppice regeneration of *Quercus emoryi* and *Quercus arizonica* in the Huachuca Mountains, Arizona. Master's thesis, University of Arizona.
- Meyer, M.C. 1984. *Water in the Hispanic southwest, a social and legal history, 1550-1580*. Tucson: University of Arizona Press.
- Mignone, A.F. 1959. A fief for Mexico: Colonel Greene's empire finds. *Southwest Review* Autumn: 332-339.
- Moorhead, M. 1968. *The Apache frontier: Jacobo Ugarte and Spanish-Indian relations in northern New Spain, 1769-1791*. Norman, OK: University of Oklahoma Press.
- Morrisey, R.J. 1950. The early range cattle industry in Arizona. *Agricultural History* 24(3):151-156.
- Mowry, S. 1859. *Geography and resources of Arizona and Sonora: an address before the American Geographical and Statistical Society*. Washington, DC: Henry Polkinghorn.
- . 1864. *Arizona and Sonora: the geography, history, and resources of the silver region of North America*. New York: Harper Brothers. [Early mining entrepreneur and promoter of Arizona who tried to entice potential investors with a vision of a wealthy Hispanic Arizona that never was.]
- Munson, R.W. 1976. Don Ignacio and Doña Eulalia Elías and the history of their hacienda on the Babocomari: Camp Wallen. *The Cochise Quarterly* 6(1).
- Murbarger, Nell. 1964. *Ghosts of the Adobe Walls*. Tucson: Treasure Chest Publications.
- Murray, F.S. 1972. *History of Fort Huachuca*. Monograph 1, Western Pioneer Series. El Paso, TX: Southwest Antiquarians.
- Myrick, D.F. 1975. Railroads of Arizona. Vol. 1., *The Southern roads*. Berkeley, CA: Howell-North Books. [An encyclopedic work that covers much more than railroads.]
- Naylor, Thomas N. 1981. Athapaskans they weren't: The Suma rebels executed at Casas Grandes. In *The Protohistoric Period in the North American Southwest, A.D. 1450-1700*, edited by David R. Wilcox and W. Bruce Maase, pp. 275-281. *Anthropological Research Papers* 24. Tempe: Arizona State University.
- Naylor, Thomas, and Charles Polzer, S.J. 1986. *The presidio and militia on the northern frontier of New Spain, 1570-1700*, Vol. I. Tucson: University of Arizona Press.
- Neale, W.G. (ed.) 1926. *The mines handbook; succeeding the copper handbook describing the mining companies of the two American continents*. Vol. 17. New York: Mines Handbook Company.
- Nelson, E.W. 1934. The influence of precipitation and grazing upon Black Grama Grass Range. *USDA Technical Bulletin* 409.
- Nesom, G.L. 1990. Taxonomy of the *Erigeron coronarius* group of *Erigeron* (Asteraceae: Astereae). *Phytologia* 69(4):237-253.
- Nutting, W.L., M.I. Haverty, and J.P. LaFage. 1987. Physical and chemical alteration of soil by two subterranean termite species in Sonoran Desert grassland. *Journal of Arid Environments* 12:233-239.
- Oak Ridge Gaseous Diffusion Plant, TN. 1982. Supplement to hydrogeochemical and stream-sediment reconnaissance basic data. National Uranium Resource Evaluation Program. Washington, DC: U.S. Department of Energy.
- Officer, J.E. 1987. *Hispanic Arizona, 1536-1856*. Tucson, AZ: University of Arizona Press. [The best synthesis of the topic to date. Includes information on the early livestock industry in the San Rafael Valley and the San Rafael de la Zanja land grant.]
- . 1993. Kino and agriculture in the Pimería Alta. *Journal of Arizona History* 34(3):287-306.
- Opler, M. 1941. *An Apache life-way: The economic, social, and religious institutions of the Chiricahua Indians*. Chicago: University of Chicago Press. [Best ethnography of the Chiricahua Apaches.]
- . 1983. Chiricahua Apache. In *Handbook of North American Indians*, Vol. 10: Southwest, edited by Alfonso Ortiz. Washington: Smithsonian Institution.
- Ossa, Ramon de la. 1994. Unrecorded interview. Lochiel, Arizona.
- Park, Joseph F. 1961. The Apaches in Mexican-American relations, 1848-1861: A footnote to the Gadsden Treaty. *Arizona and the West* 3:129-146.
- Parker family ms. "They Did a Heap O'Livin." Type-script by Catherine Wood and Beth Smith. In possession of several Parker family members. C.a. 1972.
- Parker, J. 1929. *The old army*. Philadelphia: Dorrance and Co.

