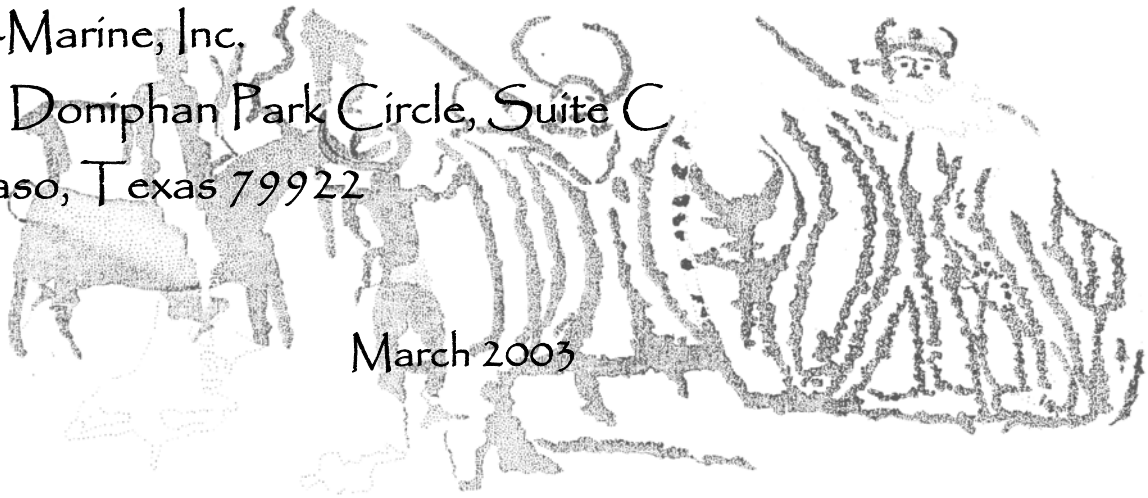
A CULTURAL RESOURCES OVERVIEW
of the
SAN ANDRES NATIONAL WILDLIFE REFUGE, NEW MEXICO

by Victor Gibbs, Principal Investigator

prepared for:
U.S. Fish and Wildlife Service
Region 2 – Albuquerque, NM

Report of Investigations No. 662EP

Geo-Marine, Inc.
3945 Doniphan Park Circle, Suite C
El Paso, Texas 79922



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United States Fish and Wildlife Service, Region 2
500 Gold Avenue, SW–Room 9116
Albuquerque, New Mexico 87103-1306

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EXECUTIVE SUMMARY

The San Andres National Wildlife Refuge encompasses 57,215 acres centered on the southern portion of the San Andres Mountains. The refuge was established in 1941 by Executive Order 8646, defining it as an area of "conservation and development of natural wildlife resources." The current mission of the refuge is to restore a remnant population of desert bighorn sheep (*Ovis Canadensis mexicana*), a State-listed endangered species in New Mexico.

The refuge is approximately 30 miles northeast of Las Cruces, New Mexico, and is surrounded by lands managed by White Sands Missile Range (WSMR). No missile impacts occur on the refuge, although it does serve as a buffer to the range. In the western portion of the San Andres National Wildlife Refuge, the Agricultural Research Service - Jornada Experimental Range has research rights. Near the southwestern border of the refuge is the National Aeronautics and Space Administration's (NASA) White Sands Test Facility. Because of restricted access, the refuge serves as a natural laboratory for the study of a variety of plant and animal species.

Twenty-seven sites have been documented within the confines of the San Andres National Wildlife Refuge. Of those, 21 sites were documented during the Human Systems Research sample survey of the Southern San Andres Mountains (1991). Two sites were documented during a survey of springs in the area conducted by Human Systems Research (1994: site files only), two more were documented during the Human Systems Research Ranches and Mines survey (1996: site files only), and the remaining site was a ranch complex documented by private individuals (1996: site files only). Temporal components documented on the refuge include Middle Archaic, Late Archaic, early and late Formative (ceramic), Protohistoric, and Historic. Five of the sites (LA 72175, LA 72176, LA 72177, LA 72191, and LA 116345) are inholdings of White Sands Missile Range.

Less than one percent of the San Andres National Wildlife Refuge has been surveyed for cultural resources. It is suggested that research questions regarding prehistoric occupation within the refuge should be more broad-based than in areas that are better documented. A research design developed for performing cultural resources assessments in the mountainous regions of southern New Mexico is provided, as well as an annotated bibliography of relevant research materials.

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CHAPTER 1
INTRODUCTION

SCOPE OF WORK

The U.S. Fish and Wildlife Service contracted Geo-Marine, Inc., El Paso, to conduct a cultural resources overview of the San Andres National Wildlife Refuge (Figure 1.1). Specific elements required by the scope of work include:

1) A succinct description of the environmental characteristics of the study area.
2 A compilation of existing site records of the Refuge.
3) Copies of site forms for recorded sites.
4) 7.5-minute USGS topographic maps with the site locations plotted (software versions acceptable).
5) A narrative discussion of the past and current archeological and ethnographic/ ethnohistorical investigations at San Andres Refuge and surrounding region.
6) A narrative section which presents the prehistoric and historic information available for the San Andres Refuge and surrounding region. This section shall constitute the major portion of the Overview and Assessment. It shall consist of both the Archeological/ Ethnographic (prehistory/protohistory) and Historic chronologies of the region.

   The prehistoric/protohistoric discussion shall include the appropriate cultural units, temporal components, or cultural sequences and phases utilized in the area. Prehistoric and protohistoric life ways shall be discussed, as identified from the archeological and ethnographic record. This shall include such factors as past technology, subsistence, settlement patterns, material culture, social and religious systems, trade alliances, and linguistics. Identify applicable sources from which ethnographic inferences can be made.

   The Historic narrative shall identify historic events, famous individuals, places and other occurrences or incidents that are pertinent to San Andres. In developing the narrative, include information on historic personal, military and scientific accounts and diaries, historic routes of travel, ethnic histories, and the lifeways of the various ethnic groups that occupied the San Andres or its immediate region. The narrative shall capture the history of homesteading and ranching at San Andres.

7) Recommendations for future cultural resource management options and research directions for the San Andres National Wildlife Refuge. Discuss the general questions and issues relating to future archeological and historic research and management. Indicate gaps in the present data base related to these questions and issues. Present suggestions concerning future research goals and investigation needs. Discuss relevant cultural resource management options for the area.
8) A listing of contemporary, Federally-recognized Indian Tribes with sufficient historical, cultural, and ancestral, ties to San Andres, which in the opinion of the contractor should be considered the primary points of consultation for U.S. Fish and Wildlife Service projects and actions under the National Historic Preservation Act, the Archeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act.
9) An Appendix listing the titles of pertinent theses, dissertations, published works, research projects and/or investigation projects which have contributed to the knowledge about the cultural resources of San Andres and the San Andres region. This listing shall be annotated with a brief summary of each listed source.
10) A listing of the cultural resource collections from the San Andres National Wildlife Refuge, if any. This listing shall include a summary of the museum and university archeological and historic artifacts, collections, catalogs, photographic records, and archival information for the National Wildlife Refuge only.
11) Maps and graphics necessary to support the Overview/Assessment.
12) An "Executive Summary" of the Cultural Resource Overview/Assessment encapsulating the most significant points of the complete Overview/Assessment.
13) Bibliography.

THE STUDY AREA

The San Andres National Wildlife Refuge encompasses 57,215 acres in the southern portion of the San Andres Mountains (see Figure 1.1). The refuge was established in 1941 by Executive Order 8646, defining it as an area of "conservation and development of natural wildlife resources." The current mission of the refuge is to restore a remnant population of desert bighorn sheep (*Ovis Canadensis mexicana*); a State-listed endangered species in New Mexico.

The refuge is approximately 30 miles northeast of Las Cruces, New Mexico, and is surrounded by lands managed by White Sands Missile Range. Although no missile impact occurs on the refuge, it does serves as a buffer zone to White Sands Missile Range. The Agricultural Research Service–Jornada Experimental Range has research rights in the western 40 percent of the San Andres National Wildlife Refuge. The National Aeronautics and Space Administration's (NASA) White Sands Test Facility is near the southwestern border of the San Andres National Wildlife Refuge. Because of restricted access, the refuge serves as a natural laboratory for the study of a variety of plants and animal species.

Figure 1.1. Project location map (White Sands, NM [1983] USGS 1:100,000 map) (11 x 17)

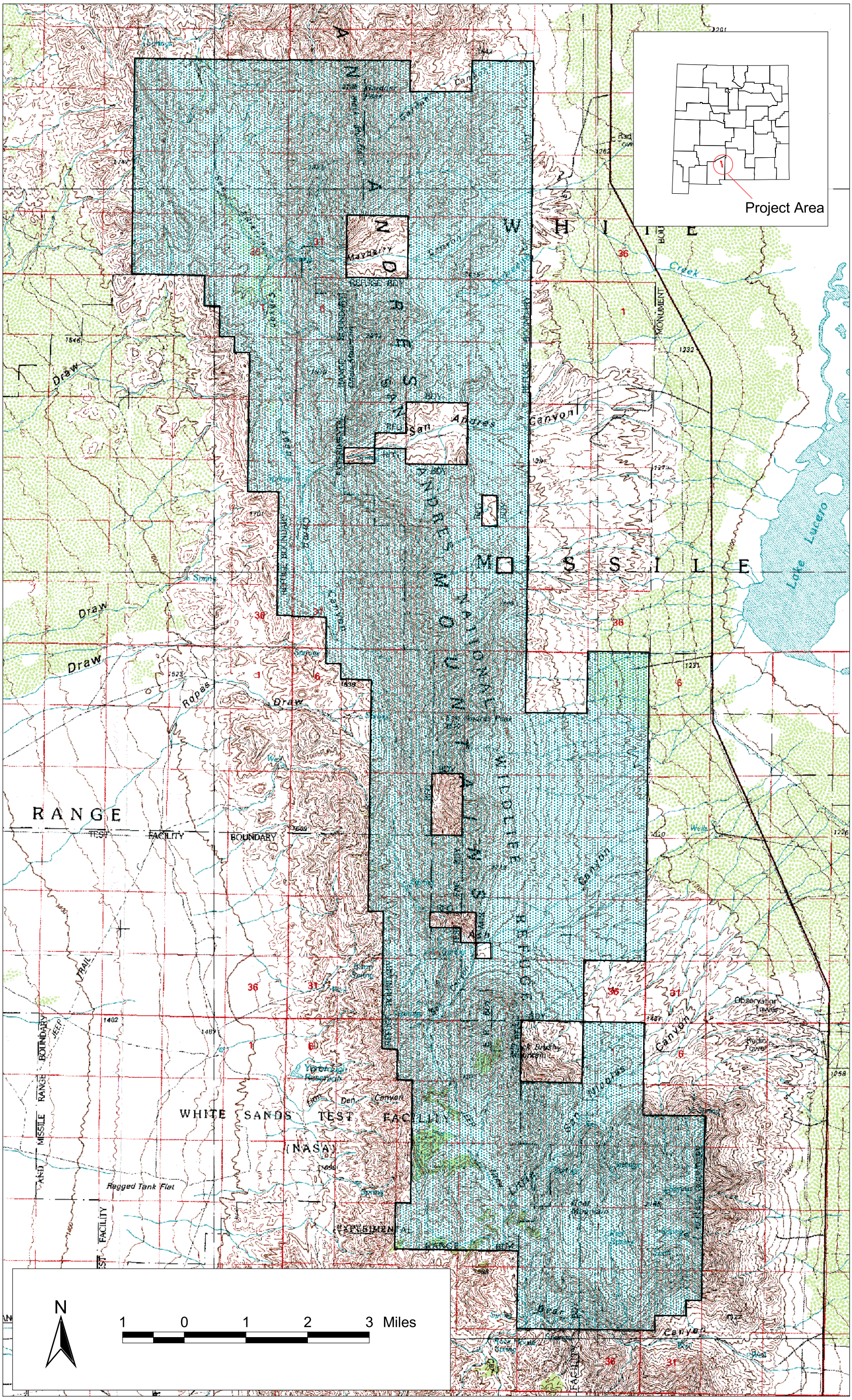

Figure 1.1. Project location map (White Sands, NM [1983] USGS 1:100,000 map).

figure 1.1

REPORT ORGANIZATION

This overview is divided into six chapters with two appendices. Chapter 1 is the Introduction (this chapter). Chapter 2 provides a brief summary of the San Andres National Wildlife Refuge environment. Chapter 3 is a prehistoric and historic cultural history of the study area and surrounding region. Chapter 4 provides a summary of the previous cultural resources research conducted in the vicinity of the study area. Chapter 5 is a summary of all recorded cultural properties within the San Andres National Wildlife Refuge boundaries. Chapter 6 provides a research design and recommendations for future work within the San Andres National Wildlife Refuge boundaries. Report references follow. Appendix A is an annotated bibliography of cultural resources work conducted on the refuge. Appendix B is a listing of federally recognized tribal groups with potential claims to cultural resources and traditional cultural properties on the San Andres National Wildlife Refuge.

CHAPTER 2
ENVIRONMENTAL SETTING

The environment of the San Andres National Wildlife Refuge is mountainous, ranging from 4,200 to 8,239 feet above mean sea level. Annual precipitation on the refuge averages between 13 and 14 inches per year, with the majority of the rain falling in intense summer storms during the months of July, August, and September. Temperatures range between below 32 degrees Fahrenheit in winter and over 100 degrees Fahrenheit in summer. The San Andres Mountains are characterized as a monocline with gentle slopes on the west and steep limestone escarpments on the east. Soils are classed as the Rockland-Rough Broken Land soil association. Rock formations found in the refuge include outcrops of limestone, shale, basalt, and sandstone. A thin layer of stoney, loamy soil occurs between the outcrops of bedrock on very steep slopes, below ledges, and in narrow valleys (Research Management Consultants 1998). Water sources within the San Andres National Wildlife Refuge include 43 natural springs and seeps, most of which drain into the Tularosa Basin to the east. Four springs that provide permanent water in the project area include Little San Nicolas, Ash, San Andres, and Mayberry.

The San Andres Mountains contain five general plant communities, including desert shrub, desert riparian, grass-shrub, mountain shrub and piñon juniper. Vegetation found within the San Andres National Wildlife Refuge includes needle and thread grass (*Stipa comata*), gramma grass (*Boteuloua* spp.), mountain mahogany (*Cercocarpus montanus*), prickly pear cactus (*Opuntia* spp.), agave (*Agave* spp.), Yucca (*Yucca* spp.), and ocotillo (*Fouquieria splendens*). Higher elevations contain stands of piñon pine (*Pinus edulis*) and juniper (*Juniperus monosperma*). Desert willow (*Chilopsis linearis*) and apache plume (*Fallugia paradoxa*) are found around springs and major drainages (Research Management Consultants 1998).

Fauna within the San Andres National Wildlife Refuge includes 38 species of mammals, including desert bighorn sheep (*Ovis canadensis mexicana*), desert mule deer (*Odocoileus hemionus crooki*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), coyote, (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), desert cottontail, (*Sylvilagus audobonii*), and a wide variety of rodents. Bird surveys conducted on the San Andres National Wildlife Refuge indicate 142 species, of which 60 are known to nest on the refuge. Over 45 species of reptiles inhabit the refuge (Research Management Consultants 1998).

CHAPTER 3
CULTURE HISTORY OF THE SAN ANDRES REGION

This chapter briefly outlines the culture history of the south-central New Mexico and the region surrounding San Andres, an area roughly equivalent to Dona Ana County and neighboring areas of Sierra and Otero Counties.

Human occupation of the American Southwest has spanned approximately 12,000 years. The earliest, generally recognized cultural occupation dates to about 10,000 B.C. and is referred to as the Paleoindian period. The cultural prehistory of the region begins with the Paleoindian period, which coincided with the termination of the Pleistocene, and was succeeded by the Archaic, Formative, Protohistoric, and Historic periods of human occupation of the Southwest (Table 3.1).

Table 3.1
Regional Cultural Periods

Pre-Clovis	35,000 B.C. – 10,000 B.C.
Paleoindian	10,000 B.C. - 5500 B.C.
Clovis	10,000 B.C. – 9000 B.C.
Folsom	*9000 B.C. – 8200 B.C.*
Plano/Cody	*8200 B.C. – 6000 B.C.*
Archaic	6000 B.C. - A.D. 200
Early Archaic	*6000 B.C. - 3000 B.C.*
Middle Archaic	*3000 B.C. - 1800 B.C.*
Late Archaic	*1800 B.C. - A.D. 200*
Formative	A.D. 200 - 1450
Mesilla Phase	*A.D. 200 - 1100*
Dona Ana Phase	*A.D. 1100 - 1200*
El Paso Phase	*A.D. 1200 - 1450*
Protohistoric	A.D. 1450 - 1680
Historic	A.D. 1680 - present

All the major recognized cultural periods in southwestern prehistory are represented among the documented archaeological sites in the region that includes the project area. The cultural remains found reflect human populations dating from as early as ca. 9000 B.C. (the Paleoindian period) through the subsequent Archaic, Formative, Protohistoric, and Historic periods.

PRE-CLOVIS PERIOD (35,000 B.C.–10,000 B.C.)

The beginning date for the Paleoindian period in the region is uncertain. While radiocarbon dating has securely established a human presence in southeastern New Mexico by about 10,000 B.C. (Carmichael 1986:8; Sebastian and Larralde 1989:24, 25), several researchers (Chrisman et al. 1996:373; Hofman et al. 1989:26) have argued that humans were present prior to that date. Dates from Pendejo Cave near Orogrande have suggested that human presence in the Hueco Bolson may extend back to 35,000 B.C. (MacNeish 1993b, MacNeish et al. 1993, Chrisman et al. 1996:1). Other pre-Clovis sites are reported from the Great Plains (Hofman et al. 1989:26-29), but considerable debate continues concerning the dating and contextual relationships of those materials. Because of this controversy, the archaeological community has not as a whole accepted the pre-Clovis occupation of North America. However, the possibility of human occupation pre-dating 10,000 B.C. cannot be completely ruled out and the beginning date for the Paleoindian period should therefore be considered tenuous.

PALEOINDIAN PERIOD (10,000 B.C.–6000 B.C.)

The environment during this period is characteristic of the Late Pleistocene-Holocene transition, with moist woodlands and continual stream flow in mountains, and standing lakes and marshes throughout the basins. Evidence from packrat middens suggests juniper-oak woodlands as well as grassland savannahs were predominant in basins during the early part of the period. A gradual increase in aridity in the region resulted in the woodlands eventually being displaced by Chihuahuan desert scrub and the extinction of large game animals by the end of this period (Miller and Kenmotsu 2002). The stone tool assemblages associated with the Paleoindian period typically include lanceolate projectile points and flake tools such as small scrapers that are usually made from high quality and exotic (non-local) lithic materials. The Paleoindian period is divided into three sub-periods, the Clovis, Folsom, and Plano/Cody complexes, based on the functional and stylistic differences in tool assemblages. No known Paleoindian artifacts have been identified on the refuge.

Clovis (10,000 B.C.–9000 B.C)

The return to wetter conditions postulated to have begun around 9000 B.C. (Irwin-Williams 1979:31), may have provided the context for the evolution of the Clovis culture. Although most of the cultural remains from this early period have been found in association with extinct species of mammoth and bison, undoubtedly the subsistence patterns of the early Clovis peoples were also dependent on floral resources available in the lush grasslands and piñon/juniper woodlands. Population was likely low density and separated into highly mobile social groups that inhabited large home ranges.

Most evidence of this cultural period in the region is from isolated projectile points. Clovis points are identified by a large thinning flake scar or flute that emanates from the base of the point and terminates less than halfway up the length of the point. Small transverse scrapers are also found with Clovis period assemblages, but are found throughout the Paleoindian period and are not exclusively temporal indicators of the Clovis period.

Documented features or sites from this period are rare: habitation sites in Rhodes Canyon and Mockingbird Gap are known to exist but have not been reported in much detail. It has been suggested that the sparse evidence of Clovis culture occupation of the region may not be an indication of a limited Clovis presence in the area, but may be the result of the depth of these buried cultural deposits (Miller and Kenmotsu 2002).

In the general project region, a large campsite excavated in the late 1960s (Weber and Agogino 1968) best represents the Clovis period. Located on the west side of the Oscura Mountains, the Mockingbird Gap site included the largest quantity of Clovis period materials on record in the area, and reportedly contained Clovis materials dating to ca. 9000 B.C. A smaller site located in the gypsum flats near the southern edge of the Tularosa Basin also included Clovis materials (Laumbach and Kirkpatrick 1985). Clovis period artifacts have also been reported from Rhodes Canyon north of Holloman Air Force Base (Eidenbach 1983), and a radiocarbon date from charcoal material that was collected during geomorphic studies north of Las Cruces has been reported (Gile et al. 1981), although no secure radiocarbon dates exist from Paleoindian sites in the San Andres National Wildlife Refuge.

Folsom (9000 B.C.–8200 B.C.)

The increasing aridity began to have an effect on the human populations in the region by 8000 B.C. (Irwin-Williams 1979:31). As the number of megafauna reliant on the once abundant grasslands began to decline, *Bison antiquus* (early) and *Bison occidentalis* (late) became the dominant game species. These large herd animals were also reliant upon the continually shrinking grasslands, and as the number of game animals declined, the pressure on human populations to seek alternative subsistence strategies increased. These cultural adaptations are evident in the archaeological record and are defined as the Folsom sub-period.

Folsom materials appear to be dominated by isolated points, lithic fragments, and preforms, which is suggestive of a society comprised of small groups that was highly mobile and practiced dispersed hunting. The lack of stratigraphy associated with many Folsom site components and the frequent mixing of Folsom period artifacts with later occupations makes inferences regarding Folsom cultural adaptation provisional. Analyses of Folsom assemblages indicate increasing use of fine quality cherts and obsidians including Chuska chert, Edwards Plateau chert, and Alibates chert (Amick 1994); suggesting either long-term movements or trade with other groups.

