THE ANAMAX-ROSEMONT PROJECT: AN
ARCHAEOLOGICAL EVALUATION IN
THE SANTA RITA MOUNTAINS

VOLUME 1

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February, 1980
ABSTRACT

This report describes the archaeological survey of approximately 65 square kilometers of Coronado National Forest land in the northern Santa Rita Mountains of southern Arizona. Centered around the historic town site of Rosemont, this area is the subject of a proposed land exchange between the USDA Forest Service and ANAMAX Mining Company. Also included in the archaeological survey were portions of existing patented and private land lying within the overall survey area.

Two separate volumes describe the survey and its results. Volume I contains detailed descriptions and discussions of the land-exchange area and its present and past environmental setting, survey and recording methodology used for the survey, and a history of previous archaeological research in the area. Other chapters discuss the culture history of the region, the archaeological sites within the proposed land-exchange area, and the implications these sites hold for the study of past settlement and subsistence systems in the Rosemont region. The final two chapters discuss the significance of the sites found in the land-exchange area and recommendations for their management. Volume II presents detailed descriptions of all the archaeological sites recorded during the survey.
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CHAPTER 1

INTRODUCTION

This report, prepared for the ANAMAX MINING COMPANY (hereafter referred to as ANAMAX), provides an evaluation of the significance of archaeological remains in a portion of the Santa Rita Mountains of southern Arizona. In accordance with the National Environmental Policy Act of 1969, ANAMAX contracted with the Arizona State Museum to carry out archaeological research in a potential land-exchange region for the purpose of assessing the importance of archaeological resources which would be affected by the proposed exchange and subsequent development. The exchange area, located in the northernmost extension of the Santa Rita Mountains, encompasses approximately 25 square miles (65 km²) of the Nogales District of the Coronado National Forest. Seven hundred and fifty areas of archaeological remains are described and evaluated for their significance. Following final environmental assessments by researchers in several disciplines at the University of Arizona, the U.S. Forest Service will determine the feasibility of ceding this land to the ANAMAX MINING COMPANY.

Project Background

Arizona State Museum involvement with the ANAMAX-Rosemont Archaeological Project (ARP) began in the fall of 1970 with negotiations between the Thorne Ecological Foundation and the Rocky Mountain Center on Environment (ROMCOE) and various University of Arizona personnel. The negotiations involved obtaining environmental input from numerous University researchers on a potential land-exchange area comprising about 16 square miles in the Coronado National Forest. ROMCOE was to conduct the overall direction and coordination of the environmental study in cooperation with the Thorne Ecological Foundation, which was to provide coordination among a number of University of Arizona consultants in the biological, physical, and social sciences.

In January, 1971, James Ayres of the Arizona State Museum submitted to the Thorne Ecological Foundation a proposal for an archaeological inventory and report for the "Rosemont Site Area" in the Santa Rita Mountains. The study was to be a preliminary step for preparing a program for excavating archaeological sites that might be destroyed by copper exploitation. The first proposal was not implemented and lay dormant for several years.

In November, 1974, Russell Davis of the University of Arizona contacted Ayres concerning the feasibility of the 1971 proposal. Davis, as Project Coordinator, was responsible for regulating the proposals, budgets,
and communications among the University of Arizona, ANAMAX MINING COMPANY, and the U.S. Forest Service regarding the practicability and acceptance of a University-wide, multidisciplinary environmental proposal.

In January, 1975, R.G. Vivian of the Arizona State Museum submitted a new proposal to Davis for surveying, recording and evaluating the significance of archaeological resources in the "Rosemont Area." At this time, the land-exchange area had increased to about 18 square miles from the original 16 square miles. The second proposal, on which the current report is based, was one of 17 separate proposals by scientists and other researchers at the University of Arizona for providing "a thorough and detailed environmental inventory" and for making "certain predictions regarding environmental impact" by mining activities. The multidisciplinary report of the 16 other environmental studies, such as geology, hydrology, vegetation, mammals, economic value of grazing, and others, was printed in May, 1977 (Davis and Callahan 1977). It was decided at that time that the archaeological study would be printed separately.

In September, 1975, the Cultural Resource Management Section of the Arizona State Museum contracted through the Department of Biological Sciences of the University of Arizona for the evaluation of the archaeological significance of the land-exchange region, hereafter referred to as the Rosemont Study Area. Vivian acted as Principal Investigator for the archaeological study. Sharon S. Debowski, Project Director, was directly responsible for all management aspects of the project. At that time, project personnel were hired to prepare a research proposal, to conduct field investigations and analyses, and to prepare the report on the findings of the survey.

The Arizona State Museum agreed to undertake a preliminary survey of the Rosemont Study Area in which approximately 25 to 30 percent of the total 18 square miles (46.6 km²) would be intensively surveyed and all archaeological remains would be recorded. The agreement also stipulated that the mine-pit zone, representing the only known area of direct impact at the time, would be covered first. This was to be followed by a survey of representative environmental areas for projecting site densities and distributions, as well as for predicting potential logistical problems for completing the survey of the entire land-exchange region.