- Parker, J.T.C. 1990. Channel-changing processes on the Santa Cruz River, Pima County, Arizona, 1936–86. In *Hydraulics/Hydrology of Arid Lands*, p. 441–446. New York: American Society of Civil Engineers.
- Parker, S.A., and D. Stotz. 1977. An observation on the foraging behavior of the Arizona rattlesnake (*crotalus-willardi-willardi* serpentes crotalidae). *Bulletin of the Maryland Herpetological Society* 13(2):123.
- Patton, Jim and Ann. 1994–1995. Personal communication with authors.
- Perry, Richard. 1991. *Western Apache heritage: People of the mountain corridor*. Austin: University of Texas Press.
- Phillips, R.A., L.G. Wilson, and P.G. Sebenik. 1977. *Physicochemical transformations within ephemeral streambeds related to sewage effluent releases*. Tucson, AZ: Arizona Water Resources Research Center.
- Plantz, D.V., Jr. 1975. Feeding habits of the gila top minnow (*Poeciliopsis-occidentalis-occidentalis*, cyprinodontiformes poecilidae) at Monkey Spring, Santa Cruz County, Arizona. *Journal of the Arizona Academy of Science* 10:14.
- Polzer, Charles William, S.J. 1968. Legends of lost missions and mines. *The Smoke Signal* 18:182–183.
- Ponce, D.A. 1990. Geophysics; gravity and magnetic methods. In J.A. Peterson, Preliminary mineral resource assessment of the Tucson and Nogales 1 degrees by 2 degrees quadrangles, Arizona. *United States Geological Survey, Open File Report* p. 41–56.
- Ponce, V.M., Z. Osmolski, and D. Smutzer. 1985. Large basin deterministic hydrology: a case study. *Journal of Hydraulic Engineering* 111(9):1227–1245.
- Prout, J.W. 1907. The silver-lead deposits of the Mowry mine, Mowry, Santa Cruz County, Arizona. Master's thesis, University of Arizona.
- Pumpelly, R. 1918. *My reminiscences*. 2 vols. New York: Holt and Co.
- . 1965. *Pumpelly's Arizona, an excerpt from across America and Asia by Raphael Pumpelly, comprising those chapters which concern the southwest*. Tucson, AZ: Palo Verde Press.
- Quinn, H.R. 1977. Further notes on reproduction in *crotalus-willardi* reptilia serpentes crotalidae. *Bulletin of the Maryland Herpetological Society* 13(2):111.
- Ratcliffe, B.C. 1982. American oryctini: *strategus verrilli* (Coleoptera: scarabaeidae: dynastinae). *Coleopterists Bulletin* 36(2):352–357.
- Ray, D.T., and R.E. Stafford. 1985. Registration of 'Santa Cruz' guar. *Crop Science* 25:1124–1125.
- Rea, Amadeo. i.p. *At the desert's green edge: An ethnobotany of the Gila River Pima*. Tucson: University of Arizona Press.