The Folsom culture is generally identified by the presence of lanceolate points similar to those of the Clovis period. Length of the flutes, or large flakes removed to thin these early points, comprises the most obvious difference between Clovis and Folsom points. While this flute, which originates from the base or proximal end of the point, typically extends midway down the length of the point during the Clovis period, it extends throughout the point's length during the Folsom. An unfluted point that is similar to Folsom types in all other morphological attributes also

frequently occurs on Folsom sites. Known as Midland types, these unfluted Folsom points are suspected to result from conservative use of raw materials in an effort to minimize the breakage frequently associated with fluting (Amick 1994:340).

Artifacts from the Folsom period have been more frequently documented than the Clovis period in the region, though Folsom sites remain a rarity. Folsom materials have been recovered from throughout the general project region in a variety of environmental zones, but these early materials are typically found in temporally mixed assemblages or as isolated artifacts (Browning et al. 1991:67; Eidenbach 1983:102; Laumbach 1985:43; Seaman and Doleman 1988). Folsom components have been identified on Holloman Air Force Base (HAFB) property south of Alamogordo in the Boles Wells area (Mauldin and O'Leary 1994; Sale et al. 1996a, from the Main Base at HAFB (O'Leary 1994, Sale et al. 1996a; Sale et al. 1996b), and numerous finds have been documented south of the project area near Lone Butte (Amick 1994). Folsom materials have also been reported from Rhodes Canyon in the San Andres Mountains (Eidenbach 1983; Wessel et al. 1997) and on the Fort Bliss Military Reservation (Carmichael 1986:211, Seaman et al. 1988a). The closest know Paleoindian site to the refuge is the San Nicolas Site (LA 117481), located just east of the refuge in San Nicolas Canyon. The site contained gravers, scrapers, channel flakes, Folsom projectile point fragments, as well as possible Clovis fragments (Wessel et al. 1997).

Plano/Cody (8200 B.C.–6000 B.C.)

The Plano and Cody traditions are well documented with several different unfluted projectile point styles noted including Cody, Plainview, Eden, and Scottsbluff. Hunting remained the predominant subsistence activity, although the diversification of point styles has been seen as indicative of varying adaptive hunting strategies. Other lithic tools such as scrapers, knives, and drills have been found in association with Plano complex projectile points. Although well-documented sites are rare, the Plano/Cody complex has been documented through numerous surface finds within the general project region and are common in the Hueco and Tularosa Basins (Carmichael 1986; Human Systems Research 1973; Meyer and Eidenbach 1996; Miller and Kenmotsu 2002; Sale 1999).

ARCHAIC PERIOD (6000 B.C.–A.D. 200)

During the nearly 6,000 years of the Archaic period within the region, a slow evolution took place. Subsistence strategies gradually changed from the big game dependent, nomadic lifestyle common in the preceding Paleoindian period to a more sedentary, broad based hunting and gathering adaptation that included the first use of cultigens. Maintenance of domesticated plants required constant attendance from at least a few individuals. Base camps, including some type of habitation structures (either *jacales* or pithouses) become more prevalent as a result. Foraging efficiency continually increased during the Archaic period as the usefulness of more plant species and the technology to process them were discovered, and storage facilities and thermal features appear in the archaeological record.

General trends in projectile point morphology have been recognized during the Archaic period, enabling refinement of temporal assignments into Early, Middle, and Late subdivisions. While some researchers have suggested alternate sequencing for the Archaic period in the Rio Puerco area (Irwin-Williams 1973, 1979) and the Tularosa Basin (MacNeish and Beckett 1987; MacNeish 1993a), for the sake of simplicity and compatibility, the long standing use of Early, Middle, and Late Archaic sub-periods is applied in this report, in concurrence with Carmichael (1986), Browning et al. (1991), and others.

Early Archaic (6000 B.C.–3000 B.C.)

Early Archaic groups were likely seasonally mobile hunter-gatherers that moved in small bands, although this period is not well defined and is generally identified by projectile point styles including Jay and Bajada types. These point forms represent a change from the Paleoindian lanceolate style to a stemmed form that is thought to be the result of the increase in regional aridity and extinction of Pleistocene fauna. Hunting continues to play a predominant role in the subsistence strategies of the period and the few artifacts and features associated with this period have been found in all environmental zones. The Early Archaic sub-period in the region is generally characterized by an increase in the use of coarse-grained material to manufacture projectile points, the use of rock as a heating element, and an increase in the number and type of projectile points manufactured. No Early Archaic sites have been identified in the San Andres National Wildlife Refuge; however, sites of this time period have been identified west of the Oscura Mountains to the north (Browning et al. 1991).

Middle Archaic (3000 B.C.–1800 B.C.)

Although the basic subsistence and technological adaptations evident during the previous period remain generally unchanged, the Middle Archaic is marked by an increase in the overall number of sites, and an increase in site size, assemblage size and the use of features in comparison with Early Archaic sites (Knight et al. 2003). Shallow pithouses first appear during the Middle Archaic, and sites are largely found along drainages. The increase in site and feature size and diversity may be the result of population increase and larger social groups. The frequency of groundstone artifacts also increases during this period, which has been proposed as an increased emphasis on plant foods (Mallouf 1985) and a reduction in residential mobility (Graves et al. 2002), although hunting still played an important role in the subsistence strategies of the Middle Archaic people. No Middle Archaic period sites have been identified in the San Andres National Wildlife Refuge.

Late Archaic (1200 B.C.–A.D. 200)

Significant changes in the cultural adaptations and lifeway of Archaic groups occurred during this period. Late Archaic sites are found in all environmental zones; the diversity of the artifact assemblage increased with the addition of the atlatl, basketry, and nets; small circular structures are common; and projectile point styles change to smaller, corner- and side-notched forms (marking the introduction of the bow and arrow). The first evidence of cultigens (corn, beans, and squash) is also found in the archaeological record from this time period. Corn from the Tornillo Shelter was dated between 2030 - 830 B.C. (Upham et al. 1987) and dates ranging from

1390–940 B.C. and 1200 B.C.–A.D. 600 were recovered from Fresnal Shelter (Tagg 1996). Although hunting still played an important role in the Late Archaic diet, there does appear to be an increased emphasis on small mammals.

A dramatic increase in the ring midden feature type during the Late Archaic period has been identified in mountainous and low hill environs southeast of the project area. These features were likely used for roasting locally available succulent plants such as agave and sotol (Lowry 2000; Zier 1996). The presence of a similar environment within the project area suggests the possibility of similar features being found within the San Andres National Wildlife Refuge boundaries. Late Archaic point styles continue to be used well into the Formative period, creating problems with the temporal assignment of sites of this period.

FORMATIVE PERIOD (A.D. 200–1450)

The Formative period, also referred to as the Ceramic period (Willey and Phillips 1958), is defined by the appearance of ceramics in the archaeological record. This period was a time of great cultural diversity that can be seen in the numerous ceramic types and building construction styles that are thought to represent unique groups or cultural regions. Numerous, disparate, and often confusing regional and chronological terms exist that describe this era in the Southwest. These terms are often based on minute differences in artifact styles. Two general terms are used to describe cultural development in the study area, the Mogollon and the Anasazi. The Anasazi culture is generally assigned to groups in the northern portion of New Mexico and the southern portion of Colorado, and the Mogollon culture is assigned to the region generally south of that area.

Within the region, the Mogollon culture is described as the Jornada Mogollon, a desert adaptation (called the Jornada Branch) of the larger Mogollon culture first described by Lehmer (1948). Cultural remains associated with the Jornada Mogollon culture have been found in the central and southern portions of the region, while on the northern end of the San Andres National Wildlife Refuge artifacts affiliated with the Anasazi culture are evident. Since the project area encompasses both cultural traditions, they will be discussed separately.

Jornada Mogollon

The Formative period is divided into three general phases for the Jornada Mogollon; the Mesilla phase (A.D. 200–1100), the Doña Ana phase (A.D. 1100–1200), and the El Paso phase (A.D. 1200–1450). These divisions were primarily based on changes in ceramic attributes noted by Lehmer (1948) although considerable refinement and debate has occurred in the ensuing years since Lehmer's first publication.

Mesilla Phase (A.D. 200–1100)

Although debate continues regarding the beginning of the Mesilla phase (Browning et al. 1991:22; Carmichael 1986:14), it has been tentatively set at A.D. 200 when plain, brownware pottery first appears in the archaeological record. The adoption of the more sedentary, village

lifestyle seen during this phase may be due, in part, to the increased use of cultigens and the increased storage potential provided by ceramic vessels. Subsistence was generally based on small game hunting and plant foraging, although an increased reliance on agriculture is evident throughout this phase. Structural remains typically consisted of roof- or ramp-entry pit structures and brush huts. Sites from this phase are generally larger than the earlier Archaic period and tend to contain more artifacts. Decorated tradewares, predominantly Mimbres Black-on-white, are commonly included in later associated ceramic assemblages from this phase. Pinched and direct brownware rim forms are usually attributed to the Mesilla phase and are often relied upon for temporal assignments, particularly in the absence of decorated tradeware examples (Whalen 1978:59).

Doña Ana Phase (A.D. 1100–1200)

Originally conceived by Lehmer (1948:78), the Doña Ana phase represents a transitional period when pithouses were abandoned in favor of pueblo-style housing. Since its definition, however, several researchers have aptly demonstrated weaknesses of or exceptions to this general rule. Further complicating temporal assignments to the Doña Ana phase is the reliance on local decorated wares. Black paint designs (bichrome) adorn the earlier decorated style, with red paint (polychrome) added later. Unfortunately, the red pigments used in the later Doña Ana and succeeding El Paso phases are somewhat fugitive, and often difficult to discern. Additionally, Chupadero Black-on-white, a tradeware commonly associated with remains of this phase, continued in production throughout the following El Paso phase, and possibly to as late as A.D. 1500 (Browning et al. 1992:71). A variation in rim forms does seem to correlate with the Doña Ana phase, when rims appear to have been intentionally thickened and flattened (Carmichael 1986:72, 81).

Although the validity of the Doña Ana phase as a component that is identifiable in the field remains somewhat questionable, the use of this designation continues. In the future, however, it may be ultimately discarded, opting for “Early El Paso phase” or “Early Pueblo” terminology, as a few previous researchers have preferred (Sale and Laumbach 1989; Whalen 1978:58).

El Paso Phase (A.D. 1200–1450)

The El Paso phase essentially represents the pueblo period of Jornada Mogollon prehistory. Although several structure types have been reported (Sale and Laumbach 1989:140), contiguous, surface, room blocks of puddled adobe typify structural remains. El Paso Polychrome jars with everted rims are associated with this phase. A specialized, intensive farming adaptation has been suggested for El Paso phase times (Whalen 1978:38), yet hunting and gathering continued to play an important role in subsistence. Hunting activities appear to have been primarily focused on small mammals, particularly rabbits (Carmichael 1986:16). Trade contact with surrounding regions reached its peak during this phase, as evidenced by ceramic tradewares from central and northern New Mexico, as well as northern Arizona and Mexico. An increase in the size and density of sites relating to the El Paso phase is taken to represent a population increase and infers higher levels of social organization (Carmichael 1986:16).

The end of the El Paso phase is marked by what appears to be a depopulation of the Jornada region. While the regression of the local occupants to a less intensive adaptation (i.e., hunter-gatherer lifestyle) has been argued (Wimberly 1979), there is little recognized archaeological evidence for occupation of the region after A.D. 1400. Production of the local ceramic types (El Paso Polychromes, Chupadero Black-on-white), used to designate this cultural group seems to have ended abruptly. In the Tularosa Basin, all major village locations were evidently abandoned by about A.D. 1350 (Wimberly and Rogers 1977:450). What happened to the Jornada and where they might have gone remains predominantly in the realm of speculation at the present time.

Anasazi

Following the Archaic period, Anasazi and Rio Grande pueblo utilization of the area to the north of the refuge is evidenced by occasional finds of glazeware and whiteware. Previous research on and near Chupadera Mesa has documented both pueblo (Peckham 1976) and field house sites (Laumbach and Kirkpatrick 1985) apparently related to the Rio Abajo province of the Rio Grande prior to A.D. 1000 (Clifton 1985). Ceramics recovered from survey adjacent to the Oscura Mountains also indicate utilization of the northern White Sands Missile Range by puebloan groups possibly as late as A.D. 1750 (Browning et al. 1991). Red Mesa Black-on-white, Kana'a Gray, Socorro Black-on-white, Escondida Polychrome, Koyiti Glaze-on-yellow, and Agua Fria Glaze A red ceramic examples have all been recorded within the northern White Sands Missile Range (Browning et al. 1991:113; Laumbach and Kirkpatrick 1985:59). While large pueblos are present just outside the northern range boundary near the Rio Grande (Sale 1987:13) and closer to Carrizozo along Highway 380 (Laumbach and Kirkpatrick 1985:67), agricultural pursuits within the northern missile range proper appear confined to small camps and isolated field houses (Clifton 1985:36; Laumbach and Kirkpatrick 1985:67). No known Anasazi sites have been documented on the refuge, but evidence from LA 72151 (a Pueblo period site with stone roomblocks) and Cottonwood Springs Site (LA 175) on the western boundary of the San Andres National Wildlife Refuge (also containing roomblocks), may have direct influences from Anasazi culture groups.

PROTOHISTORIC PERIOD (A.D. 1450–1680)

Several cultural groups may have utilized the region during the Protohistoric period. According to Beckett and Corbett (1988), tribes including the Chinarra, Concho, Jano, Jocome, Manso, Suma, Piro, and even Tarahumara may have frequented the project area. Unfortunately, archaeological evidence representing these groups has not been found, or at least has not been recognized. The only documented protohistoric inhabitants in the region are the Mescalero Apache. First documented by the Spanish explorers (Sale and Laumbach 1989:13), and more recently by archaeological remains (Sale and Laumbach 1989:13, 51), the Apache once roamed freely throughout the project area.

During recent archaeological investigations, Human Systems Research, Inc. (HSR), personnel located several firing positions utilized during the Hembrillo Canyon battle (Laumbach 2001). Hembrillo Canyon, a natural pass through the San Andres Mountains north of Lake Lucero, has provided most of the Protohistoric evidence documented on White Sands Missile Range. In addition to inclusion of the famed Victorio Peak treasure cache, this canyon was once a favored

camp for Apaches. During an unsuccessful attempt by U.S. military troops to trap Apache chieftain Victorio in 1880, Hembrillo Canyon became a battleground (Laumbach 2001).

On February 3, 1880, a Major Morrow located Victorio's band in the San Andres, just west of White Sands. A fight followed, with the Apaches escaping during the night. The hostiles were encountered again in a canyon northwest of Aleman (probably 16 km [10 miles] west of the San Andres near Caines Ranch), were again attacked and again escaped. Six days later, a Captain Rucker overtook the Indians once more still in the San Andres. This time, however, the Apaches charged the disadvantaged troops and forced them back across the Rio Grande (Thrapp 1974:262).

In March of that same year, 35 Apaches were noted to have escaped the Mescalero Agency to join Victorio's camp. Victorio's camp, it was understood, remained where it had been (some 80 or 90 km [50 or 60 miles] distant), in the San Andres near a spring in the upper Hembrillo Canyon, on the east side of the crest of the range (Thrapp 1974:266).

In April, Colonel Hatch issued special orders designed to flush Victorio and the Mescalero out of the San Andres. One battalion of soldiers was to cover the northeast and east sides of the San Andres. Another battalion was to cover the western side, blocking flight toward the Rio Grande and the Black Range. Hatch himself, with yet another battalion, was to move into the mountains and bring Victorio to a fight. From Fort Concho in Texas, 280 men and officers had been sent toward the Mescalero Agency, expecting that they might block escape to the east and southeast. This seemingly foolproof plan was fouled when the battalion responsible for the east and northeast coverage drank some chemically charged water at Malpais Spring and became ill (Cruse 1941). After finding another known spring dry, the battalion "at long last, suffering the effects of the gypsum and their long, dry marches, staggered into Hembrillo Canyon" (Cruse 1941:72). Here they found the springs held by Victorio and his men. Following an all-night fight involving perhaps 200 Apaches and at least 50 soldiers, additional troops arrived and finally rousted the Indians. Victorio fled south, probably down Green Valley, while Hatch and his troops moved north along the western side of the San Andres Mountains. The two groups narrowly missed each other, allowing Victorio's band to escape and, once again, to frustrate the military (Thrapp 1974:70).

Tommy Cruse (1941:7), in remarking on the mistakes of the 9th Calvary column from Fort Stanton during this attempt to corral Victorio in the San Andres, states that:

> [i]t must be understood that this wild section was almost Terra incognita to any but the Indians. A few important points, such as springs and water holes and peaks, were known to a few hardy frontiersmen and Army men, but often their situation was conjectural and indefinite.

To date, evidence of Apachean activity on White Sands Missile Range is limited to a remarkable pictograph record in Hembrillo Canyon that likely depicts the Apache version of the battle there (Laumbach 2001; Sale and Laumbach 1989); the battle firing positions and associated artifacts (metal bracelet fragment, metal arrow point, ring, and others); a probable Apachean pot drop (Sale and Laumbach 1989); a roasting pit in Hembrillo Canyon radiocarbon dated to A.D. 1620 ± 50; a similar roasting pit located within a multicomponent site with a corrected radiocarbon date of A.D. 1660; and three hearths dated 1760, 1862, and 1867. All these features lie within the San Andres Mountains and aside from a few micaceous brownware sherds observed in association

with the Hembrillo Canyon roasting pit, no evidence of Apachean material culture was recognized on sites with dated features. In fact, three of the sites included surface evidence of utilization during both the Late Archaic and the Formative periods. One of these sites that was considered to be of Late Archaic temporal affiliation, based on its location and low artifact density, contained a Late Archaic style projectile point and Formative period White Mountain Redware ceramics (Sale 1991).

This situation illustrates the problems associated with the recognition of Protohistoric sites in the study area. Without the rare discovery of metal arrow points or worked glass, Protohistoric components are nearly impossible to identify short of radiocarbon dating. In addition, radiocarbon dating becomes inaccurate for dates after A.D. 1500. While it is well known that the San Andres Mountains, and for that matter all of White Sands Missile Range, was once part of the Mescalero Apache homelands, recognizable evidence remains frustratingly elusive.

Ethnographic research has provided some clues to the more recent usage of the San Andres Range for a variety of tasks, including hunting, agave and other resource gathering and processing, as well as spiritual beliefs. Basehart (1973) documented through interviews the Mescalero Apache subsistence patterns throughout their known historic range. The San Andres Mountains were known to the Apache as *dzilhn?ai* or "Mountain Runs." Basehart (1973) states that, "this term was applied to the San Andres as a whole." Mescal, sotol, prickly pear, and other plants were collected in these mountains, while deer and mountain sheep were hunted. Mountain sheep or *dzildibeh*, "were hunted in August and September and could be found in the Guadalupes, the west slope of the Sacramentos, and in the San Andres Mountains, especially Salinas Peak" Human Systems Research (1973:154). Water was described by the Mescalero at "Mockingbird Gap, at a place known as 'cedars lift the branches up'; at 'spring running from a patch of oaks', possibly in the area of Encino, New Mexico; on the north site of Salinas Peak; at the east end of the Capitans, and at Organ Gap in the Organ Mountains" (Human Systems Research 1973:174).

Salinas Peak or *dzildiyene*, mentioned earlier in this text, was "known to all informants as a 'holy mountain' where it was possible to obtain supernatural power. Mescalero would stop, pray, and drink from the spring on the northern side when passing by the mountain" (Human Systems Research 1973:177). Similarly, a place called *tsedazai* or "rock pointed in a row" was a sacred site located south of San Augustine Pass in the Organ Mountains. This sacred place "people could hear the sound of drums and of the next beat of the feet of ceremonial dancers" (Human Systems Research 1973:178).

HISTORIC PERIOD (A.D. 1680–PRESENT)

While the Spanish expeditions and subsequent colonization of Santa Fe followed the Rio Grande and Jornada del Muerto route (Camino Real) west of the project area, evidence suggests that some resources near White Sands Missile Range may have been utilized as early as the seventeenth century. The Organ and San Andres mountains flanking the Tularosa Basin on the west, figure prominently in early Historic period activity near the study area.

Stories abound of a sealed Spanish mine and accompanying treasure, found and then lost in the northern Organ Mountains (Jameson 1989:105-113). Further north, the Victorio Peak treasure (named after, but unrelated to, a nearby Apachean campsite) claims a similar cache that is still

being actively sought by the famed Noss family. According to the Padre LaRue story (Jameson 1989:99), a dissident Spanish mining colony in the San Andres Mountains originally secreted the supposed treasure during the 1600s. Jameson (1989:104) states that Ova Noss showed him a Spanish sword, a silver goblet, and a golden cup, "all which she claimed came from the cache within Victorio Peak." While solid archaeological evidence documenting Spanish activity in the study area is yet lacking, it seems absurd to suppose that with hundreds of trips along the dry Jornada del Muerto, the Spanish never opted to explore the majestic mountains flanking the trail to the east. Nonetheless, the Tularosa Basin lacks mention in Spanish records, predominantly due to the Apache activity there. Schneider-Hector (1993:32) remarks that ". . . from 1610 to 1821, in spite of the Spanish presence, the white sands country remained an Apache domain."

In addition to documented use of Hembrillo Canyon and San Nicholas Spring by the Apache (see Protohistoric), the importance of another location in the San Andres is related by Eve Ball (1970:11).

> Salinas Peak, the highest in the San Andres Range, is our Sacred Mountain. To it our medicine men go, not only for herbs, but for that far more efficacious instrument of healing which we call Power. Just what Power is I cannot explain, for it is beyond my comprehension. Those who seek it go alone that they may be tested for their worthiness. It is a gift to be bestowed not only for virtue but for prayer and courage. If the applicant bravely endures hunger, fear, and other tests of which we do not speak, he may receive a healing art, usually for some specific illness. Or he may be given the ability to do some seemingly impossible things such as the Power possessed by Lozen. [Lozen was reported to exhibit an ability to 'see' enemy movement well beyond visual range].