Prior to the field work for this first phase, preparation and a field reconnaissance of the project area required 30 person-days. Field work for the preliminary survey began on October 13, 1975, and lasted until December 12, 1977. Three archaeologists, including a Supervisory Archaeologist and two Assistant Archaeologists, spent a total of 123 person-days surveying the area, recording sites, and analyzing the data. Between December and May, 1976, the Supervisory Archaeologist and one assistant, along with several student volunteers, made periodic visits to the Rosemont Study Area. These required about 45 person-days.
During the same time period, the Supervisory Archaeologist and several temporary volunteers reviewed and organized field data and began the literature research on the prehistory and history of occupation in the Rosemont region; a minimum of 135 person-days was spent in these activities during Phase I. A preliminary report (Fritz 1976), prepared for the U.S. Forest Service, was also completed during this time. This report discussed the preliminary survey of approximately 3150 acres or 28 percent of the 18 square mile area. Four units were selected within which to survey; within these four units, 120 areas of archaeological remains were recorded during the fall, 1975 survey. The sites included isolated artifacts, lithic scatters of various sizes and containing a variety of artifact types, sherd and lithic scatters, sites with possible structures and artifact scatters, cobble features, and historic trash scatters. These sites represented a long and almost continuous occupation of the study area from the Archaic Period to the Historic Period. This archaeological evidence demonstrated that parts of the Rosemont Study Area were rich in significant archaeological remains and that a complete surface survey was necessary before a satisfactory evaluation of archaeological significance could be made.

Following discussions and correspondence with Dee F. Green (U.S. Forest Service Regional Archaeologist), Charles E. Stott (ANAMAX MINING COMPANY Vice-President and legal counsel), Jim Rivers (U.S. Forest Service representative for the project), and Russell Davis (University of Arizona Project Coordinator), a determination was made to complete an intensive survey of the remaining portions of the Rosemont Study Area before final evaluations would be given and archaeological clearance recommended. By this time, the size of the Rosemont Study Area had been increased to about 30 square miles. The size of the study area was changed several times during the project. Aspects of land status that resulted in Rosemont Study Area boundary changes included the following:

1. ANAMAX patented and fees land. Based on the General Mining Laws of 1872, patented and fees lands remain under ANAMAX jurisdiction. Because of U.S. Forest Service advisement, and also because these lands are considered to be private lands, these patented and fees lands were not surveyed for the ANAMAX-Rosemont Project. All of the patented and fees lands stretch along the Santa Rita ridge line and adjacent areas where site density is believed to be extremely low. However, a few historic sites that are important to the mining history of the region are known to exist within this patented land. With the exception of the mine-pit zone, archaeological remains within the patented and fees lands are not covered in this report. Study Unit 1, encompassing all of the mine-pit zone, was surveyed before patented and fees lands were reported. All archaeological remains in Study Unit 1 are reported upon and evaluated in this report.

2. Lands privately owned by ANAMAX. These areas, currently inhabited, are privately owned by ANAMAX and are not parts of the Coronado National Forest. These include about 160 acres (Township 18S,
Range 16E, Section 21, NE1/4) around Hidden Valley Ranch (Scholefield Ranch), about 40 acres (Township 18S, Range 16E, Section 29, N1/2 of S1/2 of SW1/4) around the Rosemont trailer at the Rosemont junction (this trailer was removed from the junction after the 1976 survey), and about 200 acres (Township 18S, Range 16E, Section 32, N1/2 of SW1/4, S1/2 of NW1/4, and NE1/4 of NW1/4) surrounding the Gayler or V-R Ranch. Based on the reconnaissance and preliminary surveys, it was predicted that each of these areas would encompass important archaeological sites. After this prediction was explained to Stott and Rivers, ANAMAX generously agreed to include these three areas within the project's scope of work. All archaeological remains discovered on these privately owned sectors are reported upon and evaluated in this report.

3. Land-exchange expansion. The accompanying project map for the July, 1975 proposal is shown in Figure 1. All of the project area is west of State Highway 83 and east of the Santa Rita Mountains. In May, 1976, the project area was increased to include parts of six sections east of the highway (Township 19S, Range 16E, Section 3 and part of Section 4; Township 18S, Range 16E, Section 34 and parts of Sections 22, 27, and 33) and parts of six sections west of the Santa Rita Mountains ridge line (Township 18S, Range 15E, Sections 25, 26, 27, 34, 35, and 36) (Figure 2). The north land-exchange boundary, which coincides with the northern boundary of Sections 15 through 18 of Township 18S, Range 16E, and Section 13 of Township 18S, Range 15E, has not changed from the original project area. In July, 1975, the south land-exchange boundary included Section 5 and part of Section 4 (that part west of State Highway 83) of Township 19S, Range 16E (Figure 1). In May, 1976, Section 6 of Township 19S, Range 16E and Section 1 of Township 19S, Range 15E immediately west of these were added to the project area (Figure 2).

4. Changes in land status. Based on preliminary topographic maps obtained from ANAMAX, it was determined that the southern land-exchange boundary actually extended a short distance south of the southernmost section. This resulted in the survey of a thin 225 foot (68 m) strip along the southern border of Study Unit 2 (Figure 2). In May, 1976, ANAMAX submitted maps indicating that the southern land-exchange boundary actually ran along the southern boundary of Sections 3, 4, 5, and 6 of Township 19S, Range 16E, and Section 1 of Township 19S, Range 15E. Two sites (HS1-53-L4 and L7) discovered in this strip are briefly discussed in this report. They are not, however, considered in the recommendations, since they are outside the proposed land exchange area. In July, 1976, shortly after Section 1 of Township 19S, Range 15E was surveyed, ANAMAX indicated that it should be deleted from the land-exchange area. Although a few small sites were discovered during the survey, they were never recorded and are not discussed in this report.
ROSEMONT REGION
U. S. FOREST SERVICE—ANAMAX MINING CO.
LAND EXCHANGE AREA 1975

Figure 1
Figure 2. Rosemont Study Area after July, 1976 (study units numbered and darkly outlined)
5. Later deletions from the proposed land-exchange area. During the summer of 1977, ANAMAX and the U.S. Forest Service agreed to Section 3 and that part of Section 4 east of State Highway 83 of Township 19S, Range 16E, and the SE½ of the SE½ of Section 33 and the S½ of Section 34 of Township 18S, Range 16E (all areas are east of State Highway 83). All of this area was surveyed during the summer of 1976, and all archaeological remains within this area were recorded. These sites will be included within the archaeological discussions of the report; all site descriptions are presented as well. However, these sites will not be considered in the recommendations presented for the U.S. Forest Service and ANAMAX.