- Ready, A. 1973. *Open range and hidden silver: Arizona's Santa Cruz County*. Nogales, AZ: Alto Press.
- Reff, Daniel. 1991. *Disease, depopulation, and culture change in northwestern New Spain, 1518–1764*. Salt Lake City: University of Utah Press.
- Reid, J.C. 1858. *Reid's tramp, or a journal of the incidents of ten months travel through Texas, New Mexico, Arizona, Sonora, and California*. Austin, TX: The Steck Co.
- Richardson, Rollin Rice. n.d. Autobiographical sketch. Rollin R. Richardson Biographical File, Arizona Historical Society.
- Richardson, T.C. 1988. A risk analysis approach to managing groundwater quality in the upper Santa Cruz basin (Arizona). Master's thesis, University of Arizona.
- Riechert, S.E., and A.V. Hedrick. 1990. Levels of predation and genetically based anti-predator behavior in the spider, *Agelenopsis aperta*. *Animal Behavior* 40(4):679–687.
- Robbins, Larry. 1995. Unrecorded interview. Little Outfit Ranch, San Rafael Valley, Arizona.
- Roskruge, George. 1881. Map of Mining Claims, Property of the Harshaw Mining Co., Pima County, Arizona. Tucson: Arizona Historical Society.
- Rynning, T.H. 1931. *Gun notches*. New York: A.L. Burt.
- Sanderlin, W.S. (ed.) 1964. A cattle drive from Texas to California: the diary of H.M. Erskine, 1854. *Southwestern Historical Quarterly* 47:397–412 (Jan.). San Rafael Cattle Company. Papers. Special Collections, University of Arizona Library, Tucson. [Papers of the cattle company founded and managed by Colin Cameron.]
- San Rafael de la Zanja Land Grant. *Papers*, 1880–1887. Folder. Arizona Historical Society, Tucson, AZ.
- Sauer, Carl O. 1932. *The road to Cibola*. Ibero-Americana, vol. 3. Berkeley, CA: University of California Press.
- . 1934. The distribution of aboriginal tribes and languages in northwestern Mexico. *Ibero-Americana* 5. Berkeley: University of California.
- . 1935. *Aboriginal population of northwestern New Mexico*. Ibero-Americana, vol. 10. Berkeley, CA: University of California Press.
- Schaus, Richard. Various *Arizona Cattlelogs*.
- Schnabel, Lorraine, et. al. 1986. Bibliography for metallic mineral districts in Pima and Santa Cruz Counties, Arizona. *Arizona Bureau of Geology and Mineral Technology Circular* 26.
- Schrader, F.C. 1915. Mineral deposits of the Santa Rita and Patagonia Mountains, Arizona. *U.S. Geological Survey Bulletin* 582.