Spanish campaigns against the Apache in the study area were reported in 1771, 1775, and 1776 until a Lieutenant Hugh O'Conner was "ordered to Mexico City, where he was stripped of rank and ordered to write a complete report of his activities on the northern frontier" (Wimberly et al. 1979:21).

The first Mexican settlement in the Tularosa Basin area occurred around 1845, when a water powered sawmill was constructed along Tularosa Creek to cut *vigas* for the church in old El Paso. According to local informants, transport of the *vigas* required three separate trips, the first of which proved costly (in terms of lives and oxen) at the hands of the Mescalero (Sanders 1990:5).

The Tularosa Basin remained a dangerously uncharted territory until after the Treaty of Guadalupe Hidalgo in 1848, which brought this portion of Apacheria under the jurisdiction of the United States government. The first documented excursion into the Tularosa Basin by United States military forces occurred when the military pursued Apaches into the Tularosa Basin. The ensuing skirmish resulted in casualties on both sides (Wimberly et al. 1979:31).

By 1849, the military had learned of timber in the Sacramento Mountains (Schneider-Hector 1993:28), and during that year a Captain Marcy led the first official exploratory venture into the Tularosa Basin. Only a few days after Marcy's venture, a Lieutenant Smith was directed to survey the Sacramento Mountains east of the basin. Smith reportedly followed the salt trail to San Nicolas Springs, just north of present-day Highway 70 along the east side of the San Andres range. Springs in the Tularosa Basin were continually mentioned during subsequent military pursuits of the Apache. Smith then crossed the basin following a large Indian trail to Dog Canyon along the Sacramento Mountain foothills (Schneider-Hector 1993:41). Smith's conclusion that the region's rough terrain precluded a safe passage for wagon travel served to inhibit further exploration of the Tularosa Basin for only another decade.

Of important note are the first mentions of the salt road and San Nicolas Springs by these early American explorers. It was during Marcy's expedition that the salt road leading from El Paso to the Tularosa Basin first received attention. Though little published information is available on the salt road, the area around White Sands Missile Range had apparently been used to harvest salt for an unknown length of time prior to 1849. *Carretas* from the El Paso area had long established a route paralleling the Organ Mountains to San Nicholas Springs, then on to the salt lake area, despite the Apache threat. Little evidence of the salt road has ever been documented, but San Nicholas Spring still provides a fresh water flow toward the basin, and early, non-Indian artifacts may some day be recovered there, providing a glimpse of Spanish/Mexican presence in the vicinity of the study area.

In 1862, the salt road was discontinued in favor of salt beds located near Guadalupe Peak in Texas. Sonnichsen (1961:1) related that the quality of the salt near Guadalupe Peak was better and that "there was a rumor that private owners might close off the Tularosa supply."

> The Valley Mexicans must have known about the existence of these deposits from the earliest times, but until the outbreak of the American Civil War they let them alone. Custom and a good road had led them from time immemorial to the Tularosa or San Andres salinas along a two-day's journey to the north in New Mexico [Sonnichsen 1961:7].

For whatever reason, however, the salt road in the Tularosa Basin fell into disuse and the salt business moved to Texas, where disputes over rights to salt deposits resulted in murder and feuding in 1877.

An early attempt to settle in the basin along the Tularosa River took place around 1860, but Apache attacks forced the settlers to flee southward (Schneider-Hector 1993:42). By 1862, however, settlement of Tularosa proved to be successful. Kit Carson, while campaigning against the Mescalero, visited the area and reported that:

> [t]he country adjacent to Fort Stanton was beginning to assume the appearance of industry and civilization. Below the military reserve, on the Rio Bonito and Rio Ruidoso, settlements were springing up rapidly . . . [and] on the Tularosa, some 50 or 60 settlers from La Mesilla had established themselves and commenced planting [Bender 1974:83].

Both the villages of Tularosa and nearby La Luz constructed entrenched fortifications providing retreat for defense against Apache raids (Sanders 1990:10). Such measures testify not only to the ever-present danger surrounding the early settlers of the basin, but also to the tenacity of those settlers to hold and farm the rich drainages along the Tularosa Basin margins.

Dog Canyon became a well-known Apache stronghold in the foothills of the Sacramento Mountains overlooking the Tularosa Basin. From there, much of the Apache raiding took place. The canyon figured significantly in the military campaigns that were carried out against the Apache (Wimberly et al. 1979). Between 1859 and 1880, eight documented engagements between the Mescalero Apache and the United States Army were fought in Dog Canyon (Wimberly et al. 1979:143). In 1881, however, Chief Nana was ousted from the basin for the last time.

Ironically, years after the last Apache skirmish in Dog Canyon, murder and turmoil along the canyon's waters would again bring extensive notoriety to the canyon when a man named Frank "Frenchy" Rojas was gunned down. Officially, the coroner's jury reported that the Frenchman, who had settled the canyon mouth prior to 1886, died of a self-inflicted rifle wound to the chest, on or the day after Christmas 1894. Although Oliver Lee, a Texas cattleman who had settled Dog Canyon a mile or so below Frenchy's homestead, was suspected by some, no charges were ever filed.

The Salt War also influenced another man's decision to move to New Mexico. Two years later, however, Albert Fountain and his son Henry were waylaid and murdered near White Sands. Again, Oliver Lee was suspected. This time indictments were filed, but he was acquitted of the charge.

The arrival of the railroad brought major changes to the Tularosa Basin and vicinity. The situation was summarized in the words of Julio Betancourt (Wimberly et al. 1979:103):

> By 1897, the Tularosa Basin was teeming with the excitement at the prospect of construction to El Paso and amidst the ruckus caused by the Fountain Murder. John Eddy, who had promoted the railroad through the Pecos Valley, bought the El Paso and White Oaks Railroad from Jay Gould and managed to persuade Rock Island Investors to extend their own line from Liberal, Kansas to El Paso. The El Paso Northeastern Railroad, as it was called, bought out several ranches in the Sacramentos and began securing water rights. In April, Lee sold his Alamo Canyon holdings to Eddy, water rights and all, and surveyors had already arrived to lay out the first blocks of Alamogordo.

A rail terminal was established and the area expanded from "three tents and a handful of people in June 1898, to a town of one thousand people by March 1899" (Schneider-Hector 1993:46). The feuding among other ranchers over water, land, and political leverage in the Tularosa Basin had finally been pacified by the arrival of industry and population growth. By the turn of the century, the Apaches had been subdued and resettled on their own reservation, the Lincoln County War (which ended political strangleholds) had been fought, and a city had been created. A new era faced the local inhabitants of the Tularosa Basin, who were not soon to forget the bloody past.

Located just east of the northern White Sands Missile Range boundary lies the old mining community of White Oaks. With the discovery of gold deposits in the late 1850s, White Oaks achieved boomtown status with as many as 2,500 inhabitants. Total gold production from the White Oaks mines has been estimated at 4.5 million dollars and the area is said "to have the deepest dry free-milling gold mines in the United States, probably the world" (Parker 1971:127,129). Business thrived at White Oaks through the late 1800s, not only adding to the regional population, but also improving the condition and safety of road travel between distant towns. The establishment of trade from White Oaks facilitated travel from Alamogordo past the Oscura Mountains to Socorro. Stage lines from the Tularosa Basin to Carthage, a coal mining operation southeast of Socorro, became commonplace. Unfortunately for White Oaks, the town fathers decided to charge the coming railroad excessively to pass through the town, thinking the engineers had no option. Much to the surprise of those at White Oaks, the railroad bypassed the town completely. By the turn of the century, the mines had played out, and with the railroad avoidance of White Oaks, the town was doomed.

A new town, Carrizozo, was established along the railway southeast of White Oaks, and most of the population of the once-booming mining town eventually relocated there; "some of them brought their buildings with them" (Parker 1971:xvi). Today, while White Oaks rests in ghost town status (though a few families remain) Carrizozo is supported by travelers along U.S. Highway 54, the railroad, cattle ranching, and tourism.

One mining town once prospered within the confines of White Sands Missile Range, near the south end of the Oscura Mountains. Estey City was created during a brief mining boom in the early 1900s and now remains as the only true ghost town on White Sands Missile Range land. Wilson (1975:14) has summarized the pertinent details:

> Estey City was a copper-mining 'boom' town, one which never achieved notable production. Development started in 1900 when the Estey Mining and Milling Company, promoted by David M. Estey of Owosso, Michigan began building an ore crusher, electrolytic plant and other features of a copper-mining and reduction enterprise. The townsite apparently dates from 1901, and soon grew to include some 50 permanent dwellings, a large warehouse, general store, saloon and a "commodious hotel" that would accommodate up to 60 guests.

A financial panic resulted in the company going bankrupt in 1902 and the 'city' soon became a ghost town. In 1903, Divident Mining and Smelting Co. purchased the properties, tapped new water supplies, and began construction of a smelter. Activity continued through at least 1905, hampered by a shortage of water and the expense of mining low-grade ore. The later years are not well recorded, but the post office closed on March 15, 1910 and with this the town effectively ceased to live. Total production amounted to only about $10,000 in copper.

Ranching in the region began in the 1880s with a plentiful supply of grass. Approximately 97 families owned or leased cattle and goat ranches on the area that is now White Sands Missile Range. Ranching families in the San Andres Mountains included Cain, Lucero, Mahaney, Potter, Tucker, and Wood (Eidenbach and Morgan 1994).

CHAPTER 4
PREVIOUS RESEARCH IN THE SAN ANDRES REGION

Previous archaeological investigations within the region of the study area began in the 1920s and 1930s, which is considerably later than the exploration of the Anasazi cultures to the north. The region was viewed by early researchers as an area having less to contribute to the field of archaeology because of the lack of standing architecture. The cultures of southern New Mexico were also viewed as peripheral to those of the north.

Preliminary archaeological work began in southern New Mexico and west Texas by the husband-wife team of Cosgrove and Cosgrove who, in the 1930s, published brief reports about the archaeology in the general study area. Herbert Yeo also documented primarily rock art sites in the area, but also included LA 175 (Cottonwood Springs Site), an El Paso phase Pueblo site located just outside the refuge boundary. In 1948, Donald Lehmer published the landmark study on the Jornada branch of the Mogollon culture, establishing the chronological phases for the region that, with few revisions, are still in use today.

Between 1948 and 1970, little archaeological research was conducted in the region. With federal legislation of the National Historic Preservation Act of 1966, archaeological research expanded greatly throughout the 1970s and 1980s. Much of the relevant archaeological work in the area was conducted on White Sands Missile Range and other federal projects by local cultural resources management firms including Human Systems Research, Inc. (HSR), Batcho and Kauffman Associates, the Bureau of Land Management, the University of New Mexico, and New Mexico State University.

In 1973, HSR published the Technical Manual, a research design for conducting work in the Jornada Mogollon region within the Tularosa Basin. In 1977, Hester conducted a randomized environmentally stratified survey of 33 sections of the Jornada del Muerto, located approximately 10 miles west of the project area, that provides general information on the variety and complexity of sites in the region. Seaman and Doleman (1988) conducted a similar study on adjacent areas to the southwest of the refuge that illustrated differences in site types and densities concluding that the San Andres Mountains may be the core area of the Jornada Mogollon culture (1988:70).

Between 1981 and 1985, Michael Whalen documented the Bruton Bead Site, approximately 15 miles west of the San Andres National Wildlife Refuge, which contained large quantities of trade items, including high densities of shell artifacts. In 1987, Lekson and Rorex examined further the western slope of the San Andres Mountains, further exploring the Cottonwood Springs Site and documenting the Indian Tank Site, the only known two-story prehistoric pueblo in the region (Lekson and Rorex 1987:23).

Batcho and Kauffman Associates conducted surveys on NASA White Sands Test Facility lands to the southwest of the San Andres National Wildlife Refuge, covering over 10,000 acres and recording 72 prehistoric sites. The sites were predominantly small artifact scatters, which contrast with the larger sites found only a few miles to the north (Kauffman 1987; Kauffman and Howell 1987; Kauffman and Wright 1987; Michalik and Kugler 1988). To the northwest of the San Andres National Wildlife Refuge, Sale and Laumbach (1989) documented nine sites including several rock art panels and the Hembrillo Canyon battle site. This site is considered important because of a skirmish between Apache forces led by Victorio and members of the 9th Calvary (Sale and Laumbach 1989). The battle site was revisited later using metal detectors and archival information to relocate firing positions (Laumbach 2001).

In the late 1980s and 1990s, many sample surveys were conducted in the region; several of these surveys were conducted by HSR on the San Andres National Wildlife Refuge itself (Table 4.1). In 1988, HSR conducted an environmentally stratified sample survey of the southern San Andres Mountains, covering 37 one-square kilometer areas and documenting 91 sites (Human Systems Research 1991). A second project was conducted in 1990, in which 5 one-square kilometer areas were surveyed; 18 sites were documented during this project (Sechrist et al. 1994). In 1995, Sechrist and others (1996) conducted an environmentally stratified sample survey of five 1-square kilometer areas in the central portion of the San Andres Mountains. The survey was centered in the Cottonwood Canyon area. Thirty-one sites were documented during the survey.

In 1994, HSR examined 39 spring locations on various parts of White Sands Missile Range. In 1996 and 1997, ranch complex sites on White Sands Missile Range were similarly documented throughout the missile range. No reports were generated for these projects, but large site packets are stored at the White Sands Missile Range Environmental Office. An oral history of the ranching families was conducted by Human Systems Research (Eidenbach and Morgan 1994). This project detailed the family lives of the goat and cattle ranchers, much of it relevant to the San Andres Mountains, on White Sands Missile Range prior to World War II.

Table 4.1
Summary of Previous Cultural Resources Work on the San Andres National Wildlife Refuge

Date	Scope of Work	Laboratory of Anthropology Site Numbers	Institution/ Individual	Report
1988	Sample Survey	72149, 72150, 72151, 72152, 72153, 72154, 72155, 72156, 72168, 72169, 72170, 72174, 72125, 72176, 72177, 71278, 72179, 72180, 72181, 72191, 72198	Human Systems Research	Human Systems Research (1991)
1994	Spring survey	104030, 104036, 104051	Human Systems Research	No report, site forms only. See White Sands Missile Range for details.
1996	Ranch complex survey	113963	Jack and Janet Mathews	No report, site form only. See White Sands Missile Range for details
1996	Ranch complex survey	116345, 116352	Human Systems Research	No report, site forms only. See White Sands Missile Range for details.

CHAPTER 5
SUMMARY OF KNOWN CULTURAL RESOURCES ON SAN ANDRES NATIONAL WILDLIFE REFUGE

Twenty-seven sites have been documented within the confines of the San Andres National Wildlife Refuge. Of those, 21 sites were documented during the Human Systems Research (1991) sample survey of the Southern San Andres Mountains (Figure 5.1). Two sites were documented during the Human Systems research Spring survey (1994: site files only), two more were documented during the Human Systems Research Ranches and Mines survey (1996: site files only), and the remaining site was a ranch complex documented by private individuals (1996: site files only). Temporal components documented on the refuge include Middle Archaic, Late Archaic, early and late Formative (ceramic), Protohistoric, and Historic. Five of the sites (LA 72175, LA 72176, LA 72177, LA 72191, and LA 116345) are inholdings of White Sands Missile Range. The sites and their temporal affiliations are summarized in Table 5.1. All of the previously documented sites on the San Andres National Wildlife Refuge are presented in Figures 5.2–5.8 on 1:24,000 scale maps.

ARTIFACT COLLECTIONS

Artifacts collected from the 27 previously recorded sites were examined on January 7, 2002 and are listed as part of the site descriptions. The curation facility for the artifacts is White Sands Missile Range under direction of Bill Yehle (505) 678-2007. However, the entire White Sands Missile Range artifact collection is scheduled to be transferred to a permanent curation facility at Fort Bliss Military Reservation, currently under direction of Peter Bullock at (915) 568-5396.

LA 72149

Other Site Name/Number: HSR 8855-37
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Habitation, resource processing
Cultural Affiliation: Formative period, El Paso phase (A.D. 1200 – 1450)
Collections: Two Late Archaic projectile points, 2 obsidian flakes, 1 Gila Polychrome sherd
Dimensions: 150-x-40 m
Number of artifacts: 100s

LA 72149 is a Formative period, El Paso phase site that consists of an estimated 13 rooms within five separate room blocks. Human Systems Research recorded the site in 1989. The site is on a small ridge overlooking one of a series of springs called Andrecito Springs (see Figure 5.2). Room Block 1 consists of seven rooms, connected together in an east-west line. A large ashy stain midden is just to the southwest of this room block. Room Block 2 is approximately 10 m to the southeast of Room Block 1 and consists of a single room. Room Block 3 is approximately 10 m southeast of Room Block 2 and consists of three rooms. Room Block 4 is a single room located approximately 5 m southeast of Room Block 3. Room Block 5 is a single room approximately 60 m to the southeast of Room Block 4. Mesquite bushes may conceal additional architectural features.

Ceramics associated with this site include El Paso Polychrome, Chupadero Black-on-white, Gila Polychrome, El Paso Brownware, Seco Corrugated, St. Johns Polychrome, Lincoln Black-on-red, and Three Rivers Red-on-terracotta. Two Late Archaic-style points and a Formative-style projectile point fragment were observed. Groundstone consisted of a large bifacial mano, a small mano fragment, and a schist pestle. A light scatter of lithic artifacts included materials of chert, limestone, and obsidian. Based on the midden stain and the room blocks, the site contains additional important information for future research. This site was recommended as eligible for inclusion in the NRHP.

LA 72150

Other Site Name/Number: HSR 8855-38
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Habitation, resource processing
Cultural Affiliation: Formative, late Mesilla to El Paso phases (A.D. 950-1450)
Collections: 2 Formative projectile points, 2 obsidian flakes, 9 Mimbres Black-on-white sherds, 1 radiocarbon sample
Dimensions: 140-x-100 m
Number of artifacts: 1,000s

LA 72150 is a late Mesilla/El Paso phase site containing four large ashy fire-cracked rock midden areas. Human Systems Research recorded the site in 1989. The site is on a small ridge overlooking a spring to the northwest (see Figure 5.2). The midden areas vary in size from 20 to 40 m in length. Five hearth features were located within the midden areas, one of which was articulated. A radiocarbon sample was retrieved from one of the hearths that yielded a date of A.D. 1373. On the south slope of the ridge, ashy soils are visible to a depth of 60 cm.

Ceramics included El Paso Brownware (with rounded rims), Mimbres Transitional Black-on-white, San Francisco Redware, Alma Plain, Chupadero Black-on-white, and Ramos Polychrome. Two Formative-style projectile points were collected. Several pieces of obsidian were also collected. Groundstone consisted of one-hand manos and slab metates. The density of the debitage was as great as 250 artifacts per m^2 within portions of the site. Based on the depth of materials, quantities of artifacts on the site, and the potential for it to yield additional important information regarding radiocarbon and macrobotanical data, it was recommended as eligible for inclusion in the NRHP.