In May, 1976, the Arizona State Museum contracted independently with ANAMAX to complete the survey of the remaining portions of the land exchange, including all new additions. On June 1, 1976, the project staff included the Project Director, a Project Supervisor, two Supervisory Archaeologists, one in-house Research Archaeologist, six Assistant Archaeologists, and a cook, who also acted as an Archaeological Assistant. In addition, one volunteer participated for 24 days during the 1976 field phase project. Following a four-day orientation program, the final field survey began on June 7 and lasted until October 8, 1976. During the first two weeks, a full 10-person crew was used for the survey. After that time, the Project Supervisor and Research Archaeologist made periodic visits to the field to assist in surveying and to discuss the findings of the survey. Otherwise their time was spent reviewing field forms, organizing field data, analyzing and cataloging collections, conducting literature and informant research, and making preliminary steps toward report preparation. Volunteer assistance was occasionally available throughout the survey period.

On August 17, 1976, before the beginning of the fall academic semester, the cook/Archaeological Assistant and four Archaeological Assistants returned to various universities to resume their studies. A survey crew of two Supervisory Archaeologists and two Assistant Archaeologists was retained to complete the archaeological survey. Other personnel on the project were also students and began half-time work on the project with the start of the 1976 academic year. The 1976 survey ended on October 8, 1976; however, additional field checks and recording continued periodically until May 1977. The final survey took about 634 person-days. Subsequent to the end of the survey, both field Supervisory Archaeologists continued working for approximately 10 person-days to complete and organize all survey data. One Supervisor then remained at work to review field forms, to assist in additional field work, and to write the site descriptions for the report; all of this work required a minimum of approximately 232 person-days. The Project Supervisor and a Research Assistant devoted their time from approximately September, 1976 to December 1977, to reviewing the data, organizing and tabulating the archaeological data for the report, cataloging and identifying
survey collections, conducting literature research and analysis, and preparing the report. During this time, numerous other individuals volunteered to undertake the preparation of the data for analysis. Others were hired to complete portions of this report. All of these individuals together worked a minimum of 700 person-days to complete the report.

Study Area Location

The Rosemont Study Area and proposed land-exchange encompasses approximately 25 square miles in the northernmost extension of the Santa Rita Mountains (Figure 3). Rosemont, an abandoned mining camp and town, is located near the center of the Rosemont Study Area. Tucson is located 30 miles (48.3 km) to the northwest of Rosemont; Benson is located 27 miles (43.4 km) to the east-northeast, and Nogales is located 37 miles (54.5 km) to the south-southwest. The following township and range sections are included in the Rosemont Study Area:

- Township 18S, Range 15E, Sections 25, 26, 27, 34, 35, and 36
- Township 18S, Range 16E, Sections 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, and 34
- Township 19S, Range 15E, Section 1
- Township 19S, Range 16E, Sections 3, 4, 5, and 6.

Again, it should be noted that Township 19S, Range 15E, Section 1 was deleted from the land exchange as late as July, 1976, after the section had been surveyed. The sections in the southeast corner of the proposed land-exchange area east of State Highway 83 were deleted from the land exchange in the summer of 1977.

Most of the Rosemont Study Area is located at the far western edge of a large watershed known as the Cienega or Empire Valley, which ranges from an elevation of about 3800 feet (1158 m) to 9453 feet (2881 m) at the top of Mt. Wrightson in the Santa Rita Mountains (Figure 3). The valley is fringed on the west by the Santa Rita Mountains, on the north by the Empire Mountains, and on the east by the Whetstone Mountains and Mustang Mountains. Cienega Creek, flowing north through the valley, is the major drainage. At the head of this creek, two major drainages form the southern end of the watershed. One of these is Sonoita Creek, which flows south and west past the towns of Sonoita and Patagonia to its confluence with the Santa Cruz River near Calabasas. The other major drainage, the Babocomari River, flows eastward past the town of Elgin to its confluence with the San Pedro River near Fairbank. The Santa Cruz River and San Pedro River watersheds are among the most important in southeastern Arizona.
Figure 3. Location of the Rosemont Study Area
Most of the Empire Valley is in the far southeast corner of Pima County. However, the southern one-quarter is located in northern Santa Cruz County, and the far eastern edge is in west-central Cochise County (Figure 3).

About 85 percent of the Rosemont Study Area is located east of the ridge line of the Santa Rita Mountains; the remaining area is west of the ridge line (Figure 3). The southern base of Mt. Fagan (elevation 6186 feet, or 1886 m), a prominent landform of this range, extends almost to the northern boundary of the Rosemont Study Area. The mouth of Box Canyon, which separates the northern mountain range from the higher, larger range to the south, opens at the south-central edge of the study area boundary. State Highway 83 runs through the eastern portion of the study area.