- Schrader, F.C., and J.M. Hill. 1914. Topographic map of the Santa Rita and Patagonia Mountains. Tucson: Arizona Historical Society.
- Sedgwick, Sam. 1995. Personal communication with authors.
- Sellers, W.D., and R.H. Hill (eds.). 1974. *Arizona climate 1931–1972*. Tucson, AZ: University of Arizona Press.
- Sellers, W.D., R.H. Hill, and M. Sanderson-Rae. 1985. *Arizona Climate*. Tucson, AZ: University of Arizona Press.
- Serven, J.E. 1965. The military posts on Sonoita Creek. *The Smoke Signal* 12:25. Tucson, AZ: Tucson Corral of the Westerners.
- Seymour, Deni. 1989. The dynamics of Sobaipuri settlement in the eastern Pimería Alta. *Journal of the Southwest* 31(2):205–222.
- Sheridan, T.E. 1979. Cross or Arrow? The Breakdown in Spanish–Seri Relations, 1729–1750. *Arizona and the West* 21(4): 217–334.
- Sheridan, T.E. 1988a. Kino's unforeseen legacy: the material consequences of missionization among the northern Piman Indians of Arizona and Sonora. *The Smoke Signal* 49–50. Tucson, AZ: Tucson Corral of the Westerners.
- Sheridan, T.E. 1986b. *Where the Dove Calls: The Political Ecology of a Peasant Corporate Community in Northwestern Mexico*. Tucson: University of Arizona Press.
- Sheridan, T.E. 1995. *Arizona: A History*. Tucson: University of Arizona Press.
- Simpson, Ruth. 1946. Those who have gone still live: The Hohokam since 1400 A.D. *The Masterkey* 20: 73–80.
- Smith, R.A. 1962. Apache plunder trails southward, 1831–1840. *New Mexico Historical Review* 37(1):20–42.
- . 1964. The scalp hunter in the borderlands, 1835–1850. *Arizona and the West* 6(1).
- Solomon, A., T.J. Blasing, and J.A. Solomon. 1982. Interpretation of floodplain pollen in alluvial sediments from an arid region. *Quaternary Research* 18(1):52–71.
- Sonnichsen, C.L. 1974. *Colonel Greene and the copper skyrocket*. Tucson: University of Arizona Press.
- Spanton, T.G. 1988. The *Cicindela sylvatica* group: Geographical variation and classification of the Nearctic taxa, and reconstructed phylogeny and geographical history of the species (Coleoptera: Cicindelidae). *Quaestiones Entomologicae* 24(1):51–161.
- Spicer, E.H. 1962. *Cycles of conquest*. Tucson: University of Arizona Press.
- State of Arizona. *Annual Report of State Mine Inspector*. Beginning in 1912. State of Arizona.
- Stevens, H.J. (ed.). 1900–1911. *The Copper Handbook, a Manual of the Copper Industry of the World*. Houghton, Mich.: H.J. Stevens. (See Weed., W.H.)
- Stewart, O.C. 1956. Fire as the first great force employed by man. In W.L. Thomas (ed.), *Man's role in changing the face of the Earth*, 115–133. Chicago: University of Chicago Press.
- Strenzel, J.T. 1890. Overland journey to California, 1849. Manuscript in the Bancroft Library.
- Strong, T.R. 1988. Bird communities in the riparian habitats of the Huachuca Mountains and vicinity in southeastern Arizona. Ph.D. diss., University of Colorado, Boulder.
- Sweeney, E. 1991. *Cochise: Chiricahua Apache Chief*. Norman: University of Oklahoma Press.
- Swetnam, T.W. 1990. Fire history and climate in the southwestern United States. In *Proceedings—Effects of Fire in Management of Southwestern Natural Resources*. *USDA Forest Service General Technical Report* RM–191.
- Szuter, Christine. 1991. *Hunting by Prehistoric Horticulturalists in the American Southwest*. New York-London: Garland Publishing.
- Tenney, J.B. 1927–29. History of mining in Arizona. Vol. 1. Chapter 14. Unpublished manuscript. Arizona Bureau of Geology and Mineral Technology: Tucson.
- Thibault, F.J. 1851. Excerpts from the journal of F.J. Thibault. *Arkansas State Gazette and Democrat*. January 31, July 11, and May 9, 1851.
- Thomas, Alfred Barnaby. 1932. *Forgotten frontiers: A study of the Spanish Indian policy of Don Juan Bautista de Anza, Governor of New Mexico*. Norman: University of Oklahoma Press.
- Thorner, J.J. 1906. *Alfilaria (Erodium cicutarium)*, as a forage plant in Arizona. *University of Arizona Agricultural Experiment Station Bulletin* 52:27–58.
- . 1910. The grazing ranges of Arizona. *University of Arizona Agricultural Experiment Station Bulletin* 65:245–360.
- Thrapp, Dan.L. 1967. *The conquest of Apacheria*. Norman, OK: University of Oklahoma Press.
- Tiedmann, A.R., and J.O. Klemmedson. 1973. Nutrient availability in desert grassland soils under mesquite (*Prosopis juliflora*) trees and adjacent open areas. *Soil Society of America, Proceedings* 37(1): 107–111.
- Touchan, R. 1992. Effects of coppice thinning on growth and yield of oak sprouts in southeastern