Figure 5.1. Previously surveyed areas within the San Andres National Wildlife Refuge (11 x 17)

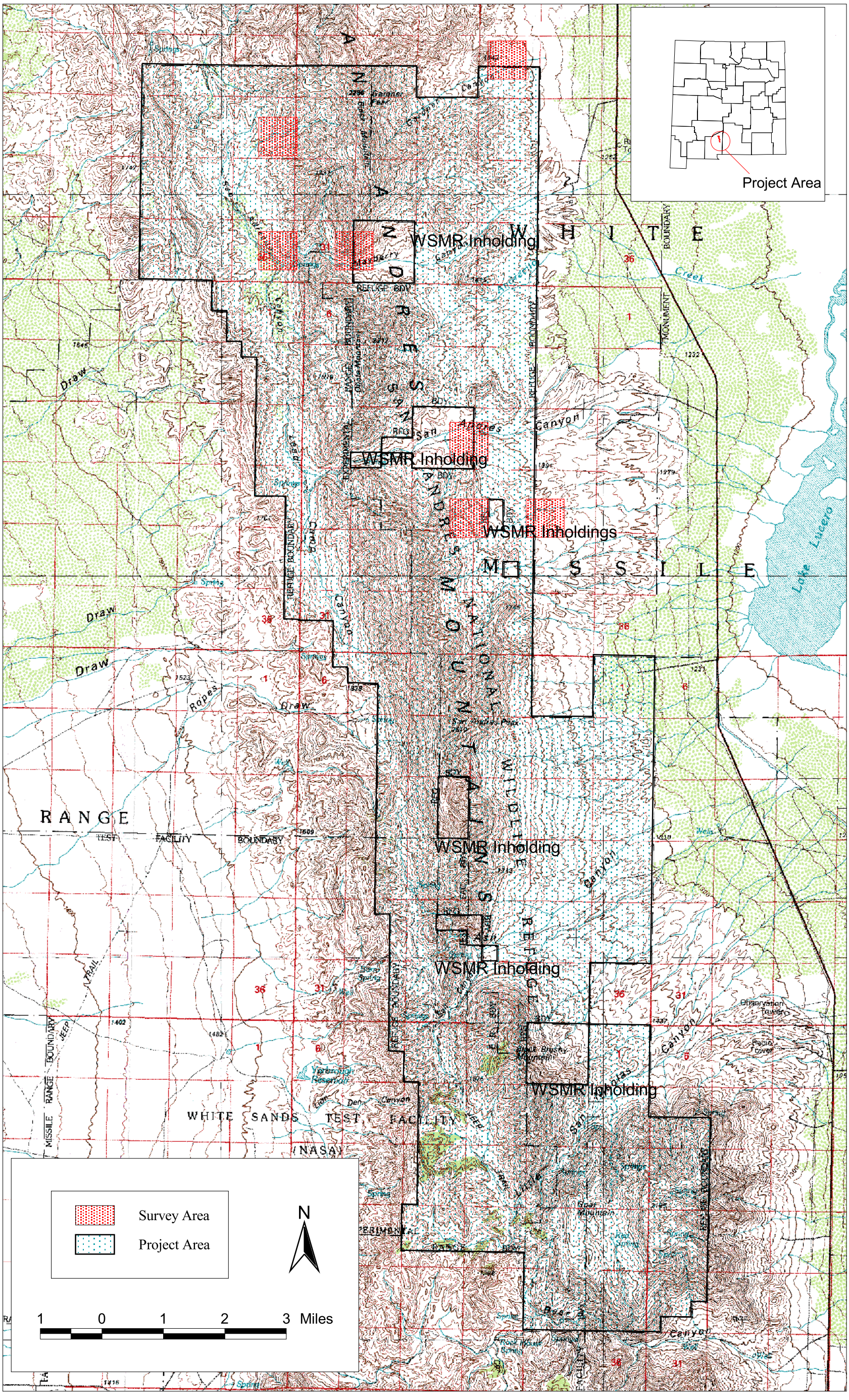

Figure 5.1. Previously surveyed areas within the San Andres National Wildlife Refuge.

figure 5.1

Table 5.1
Previously Recorded Sites on San Andres National Wildlife Refuge

LA No.	Temporal Affiliation	Recorder	Other Site name
72149	El Paso	HSR** (1991)	HSR 8855-37
72150	Late Mesilla, El Paso	HSR (1991)	HSR 8855-38
72151	Late Archaic, Late Mesilla, El Paso, Apache?	HSR (1991)	HSR 8855-39
72152	Late Archaic, Apache?	HSR (1991)	HSR 8855-40
72153	Middle/Late Archaic, Early Mesilla, NM Statehood-WWII	HSR (1991)	HSR 8855-41
72154	Unknown Prehistoric	HSR (1991)	HSR 8855-42
72155	Late Archaic	HSR (1991)	HSR 8855-43
72156	Mesilla	HSR (1991)	HSR 8855-44
72168	El Paso, US Territorial-WWII	HSR (1991)	HSR 8855-57
72169	Late Archaic, Mesilla, El Paso, Apache/Manso, US Territorial-WWII	HSR (1991)	HSR 8855-58
72170	Unknown Prehistoric	HSR (1991)	HSR 8855-59
72174	Late Archaic, El Paso	HSR (1991)	HSR 8855-63
72175*	Mesilla	HSR (1991)	HSR 8855-64
72176*	Middle Archaic, El Paso	HSR (1991)	HSR 8855-65
72177*	Late Mesilla, El Paso	HSR (1991)	HSR 8855-66
72178	Early El Paso, Historic	HSR (1991)	HSR 8855-67
72179	Late Archaic	HSR (1991)	HSR 8855-90
72180	Late Archaic	HSR (1991)	HSR 8855-91
72181	Late Archaic	HSR (1991)	HSR 8855-68 Saddle Site
72191*	Late Archaic, Late Mesilla	HSR (1991)	HSR 8855-78
72198	Late Archaic, NM Statehood-WWII	HSR (1991)	HSR 8855-85, Dugout Springs Site
104030	Archaic, Formative, NM Statehood-WWII	HSR (1994; no report)	HSR 9206-98A, Little San Nicolas Spring
104036	Archaic, El Paso, US Territorial-WWII	HSR (1994: no report)	HSR 9206-88A, Lead Camp, Horse, and unnamed springs
104051	Late Archaic, US Territorial-WWII	HSR (1994: no report)	Stinking Springs A WSMR/SANWR border
113963	US Territorial-WWII	Private (1996:no report)	Red Springs Homestead
116345*	US Territorial-WWII	HSR (1996: no report)	Fresno Site
116352	NM Statehood-WWII	HSR (1996: no report)	Upper Ash Canyon Site

* White Sands Missile Range Inholding
** Human Systems Research

Figure 5.2. Site location map (Gardner Peak, NM [1981], USGS 7.5' map)

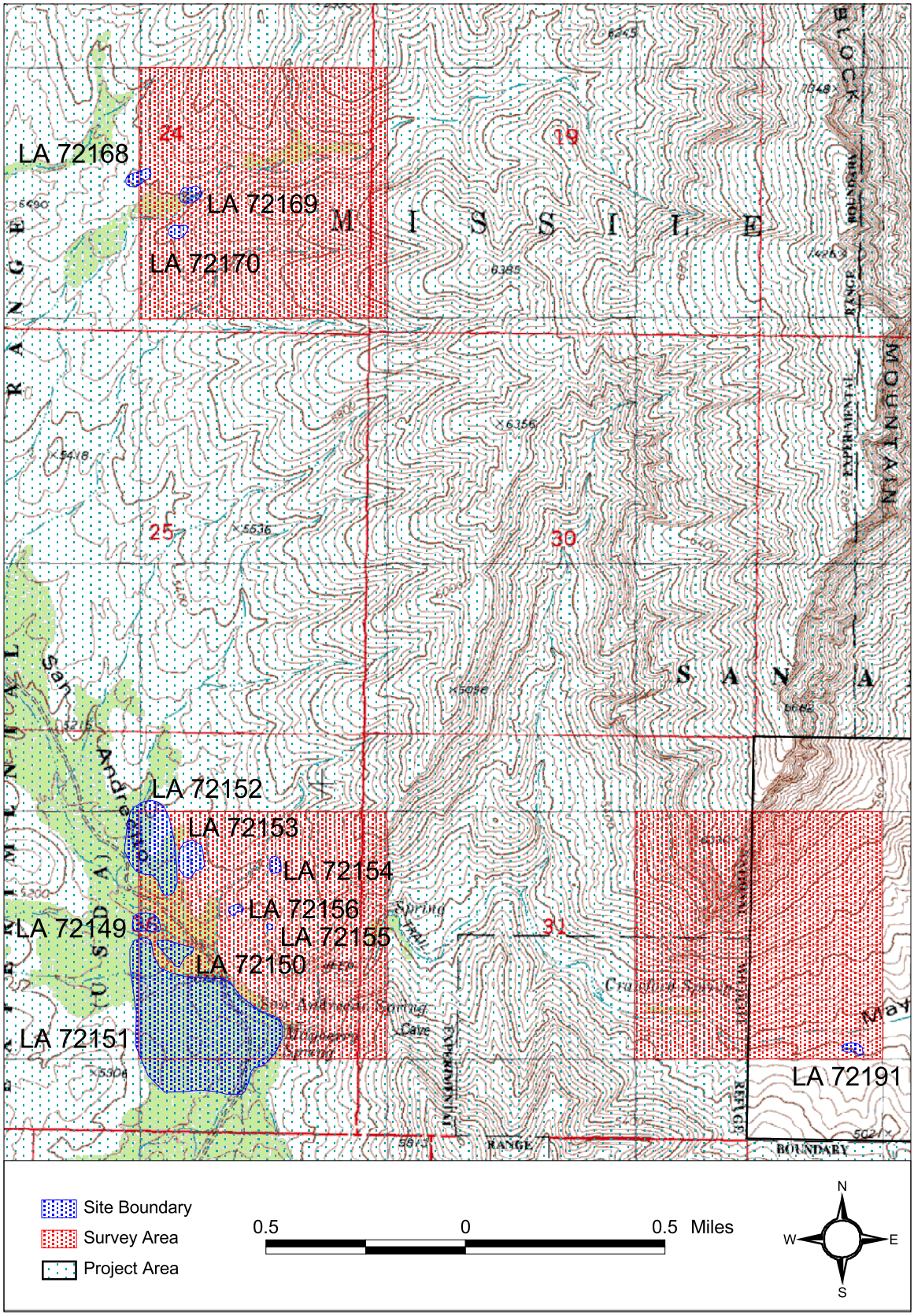

Figure 5.2. Site location map (Gardner Peak, NM [1981], USGS 7.5' map).

Figure 5.3. Site location map (Gardner Peak, NM [1981], USGS 7.5' map)

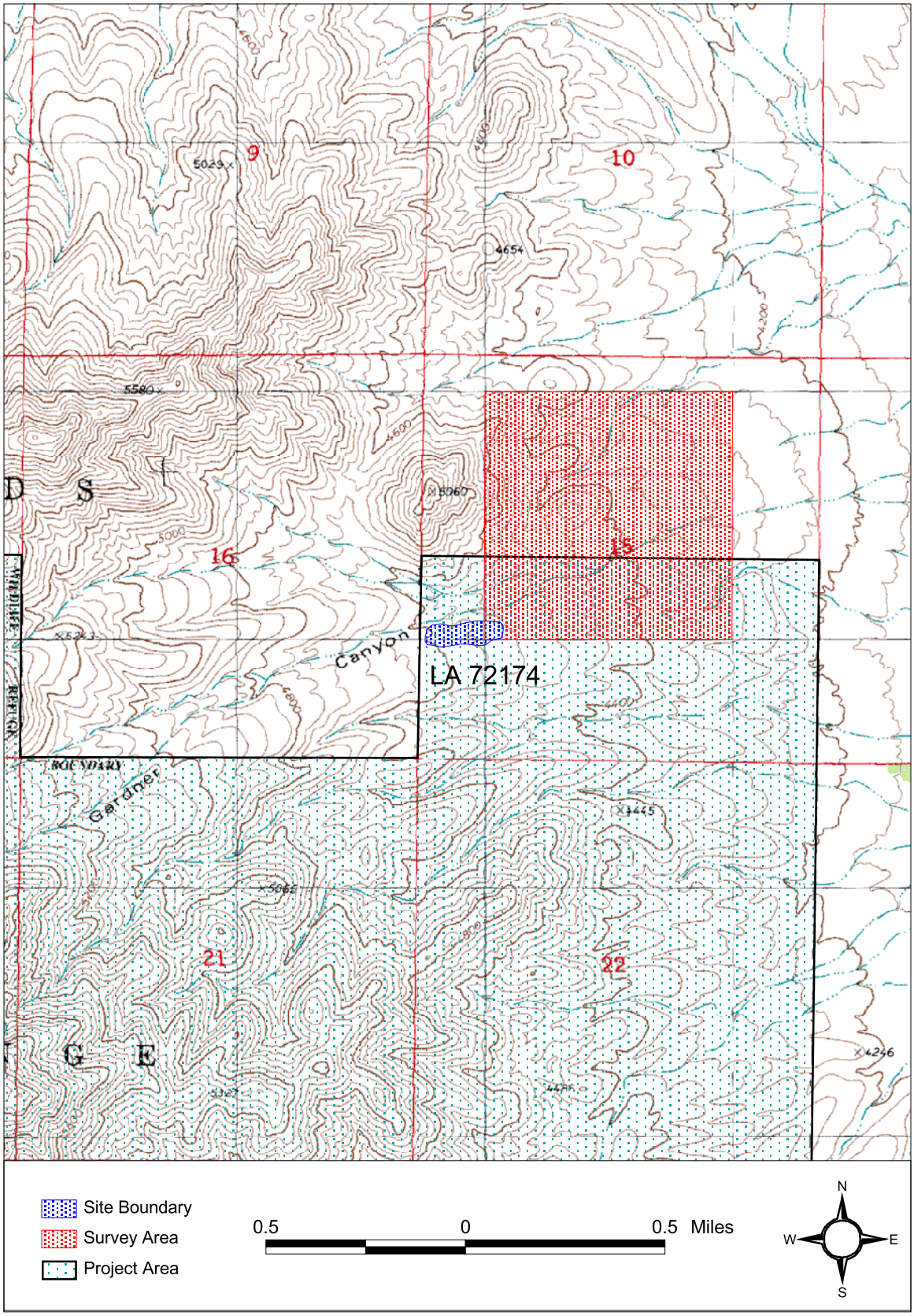

Figure 5.3. Site location map (Gardner Peak, NM 1981 USGS 7.5' map).

Figure 5.4. Site location map (San Andres Peak, NM [1981], USGS 7.5' map)

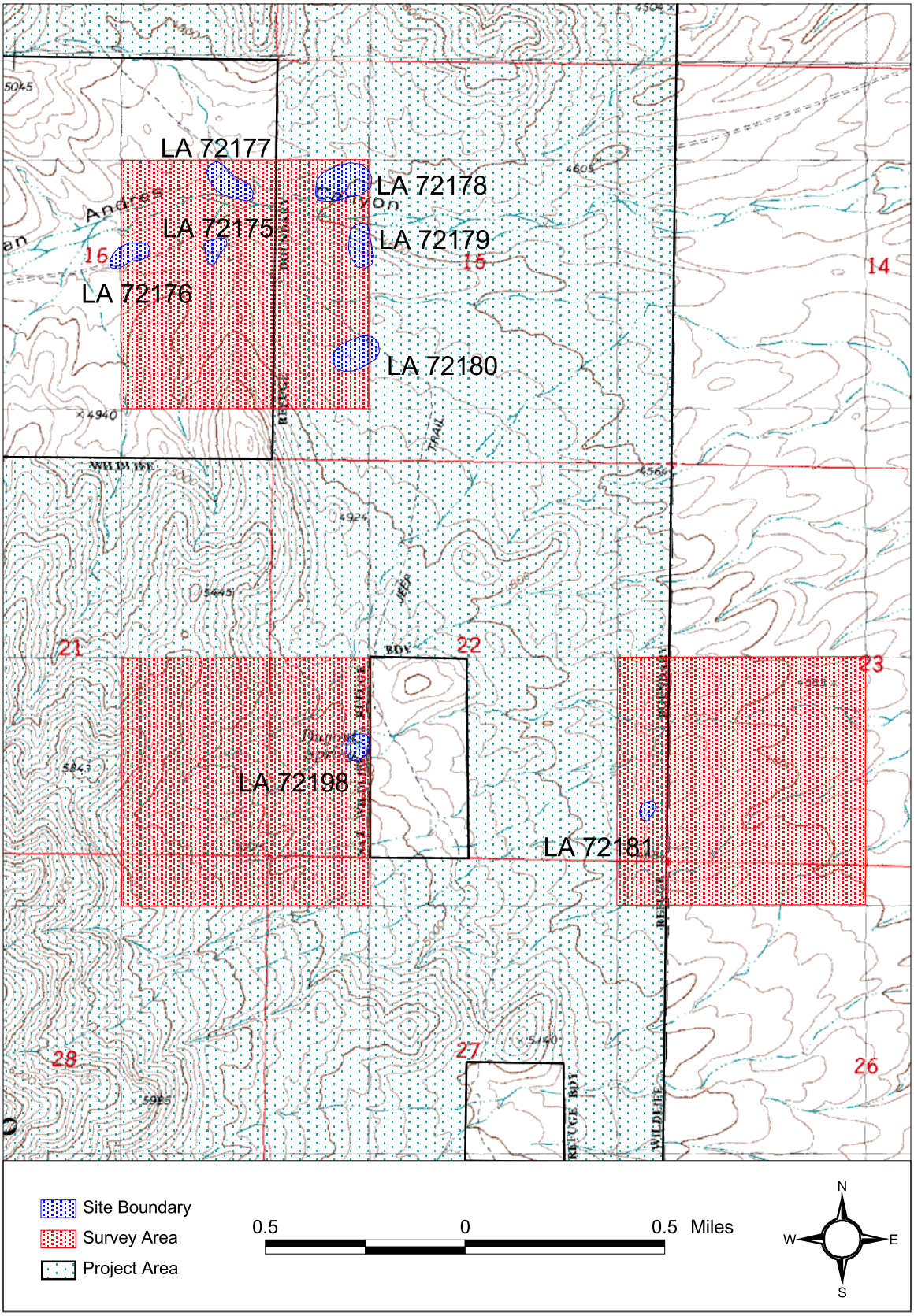

Figure 5.4. Site location map (San Andres Peak, NM [1981] USGS 7.5' map).

Figure 5.5. Site location map (Bennett Mountain, NM [1981], USGS 7.5' map)

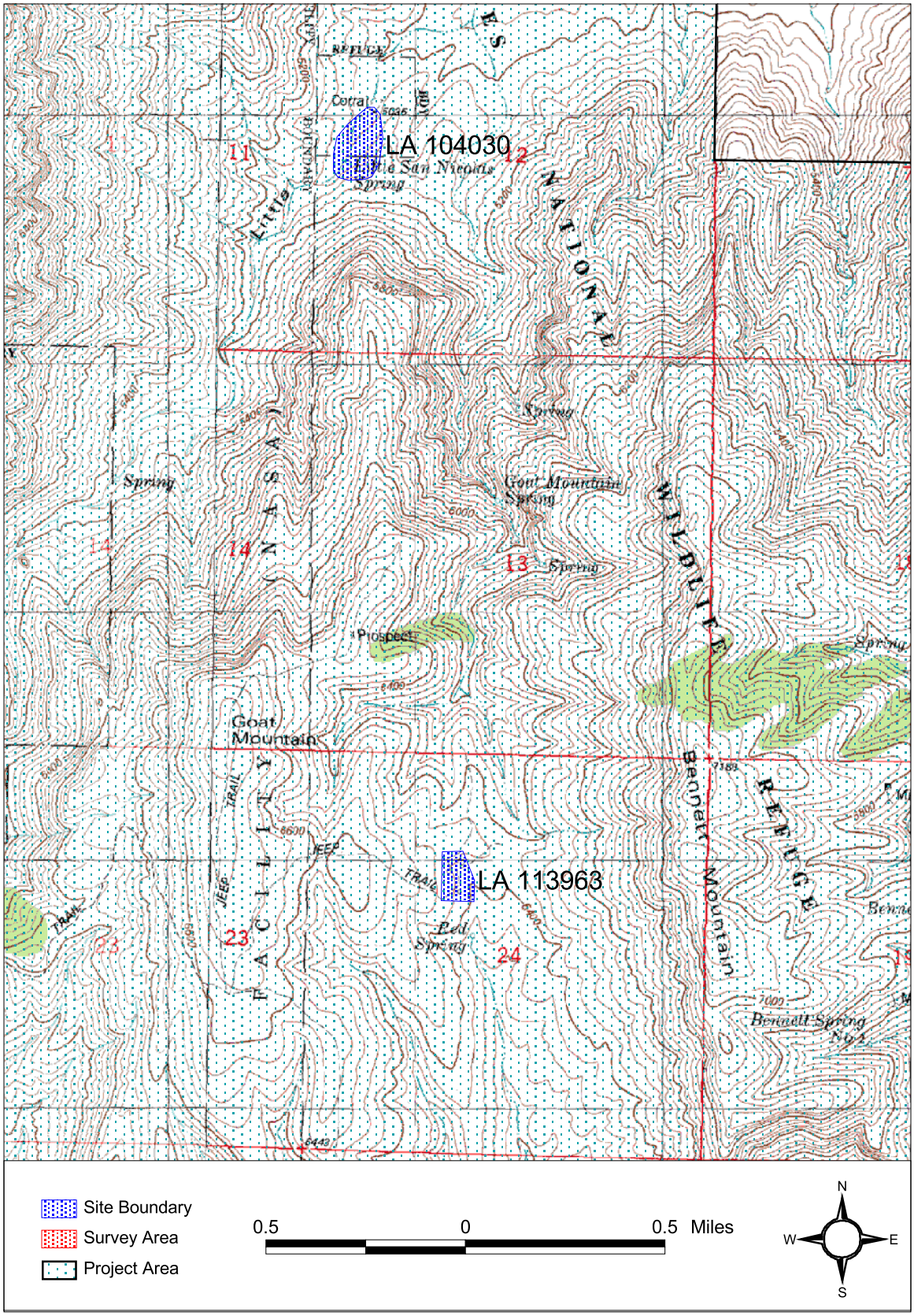

Figure 5.5. Site location map (Bennett Mountain, NM [1981] USGS 7.5' map).

Figure 5.6. Site location map (San Andres Peak, NM [1981], USGS 7.5' map)

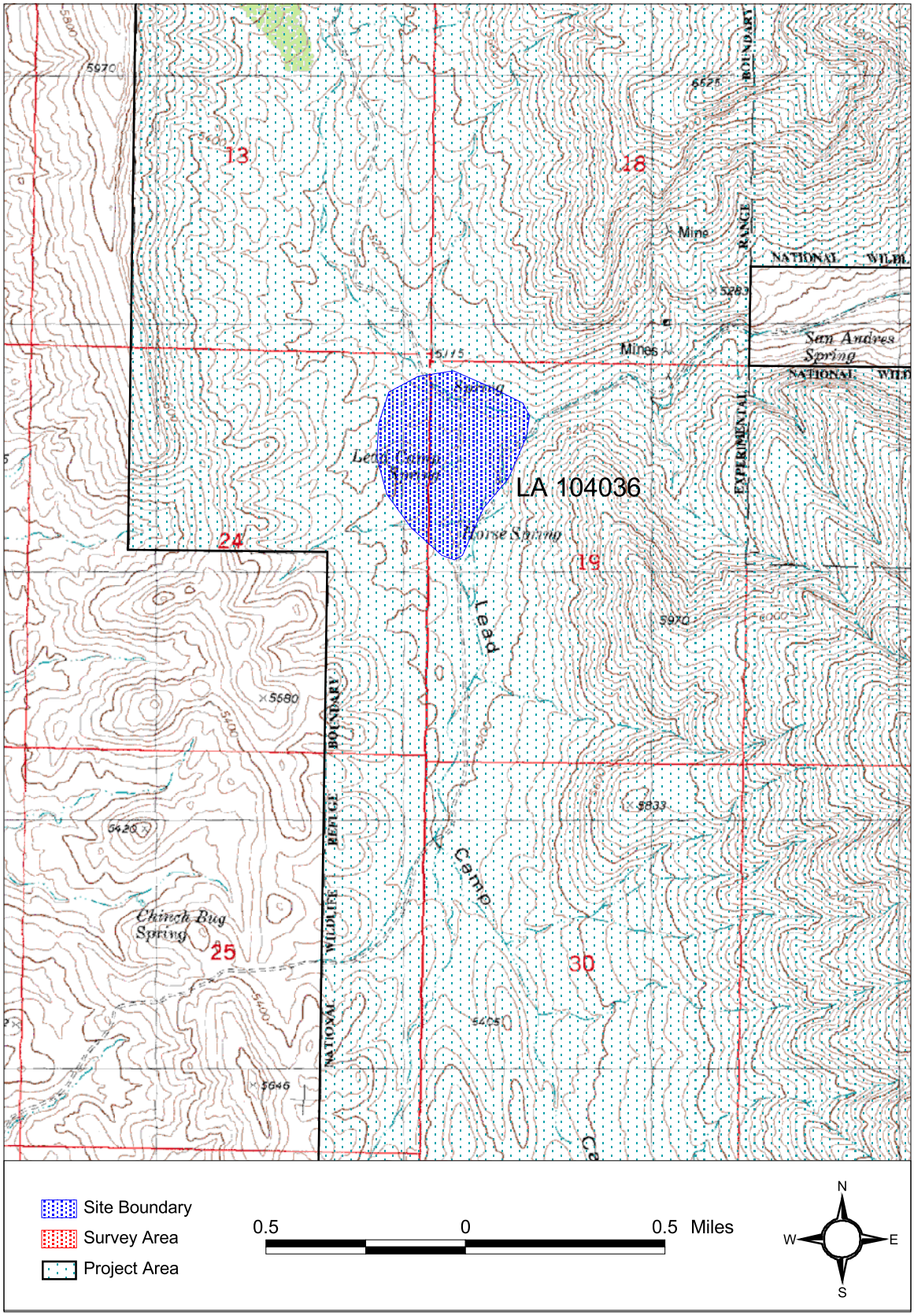

Figure 5.6. Site location map (San Andres Peak, NM [1981], USGS 7.5' map).