The elevation ranges from 4375 feet (1334 m) to 6312 feet (1924 m); most of the area surveyed lies between 4500 and 5000 feet. A number of important drainages flow through parts of the study area. The most prominent is Barrel Canyon, which heads near the south-central boundary and drains northeastward, where it meets Davidson Canyon outside the study area. The latter canyon is an important tributary to Pantano Wash, which drains part of the Tucson Basin. Three major tributaries of Barrel Canyon also head in the study area. The northernmost is Scholefield Canyon, named for an early historic rancher within the region. It drains eastward from the north-central part of the study area to the far northeast boundary, where it meets Barrel Canyon. McCleary Canyon, named for an early historic miner at the historic town of Rosemont, meanders from the west-central part of the study area to its junction with Barrel Canyon in the east-central portion of the area. The third major tributary is Wasp Canyon, which heads in the southwest corner of the study area and drains to the northeast, where it meets Barrel Canyon at the historic town of Rosemont. The above four canyons drain about 50 percent of the land included within the project area.

Several other important drainages also occur in the study area but are not tributaries of Barrel Canyon. In the northwest quarter of the study area, the south fork of Sycamore Canyon flows for about one mile (1.6 km) from south to north through a steep-sided valley that was designated Study Unit 4. In the northeast corner of the study area, Papago Canyon and Mulberry Canyon meet and drain southeast, then head northeast for about one mile before crossing the land-exchange boundary. Two major tributaries of Cienega Creek, North Tree Canyon and Oak Tree Canyon, drain eastward through large areas of land in the southeast quarter of the study area. Numerous smaller but significant drainages flow towards all cardinal directions from the Rosemont region.

Mining Facilities within the Land Exchange

The previous section discussed the location of the proposed Rosemont land exchange. Pending the recommendations in this report, the review of the report by the U.S. Forest Service and ANAMAX, and final decisions regarding
the boundaries of the land exchange, the approximately 25 square miles or portions of that area will be exchanged between the U.S. Forest Service and ANAMAX. On May 23, 1975, ANAMAX presented to the Coronado National Forest a land-exchange offer that involved the acreage discussed under study area location. Those additional lands adjacent to the ore body, within the area called the mine-pit zone, and the patented lands are all non-patented claims required to provide sufficient land area for future mining and milling operations. Lands within Coronado, Tonto, Apache-Sitgreaves, and Coconino National Forests will be offered in exchange for the Rosemont land. ANAMAX is acquiring these lands through land exchange, rather than through the mining laws patents, to provide better land management and ownership and to obtain lands through more amenable methods than the mining-law process.

Decisions concerning the placement of the final boundaries of the proposed land exchange, especially the eastern boundary, will be in large part dependent upon ANAMAX's needs for their mining complex. These facilities will be briefly discussed here and will only be indirectly mentioned in the recommendations concerning the management of the cultural resources of the study area.

The mining facilities proposed by ANAMAX include the general area of the mine-pit zone, patented lands, areas to be used as waste dumps, the plant area, two access roads, and a pipeline route. In addition, minor facilities such as wells, an electrical substation, transmission lines, and water tanks will be located in the area. All of these areas and facilities except a portion of the pipeline, are located within the land exchange that is west of State Highway 83.

The mine-pit zone, which corresponds to Study Unit 1 of the archaeological project, and the patented lands (which will eventually total about 2353 acres), which contain the concentrations of ore, are situated just to the east of the Santa Rita Mountains ridge line. The two areas for the dumping of waste materials, which are materials without significant mineral content, surround the mine-pit zone on the south and southeast and northeast and east. The larger waste dump area will eventually cover areas surrounding the historic community of Rosemont, the old Narragansett Mine area, and large portions of Barrel, McCleary, and Wasp canyons. The smaller waste dump area is approximately one-eighth the size of the larger area, and covers the upper limits of Wasp Canyon and Section 6 of Township 19S, Range 16E. Nestled between the two dump areas is the plant area. Two access roads and a pipeline will service the plant area. One access road heads south into Box Canyon Road, while the other access road runs east and connects with State Highway 83. It is along State Highway 83 that the ore concentrate will be hauled to Vail, Arizona, north of the project area (materials were also shipped to Vail in historic times). The pipeline route follows the access road that connects with State Highway 83 and will head east past the highway to an alternate tailings disposal site on the Empire Ranch, which is now owned by ANAMAX. All tailings, the product of the concentrator, are expected to be dumped outside the land-exchange area on the Empire Ranch.
The additional land within the exchange area will be used for the grazing of cattle until the waste areas are increased. The yield from the ore body is expected to last for 30 to 50 years. As the plans proceed for the mining of the ore, new facilities may be added or those already proposed may be changed.

**Legislation**

Since 1906, with the establishment of the United States Antiquities Act (Public Law 59-209; 32 Stat. 225), important measures have been taken to protect and adequately preserve archaeological resources that help to document and explain the history and heritage of all Americans in the United States. The Antiquities Act of 1906 was the foundation of all future related federal legislation. "It clearly established the principle that government, acting for all the people, should not only protect archaeological and historic objects and sites but should also actively work toward their preservation and public availability" (McGimsey 1972: 111). The act was the first of a series of federal laws and policies that have direct relevance to archaeological studies on the ANAMAX-Rosemont Project. These laws and policies include the National Historic Preservation Act of 1966 (Public Law 89-665; 80 Stat. 915), the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190; 91 Stat. 852), and Executive Order 11593, "Protection and Enhancement of the Cultural Environment," May 15, 1971 (36 FR 8921). The Advisory Council on Historic Preservation Procedures for the Protection of Historic and Cultural Properties (36 CFR 800) instructs Federal agencies to coordinate NEPA compliance with the separate responsibilities of the National Historic Preservation Act and Executive Order 11593 to ensure that historic and cultural resources are given proper consideration in the preparation of environmental impact statements." This report will provide ANAMAX and the Forest Service with sufficient information to coordinate and comply with the requirements of the above legislation.