- Arizona (*Quercus emoryi*). Ph.D. diss., University of Arizona.
- Toumey, J.W. 1891. Overstocking the range. *University of Arizona Agricultural Experiment Station Bulletin* 2.
- Treat, A.E. 1985. Larval *Callidosoma* (Acari, Erythraeidae): New records and a new rearing from the Americas. *International Journal of Acarology* 11: 93-124.
- Tschirley, F.H, and S.C. Martin. 1961. Burroweed in southern Arizona rangelands. *Arizona Experiment Station Technical Bulletin* 146.
- Tuck, Fred. 1963. *History of mining in Arizona*. Phoenix: Department of Mineral Resources, State of Arizona.
- Turner, Christie. 1993. Southwest Indian teeth. *National Geographic Research and Exploration* 9:32-53.
- Turner, Christie and Joel Irish. 1989. Further assessment of Hohokam affinity: The Classic Period population of the Grand Canal and Casa Buena sites, Phoenix, Arizona. In *Archaeological Investigations at the Grand Canal Ruins: A classic period site in Phoenix, Arizona*, Vol. II, pp. 775-792. *Soil Systems Publications in Archaeology* 12, Phoenix.
- Turner, Jack. n.d. Unrecorded interview. Turner Ranch, Harshaw Canyon, Patagonia, Arizona.
- Tuskes, P.M. 1986. The biology and immature stages of *Automeris randa* and *Automeris iris hesselorum* (Saturniidae). *Journal of the Lepidopterists' Society* 39(3):163-170.
- . 1986. Biology and immature stages of *Citheronia splendens sinaloensis* and *Eacles oslari* in Arizona (Saturniidae). *Journal of the Lepidopterists' Society* 40(4):264-270.
- U.S. Bureau of the Census. 1864. *Eighth census of the United States, 1860: population*.
- . 1872. *Ninth census of the United States, 1870: population*.
- . 1883. Report on cattle, sheep, and swine. *Tenth census of the United States, 1880: report on the production of agriculture*.
- . 1883. *Tenth census of the United States, 1880: population*.
- . 1902. *Twelfth census of the United States, 1900: agriculture*. Vol. 6, pt. 2
- . 1913. *Thirteenth census of the United States, 1910: agriculture*. Vol. 6.
- . 1922. *Fourteenth census of the United States, 1920: agriculture*. Vol. 6, pt. 3.
- . 1943. *Sixteenth census of the United States, 1940: housing*. Vol. 2.
- . 1975. *Historical statistics of the United States, colonial times to 1970*. Pt. 2.
- . 1983. *Twentieth census of the United States, 1980*. Vol. 1. *Characteristics of the population*. Chap. D, detailed population characteristics, pt. 4.
- U.S. Congress, House. 1879. *Annual report of the Governor of Arizona*. House executive document I, 46th Congress, 2nd session. Serial 1911.
- . 1881. *Annual report of the Governor of Arizona*. House executive document I, 47th Congress, 1st session. Serial 2018.
- . 1883. *Annual report of the Governor of Arizona*. House executive document I, 48th Congress, 1st session. Serial 2191.
- . 1885. *Annual report of the Governor of Arizona*. House executive document I, 49th Congress, 1st session. Serial 2379.
- . 1890. *Annual report of the Governor of Arizona*. House executive document I, 51st Congress, 2nd session. Serial 2642.
- . 1893. *Annual report of the Governor of Arizona*. House executive document I, 53rd Congress, 2nd session. Serial 3211.
- . 1895. *Annual report of the Governor of Arizona*. House executive document I, 54th Congress, 1st session. Serial 3383.
- U.S. Department of the Interior. 1887. *Report of Commissioner of the Land Office relative to readjustment of private land claims in New Mexico and Arizona*. Washington, DC: Government Printing Office.
- Voss, S.F. 1982. *On the periphery of nineteenth-century Mexico*. Tucson: University of Arizona Press. [Most comprehensive analysis of Sonora and Sinaloa in the nineteenth century. Focuses upon the competing elites that ran those two states, including the Elías family.]
- Wagoner, J.J. 1951. Development of the cattle industry in southern Arizona, 1870s and 1880s. *New Mexico Historical Review* 26:204-224.
- . 1951. Gadsden purchase lands. *New Mexico Historical Review* 26:18-43.
- . 1952. A history of cattle branding in Arizona. *New Mexico Historical Review* 28:187-199.
- . 1952. History of the cattle industry in southern Arizona, 1540-1940. *University of Arizona Social Science Bulletin* 20. [Only historical synthesis of cattle ranching in Arizona in print.]
- . 1961. Overstocking of the ranges in southern Arizona during the 1870s and 1880s. *Arizonaiana* 2:23-27.
- . 1970. *Arizona Territory 1863-1912: a political history*. Tucson: University of Arizona Press.