Figure 5.7. Site location map (Bear Peak, NM [1981], USGS 7.5' map)

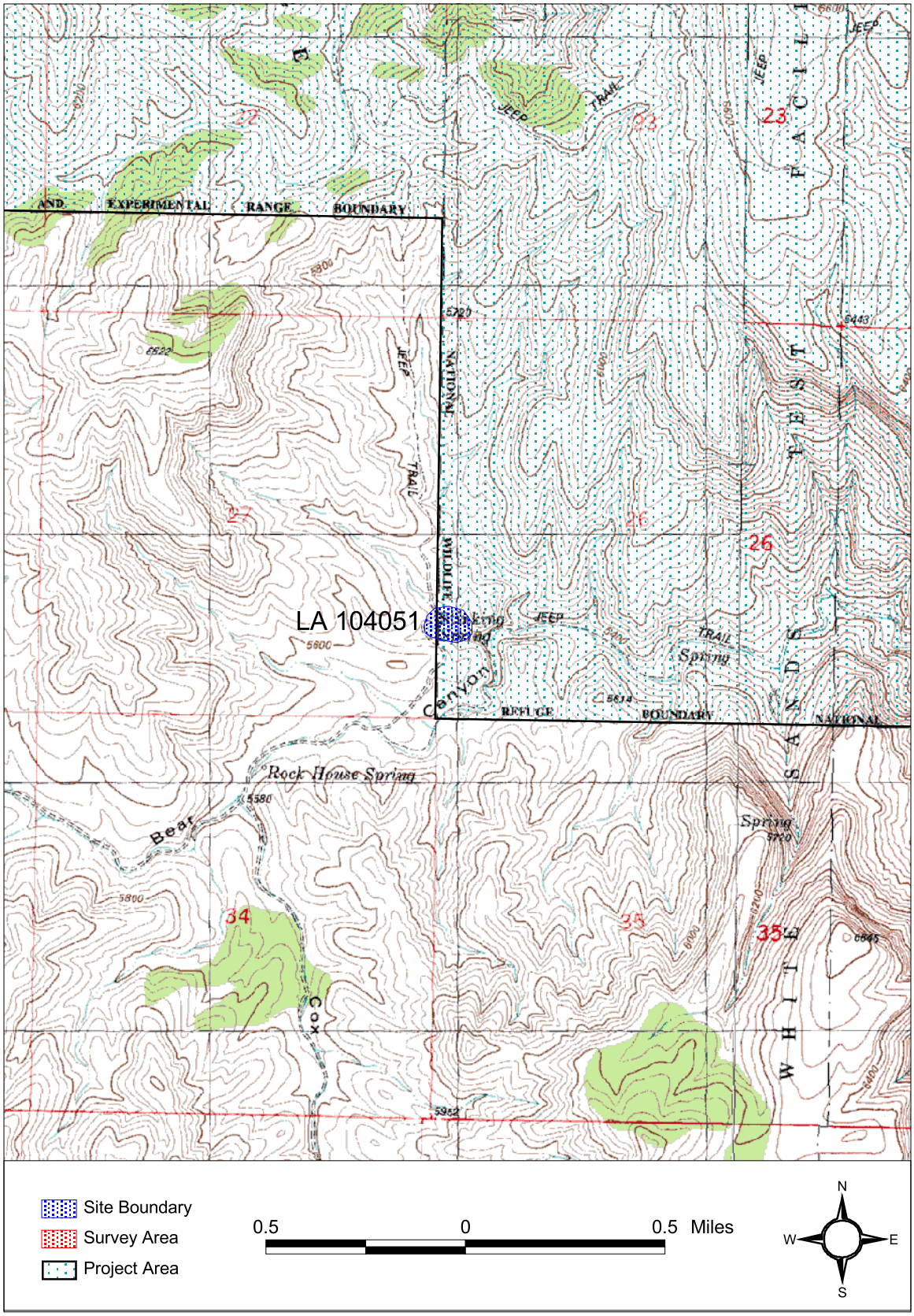

Figure 5.7. Site location map (Bear Peak, NM [1981], USGS 7.5' map).

Figure 5.8. Site location map (San Andres Peak [1981] and Bear Peak [1981] NM, USGS 7.5' maps)

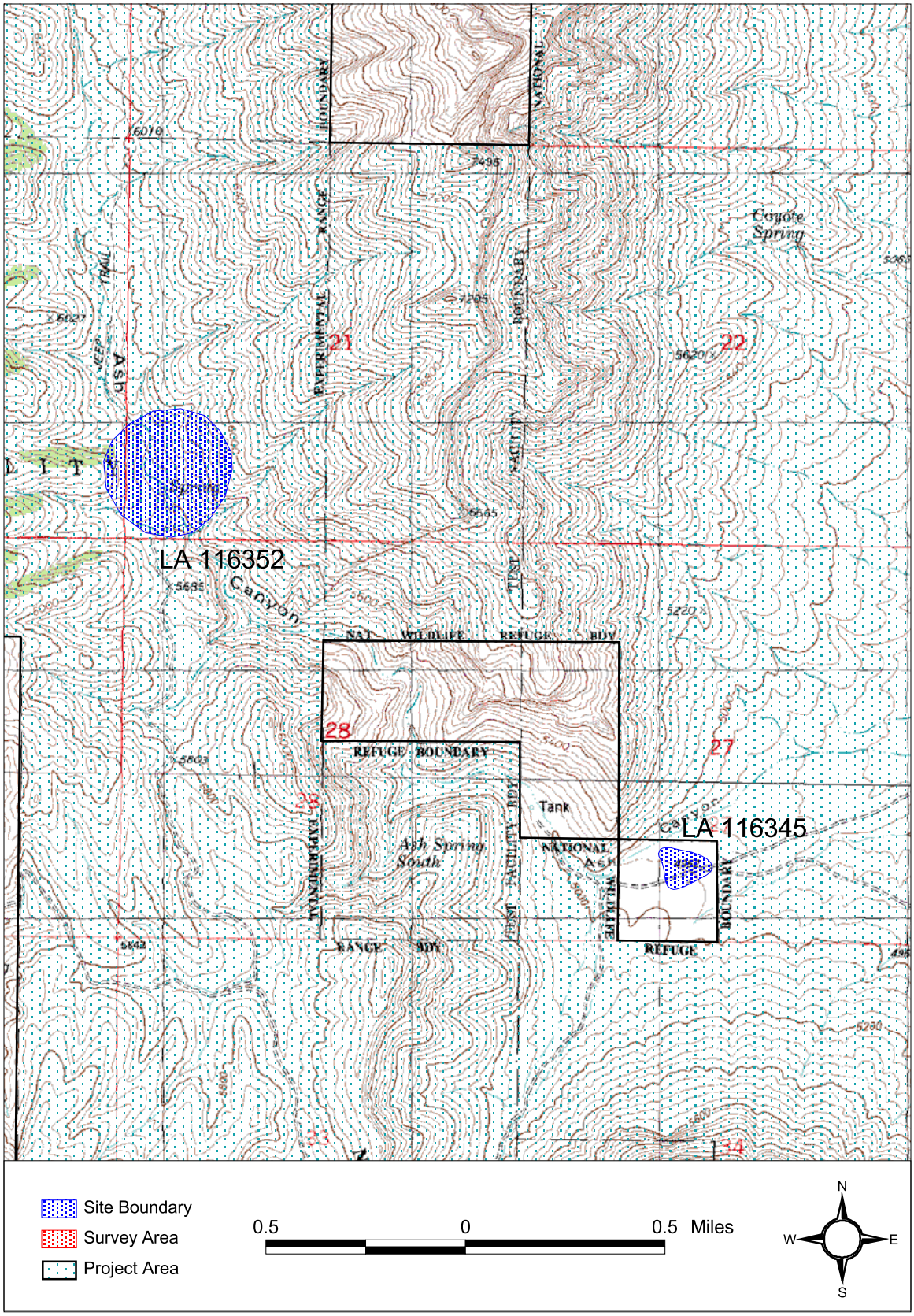

Figure 5.8. Site location map (San Andres Peak [1981] and Bear Peak [1981], NM USGS 7.5' map).

LA 72151

Other Site Name/Number: HSR 8855-39
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: campsite, resource processing
Cultural Affiliation: Late Archaic (1800 B.C.–A.D 200)., Formative; late Mesilla to El Paso phases (A.D. 900-1450), Apache (A.D. 1760, based on radiocarbon date)
Collections: 17 Late Archaic points, 6 obsidian flakes, 1 radiocarbon sample
Dimensions: 650-x-550 m
Number of artifacts: 1,000s

LA 72151 is a large, multicomponent, multiple feature site that consists of Late Archaic period, Formative period late Mesilla and El Paso phases, and possibly Apachean or Manso components. Human Systems Research recorded the site in 1989. Based on the site map available, the site was not fully recorded. The site is on a series of low sandy ridges facing the San Andrecito Springs to the north (see Figure 5.2). Mayberry and San Andrecito Springs are on the northeast side of the site. The site contained at least 10 hearth and midden features, and a tree-ring corrected radiocarbon date from one of these features returned a date of A.D. 1760.

Ceramics included Mesilla phase rims of El Paso Brownware, and Lincoln Black-on-red. Several bifaces and Late Archaic-style projectile points were observed. Most materials present included San Andres cherts, but some obsidian was noted as well. Unidentified quantities of groundstone were observed as well. Artifact densities ranged from 90 to 146 artifacts per m^2. Based on the site size, the quantity of artifacts, and the potential depth of artifacts, the site was recommended as eligible for inclusion in the NRHP.

LA 72152

Other Site Name/Number: 8855-40
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Resource processing
Cultural Affiliation: Late Archaic period 1800 B.C.–A.D. 200)
Historic/Apache (A.D 1867 based on radiocarbon date)
Collections: 3 Late Archaic projectile points, 1 obsidian flake, 1 obsidian nodule, 2 radiocarbon samples
Dimensions: 350-x-225 m
Number of artifacts: 1,000s

LA 72152 consists of a large midden area with areas of dense lithic concentrations. Human Systems Research recorded the site in 1989. The site is on a small ridge overlooking San Andrecito Canyon to the south (see Figure 5.2). A single hearth was also observed on the eastern edge of the site. A tree-ring corrected radiocarbon sample from this hearth yielded a date of A.D. 1867. Small fragments of bone were observed in the midden feature.

The artifact assemblage contains debitage, slab metates, one-hand manos, bifaces, and Late Archaic-style projectile points. Most of the debitage recorded was bifacial thinning flakes. One El Paso Brown sherd was observed. Chert was the most commonly identified material type. Densities of 114 artifacts per m^2 were observed. Based on the site size, the quantity of artifacts, and the potential depth of artifacts, the site was recommended as eligible for inclusion in the NRHP.

LA 72153

Other Site Name/Number: HSR 8855-41
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: resource processing, campsite
Cultural Affiliation: Middle/Late Archaic period (3000 B.C.–A.D. 200), Formative period, early Mesilla phase (A.D. 200–900), New Mexico Statehood-World War II
Collections: 5 Late Archaic projectile points
Dimensions: 80-x-60 m
Number of artifacts: 100s

LA 72153 consists of a fire-cracked midden with an associated artifact scatter. Human Systems Research recorded the site in 1989. The site is on a small limestone ridge overlooking San Andrecito Canyon to the south (see Figure 5.2). The southern portion of the site is covered with sand. The site contains one large 10-x-10 m fire-cracked rock midden with a black ashy stain.

Ceramics included approximately 60 sherds of El Paso Brownware. Five Late Archaic-style projectile points were collected. Debitage materials included chert and quartzite. Bifocal thinning flakes were present, as were several bifaces and bifocal fragments. Groundstone implements included a bifacial vesicular basalt mano, a sandstone wedge-shaped mano, fragments of schist pestles, and a large slab metate. Densities reached 53 artifacts per m^2. Several bottle fragments, estimated to date between 1870 and 1890 and a patinated brass strip were also observed on the site. Based on the depth of materials, quantities of artifacts on the site, and the potential for it to yield additional important information regarding radiocarbon and macrobotanical data, it was recommended as eligible for inclusion in the NRHP.

LA 72154

Other Site Name/Number: HSR 8855-42
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Resource procurement and reduction
Cultural Affiliation: Unknown Prehistoric
Collections: None
Dimensions: 35-x-17 m
Number of artifacts: 10s

LA 72154 is a lithic scatter situated on a saddle between two small ridges (see Figure 5.2). San Andrecito Canyon is to the south. Human Systems Research recorded the site in 1989. Approximately 40 pieces of chert debitage, a projectile point tip and a preform comprise the assemblage. The site is estimated to have shallow deposits, based on the surface limestone outcrops. Densities reached seven artifacts per m^2. Based on the limited assemblage and the lack of potential for subsurface remains, the site was recommended ineligible for inclusion in the NRHP.

LA 72155

Other Site Name/Number: HSR 8855-43
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: campsite, resource procurement and reduction
Cultural Affiliation: Late Archaic period (1800 B.C.–200 A.D.)
Collections: 4 Late Archaic projectile points
Dimensions: 75-x-40 m
Number of artifacts: 10s

LA 72155 is an artifact scatter situated on a ridge immediately north of San Andrecito Canyon (see Figure 5.2). Human Systems Research recorded the site in 1989. The site is on shallow soil over limestone bedrock. Four Late Archaic projectile points were observed on the site, as well as bifaces, cores, and debitage in all stages of reduction. The dominant material type was San Andres chert, but quartzite was also present. Several sandstone slab metate fragments and several schist pestle fragments comprised the groundstone assemblage. Densities reached four artifacts per m^2. Based on the diverse assemblage and the limited potential for subsurface remains, it was recommended that further work be conducted at the site prior to making an eligibility recommendation for inclusion in the NRHP.

LA 72156

Other Site Name/Number: HSR 8855-44
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: campsite
Cultural Affiliation: Formative period, Mesilla phase (A.D. 200–1100)
Collections: 2 Formative projectile points
Dimensions: 130-x-60 m
Number of artifacts: 10s

LA 72156 is an artifact scatter with an associated hearth feature in a saddle overlooking Mayberry Spring (see Figure 5.2). Limestone outcrops are to the east and west. Human Systems Research recorded the site in 1989. The hearth measures 1 m in diameter. The site contains approximately 150 artifacts, including two Formative-style projectile points, 100 fragments of lithic debitage, and 30 El Paso Brownware sherds, including one rounded rim. The majority of flakes were biface thinning flakes of local chert. Densities reached five artifacts per m^2. The site

is reported to contain little depth, based on the limestone outcrops. Based on the diverse assemblage and the shallow deposits, it was recommended that further work be conducted at the site prior to making an eligibility recommendation for the NRHP.

LA 72168

Other Site Name/Number: HSR 8855-57
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: resource procurement, campsite
Cultural Affiliation: Formative period, El Paso phase (A.D. 1200–1450), Historic period, U.S. Territorial–World War II
Collections: 1 Chupadero Black-on-white sherd, 1 white porcelain historic sherd
Dimensions: 130-x-60 m
Number of artifacts: 10s

LA 72168 is a prehistoric and historic artifact scatter situated on a limestone ridge (see Figure 5.2). San Andrecito Spring is approximately two miles to the south. Human Systems Research recorded the site in 1989. Ceramics included three sherds of Chupadero Black-on-white. Lithic debitage consisted of gray, black, and chalcedonic cherts. Densities reached 0.26 artifacts per m^2. One small fragment of porcelain whiteware with a blue maker's mark comprised the historic assemblage. Based on the shallow soil depth at this site and the limited artifact assemblage, the site was recommended as ineligible for inclusion in the NRHP.

LA 72169

Other Site Name/Number: HSR 8855-58
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Resource processing, campsite
Cultural Affiliation: Late Archaic period (1800 B.C.–A.D. 200), Formative period, Mesilla and El Paso phases (A.D. 1200–1450), ^{14}C date of A.D. 1550, Unknown Historic
Collections: One unidentified brownware sherd, 1 Late Archaic projectile point
Dimensions: 95-x-40 m
Number of artifacts: 100s

LA 72169 consists of a large roasting pit feature, a hearth feature, and associated artifacts. Human Systems Research recorded the site in 1989. The site is on the north side of an arroyo on the open floor of San Andrecito Canyon (see Figure 5.2). The roasting pit was roughly 13 m in diameter and consists of thousands of fragments of baseball to football sized fire-cracked rocks and dark charcoal staining. The feature reached a height of 1.5 m from the surrounding site surface. A tree-ring corrected radiocarbon date of A.D. 1550 was retrieved from this feature. The hearth was described as a 1-m diameter area of fire-cracked limestone fragments. Charcoal was present in this feature.

Artifacts on the site consisted of white, gray, and chalcedonic chert debitage, a Late Archaic-style projectile point, one El Paso Brownware sherd, on Chupadero Black-on-white sherd, and two fragments of vesicular basalt groundstone. One horseshoe comprised the historic assemblage. Densities reached four artifacts per m^2. Based on the depth of materials, and the potential for it to yield additional important information regarding radiocarbon and macrobotanical data, LA 72169 was recommended as eligible for inclusion in the NRHP.

LA 72170

Other Site Name/Number: HSR 8855-59
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: resource procurement
Cultural Affiliation: Unknown Prehistoric
Collections: none
Dimensions: 60-x-40 m
Number of artifacts: 10s

LA 72170 is a prehistoric artifact scatter situated on a low east-west trending limestone ridge (see Figure 5.2). San Andrecito Spring is approximately two miles to the south. Human Systems Research recorded the site in 1989. The site contained lithic debitage of white and black chert. Densities reached 0.36 artifacts per m^2. Based on the shallow soil depth at this site and the limited artifact assemblage, the site was recommended as insufficiently evaluated for inclusion in the NRHP.

LA 72174

Other Site Name/Number: HSR 8855-63
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Campsite
Cultural Affiliation: Late Archaic, Formative, El Paso phase (A.D. 1200–1450)
Collections: 2 Late Archaic projectile points, 2 bifaces, 1 obsidian flake, 1 unidentified brownware sherd, 1 Chupadero Black-on-white sherd, 1 unidentified red painted sherd
Dimensions: 650-x-150 m
Number of artifacts: 1,000s

LA 72174 is a large, low-density artifact scatter situated on an east-sloping alluvial ridge between two drainages (see Figure 5.3). Human Systems Research recorded the site in 1989. The site contained thousands of fragments of lithic debitage, eight Late Archaic-style projectile points or fragments, cores, scrapers, and an obsidian biface. Material types included San Andres banded chert, gray, white, and black cherts, and obsidian. A wide low density scatter of artifacts was identified to the north and east of the site, but not in sufficient quantities to include with the site. Ceramics included Chupadero Black-on-white, El Paso Brownware, Alma Plain, and a burnished redware. Based on the quantity and diversity of artifacts on the site, it was recommended as eligible for inclusion in the NRHP.

LA 72175 (White Sands Missile Range Inholding)

Other Site Name/Number: HSR 8855-64
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Campsite
Cultural Affiliation: Formative, Mesilla phase, Doña Ana phase
Collections: 1 Late Archaic projectile point, 1 biface
Dimensions: 200-x-180 m
Number of artifacts: 100s

LA 72175 is an artifact scatter situated on three limestone ridges on the southern terrace of San Andres Canyon (see Figure 5.4). A jeep trail bisects the northern portion of the site. Human Systems Research recorded the site in 1989. The site consists of hundreds of fragments of lithic debitage, cores, performs, and bifaces, in materials of chert, chalcedony, quartzite, limestone, siltstone, and banded San Andres chert. One side-notched Late Archaic-style projectile point was collected. Mesilla phase ceramics are mentioned in the top portion of the form, but are not discussed in the narrative or depicted on the site map. Densities reached seven artifacts per m^2. Based on the quantity and diversity of artifacts on the site, it was recommended as eligible for inclusion in the NRHP.