The National Historic Preservation Act (NHPA) "provides for a vastly expanded National Register of important sites and objects -- expanded principally in the sense that now sites of local, state, and regional as well as national significance are eligible for inclusion" (McGimsey 1972: 112). This act is important to the ANAMAX-Rosemont Project primarily because this report will recommend to the U.S. Forest Service and ANAMAX that certain sites and districts be considered eligible for nomination to the National Register of Historic Places.

Next, the National Environmental Policy Act of 1969 is the most important law affecting archaeological and other resource assessments on the ANAMAX-Rosemont Project. McGimsey (1972: 118-119) has described the act as follows:

The act states that it is for the "continuing responsibility of the Federal Government to use all practicable means consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to
the end that the Nation may... preserve important historic, cultural, and natural aspects of our national heritage." It also directs that "to the fullest extent possible" all federal policies, regulations, and laws shall be interpreted in a manner consistent with the aim and purpose of the National Environmental Policy Act. It charges all federal agencies with responsibility for reviewing all of their present and future programs to determine their total environmental impact and to prepare statements and recommendations which set forth in detail the nature of the impact, any adverse effect, alterations, total short- and long-term effects, and any irreversible and irretrievable commitments of resources resulting from their programs. Finally, responsible federal officials must consult with and obtain the comments of any federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved.... Copies of these statements are to be made available to the public.

Finally, Executive Order 11593, which furthers the policies and purposes of NEPA and NHPA and the 1906 Antiquities Act, protects the federally owned property that might qualify for nomination to the National Register of Historic Places from being "inadvertently transferred, sold, demolished or substantially altered." The order sets forth three important federal policies. As quoted in the Federal Register, Vol. 36, No. 95, May 15, 1971, these policies are to:

1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations,
2) indicate measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored and maintained for the inspiration and benefit of the people, and
3) in consultation with the Advisory Council on Historic Preservation..., institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned sites,...structures and objects of historical, architectural or archaeological significance.

Goals of the ANAMAX-Rosemont Project

The primary aim of the ANAMAX-Rosemont Project was to obtain and present information to the U.S. Forest Service and ANAMAX that could be used in making management decisions relating to the future of archaeological resources within the Rosemont Study Area. In compliance with federal legislation and guidelines, the following information was deemed necessary for an environmental impact report for the ANAMAX-Rosemont Project:

1. The presence, location, and description of archaeological resources identified in areas to be affected by the project.

2. An interpretation of the significance of the identified resources and their potential for contributing information about archaeological
problems in southern Arizona, including identification of those resources which appear to meet the eligibility criteria of the National Register of Historic Places (36 CFR 800.10).

3. A recommended program of studies to realistically mitigate adverse effects that will result from the project.

4. An identification of the alternative actions that would avoid or reduce potential impacts to the archaeological resources within the project area.

Work to meet these goals was to some extent structured by ANAMAX planning stages. During the preliminary survey only one area, the mine-pit zone (Figure 4), had been outlined as a final direct impact area. Other areas of direct impact within the land-exchange area included buildings, waste deposits, tailings, and access roads, which were only tentatively identified and would be planned after review of the environmental impact statements. Based on this information, the first area to be surveyed included the entire mine-pit zone, designated Study Unit 1. In October, 1976, ANAMAX prepared a new map showing the original mine-pit location and tentative locations for extra facilities (Figure 4). The recommendations at the end of this report are based largely on sponsor plans as shown on this map, with the exclusion of those areas deleted from the land exchange since the summer of 1977.

Evaluation of Significance

Evaluation of the significance of cultural resources in the study area is a critical part of the cultural resource management process. Criteria for determining the significance of archaeological sites are defined in procedures established by the Advisory Council on Historic Preservation (36 CFR 800) and in the U.S. Forest Service Guidelines (F.S. Manual 2361.01).

The importance of cultural resources can be viewed from several perspectives. To the public, sites may have recreational value or may be of interest for reasons of architectural or aesthetic importance. To both the general public and the archaeological profession, cultural resources are important for their potential to provide historical and scientific information. By far the most complex element in evaluation of significance is prediction of this potential. It is essential that consideration be given to a range of research problems so that an adequate evaluation can be made.

While the primary objective of archaeological research has been defined in a multitude of ways, ultimately it is the goal of most archaeologists to contribute to the understanding of the behavior of human groups. Archaeology makes its most effective contribution to this goal in focusing on relatively long-term processes of change and stability.
Figure 4. October, 1976 map of Rosemont Study Area, with locations of original mine-pit zone and proposed extra facilities.
In order to deal with problems of this sort, it is necessary to deal with a range of others. Historical problems, in the traditional sense of simple reconstruction of events and sequences of events, are prominent among these. The information that someone, at sometime, acquired and processed cactus fruit in upper bajada environments by itself contributes little to our knowledge of human behavior. If it can be demonstrated ... that an increase in this activity coincided with a known period of environmental stress and decreased agricultural activity, it may become a meaningful part of the explanation of change in a particular society, with implications for comparable changes in other societies.

This example illustrates another problem area, that of reconstructing past environments in order to make reasonable inferences about the relationship of human populations to the natural environment. Few areas environmentally comparable to the Rosemont Study Area have undergone intensive archaeological study. Nevertheless, it became apparent early in this project that portions of this area had experienced unexpectedly great human use over long periods of time. As will be argued later, the nature of this use varied through time, seemingly in response to regional changes in environmental variables.