- Walker, H.P. 1973. Wagon freighting in Arizona. *The Smoke Signal* 28. Tucson, AZ: Tucson Corral of Westerners.
- Walker, H.P., and D. Bufkin. 1979. *Historical atlas of Arizona*. Norman: University of Oklahoma Press.
- Warren, D.K., and R.M. Turner. 1975. Saltcedar (*Tamarix chinensis*) seed production, seedling establishment, and response to inundation. *Journal of the Arizona Academy of Science* 10:135-144.
- Watson, D.S. (ed.). 1931. *The Santa Fe trail to California, 1849-1852. The journal and drawings of H.M.T. Powell*. San Francisco: The Grabhorn Press.
- Wayland, J.A. 1964. Experiment on the Santa Cruz: Colin Cameron's San Rafael Cattle Company, 1882-1893. Master's thesis, University of Arizona. [Sympathetic account of Colin Cameron's attempts to build a cattle empire in the San Rafael Valley by laying claim to the "overplus" lands of the San Rafael de la Zanja land grant as well as the grant's original four *sitios* (four square leagues).]
- Webb, R.G., and Julio Betancourt. 1992. Climatic variability and flood frequency of the Santa Cruz River, Pima County, Arizona. *United States Geological Survey Water-Supply Paper* 2379. Washington: U.S. Government Printing Office.
- Webb, R.G., and J.K. Korky. 1977. Variations in tadpoles of frogs of the *rana-tarahumarae* group in western Mexico anura ranidae. *Herpetologica* 33(1):73-82.
- Weber, D.J. 1982. *The Mexican frontier, 1821-1846: the American southwest under Mexico*. Albuquerque: University of New Mexico Press. [The best account of the American Southwest, including Arizona, when it belonged to Mexico.]
- . 1992. *The Spanish frontier in North America*. New Haven, CN: Yale University Press. [The finest synthesis of Spain's empire in what is now the United States, including Arizona.]
- Weed, W.H. (ed.). 1912-13. *The Copper Handbook, a Manual of the Copper Industry of the World*. Houghton, Mich.: W.H. Weed.
- . (ed.). 1918-1920. *The Mines Handbook; an Enlargement of the Copper Handbook, a Manual of the Mining Industry of the World*. New York: W.H. Weed.
- . (ed.). 1925. *The Mines Handbook, Succeeding the Copper Handbook Describing the Mining Companies of the two American Continents*. Tuckahoe, NY: Mines Handbook Company.
- Wehrman, G. 1965. Harshaw: mining camp of the Patagonias. *Journal of Arizona History* 6:21-36.
- Welty, J.W., et. al. 1985. Mine index for metallic mineral districts of Arizona. *Arizona Bureau of Geology and Mineral Technology Bulletin* 196.
- West, Robert. 1993. *Sonora: Its geographical personality*. Austin: University of Texas Press.
- Wilcox, David. 1981. The entry of Athapaskans into the American Southwest: The problem today. In *The Protohistoric Period in the North American Southwest, A.D. 1450-1700*, edited by David R. Wilcox and W. Bruce Maase, pp. 213-256. *Anthropological Research Papers* 24. Tempe: Arizona State University.
- . 1986. The Tepiman connection: A model of Mesoamerican-Southwestern interaction. In *Ripples in the Chichimec Sea: New considerations of Southwestern-Mesoamerican interactions*, edited by Frances Joan Mathien and Randall H. McGuire. Carbondale: Southern Illinois University Press.
- Willson, Roscoe. 1965. Feature article in *The Arizona Republic* October 17, 1965.
- Wilson, Eldred D. 1961. Gold placers and placering in Arizona. *State of Arizona Bureau of Geology and Mineral Technology Bulletin* 168.
- Wilson, E.D., J.B. Cunningham, and G.M. Butler. 1967. Arizona lode-gold mines and gold mining. *Arizona Bureau of Mines Bulletin* 137.
- Wilson, John. 1987. *Islands in the desert: A history of the upland areas of southeast Arizona*. Las Cruces, NM: United States Forest Service.
- Wilson, R.G. n.d.. *Pioneer cattlemen of Arizona*. 2:29.
- . 1951. *Pioneer and well known cattlemen of Arizona*. Phoenix, AZ: McGrew Printing Co.
- Winship, G.P. 1896. *The Coronado expedition, 1540-1542*. Washington: Fourteenth Annual Report of the Bureau of American Ethnology. 1892-1893, part I.
- Wolcott, M.T. (ed.). 1929. *Pioneer notes from the diaries of Judge Benjamin Hayes*. Los Angeles: Marjorie Tisdale Wolcott.
- Wyllys, R.K. 1935. *Pioneer padre: the life and times of Eusebio Francisco Kino*. Dallas, TX: Southwestern Press.
- Young, Otis, E., Jr. 1970. *Western Mining*. Norman: University of Oklahoma Press.
- Yourgules, Mike. 1994. Personal communication with authors. Harshaw, Arizona.