LA 72176 (White Sands Missile Range Inholding)

Other Site Name/Number: HSR 8855-65
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Campsite
Cultural Affiliation: Middle Archaic, Formative, El Paso phase
Collections: 2 Late Archaic/Early Formative projectile points, 1 Chupadero Black-on-white jar base sherd, 1 biface (or point)
Dimensions: 300-x-120 m
Number of artifacts: 100s

LA 72176 is an artifact scatter situated on a low hill on the southern terraces of San Andres Canyon (see Figure 5.4). Limestone outcrops are located to the southeast and a jeep trail trends east-west through the site. Human Systems Research recorded the site in 1989. The site consisted of a dense scatter of lithics in materials of chert and chalcedony. The assemblage contained flakes, cores, preforms, bifaces, scrapers, one Middle Archaic projectile point, and four Formative projectile points. Ceramics included one Chupadero Black-on-white jar sherd. Groundstone included two mano fragments. Densities reached six artifacts per m^2. Based on the quantity and diversity of artifacts on the site, it was recommended as eligible for inclusion in the NRHP.

LA 72177 (White Sands Missile Range Inholding)

Other Site Name/Number: 3 Pot Site/HSR 8855-66
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Campsite
Cultural Affiliation: Formative period (A.D. 900–1400)
Collections: 1 Late Archaic projectile point, four El Paso Brownware sherds (including 2 direct rims and a spindlewhorl fragment), 4 black-on-red sherds, 7 corrugated smudged sherds
Dimensions: 200-x-100 m
Number of artifacts: 100s

LA 72177 is an artifact scatter situated on the north terrace of San Andres Canyon. A jeep trail is on the eastern side of the site (see Figure 5.4). Dunes and vegetation obscured much of the site. Human Systems Research recorded the site in 1989. The site consisted of a low density scatter of lithic artifacts, including debitage, cores, performs, and a corner-notched Late Archaic projectile point. Unidentified groundstone was also recorded. Ceramics included a corrugated smudged ware, San Andres red-on-terracotta, and El Paso Brownware. Based on the potential depth of materials and quantities of artifacts on the site, it is recommended as eligible for inclusion in the NRHP.

LA 72178

Other Site Name/Number: HSR 8855-67
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Campsite
Cultural Affiliation: Formative, early El Paso phase (A.D. 1200–1300), Unknown Historic
Collections: 2 Formative projectile points, 2 El Paso brownware sherds
Dimensions: 117-x-37 m
Number of artifacts: 100s

LA 72178 is a prehistoric artifact scatter with a rock alignment, situated on the hill slope of the north terrace of San Andres Canyon (see Figure 5.4). Human Systems Research recorded the site in 1989. Loamy soils on the site suggested a depth of cultural deposits. The site contained a dense scatter of artifacts, including debitage, two Formative-style projectile points, four fragments of groundstone, and El Paso Brownware sherds. A metal rod was recently placed at the location of the rock alignment, but the construction date of the alignment itself could not be determined. Densities reached 30 artifacts per m^2. Based on the potential depth of materials, and quantities of artifacts on the site, it was insufficiently evaluated for inclusion in the NRHP.

LA 72179

Other Site Name/Number: HSR 8855-90
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Resource procurement, campsite
Cultural Affiliation: Late Archaic (1800 B.C.–A.D. 200)
Collections: 1 Late Archaic projectile point
Dimensions: 65-x-45 m
Number of artifacts: 10s

LA 72179 is a prehistoric artifact scatter, situated on a limestone slope of the south terrace of San Andres Canyon (see Figure 5.4). A jeep trail trends through the northeast portion of the site. Human Systems Research recorded the site in 1989. Limestone outcrops were reported within the site, limiting site depth. The site assemblage consists of a low-density scatter of lithic debitage, flake tools, one core, one chopping tool, and a corner-notched Late Archaic-style projectile point. Chert was the dominant material type. Densities reached five artifacts per m^2. Based on the shallow soil depth at this site and the limited artifact assemblage, the site was insufficiently evaluated for inclusion in the NRHP.

LA 72180

Other Site Name/Number: HSR 8855-91
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Lithic reduction
Cultural Affiliation: Late Archaic (1800 B.C.–200 A.D.)
Collections: 1 Late Archaic projectile point
Dimensions: 250-x-100 m
Number of artifacts: 10s

LA 72180 is a prehistoric artifact scatter, situated on a limestone ridge overlooking San Andres Canyon to the north (see Figure 5.4). Human Systems Research recorded the site in 1989. A jeep trail trends through the central portion of the site. The low-density scatter consisted of two chert cores, a scatter of siltstone debitage, and a Late Archaic projectile point. Densities reached four artifacts per m^2. Based on the shallow soil depth at this site and the limited artifact assemblage, the site was insufficiently evaluated for inclusion in the NRHP.

LA 72181

Other Site Name/Number: Saddle Site/HSR 8855-68
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Lithic reduction
Cultural Affiliation: Late Archaic (1800 B.C.–A.D. 200)
Collections: 1 Late Archaic projectile point
Dimensions: 30-x-25 m
Number of artifacts: 10s

LA 72180 is a prehistoric artifact scatter, situated on a low saddle, overlooking drainages to the west (see Figure 5.4). Human Systems Research recorded the site in 1989. Soil accumulation on the north side of the site was reported to potentially contain buried deposits or artifacts. The artifact assemblage consisted of a low density scatter of chert and limestone debitage, and a small San Pedro-style projectile point. Three fragments of fire-cracked rock were also observed. Densities reached four artifacts per m^2. Based on the limited assemblage and the potential for subsurface remains, it is recommended that further work be conducted at the site prior to making an eligibility recommendation for inclusion in the NRHP.

LA 72191 (White Sands Missile Range Inholding)

Other Site Name/Number: HSR 8855-78
USGS 7.5' Quadrangle: Gardner Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Campsite
Cultural Affiliation: Late Archaic, Formative, late Mesilla phase (A.D. 900–1200)
Collections: 3 Late Archaic projectile points
Dimensions: 74-x-46 m
Number of artifacts: 10s

LA 72191 is an artifact scatter situated on a low hill on the south terrace of Mayberry Canyon. Crawford Spring is approximately 1 km to the west of the site (see Figure 5.2). Human Systems Research recorded the site in 1989. The site assemblage consisted of approximately 200 artifacts, including lithic debitage, several bifaces, and three Late Archaic-style projectile points. Lithic materials consisted of San Andres and other cherts, and chalcedony. Two Mimbres Black-on-white sherds were also observed. Densities reached four artifacts per m^2. Based on the artifact assemblage and the potential for subsurface remains, it is recommended that further work be conducted at the site prior to making an eligibility recommendation for inclusion in the NRHP.

LA 72198

Other Site Name/Number: Dugout Springs Site/HSR 8855-85
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: Human Systems Research (1991)
Inferred Site Function: Campsite, line shack
Cultural Affiliation: Late Archaic, Historic 1900–1920s
Collections: 4 Late Archaic projectile points, 1 .44 cartridge
Dimensions: 125-x-58 m
Number of artifacts: 100s

LA 72198 is a prehistoric artifact scatter with historic features, situated at Dugout Spring (see Figure 5.4). A drainage trends southwest-northeast through the center of the site. The spring has been harnessed and flows into four water tanks. A sandstone boulder field is central to the site area. The prehistoric component consisted of hundreds of pieces of debitage, as well as cores, bifaces, and four side-notched Late Archaic projectile points. Two rock cairns were located on the northwest side of the site, but it was unknown if prehistoric or historic peoples constructed them. Densities reached eight artifacts per m^2.

The historic component of the site consisted of a two room dwelling, situated to the east of the sandstone boulders on the southeast side of the drainage. The structure was constructed with locally available sandstone and schist. The entrance was located on the east and the fireplace was built on the western wall of the southernmost room. A barbed-wire fence line was approximately 7 m to the north of the structure. Artifacts associated with the structure included aqua and amber glass, whiteware ceramics, a bullet cartridge, and cut nails. No roofing material was observed. Based on the artifact assemblage and the potential for subsurface remains, it is recommended that further work be conducted at the site prior to making an eligibility recommendation for inclusion in the NRHP.

LA 104030

Other Site Name/Number: Little San Nicolas Spring, 9206-98A
USGS 7.5' Quadrangle: Bennett Mountain
Reference Citation: White Sands Missile Range Files
Inferred Site Function: prehistoric camp, historic ranch house
Cultural Affiliation: Archaic, Formative, Historic 1846–1945
Collections: none
Dimensions: 375-x-200 m
Number of artifacts: 60s

LA 104030 was recorded by Human Systems Research in 1994. It is situated on Little San Nicolas Spring at the head of San Nicolas Canyon (see Figure 5.5). Goat Mountain is to the north of the site. It contains Archaic (based on biface reduction technologies), Formative, and Historic period assemblages. One limestone bedrock mortar was observed near the bottom of the drainage, approximately 15 cm in diameter and 5 cm deep. The prehistoric assemblage consisted of flakes, cores, bifaces, and El Paso Brownware. Lithic materials included chert, chalcedony, rhyolite and fine-grained quartzite. Densities reached 13 to 19 artifacts per m^2.

The historic component consisted of four features, including a two-room house with attached garage, a rock corral, and two troughs. Historic artifacts associated with the site included coffee, food, and syrup cans and metal hardware, window and bottle glass, stove pipe, and the remains of a cast-iron stove. The house (Feature 1) was constructed of limestone and sandstone mixed with concrete, and is approximately eight courses high. Above the stone course was a course of melting adobe. The walls were described as approximately 1 foot thick. The roof had collapsed, though corrugated metal and 1-x-8 foot beams were noted in the area. Concrete was used to cover the walls. The outer doorway was in the east-central portion of the house, and interior doors and windows were located along the dividing wall between the two rooms.

The corral (Feature 2) was constructed of stacked rock approximately 5 feet high, and measured approximately 140 feet by 70 feet. The corral was subdivided in the central portion by upright stakes wired to horizontal pipes. Gates to the corral were on the north and south.

Feature 3 is a rectangular concrete trough measuring 24 by 3 feet and was approximately 3 feet high. The trough is near the base of the drainage. The trough is divided into two sections and appears to have been constructed during different time periods, based on construction styles. On one portion of the trough the words, “May 22 1930” are inscribed. Feature 4 is a square concrete

trough adjacent to the house. It measured 4.3 feet square and was half a foot tall. Inscribed in the concrete were the words, " velio V*[?]* squ *[?]* (possibly Vásquez)/Septiembre 4 *[or 1]* 1911 *[or 1917]*."

Based on the potential for the site to yield important information regarding both the prehistoric and historic periods, the site was recommended for inclusion in the NRHP by Human Systems Research. Geo-Marine, Inc., concurs with the recommendation.

LA 104036

Other Site Name/Number: Lead Camp, Horse and Unnamed Springs, 9206-88A
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: White Sands Missile Range files
Inferred Site Function: Spring site
Cultural Affiliation: Middle/Late Archaic, Formative, Historic U.S. Territorial–World War II
Collections: 1 Middle/Late Archaic projectile point, 4 Late Archaic projectile points, 1 Formative projectile point, 1 biface, 3 obsidian flakes, 6 Mimbres Black-on-white ceramics (3 body sherds, 3 rim sherds)
Dimensions: 750-x-650 m
Number of artifacts: 10,000s

LA 104036 was recorded by Human Systems Research in 1994 as a large multicomponent spring locale located approximately 200 m northwest of Lead Camp Canyon (see Figure 5.6). A north-south road trends through the central portion of the site. The site contains both prehistoric and historic components. The prehistoric feature assemblage included three bedrock mortars, two ash stains, a probable mescal pit or ring midden, and two carbon stains with fire-cracked rock. The north-south road had impacted one of the ash stains. Six projectile points were collected; one Shumla-type Middle/Late Archaic, four untyped Late Archaic, and one Fresno-type Formative period points were identified. Three obsidian flakes were also collected. Ceramic types observed on the site included El Paso Brownware, El Paso Polychrome, and Chupadero Black-on-white, Mimbres Classic, and Mimbres Red Washed. Other artifacts included numerous flakes, cores, bifaces, and groundstone. One probable arrow shaft straightener was also observed. Materials included chert, chalcedony, obsidian, and fine-grained quartzite. Densities reached 250 artifacts per m^2.

Historic features included a rectangular water trough (Feature 1) near the northernmost spring, measuring 12.75 by 6.75 feet. The trough was constructed with native rock and concrete. Feature 2 was a large metal water tank approximately 1.5 feet tall and 18 feet in diameter. A barbed wire fence surrounded the tank, which contained water at the time of recording. In association with the tanks and fence were a scatter of cans, a wooden door, a clear glass insulator fragment, and a small rock retaining wall. Two other limestone rock alignments were observed on the eastern boundary of the site. The rock alignments were piled two courses high. A historic hearth was observed in association with the rock alignments, as well as a scatter of historic ceramics, brown glass, and sanitary seal cans.

Based on the potential for the site to yield important information regarding both the prehistoric and historic periods, the site was recommended for inclusion in the NRHP by Human Systems Research. Geo-Marine, Inc., concurs with the recommendation.

LA 104051

Other Site Name/Number: Stinking Springs A
USGS 7.5' Quadrangle: Bear Peak
Reference Citation: White Sands Missile Range files
Inferred Site Function: Spring site
Cultural Affiliation: Late Archaic, Historic 1912–1945
Collections: 1 Late Archaic projectile point, 1 unassigned projectile point
Dimensions: 170-x-125 m
Number of artifacts: 20

LA 104051 (Stinking Springs A) is a multicomponent site located at Stinking Spring, in a drainage that flows into Bear Canyon (see Figure 5.7). Three sites were located to the immediate west of LA 104051, just to the west of the San Andres National Wildlife Refuge boundary: LA 105077 (Stinking Springs B), LA 105078 (Stinking Springs C), and LA 105079 (Stinking Springs D). These additional sites are not presented here, but are listed for informational purposes only. A two-track road is on the western boundary of the site. The site was recorded by Human Systems Research in 1994. The prehistoric assemblage was limited to two projectile points, five flakes, two fragments of angular debitage, a biface fragment, four cores, and a rhyolite mano fragment. One projectile point was assigned to the Late Archaic period, while the other was unassigned. Materials included chert and fine-grained quartzite. No prehistoric features were observed. Densities reached three artifacts per m^2.

The historic assemblage included three features, including a well, a large metal tank, and two undefined rock alignments. The well was constructed using locally available sandstone and limestone, and concrete. The top of the well is topped with coarse aggregate. The interior of the well was shaped like a hexagon, but the outside was round. The interior of the well measured between 2.8 and 3.6 feet in diameter. The maximum depth of the well appeared to be about 4 feet. It was covered with a piece of plywood held down with a rock. A galvanized metal wash tub and some upright juniper posts were found near the well.

Feature 2 was a large oval metal water tank measuring between 13 and 18 feet in diameter. The tank was located 8 feet southeast of the drainage bottom. The sides of the tank were made of boiler plate metal, and the interior was sealed with concrete. Water was fed into the tank via an old metal pipe, which had been replaced with PVC pipe. The words, “LLL 9-11-84” and “MG-84” was engraved in the concrete below the pipes. It was believed by Human Systems Research that the engravings were from 1884.

Feature 3 consisted of two undefined limestone rock pile alignments. One alignment measured 9 feet long by 3 feet wide and the other measured 9 feet long by 6 feet wide. Both were approximately 1 to 2 feet high. The alignments are somewhat parallel to one another, and a slight depression existed between them. It was considered that this feature served as a temporary habitation structure. One Winchester cartridge that was manufactured between 1895 and 1940 was observed near Feature 3.

Based on the potential for the site to yield important information regarding both the prehistoric and historic periods, the site was recommended for inclusion in the NRHP by Human Systems Research.

LA 113963

Other Site Name/Number: Red Springs
USGS 7.5' Quadrangle: Bennett Mountain
Reference Citation: White Sands Missile Range files
Inferred Site Function: Ranch complex
Cultural Affiliation: Historic U.S. Territorial–World War II
Collections: none
Dimensions: 242-x-130 m
Number of artifacts: 100s

LA 113963 is a historic ranching homestead, recorded by Jack and Janet Mathews in 1996. The site is at Red Spring, approximately one-half mile southeast of Goat Mountain (see Figure 5.5). A two-track road trending north-south was to the immediate west of the house. The site consisted of a three room cabin and associated features. The cabin (Feature 1), which included a kitchen, a bedroom, and a storage room, was constructed of locally available limestone cobbles. The house was laid out from north to south, with the kitchen (the largest room) on the north, the bedroom in the middle, and the storage room (the smallest room) on the south. The doorway was on the east wall of the kitchen, and a window was on the east wall of the bedroom and the kitchen. A patio area was outside of the window. The kitchen contained a banco on the west wall. A cooler box was located immediately outside the kitchen door. The bedroom contained a religious shrine on the southern wall and a kiva-style fireplace in the northeast corner. Dates of 1918, 1919, and 1927 inscribed within the cabin suggest the likely construction periods and occupation. A fenced area was to the north and east of the structure. The remains of a wooden privy (Feature 2) are approximately 50 feet south of the house. Milled 2-x-4 and 1-x-4 inch lumber are strewn about, along with upright juniper posts. It was unknown how the structure was originally assembled.

A shed (Feature 3) was located 480 feet to the north of the house on the western side of the two-track road. The structure had three walls and the construction was the same style as the house. The fourth wall consisted of a juniper post fence. A window was on the west wall of the shed, and a fireplace with chimney was located on the south wall. Forked juniper posts held the roof in place. It was considered that the structure might have been used as temporary housing during construction of the house. Corral fences (Feature 4) were located to the north of the shed. The fences were constructed from juniper posts and barbed wire. East of the house was a large scatter of historic artifacts, including cans dating prior to the 1930s, house furniture fragments, a cast iron stove, harmonica parts, wash basin, purple glass, pails, and a cowbell. Historical information suggested that the site was occupied by goat ranchers until around 1927, and may be the remnants of a site referred to as the Goat Camp in one of the few written references on the area (Halloran 1944).

Based on the potential for the site to yield important information regarding the historic period, the site was recommended for inclusion in the NRHP by the Matthews.

LA 116345 (White Sands Missile Range inholding)

Other Site Name/Number: Fresno House, 9604-16
USGS 7.5' Quadrangle: Bear Peak
Reference Citation: White Sands Missile Range files
Inferred Site Function: prehistoric camp, Ranch complex
Cultural Affiliation: Unknown prehistoric, Historic (1880–present)
Collections: none
Dimensions: 125-x-125 m
Number of artifacts: 100s

LA 116345 is a historic ranch complex known as the Fresno Site and was recorded by Human Systems Research in 1996. The site is situated on a gently sloping southern shoulder of east-west trending Ash Canyon (see Figure 5.8). The site appeared to have been occupied between 1880 and recent times. The site includes six features and associated artifacts.

Feature 1 was recorded as a square one-room structure measuring 18 feet on a side. The walls were approximately 18 inches thick. The floors were constructed of quartzite slabs with mud mortar. The interior was plastered with concrete. A window was on the south wall and the doorway was on the east wall. Recent graffiti covered the interior walls. Based on Human Systems Research's assessment, this structure was the most recent structure constructed. This assessment was based on artifacts and construction style. A barbed wire and sheep wire corral was to the southeast of the structure. Fence posts were juniper posts and railroad ties. The corral had two gates.

Feature 3 was a roofless three-room structure to the east of Feature 1, constructed of limestone cobbles and mud mortar. The rooms were connected together in an east-west line and were about 7 feet wide by 28 feet long. No doors or windows could be determined among the rubble. The west room was used for the dumping of sanitary-seal cans.

Feature 4 is a one-room roofless limestone rock ruin, which was described as being large enough to be a bunkhouse. The remains of the rock walls were approximately 4 feet high. It was also described as a being part of an older construction period.

Feature 5 was a t-shaped rock ruin, which likely represented the first house structure constructed on the site. The south wall measured 32 feet long by 30 feet wide, including the t-shape. Some of the remaining walls were about 7 feet high, while others were 4 feet high. The chimney, on the south walls remained about 9 to 10 feet high. The north room contained a 4 foot depression that may have been a collapsed cellar.

Feature 6 was recorded as a 40 to 50 foot deep shaft on the northwest boundary of the site, with wooden shoring.

Artifacts associated with the site included clear, brown, amber, green, aqua, purple, and milk glass, whiteware ceramics, sanitary-seal and solder-seal cans, pre-1948 tobacco tins, motor oil tins, round and cut nails, pipe, barbed wire, fuel tanks, corrugated metal roofing, .45 caliber casing, and .50-70 rifle cartridge casings.

Based on the potential for the site to yield important information regarding the historic period, the site was recommended for inclusion in the NRHP by Human Systems Research.

LA 116352

Other Site Name/Number: Upper Ash Canyon, 9604-23
USGS 7.5' Quadrangle: San Andres Peak
Reference Citation: White Sands Missile Range files
Inferred Site Function: prehistoric camp, ranch complex
Cultural Affiliation: Unknown prehistoric, Unknown historic
Collections: 1 historic whiteware fragment
Dimensions: 40-x-40 m
Number of artifacts: 10s

LA 116352 was recorded by Human Systems Research in 1996 as a historic structure with associated refuse. The site is in the upper portion of Ash Canyon, at the end of a two-track road (see Figure 5.8). The structure was one room and was constructed from locally available limestone slabs. No roof was extant, and the highest walls were approximately 5 feet. The remains of a chimney could be discerned on the north wall of the structure, and a possible window on the east wall. The structure measured roughly 14-x-11 feet.

Artifacts associated with the site included a whiteware fragment dating between 1927 and 1970. Other artifacts included glass jar fragments, clear, and green glass fragments, tan earthenware, soda cans, a button, milled lumber, nuts, and bolts. More recent military and domestic trash was also observed.

Based on the potential for the site to yield important information regarding the historic period, the site was recommended for inclusion in the NRHP by Human Systems Research.