A final kind of problem relevant to this study is that of archaeological methodology. Strategies for acquiring and recording field data are necessarily related to the questions that are to be asked concerning those data. This project explored methods of field recording designed to elicit information on the activities represented, the age and cultural affiliation of sites, the distribution of archaeological sites, and the relationship of sites to environmental variables. These are inevitably critical kinds of information in any archaeological survey; the acquisition of this information presents many problems. This is illustrated by the number of sites in the Rosemont Study Area at present classified only as "unknown aboriginal" or described as the probable location of some exploitative activity. While this study has attempted to deal with methods of inferring site age and function, survey data tend to suggest a range of possibilities rather than a certain identification. Survey is therefore one stage in the development of archaeological research, not usually sufficient in itself but crucially important. The significance of the Rosemont Study Area resources will be evaluated in terms of their potential to yield additional information about themselves and, consequently, about the development of human societies in southern Arizona.
CHAPTER 2
RECORDING METHODOLOGY

Concept of an Archaeological Site

At one time, the Arizona State Museum Site Survey Manual specified standard defining characteristics of a site. It was subsequently decided that since sites are, in fact, constructs used to structure data rather than entities in themselves, it is more appropriate that projects define sites in a way useful and appropriate for the resources and research problems under consideration.

The concept of an archaeological site developed for the ANAMAX-Rosemont Project is that an archaeological site is any space where there exists evidence for past human activities. This concept was used primarily for the following reasons:

1. It has general applicability. Any place having any kind of evidence of past activities can be included in the concept. Thus, sites may be extremely small or extremely large, without arbitrary distinctions irrelevant to research problems.

2. In order to effectively use the concept, archaeologists must define how their research interests relate to their recording procedures. The ANAMAX-Rosemont Project, for example, focused on prehistoric resource utilization. Based on ethnographic observation and accounts, it was suspected that single artifacts might represent the only evidence for the exploitation of certain biotic resources. It was decided, therefore, to record isolated artifacts in greater detail than is customary because they are significant data for project research.

3. Any archaeological evidence has potential for being significant. By considering and evaluating all kinds of evidence of past activities, the assessment of archaeological significance is more complete. Unfortunately, because of the enormous and diverse nature of archaeological evidence, not all known remains of past human activity in the Rosemont Study Area were recorded; this was particularly the case for sites that appeared to be 50 years of age or less. (For a discussion of archaeological remains that were not recorded, see the section on Imposed Biases in this chapter.)

4. The site definition for the ANAMAX-Rosemont Project best reflects the recording approaches by past researchers in the adjacent Empire Valley. The diversity of archaeological remains recorded as archaeological sites in the Arizona State Museum Site Survey Files
includes isolated artifacts, large prehistoric villages, sites with few to many scattered artifacts, and approximate locations where historic events took place (Chapter 3). It was mainly due to the diversity of archaeological sites previously recorded in the Empire Valley that many of the areas of archaeological remains discovered in the Rosemont Study Area were recorded in unusually great detail.

5. It is understood that no archaeological survey can or should record all of the observable archaeological evidence. Obviously, however, the more diverse and complete the recording attempts, the better those data can be used in the future.

The direct evidence for past human activities was expressed as artifacts or material objects of human manufacture or modification found upon or within the ground. Once these phenomena were recognized, then certain interpretations concerning historical and behavioral problems could be made. In all cases, the observations and data collected from these phenomena were based directly on the research problems proposed for this study; however, much of the data can be used to evaluate and formulate other research problems not considered by ANAMAX-Rosemont Project personnel. It should be clear that the particular definitions of sites, relating to what is noted and how it is recorded, must change with the problems being addressed and the region being studied. The following section makes explicit how the concept of an archaeological site, used here, was employed for defining the limits and constituents of archaeological remains within the Rosemont Study Area.

**Application of Set Theory**

It was necessary to collect data in such a way that several problems could be evaluated efficiently without the use of numerous field sheets for each aspect of each problem. Based on the mathematical concept of set theory, a series of levels was developed for efficient recording of pertinent archaeological and environmental data. These levels are identified from largest to smallest as the Rosemont Study Area, biotic community types within the study area, separate community sections constituting the various biotic community types, archaeological site loci existing within the community sections, archaeological features constituting each locus, and archaeological elements constituting each feature. While these levels mix environmental and cultural variables within a single hierarchy, they provide an effective means of ordering data in such a way that cultural-environmental relationships are easily recorded and, in analysis, are more easily interpreted.

Set theory deals with the collecting of things into ordered hierarchical combinations. Sets of things (places in this case) are parts of larger sets and those sets are parts of still larger sets. Thus, in set theory the following equation is true:

If $A =$ the set $(1,2,3)$ and $Z =$ the set $(a,b,c)$, then the set $(a,b,c)$, is a subset of $A$. 
The Rosemont Study Area is considered the universe of all described sets and subsets and is defined as an approximately 25 square mile area bounded by the U.S. Forest Service, Coronado National Forest boundaries and the ANAMAX land-exchange limits. Environmentally, this universe is typified as a mosaic of woodland-desert grassland–desertscrub communities. At lower elevations to the west, north, and east lie lower Sonoran Desert and desert grassland biomes. At a higher elevation to the south lies a coniferous forest biome. The artificial boundaries of the study area also represent the perimeters beyond which little intensive archaeological survey has ever been conducted in the Empire Valley or Santa Cruz Valley to the west of the Santa Rita Mountains ridge line. From a research standpoint, then, the archaeological remains recorded in the study area are temporarily unique for a mountainous environment in southern Arizona.