Interviews

Ashburn, Helen. 1994. Recorded interview. Ashburn-Goodwin Ranch, San Rafael Valley, Arizona. On file with U.S. Forest Service, Tucson, Arizona.

Bercich, Bud. 1995. Recorded interview. Bercich Ranch, San Rafael Valley, Arizona. On file with U.S. Forest Service, Tucson, Arizona.

Granillo, Cuco. 1994. Recorded interview. Washington Camp, Arizona. On file with U.S. Forest Service, Tucson, Arizona.

Hale, Ruth and Norman. 1994. Recorded interview. Hale Ranch, Harshaw, Arizona. On file with U.S. Forest Service, Tucson, Arizona.

Harris, Richard. 1994. Unrecorded interview.

Hathaway, Judge James. 1995. Personal communication with authors.

Hopkins, Vera Parker. 1995. Unrecorded interview. Douglas, Arizona.

Hunt, Tom. 1994. Recorded interview. Rail X Ranch, Patagonia, Arizona. On file with U.S. Forest Service, Tucson, Arizona.

Lenon, Robert. 1994. Unrecorded interview. Patagonia, Arizona.

Lewis, Blaine. 1994. Recorded interview. Patagonia, Arizona. On file with U.S. Forest Service, Tucson, Arizona.

Macuistion, Sunny and Nancy. 1994. Unrecorded interview. San Antonio Ranch, Lochiel, Arizona.

Ossa, Ramon de la. 1994. Unrecorded interview. Lochiel, Arizona.

Patton, Jim and Ann. 1994-1995. Personal communication with authors.

Robbins, Larry. 1995. Unrecorded interview. Little Outfit Ranch, San Rafael Valley, Arizona.

Sedgwick, Sam. 1995. Personal communication with authors.

Turner, Jack. n.d. Unrecorded interview. Turner Ranch, Harshaw Canyon, Patagonia, Arizona.

Yourgules, Mike. 1994. Personal communication with authors. Harshaw, Arizona.

Newspapers

The Arizona Daily Star (ADS) Tucson, AZ.

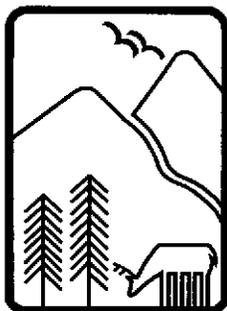
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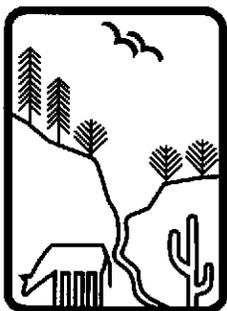
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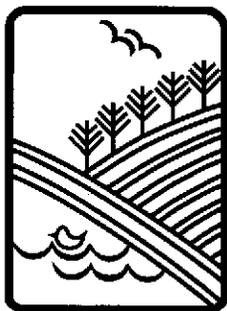
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