CHAPTER 6
RECOMMENDATIONS FOR FUTURE CULTURAL RESOURCE MANAGEMENT OPTIONS AND RESEARCH DIRECTIONS FOR THE SAN ANDRES NATIONAL WILDLIFE REFUGE

Less than 1 percent of the San Andres National Wildlife Refuge has been surveyed for cultural resources. Since so little is known of the region, it is recommended that research questions and issues should be general in nature. A set of assumptions has been generated and modified slightly from Gibbs (1998) provides as a backdrop for conducting cultural resources research in the refuge.

Assumption 1. Mountains hold a greater number and diversity of permanent water, lithic, food, and other resources than do the desert floor areas of southern New Mexico. Western slopes of the San Andres mountains receive greater amounts of afternoon heat from sunlight, and eastern slopes receive more rainfall because of the mountains' effects on weather. Thus, greater vegetation exists on eastern slopes because of cooler, wetter conditions.

Assumption 2. Through paleoenvironmental reconstruction, it has been determined that since the close of the last glacial period, there has been an increase in aridity, a retreat of conifer forests, and an expansion of piñon-juniper forests. Because of these environmental changes, reduced amounts of potable water would be available in low-lying areas, and increased reliance on mountain areas would occur, especially during drought conditions. This reliable water would probably take the form of permanent or semi-permanent natural springs and/or streams.

Assumption 3. The reliance on mountain areas should be visible in the archaeological record through time, with Paleoindian period assemblages being least represented, and Formative and Protohistoric assemblages being most represented. This assumption is made based on the time span between the Paleoindian period and the present, and the greater sedentism existing during the Formative period. Historic period sites are expected to be in high numbers where mineral deposits, timber, and water are plentiful. Historic period sites tend to increase in frequency when the hostile Apache threat was diminishing (Post-1880).

Assumption 4. The summits of mountains are difficult to reach, suggesting a prevalence of smaller sites with less diverse assemblages in the highest elevations.

Assumption 5. Due to the steep topography of mountains, sites will generally be clustered in areas of relatively level topography, including ridges, mountain tops, saddles between peaks, and wide canyon bottoms.

PHYSICAL GEOGRAPHY

The geography and topography of mountains are more diverse than that of the desert floor. The steep terrain is more difficult to move through, and the potential hazards are greater. With increased topographical slopes and geographical features, prediction of site location should be easier than that of the desert floor. However, several factors make sites in these areas more difficult to locate, including vegetation, both in density of plants and in detritus on the ground. Steepness of terrain and erosional effects also hamper the discovery of sites in mountainous areas. Geographical study of mountain sites could provide a greater understanding of not only the utilization of mountain areas but site formation processes as well.

Does mountain geography play a role in defining a real boundary for any particular culture?

Based on projectile point types, Paleoindian and Archaic period groups made such widespread use of the landscape that regional cultural boundaries are difficult to determine. Although it is probable that groups in the Paleoindian and Archaic periods utilized specific regions, no culture groups tend to be associated with particular mountain ranges or geographic area in general.

Formative period assemblages contain temporally diagnostic projectile point and ceramic types that potentially indicate an occupation of a particular prehistoric culture group or subgroup. The definition of the boundary of these culture groups is often based on the limits of the distribution of a particular ceramic style. Formative period culture groups are still defined largely by where the majority of long term occupation site types are located and architecture style can contribute to a group's cultural boundary. Within deserts, these cultural boundaries are primarily associated with mountain ranges. For example, the Mogollon culture group is largely defined by the Gila and Black ranges, and Jornada Mogollon by the Organ, San Andres, Franklin, and Sacramento Mountains. Similarly, Apachean groups were defined by the mountain ranges they inhabited. However, these boundaries change through time as new archaeological information becomes available. Trade and interaction between culture groups tend to blur these lines.

WATER

In the arid climate of this region, water sources shaped the way in which prehistoric groups conducted their lives. Water was essential to prehistoric peoples and offered several benefits. Primary benefits included water for drinking, cooking, and bathing. Secondary benefits included the use of water sources such as springs or streams as potential hunting areas, and/or for horticultural purposes. In the prehistoric period, water was obtained in two ways, either through ground water or rain. During the Historic period, water wells were utilized to pump greater quantities of water for people and cattle.

Several methods could be employed to better understand prehistoric and historic water use in the area. Weather data could be examined to determine variations in rainfall amount and intensity. Similarly, paleoenvironmental and modern plant studies could be examined to determine seasonality of plants and how it relates to potential water availability.

Several known water sources are located within and near the refuge and have been well documented during Human Systems Research spring survey (1994). Sites within the study area are expected to be clustered around these permanent water resources. Sites in the vicinity of springs are likely to contain multicomponent assemblages, because these water resources might have been available throughout the span of prehistory. However, prehistoric sites may have been destroyed or heavily modified by the use of these water resources during the Historic period. Assemblages within sites can become mixed both horizontally and vertically, especially in the vicinity of seasonal or permanent water sources. Similarly, certain site types are expected in areas containing wide drainages, which often contain a higher diversity of plant and animal resources than the surrounding higher terrain. For example, at lower elevations, drainages often hold mesquite fuel wood for thermal roasting features.

What specific types of artifacts and features are associated with spring locations within desert mountains? What temporal affiliations are associated with spring locations?

Because water is so important to human life, expected archaeological sites surrounding springs are likely to contain multicomponent assemblages. As a drying period began at the end of the last ice age, evidence of an increased use of spring locations is to be expected in mountainous areas (see Assumptions 1 and 2). Greater quantities of artifacts are predicted to exist within and surrounding spring locations. Expected artifacts at these locales may not appear any different than those of other sites, but certain trends may exist. A higher incidence of ceramic artifacts is predicted to be present, indicating water or resource gathering, or possibly dry farming. Projectile points are expected to be predominant at springs because of the potential game concentrated near them. Prehistoric features associated with spring sites also may include fire-cracked rock hearths or middens, and bedrock mortars. Historic period artifacts are also likely to be present within the vicinity of springs, and Historic period features may include remnant concrete, water pipes, stock tanks, etc.

These sites, while important because of their potential multicomponent use, are often difficult to study because of the temporal mixing of assemblages. Spring sites are often located within a seep or drainage, allowing for a mixing of archaeological assemblages through rainfall or the presence of the spring itself. The effects of curation should also be considered, as later groups could pick up and utilize a previous group's artifacts. Historically, many spring areas were developed for mining, cattle grazing, and other purposes, so prehistoric assemblages may be mixed, buried, or destroyed. Spring sites, which are commonly known to amateur collectors, may contain fewer temporally diagnostic artifacts due to collection.

What impacts did water resources have on the Spanish explorers, the early Mexican inhabitants of the Jornada del Muerto and historic settlements? How did the presence or absence of water resources affect the settlement of the Tularosa Basin?

It is unknown to what extent the Spanish explorers and Mexican inhabitants used the desert mountain areas as a water resource, but it is known that with the exception of the Salt Trail on the east side of the San Andres and the Camino Real on the west side, the San Andres Mountains were largely unexplored because of the Apache threat until the late 1800s. The Spanish used a route that followed the eastern side of the Organ Mountains to retrieve salt from a source in the Tularosa Basin. Spanish-era maps show San Nicholas Spring in the southern San Andres Mountains, as a stopping point for water. The Spanish knew that water was plentiful in the Organ and San Andres Mountains, but the Apache made them cautious about approaching these ranges, forcing them instead to travel the somewhat safer Jornada del Muerto route.

Settlement of historic ranches within the San Andres Mountains is focused around spring locales. The known ranches in the refuge are all associated with a spring.

MOVEMENT

Mountains, while considered a resource haven, are also an impediment to travel from one lowland place to another. What types of remains might be present as a result of this impediment to migration?

It is unknown exactly how mountains affected movement of nomadic hunter-gatherer groups. It is speculated that while movement over the desert floor was faster, movement along the foothills was rewarded by greater resources. Travel through mountains, passes or gaps between ranges was probably more common than through tall, impenetrable peaks such as the San Andres Mountains. Frequently traveled areas along the edge of mountains developed into trails or primitive roads. These types of roads have been recorded in Canada and Montana and remnants are still seen today along the eastern slopes of the Rocky Mountains (Stark 1997).

During the Historic period, mountains were a great obstacle as frontier movement westward was hampered by the use of covered wagons. Settlers traveling to California were forced around the Rocky Mountains to the south, where these obstacles were fewer in number. Historic roads paralleling mountains are usually located far enough away so that wagons could avoid the numerous drainage arroyos between alluvial fans. Historic roads located within mountain areas usually follow alluvial ridgelines. As the refuge contains steep and impassable mountains, and no known historic roads exist within its boundaries.

ASSEMBLAGE LOCATION AND DIVERSITY

Predictability of site assemblages within mountain areas will tend to decrease though time because a greater reuse of these areas is expected. It is expected that mountain sites should contain artifact assemblages that reflect the potentially available and obtainable resources. For example, within the lower elevations of desert mountains where plant resources such as agave are abundant, a variety of expedient tool types used to remove edible plant matter from the stalk should be common. In areas of high elevation where herds of elk and other game animals were plentiful, evidence of projectile point retooling should be apparent. Therefore, diversity of site types should be greatest in the foothill zones.

Is there greater variation in sites found in the higher mountain elevations than the lower elevations or foothills, and if so, is there a way to predict this variation?

The number of sites is predicted to be lower with increasing elevation (Assumption 5). Resources that exist at both high and low elevations are expected to have been gathered at lower elevations because of efficiency and safety. These zones are predicted to contain the highest number of sites in desert mountain regions. Specific resources, which were only found at higher elevations, were probably gathered on a limited seasonal basis. These regions contain a wealth of resources, especially large game, but also entail more severe hazards than the desert floor. These hazards potentially include but are not limited to harsh terrain, rolling rocks, falling, flash floods, and large predators such as bears or mountain lions. Severe winter temperatures probably kept most prehistoric groups away from higher elevation areas, but unpredictable temperatures during other seasons may have also proven dangerous.

If the preceding statements are true, then higher elevation sites should tend to be smaller and the assemblage variability lower, because fewer people over time would be visiting these locations. These visits were likely seasonal and for short duration. Therefore, a direct relationship is predicted for both the frequency of sites and the size of sites as elevation increases. As a test case, an environmentally stratified sample survey conducted by Human Systems Research (1991) was examined. Thirty-eight 1 km block sample units in nine environmental zones were surveyed in the southern San Andres Mountains, within and just north of the current study area. The environmental zones were located from the Jornada del Muerto through the San Andres Mountains and into the Tularosa Basin. Table 6.1 provides a summary of the number and sizes of the sites found per environmental zone, as defined from west to east. Although the sample survey of environmental zones is unequal, it suggests that sites within the "Mountain" zone are both smaller in number and size compared to all zones with exception of the "Alkali Flats" and "Malpais" zones.

Table 6.1
Site Summary Data by Environmental Zone
(Human Systems Research 1991)

Environmental Zone	Number of Units	Number of Sites	Average Size of All Sites
Upper Jornada Zone	5	18	597,854
Upper Jornada/Foothills Interzone	2	11	334,080
Foothills	12	38	128,671
Mountain	3	3	2,800
Upper Bajada	5	7	130,678
Upper/Lower Bajada Interzone	2	6	72,525
Lower Bajada	7	5	33,269
Alkali Flats	1	0	0
Malpais	1	1	17,820
Total	38	89	

Two of the sites in the "Mountain" zone were nondiagnostic lithic scatters, although one contained a possible Paleoindian point, and the third was a Historic tent base associated with a cliff overhang (Human Systems Research 1991:172). No ceramics were found within the "Mountain" zone (Table 6.2). Reasons for this appear obvious. Ceramics are heavy and difficult to carry over uneven steep terrain and can be broken easily. Groundstone artifacts were also absent in sites and isolated occurrence assemblages in this zone for similar reasons. This implies an absence of food processing and temporary settlements in the mountains.

Table 6.2
Summary Assemblage Data by Environmental Zone
(Human Systems Research 1991)

Environmental Zone	Total Sites per Zone	% Sites With Ceramics	% Sites With Projectile Points	% Sites With Groundstone
Upper Jornada Zone	18	72	66	100
Upper Jornada/Foothills Interzone	11	90	64	82
Foothills	38	61	53	63
Mountain	3	0	30	0
Upper Bajada	7	57	86	57
Upper/Lower Bajada Interzone	6	17	83	0
Lower Bajada	5	80	60	100
Alkali Flats	0	0	0	0
Malpais	1	100	0	100

A second survey conducted by Human Systems Research (1992) on the northern end of the San Andres Mountains offers similar as well as conflicting results. Five 1 km^2 units were surveyed, yielding one prehistoric site and one late historic (military) period site in the "Mountain" zone (Table 6.3). However, the prehistoric site contained El Paso brownware and groundstone artifacts, conflicting with previous data. Isolated occurrences could not be compared between the two studies because the "Mountain" zone was subject to reconnaissance survey only. There are two possible explanations for ceramics and groundstone being located at such an elevation. First, a spring location is less than a mile to the south of the site and second, the site was situated on a saddle at the source of three large canyons. The size of the site was larger than expected at this elevation, possibly because of its relatively level location in relation to the nearby canyons. In addition, it was noted by Human Systems Research (1992:97) that, "the site area has been exposed by a recent fire . . . revealing artifacts that would normally be obscured by vegetation." This suggests that the low occurrence of large sites at high elevations may be associated with low visibility rather than frequency of occurrence.

Table 6.3
Northern San Andres Study
(Human Systems Research 1992)

Environmental Zone	Number of Units	Number of Sites
Foothills	2	13
Upper Bajada	2	10
Mountains (recon only)	1	2

FOOD ACQUISITION AND PROCESSING

There are over 1,000 species of plants and animals within the study area. While not all of these plants or animals may provide food, medicine, clothing, or other uses, it is assumed that the desert landscape we see as barren and harsh today was a veritable grocery store for prehistoric peoples.

What variation exists between food resources on the desert floor versus mountainous areas? What variation is there between food resources on different sides of a mountain range? What season were mountains most useful in terms of food resources?

A study conducted by Osborn (1993) indicates that large ungulates such as bighorn sheep, elk, and mule deer, which inhabit higher elevated areas, would have been a significant calorie source to prehistoric hunter-gatherers. The food intake from these ungulates would be of greater caloric benefit (in terms of handling costs) than that of plant resources, including acorns, piñon nuts, and Indian rice grass (Simms 1984:93). According to Connolly (1981), approximately 71,268 kcal. can be obtained from the flesh and fat of an adult mule deer. The food energy value for mule deer is greatest during the summer and fall seasons (Anderson et al. 1972:586), but drops substantially in the winter and early spring.

While still speculative, several studies of the Apache Indians can be valuable in understanding prehistoric subsistence patterns. Basehart's (1973) study, for example, based on ethnographic research, examines water gathering, agriculture, and place names with territorial references. The study provides a long list of usable stone, animal, and plant resources in semi-desert brush, grassland, woodland, and forest ecozones. His study strongly indicates that almost every plant was of some subsistence, medicinal, or architectural value. The four wild food crops that proved most important, primarily for food storage purposes, were mescal, datil fruit from *Yucca bacatta*, piñon nuts, and mesquite beans (Basehart 1973). The majority of all the wild foods utilized by the Mescalero are known to exist within 2 km of the bajada slope (Johnson 1991).

THERMAL FEATURES

Thermal features including carbon stains, fire-cracked rock hearths, and burned rock middens are ubiquitous in the Jornada Mogollon region. These features can potentially provide a better understanding of previous subsistence patterns through the use of pollen and macrobotanical studies and can also provide important data regarding the approximate temporal period of a thermal feature's use. Problems exist with the collection and interpretation of macrobotanical and

radiocarbon dating. Recent macrobotanical studies of thermal features have been less than successful in understanding the actual food(s) being roasted (Sale et al. 1996, Sale and Ennes 1997, Sale and Gibbs 1997). It is possible that animals, rather than plants, were processed within some thermal features. However, this type of data has given researchers a better understanding of the fuel wood used to create thermal features. Radiocarbon dating is a useful tool for understanding the age of thermal features, but provides information only on the last date the feature was used. In cases of Protohistoric (Apache) assemblages, dates obtained from thermal features tend to be less reliable because the samples are too recent for an accurate measure.

What is the distribution of thermal features in desert mountain areas, and what are the potential factors that influence this distribution?

Recent investigations on Otero Mesa and nearby alluvial fans have suggested that thermal features have a strong association with drainages (Gibbs and Phippen 1998). Thermal features require fuel wood such as mesquite, which is usually more abundant in drainages. Because of increased runoff, both food resources and source rock suitable for the creation of thermal features are more abundant than in other areas. Other researchers (Sale and Gibbs 1995; Gibbs and Phippen 1998; Sale and Ennes 1997) have found that large roasting middens were located at the base of the Northern Franklin Mountains, Otero Mesa, and the Sacramento Mountains, respectively. These studies illustrate a strong relationship between mountains, drainages and features. It is further probable that permanent water drainages will contain the most sites within an area.

LITHIC RESOURCES

The study of lithic resources can provide an understanding of how far prehistoric peoples traveled for source materials. Stone artifacts comprise a large portion of archaeological assemblages not only because stone is the dominant material used by prehistoric peoples, but also because it is the material that is best preserved in the archaeological record. Lithic artifacts include chipped stone materials, including debitage, unifacial and bifacial tools, projectile points, awls and drills, and hammerstones. Groundstone artifacts include manos, metates, pestles, and bedrock slabs and mortars. Other stone resources include clay sources, ochre pigments and glazes, and ornamental stone such as turquoise.

What role do desert mountains play in the acquisition of stone resources, and how do these resources differ from those found in nonmountainous areas?

Lithic sources can be viewed as primary or secondary. Primary lithic sources are derived from the initial location of the resource. Secondary lithic sources are derived from alluvial deposits away from the primary location. Secondary deposits are carried away from the initial location by erosional processes, and deposited into alluvial fans or channeled through arroyos. These secondary deposits can be considered as potentially valuable to aboriginal groups as primary sources because the source material is often as fine in quality and abundance as at the primary source. Furthermore, it is easier to acquire a piece of chert from the alluvial fan, than to climb to its source and mine the rock, reduce the material, and return.

If the above assumptions regarding primary and secondary lithic sources are true, it is then expected that the foothills would contain a variety of high quality lithic materials for use by prehistoric peoples. Primary lithic acquisition source areas would therefore be uncommon, except perhaps for the highest quality materials. However, more testing of artifacts as evidenced by primary flakes, cores, and tested nodules would be expected in quantity on the foothills of desert mountains. According to Church et al. (1996:156),

> The foothills and perimeter of the Tularosa Basin and Hueco Bolson can be characterized as lithic rich. Sites in the foothills and around the perimeter of the basins have few exotic materials, few nonlocal materials, and many local materials. Procurement was extractive in nature. Distribution of procured material was wide, conservation and reuse was low and caching was not present. Cores, primary, and secondary flakes should be numerous.

Several studies have been conducted within the vicinity of the project area regarding stone source areas, including Martin (1977), Pigott and Dulaney (1977), Hawley (1983), Bradley (1983), Camilli (1988), Warren (1988), Goldsmith (1993), and Church et al. (1996). Pigott and Dulaney (1977:90) suggest that, "With some exceptions, the display of the data indicated that raw materials for artifacts tended to be locally available to the sites where the artifacts were found." Further, Martin (1977:28) states that, "Lithic tools and debitage found in the El Paso area sites seem to indicate that aborigines inhabiting or exploiting this area from at least the Folsom era through the Pueblo era utilized virtually all of the locally available mineral types."

However, evidence exists that Paleoindian materials, recovered primarily from Folsom assemblages in the area, may have come from extra-regional locations, probably from the Edwards Plateau in southeast New Mexico. The basis for this claim comes from the examination of local cherts and cherts from Paleoindian sites as viewed under ultraviolet light. Rock types found within the Edwards Plateau will fluoresce an orange or red color, whereas local materials will not.

Church et al. (1996) examined several potential raw stone sources for all of these artifact types within and surrounding the project area, to create a comparative collection from known provenances for the Jornada Mogollon culture region. His findings indicate that while many of the mountain ranges within the Jornada Mogollon area may appear similar, composition is highly variable. He states, "The Franklin, Organ, and Jarilla Mountains contain more igneous and metamorphic materials than do the San Andres, Sacramento, and Hueco Mountains, which are dominated by sedimentary materials" (Church et al. 1996:3).

CEREMONY AND MOUNTAINS

Most mountains hold special significance for Native American groups in the local region, such as the Mescalero Apache. Ceremonial concerns in archaeological studies are difficult, if not impossible to address, because attempts to assign a meaning to a particular culture group is often charged with our own beliefs and concepts of the subject. It is also flawed to try to derive a ceremonial behavioral pattern from an artifact or feature based on limited evidence. However, drawing upon present knowledge and a wealth of archaeological and ethnographic data, it is firmly believed that past cultures participated in ritual behaviors. Mountains hold a significant religious or spiritual value to many cultures, possibly because of their remoteness and

inaccessibility. Many cultures with sky and/or earth deities may associate spiritual significance with mountains because of a sense of closeness through high mountain peaks or caverns.

What are the ceremonial aspects of mountains that may be reflected in the archaeological record?

Two potential archaeological feature types that suggest a ceremonial or ritual purpose are rock art and cairns. Ritual purposes of rock art on mountain tops could be associated with petroglyph archaeoastronomy sites, such as Fajada Butte in Chaco Canyon or Tonuco Peak located northwest of the Doña Ana Mountains. Unidentified cairns located atop certain peaks could indicate a ceremonial use as well. Among modern Pueblo groups in northern New Mexico, these rock shrines are akin to churches and hold great power. Florence Hawley Ellis (1994:105) states:

> Shrines clearly are central to the practice of Pueblo religion, whether located within the village or at a distance. Shrines that have fallen out of present use remain sacred and revered, since each shrine is like a telephone receiver, whose line communicates with the supernatural switchboard even when rarely employed. Each shrine contains a sacred power to be respected and never desecrated.