Numerous biotic communities (sets of the Rosemont universe) represent the major biomes in the study area. From their spatial distributions, these form a tesselating pattern of different physiographic, lithologic, floral, and faunal assemblages that are characterized as various kinds or types of biotic communities. Defining and mapping these types of biotic communities is especially useful because several archaeological research problems involve studies of biotic communities (see section on recording biotic communities later in this chapter).

Biotic community types are separated into individual biotic community sections (sets of biotic communities, subsets of the Rosemont Study Area), the sum of which constitutes all of the communities of a single type. Generally these biotic community sections are disconnected from other sections because they are surrounded by sections of different biotic communities. Biotic community sections were often separated on the basis of small physiographic features, such as drainages or ridge lines, that crosscut biotic communities. Of all the different site levels used, this was the most difficult and least systematic to use. Defining the boundaries of a biotic community section was usually a subjective process.

Archaeological loci (sets of biotic community sections, subsets of biotic community types) are those places having within a biotic community section evidence of past human activities that are either spatially or temporally distinct from one another. Therefore, two archaeological loci of obviously distinct time periods might have the same spatial distribution. Although it was usually simple to recognize evidence of repeated use of a locus, it was less simple to segregate this evidence spatially. The limits of an archaeological locus were determined by noting the locations of the archaeological remains and drawing an arbitrary line around and encompassing all of the remains. Determining site boundaries was difficult at times when the artifacts were sparsely scattered throughout a site. Many sites contained no clusterings or concentrations of materials or a high density of artifacts that would have aided in the determination of a site boundary. As was the case at many of the chipped stone artifact scatters, these remains were sparsely scattered over an entire ridge top and often down the slopes of those ridge tops.
Two examples follow which represent different kinds of field situations and how each was dealt with. In Study Unit 10, at site M11-S13-L1, a sparse lithic scatter of about 25 artifacts occurred within an area of about 19,000 m$^2$ (see site descriptions). There was no apparent clustering or concentration of the materials. The locus boundary, then, encompassed the area around the extent of artifacts.

In another example, at X1-S6-L1 to L5, in Study Unit 1, five loci were distinguished on the basis of their temporal differences and clustering of different kinds of remains (see site descriptions). These sites include the following:

X1-S6-L1 Extensive scatter of historic artifacts and large rock piles. Although the density of artifactual remains within the locus is variable, the locus boundaries encompass all historic artifacts on the east end of the biotic community section.

X1-S6-L2 Two aboriginal flaked stone artifacts within the boundaries of Locus 1. One of these may be a weathered projectile point of Archaic age. The artifacts were found about 15 m from each other. If one of these had been found at a greater distance away, say between Locus 2 and Locus 3, then each would have been given a separate locus designation. These were, however, the only two prehistoric artifacts found in the eastern one-half of the section.

X1-S6-L3 Two historic mining claims. Although initially recorded, definite historic mining claims were later deleted from the kinds of archaeological remains that were recorded.

X1-S6-L4 A scatter of about 20 lithic artifacts believed to represent Archaic Period activities. The artifacts are scattered in an area of about 300 m$^2$.

X1-S6-L5 A small stone feature of two cobble alignments and one cobble concentration. It was impossible to determine from field observations if the feature was of recent or historic origin. Nevertheless, the feature was recorded because of the possibility that it represented historic and not recent activities.

Archaeological features (sets of archaeological loci, subsets of biotic community sections) refer to the archaeological remains making up a locus. Different features represent the places where different kinds of activities took place in different locations within the locus. This category generally refers to particular phenomena at an archaeological locus that suggest unique activities which can be distinguished because of their artifactual make-up and/or their location at the locus. The kinds of features recorded included cobble piles, alignments, and concentrations; cobble-walled structures; trash mounds; concrete water tanks; clusters of ground stone artifacts; concentrations of flakes and cores; depressions
with associated artifacts that may represent buried structures; areas that appeared to have been cleared of all surface cobbles and miscellaneous debris; and platforms cleared for tents at the mining camps. If a set of remains could not be placed within a particular assemblage denoting a past activity, then it was included under a miscellaneous feature or "null" set. Because archaeological features are material phenomena and not geographic places, they are not considered archaeological sites.

Archaeological elements (sets of archaeological features, subsets of archaeological loci) are simply those material objects that collectively make up an archaeological feature. Elements could include things such as potsherds, flakes, cores, projectile points, cobbles, glass fragments, cobbles within an alignment, the alignments that comprise a structure, and the various parts of a historic structure. Depending on one's research interests, the places where individual archaeological elements are found could be considered sites; however, as material objects alone they do not represent sites.

Description and Interpretation

Archaeology by its very nature is an interpretive science. Past human activities in the Rosemont Study Area cannot be observed; they can only be inferred. Furthermore, the evidence found of past activities is undoubtedly a poor indication of the diversity of activities that took place. It seems appropriate, then, to document the ways in which interpretations of the archaeological record were made. As with any archaeological interpretation, any argument is only as strong as the evidence on which it is based.

Throughout the recording phases of the preliminary and final surveys, attempts were made to be as thorough as possible in recording archaeological remains. The purpose of this policy was to allow other researchers the opportunity to reinterpret the data if they wished to do so, as well as to minimize bias in project data introduced by field interpretation. Archaeological sites were described on the site forms from the general cultural materials (features) to the specific (elements). The hierarchy established and discussed under the section on set theory was adhered to on the site forms in the description of each archaeological site. The locus was described first, followed by a description of the features at each locus and the elements comprising the features. After artifacts or sites were described, each surveyor was encouraged to make interpretations and formulate hypotheses explaining the nature of the particular phenomena that he or she observed. The following section discusses the classification scheme used for describing the artifacts discovered during the survey.