These shrines may be located upon mountain tops indicating a dwelling place of the sky gods, or may be located close to spring locations, as a reverence for the underworld and water spirits. Offerings may be left to the spirits for guidance, wisdom, or power, in the form of plants, special stones, or animal bones (Ellis 1994). Additionally, shrines associated with Indian trails as described by Jett (1994) may contain rocks and/or sticks. However, unidentified cairns may also represent a historical mining claim boundary corner or a celebration by modern mountaineers, and thus, these rock piles cannot exclusively be associated with aboriginal activities.

Historic ceremonial uses of mountains usually include Christianity as their core. Crosses appear on peaks in many mountain ranges in the area, including the Doña Ana, the Sacramento, and Tortugas Mountain. In the latter case, the cross is associated with the Virgin de Guadalupe.

CULTURE AND INTERACTION

Because of large-scale climatic changes taking place over 10,000 years, mountain resources may have been preferred and exploited by certain cultural groups over desert floor areas, and thus these areas are expected to be better represented in the archaeological record. Particular culture groups may also have utilized only a specific resource within a mountain area. For example, historic use of mountains within the study area is centered on ranching and mining.

How does the cultural landscape surrounding desert mountains change through time and what groups are represented? Can any particular group be associated with a particular site type or location within these areas? What, if any, are the potential cultural traits which could affect site location from the Paleoindian period through the Historical period? What potential site types are apt to occur in mountains (i.e., camps, kill sites, ritual locations, mines, etc.)?

Paleoindian Period

During the Paleoindian period, the use of mountain areas may have been more limited than in other time periods. The Late Pleistocene climate was cooler and wetter, and resources of all types were more plentiful in all ecological and geological zones. However, topography does appear to have been a factor in site selection for members of the Folsom culture. Of 15 Folsom period sites located in the central Rio Grande Valley, 60 percent were located on a hill slope, and 95 percent of the total were located within the vicinity of a playa bottom (Judge 1973:195). The remainder of the sites were found along streams. It is suggested by Judge (1973) that the topography was used to scout and prepare for hunting activities. Similarly, 56 percent of nine Folsom period, Belen phase sites were observed on a ridgetop and 67 percent of the total were associated with a playa. Sites associated with the Cody complex of the Folsom period appear to be primarily located on level topography and have less association with playas, but the sample size (n=5) was too small for accurate interpretation (Judge 1973:245). Earlier, Clovis period sites are far less common in mountainous areas and do not appear to be associated with topographical features. The two sites, which Judge examined, one from his study and the Mockingbird Gap site, appeared to have been located between two sources of water (Judge 1973:255).

The majority of Folsom sites in the lowlands of south-central New Mexico are found between 4,000 and 5,000 ft above mean sea level (amsl) in basin, plain, and foothill settings (Amick 1994). Evidence exists that suggests Folsom groups foraged into higher elevated areas, as sites have been found as high as 7,500 ft amsl, and isolated occurrences as high as 8,500 ft (Amick 1994). However, later groups could have curated isolated occurrences of this kind. In comparison, the average Cody complex site was found at 5,500 ft, and had the highest elevational range of any Paleoindian group in New Mexico. This elevational difference may be reflected in changing environmental conditions in the Southwest (Amick 1994:292).

In recent years, several Folsom sites have been discovered within the Tularosa Basin and Hueco Bolson. On the east side of the northernmost Franklin Mountains within Fort Bliss Military Reservation, is a Folsom period site (FB 1613) situated on a hill overlooking a large playa to the northeast. Another Folsom site, located on Holloman Air Force Base, overlooks Ritas Draw and Lost River Playa to the north and west (Sale et al. 1996). Two additional sites on McGregor Range were recorded on hilltops overlooking drainages to the north (Browning et al. 1998). In contrast, two Folsom sites were recorded at the base of the Sacramento Mountains on Holloman Air Force Base administered lands near Boles Wells, New Mexico (Mauldin and O Leary 1994; Sale et al. 1996). These sites were located within 200 m of each other and neither was associated with an obvious playa. More investigation of this site type is needed in the region before a clear determination of Folsom period land use in the project area can be made.

Archaic Period

By the end of the Paleoindian period, the dwindling megafauna were gone, and based on changes in projectile point styles new hunting strategies were being adopted by the human inhabitants of the region. Evidence suggests that Early Archaic through Late Archaic groups did hunt at elevations above 8,000 feet within northern New Mexico (Hill 1990a; Hill 1990b:18). Nomadic groups roamed the retreating conifer forests, slowly adapting to the gradually changing climate.

Evidence of the Early Archaic usage of the landscape is similar in frequency (minimal) to that of the Paleoindian sites. Of 14 Early Archaic period sites examined on and surrounding Fort Bliss by MacNeish (1993a), 12 of them were located on the desert floor, and the majority of these sites were small in size. The remaining two sites were Fresnal Shelter and Peña Blanca Shelter. Thermal features first appear during the Early Archaic period, but were more common and larger during the Middle Archaic period. Projectile point styles gradually changed again, and the use of basketry was adopted, though the overall settlement patterns are thought to have remained similar (MacNeish 1993a:396). Groundstone artifacts increased in frequency during this phase, suggesting greater processing of food resources and additional usage of mountain areas to retrieve source rock. Populations grew and pithouse base camps were established in the riverine areas (O'Laughlin 1980). Additional reliance on horticultural efforts during the Late Archaic period allowed populations to expand and become more sedentary, associated with the advent of ceramics.

Formative Period

Formative period use of mountain areas increases significantly, especially within the foothill regions. Greater frequencies of larger sites appear during this period, indicating either larger groups utilizing an area and/or reuse of an area. Formative period sites are found in almost all topography, but larger sites are generally located in several foothill areas on the north Franklin and Sacramento Mountains beginning with the Mesilla phase (Sale and Gibbs 1995; Sale et al. 1996; Sale and Ennes 1997). These sites contain large burned rock middens mixed with numerous ceramics that were used for the processing of plant resources, likely agave (Castetter et al. 1938). These large sites are located in the vicinity of playa lakes or drainages, and may have been used seasonally as winter or spring camps. By examining the temporal components from the Human Systems Research study (Human Systems Research 1991) no differences in utilization by landform can be easily observed between the early and late Formative periods. Thirty-three Mesilla phase components and 35 El Paso phase components were located during this study, with similar numbers of sites located within each topographical zone.

Following an environmental landform sampling system designed by Doleman (1994), Sale and Ennes (1997), divided their study area along the western slopes of the southern Sacramento Mountains into three environmental zones: Upper, Middle, and Lower Bajada. The Upper Bajada exhibits greater than 2 degree slopes and contains creosote bush and succulents such as cacti, sotol, and agave. The Middle Bajada exhibits slopes of 1 to 2 degrees, and contain a mixture of creosote and mesquite with few succulent species. The Lower Bajada exhibits less than 2 degree slopes and is almost all mesquite and creosote (Doleman 1994). Most, if not all of the plant resources within these zones were utilized by prehistoric people and for a variety of purposes including food, clothing, baskets, and cordage (Bell and Castetter 1937; Castetter et al. 1938; Bell and Castetter 1941).

The study by Sale and Ennes (1997) of 43 aboriginal sites on the western slopes of the Sacramento Mountains reported that 30 percent of the Formative period sites were located in the Upper Bajada, 57 percent in the Middle Bajada, and only 7 percent in the Lower Bajada. The results suggest that large-scale processing of plant remains was being conducted on the Middle Bajada sites. Further, almost all of the sites were clustered at the bases of San Andres, Dog, and Escondido Canyons. Aceramic and/or Archaic period sites were located predominantly in the

Upper Bajada zone, and Formative period sites were located primarily within the Middle and Lower Bajada zones. Several of the Formative period sites located during this survey were over a kilometer in diameter, and contained evidence of long-term occupation, but more so, large-scale processing of food resources as evidenced by the hundreds of burned-rock middens.

Many El Paso phase sites with architectural remains in the southern Tularosa Basin and Hueco Bolson are located on the desert floor, including Cottonwood Springs, Condron Field, Escondida, Hot Well, Firecracker, Pickup, McNew; Rattlesnake Hill, and Adobe Wall Pueblos. The remainder of sites with architectural remains are located along major water drainages along the edge of the Sacramento Mountains, and include Pueblo del Cruz, Three Rivers Pueblos, the Temporal site, and several unnamed pueblos at the base of Alamo and La Luz Canyons near Alamogordo. The presence of tradewares from the north (Chupadero Black-on-white, Anasazi styles), south (Chihuahuan styles) and the west (Mimbres styles) at these foothill sites, and throughout the basin areas as well, suggests a more intensive trade with culture groups outside the Jornada Mogollon region.

A supposition is made that during the early Formative period, overpopulation, caused by increased sedentism and growing aridity itself, caused traditional food resources to dwindle, possibly forcing groups away from the foothills and onto the desert floor on a more seasonal basis. Johnson (1991) suggests that adaptive diversity theory, as first described by Upham (1984), may have been partially responsible for the high number of sites on bajadas. Forays into higher mountain areas during the summer and autumn seasons supplemented horticultural endeavors utilizing lower foothill and bajada zones to perform dry farming during the wetter years. In high rainfall years, there may have been some farming activity, but in poor years, additional reliance on wild foods may have occurred. This indicates the possibility that late Formative groups (beginning around A.D. 1100) may not have been as sedentary as previously believed (Johnson 1991).

More formal structures, including above ground adobe architecture, were erected near permanent water locations, often on top of or in the vicinity of earlier pit house structures. A possible drought may have occurred between ca. A.D. 1450–1500 that caused a population decrease in the area which may have resulted in these structures being used less often and falling into disrepair. Perhaps smaller bands traveling further for food resources at the end of the Formative period (ca. A.D. 1450) again became the main subsistence strategy. This pattern would closely match the depiction of Spanish encounters with these groups (Beckett and Corbett 1992).

Apache/Spanish Period

For the Mescalero Apaches, mountains were resource areas during the summer and fall months, but were abandoned in the winter in favor of the warmer lowlands (Sonnichsen 1986). This group exploited various plants and large game, and the mountainous setting may have also provided cool air during the long, hot summers. Groups migrating into the mountains likely traveled light, though they may have brought some extra clothes or blankets for the cold mountain evenings. Short-term excursions from the desert floor to retrieve water from springs and streams during the winter likely took place at frequent intervals, especially during dry years.

With the exception of a few artifact types associated with Apache assemblages (metal projectile points, con-tinklers, worked glass fragments, etc.), it is difficult to identify these sites without the diagnostic historic indicators. Artifacts associated with hunting camps may contain lithic arrow points and lithic debris and evidence of seasonal plant gathering may be limited to the presence of ring middens. Apache sites have been located within all landforms, but these sites will undoubtedly be most visible and possibly most numerous in the mountains because the dense forests and steep terrain provided defense and safety. The mountain terrain was familiar to the Apaches, who had been in the area probably since the late 1400s or early 1500s. Numerous skirmishes were fought with Apaches by both Spanish and later American forces. Hugo Oconor details the Apache in his 1777 letter of relinquishment to Theodoro Del Croix (Oconor 1994):

> According to the seasons of the year, those barbarians inhabit those places that offer the best advantages for their support and for pasture for their horse herds, but always in the interior, yet hidden protected by the sierras, motivated by the security for their wives and children and for their crops of corn and other products, but without the need of maintaining and guarding these lands, because of having the same thing in any other place.

Raiding was a non-seasonal activity that took place on an opportunistic basis (Human Systems Research 1973:248). The Apaches were likely doing what they did best, and saw their new Spanish neighbors as a resource for items that were previously unavailable in their world, such as guns and horses. For this reason, the Spanish likely stayed clear of these areas except when traveling with a force large enough to defend against Indian attack. Spanish-era sites are uncommon to the area, and except for rare locales such as San Nicolas Spring in the San Andres, are not found in southern New Mexico mountains.

MANAGEMENT RECOMMENDATIONS

Because so little cultural resources work has been conducted on the San Andres National Wildlife Refuge, additional work will be required. Since relatively few federal undertakings are conducted in the refuge, Section 110 of the National Historic Preservation Act applies best to federal management of the land holdings. Subsection 2 of Section 110 states that:

> Each Federal agency shall establish (unless exempted pursuant to Section 214), in consultation with the Secretary, a preservation program for the identification, evaluation, and nomination to the National Register of Historic Places, and protection of historic properties. Such program shall ensure-
>
> (A) that historic properties under the jurisdiction or control of the agency, are identified, evaluated, and nominated to the National Register;
>
> (B) that such properties under the jurisdiction or control of the agency as are listed in or may be eligible for the National Register are managed and maintained in a way that considers the preservation of their historic, archaeological, architectural, and cultural values in compliance with Section 106 and gives special consideration to the preservation of such values in the case of properties designated as having National significance;
>
> (C) that the preservation of properties not under the jurisdiction or control of the agency, but subject to be potentially affected by agency actions are given full consideration in planning;

> (D) that the agency's preservation-related activities are carried out in consultation with other Federal, State, and local agencies, Indian tribes, Native Hawaiian organizations carrying out historic preservation planning activities, and with the private sector; and
>
> (E) that the agency's procedures for compliance with section 106.

Development of a Cultural Resources Management Plan

A Cultural Resources Management Plan (CRMP) should be developed and used in concordance with this document. The CRMP is a document to help land managers understand and comply with cultural resource laws and regulations, and provide guidance and methodology for cultural resources management of the refuge.

Evaluate National Register of Historic Places Eligibility of Cultural Resources

National Register of Historic Places (NRHP) eligibility of previously documented sites should be determined, in consultation with the New Mexico State Historic Preservation Officer (NMSHPO). Recommendations for eligibility were provided in the site descriptions in this document, and are based on previous recommendations, site assemblages, and features present on the sites. Site revisits may be required to determine eligibility. Any known sites that have not been recorded should be documented and evaluated for NRHP eligibility. The United States Department of the Interior (1990) provides guidelines for evaluating cultural resources properties:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history.

Document All Cultural Resources within the San Andres National Wildlife Refuge Boundaries

Federal funding should be sought to identify all cultural resources on the refuge. Cultural resources surveys should be conducted to locate and record archaeological and historic properties. Methodology should be developed to determine proper survey techniques for conducting work in mountainous terrain. Shovel testing may be necessary in areas where detritus areas is dense. Areas where slopes reach 20 percent or more may not have to be surveyed because of low site density. Prehistoric sites should be documented through survey work. If eligibility cannot be

immediately determined, a testing or NRHP evaluation program may be needed to determine eligibility. Known ranches, mines, and other historic properties should be documented through survey and archival work.

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APPENDIX A

ANNOTATED BIBLIOGRAPHY OF SAN ANDRES AND SURROUNDING AREA

The following annotated bibliography details the notable work that has been conducted on the San Andres Wildlife Refuge and surrounding area. Note that some of these references do not involve the refuge directly, but are provided to provide the reader with background knowledge of the region.

Eidenbach, P.L., and B. Morgan (editors)

1994 *Homes on the Range: Oral Recollections of Early Ranch Life on the U.S. Army White Sands Missile Range, New Mexico*. Human Systems Research, Tularosa, New Mexico.

This volume is a collection of interviews from ranchers in the White Sands Missile Range area. Fourteen ranchers were interviewed for the project concerning a variety of topics, including the elements, neighbors, food, home remedies, and the Atomic Bomb. This oral history is a manner of exploring historical research not seen in such sources as archival records.

Gibbs, V.

1998 *Mountains out of Molehills: An In-Depth Study of The Organ Mountains and Regional Research Design of Southern New Mexico Mountains, Dona Ana County, New Mexico.* Degree of Masters Thesis. New Mexico State University, Las Cruces.

This document is a cultural resources overview and research design conducted on the Bureau of Land Management Organ Mountain ACEC. The data contained within this document are similar in scope to the current project and could provide additional research materials for future work. The research design focuses on the research aspects of conducting cultural resources work in mountainous areas of southern New Mexico.

Human Systems Research, Inc.

1973 *Technical Manual: Survey of the Tularosa Basin.* Human Systems Research. Tularosa, New Mexico.

This early volume by Human Systems Research provides the basis for conducting archaeological and ethnographic research in the Tularosa Basin and surrounding region. The document is a collaboration effort that includes the works of Lewis Binford, James Judge, Harry Basehart, and many others, each writing about what they knew best. The document includes a research design, including different approaches to problems, sampling strategies, and methods for documenting sites. Background information regarding the Tularosa Basin in terms of culture groups (including the Mescalero Apache, Janos, Jacomes, and Mansos), vegetation, climate, faunal species, and ethnobotany. The document also contains research that was conducted at Fresnel Shelter, in the Sacramento Mountains east of Alamogordo.

Human Systems Research, Inc.

1991 *Mountains of Sunlit Silence: White Sands Missile Range Inventory of the Southern San Andres Mountains, New Mexico.* Report No. 8855. Human Systems Research, Tularosa, New Mexico.

This document contains the most comprehensive volume regarding the cultural resources of the San Andres Wildlife Refuge and surrounding region. Twenty-one sites from this environmentally stratified sample survey were documented within the San Andres National Wildlife Refuge boundaries. Environmental zones included Lower Bajada, Jornada/Foothills Interzone, Upper Bajada, Mountain, Foothills, Alkali Flats, Bajada Interzone. The total survey area included 9,143 acres within thirty-seven 1-square kilometer survey units. An additional 247 acres was examined in the Malpais environmental zone, several kilometers east of the San Andres Mountains. Radiocarbon samples were recovered from 11 sites during the project (Table A-1).

Table A-1
Radiocarbon Samples Documented during the Project

Sample	Site	Sample material	C-13 Adjusted Date (BP)	Tree ring Calibrated Date Range
Beta 31612	LA 72152*	carbonized wood	80±60	A.D. 1695-1725 A.D. 1816-1921
Beta 31613	LA 72151*	carbonized wood	240±50	A.D. 1636-1682 A.D. 1747-1805 A.D. 1950-1952
Beta 31614	LA 72150*	carbonized wood	560±90	A.D. 1307-1362 A.D. 1377-1436
Beta 31615	LA 72135	carbonized wood	170±100	A.D. 1664-1707 A.D. 1713-1821 A.D. 1836-1877 A.D. 1914-1955
Beta 31616	LA 72147	maize	470±50	A.D. 1413-1469
Beta 31617	LA 72164	carbonized wood	680±90	A.D. 1279-1329 A.D. 1331-1396
Beta 31618	LA 72131	carbonized wood	5870±120	4900-4877 B.C. 4851-4585 B.C.
Beta 31619	LA 72169*	carbonized wood	290±70	A.D. 1491-1604 A.D. 1613-1667 A.D. 1788-1791 A.D.1950-1952
Beta 31620	LA 72123	carbonized wood	4070±170	2880-2452 B.C. 2427-2403 B.C.
Beta 31621	LA 72138	carbonized wood	540±100	A.D. 1305-1368 A.D. 1372-1449
Beta 32081	LA 72147	carbonized wood	740±60	A.D. 1226-1304 A.D. 1369-1371

* within SANWR boundaries

Based on the dates, the mountainous zones appeared to be inhabited late in time, most likely by the Apaches. The largest average site size identified during the project was in the Upper Jornada Zone (5,250 ft amsl) and the smallest site size was in the Mountain Zone (above 5,900 ft amsl). A gradation was identified between the lower sloped elevations, which had high site density on the Foothills with low densities on the Alkali Flat, Malpais and Mountain Zones.

Human Systems Research, Inc.

1994 *WSMR Springs Reconnaissance Survey*. Human Systems Research Report No. 9206. Tularosa, New Mexico.

No report exists for this compilation of data, but is instead a compilation of site forms related to spring sites on White Sands Missile Range and the San Andres National Wildlife Refuge. The documentation itself is quite detailed. Many of the spring sites contain multicomponent sites, so it is useful for both prehistoric and historic background research.

Human Systems Research, Inc.

1996 *WSMR Ranches and Mines Survey*. Human Systems Research Report No. 9604. Tularosa, New Mexico. (note no report, files at White Sands Missile Range only).

No report exists for this compilation of data, but is instead a compilation of site forms related to historic ranching sites on White Sands Missile Range and the San Andres National Wildlife Refuge. The documentation itself is quite detailed and useful for historic background research.

Laumbach, K.W.

2001 *Hembrillo An Apache Battlefield of the Victorio War*. Human Systems Research Report No. 9730. Tularosa, New Mexico.

This document is a complete examination of the Hembrillo Canyon Battlefield. Documentation included field examination of battlefield positions through the use of metal detectors, rock alignments, historical research and other archives. The report is a good resource for Apache information.

APPENDIX B

FEDERALLY RECOGNIZED TRIBAL ORGANIZATIONS WITH POTENTIAL CLAIMS TO CULTURAL RESOURCES ON SAN ANDRES NATIONAL WILDLIFE REFUGE

This list of tribes and addresses is current in 2003. It was compiled from a consulting list in Dona Ana County, generated by the Office of Cultural Affairs Historic Preservation Department in Santa Fe, New Mexico. Depending on the tribe and proposed action, differing levels of consultation may be required. Users should consult updated addresses and telephone numbers periodically.

Fort Sill Apache Tribe
Route 2, Box 121
Apache, OK 73006
580-588-2298
580-588-3133 fax

Mescalero Tribal Historic Preservation Office
P.O. Box 227
Mescalero, NM 88340
505-464-4494 extension 279
505-464-9191 fax

Navajo Nation
Navajo Nation Historic Preservation Dept.
P.O. Box 4950
Window Rock, AZ 86515
520-871-6437
520-871-7886 fax

White Mountain Apache Cultural Center
P.O. Box 507
Fort Apache, AZ 85926
928-338-4625
928-338-1716 fax

Ysleta del Sur Pueblo
P.O. Box 17579 - Ysleta Station
El Paso, TX 79917
915-859-7913
915-859-2988 fax