Most of the evidence for past human activities from the ANAMAX-Rosemont Project came from observations made of artifacts on the surface of the ground. It was never assumed that these artifacts were lying in
primary depositional context. In many cases, however, it was argued that the spatial distribution of artifacts today is essentially similar to the distribution at deposition. Major factors that had to be considered included:

1. Whether the surface had been disturbed by human, animal, or physical activities.

2. The slope of the ground on which artifacts lay. It was assumed that surface displacement due to erosion would be minimal on flat surfaces and substantial on steep slopes.

3. The surface stability of the ground cover. Even on steep slopes, the presence of large stones was assumed to block the downward displacement of many artifacts.

4. The presence of related artifacts associated with the same activities. For example, if remains of a broken vessel, comprising numerous sherds, were all found together on a slope, it was assumed that surface displacement following original deposition was minimal. Also, if remains of a flaking station were found in a restricted space on a slope, the same assumption was made.

A major problem facing field archaeologists is to determine whether the density, diversity, and distribution of observable archaeological remains are representative of all remains, including those that are not observable. This applies to sites in a region as well as archaeological phenomena at an archaeological site. This determination is complicated by soil deposition through time. Within the Rosemont Study Area, it is believed that soil deposition is not uniform but rather relates to specific environmental circumstances. For example, Archaic Period sites several thousands of years old are found on many ridge tops. Post-Archaic Period sites, however, of only a few hundred years age are covered by several decimeters of alluvial deposits along Barrel Canyon. It was necessary, then, to deal with the question of deposition on a site-by-site basis.

In some cases it was possible to estimate a minimum depth of archaeological remains by closely examining how deeply artifacts were buried. Usually, these estimates were based on the soil deposition on larger artifacts such as ground stone, cores, and hammerstones. Occasionally, it was possible to determine the minimum depth of archaeological remains by closely observing mammal burrows that had been excavated through humic soil of human origin. In some sites, particularly of the Historic Period, layers of human deposits were excavated by recent pits or machine blade cuts. Unfortunately it was not possible at most sites to make estimates of minimum depth. Sites lacking these estimates, however, do not necessarily lack buried cultural materials. Only a carefully planned testing program can yield the data needed to determine the actual depth of deposits at all archaeological sites.

In all cases, attempts were made to infer the subsurface or unobservable nature of archaeological remains at a site. This was necessary for an interpretation of the activities at each site. The methods involved
in this evaluation were based on both a subjective determination based on past experience and on objective conclusions based on explaining the occurrence of unusual phenomena at a site. It was interesting to note that experienced excavators more often suggested the possible presence of buried structures.

Simple depressions, berms, or cobble concentrations and alignments were often recognized as evidence of possible subsurface structures. Obviously, further investigations will be necessary at those sites with possible subsurface features in order to determine the full range of activities present. Details of why these interpretations were made are found under each site description in Volumes 2 and 3.

Unusual occurrences of plants were often used to suggest the presence of unobservable structures. Sacaton grass in circular or oval clumps was often inferred to be evidence of buried structures. This species, generally found in floodplain communities where water availability is high, was seldom found in large clumps except on certain archaeological sites. It is believed that buried structures may act as reservoirs of moisture that allow these clumps to live outside their common habitat. In one case, this grass grew in a square, possibly following wall outlines of a buried structure.

Other plants such as Lycium and mesquite were also used as indicators of possible buried structures. Large Lycium shrubs, often an indicator of disturbance in the Rosemont Study Area, were occasionally found on tops of ridges in slight depressions or within earthen heaps believed to have been refuse or trash mounds. Mesquite trees and shrubs often were larger or had greener foliage when they were growing atop ridges in archaeological sites. These, too, may be evidence of subsurface structures.

Other evidence for inferring the presence of unobservable structures included the nature and distribution of other archaeological remains on the site. The presence of features that are believed to be refuse mounds should be considered as evidence for some kind of temporary or even permanent dwelling. This criterion has been used elsewhere in southern Arizona (King 1977). At several sites, the spatial distribution of artifactual remains is suggestive of underlying dwellings. All of these are Post-Archaic Period sites located atop ridges or small hills and usually near arable land. On the very tops of these ridges, the ground is often unnaturally flat, and cobbles have been cleared from the surface. Around the perimeter of these cleared areas, however, are extremely dense concentrations of artifactual remains scattered along one or more slopes of the ridge. It is expected that subsurface features will be found on the tops of these ridges and hills where artifacts are absent or rare.

Imposed Biases

At the outset of field work, during the preliminary survey of Study Unit 1, attempts were made to record all evidence of past human activities
regardless of age or nature of the remains. After a few long hours of recording road trash, recent camp sites, and ubiquitous land disturbances, this attempt was abandoned. A decision to impose a temporal and activity bias was made, in which sites of certain ages and representing certain activities would not be recorded. The temporal bias restricted the recording of archaeological remains to those that predated the end of World War II. Several reasons for this bias should be explained.

First, the number and diversity of recent (post-1945) artifactual remains were enormous. Refuse deposited by miners, hikers, hunters, and campers seemed to be everywhere. There was simply too much to record in the time allotted. Second, our early library research indicated that the most important ranching and mining activities took place before the 1940s. This was also an important consideration when determining significance, since sites less than 50 years old are seldom eligible for the National Register of Historic Places. Third, a number of temporal indicators begin to show up in sites that date from the late 1940s and early 1950s. The widespread use of plastics and aluminum is not characteristic of sites before that time. Perishable materials like paper, hemp, and light leather do not occur on the surface unless they are fairly recent. Finally, "return for deposit" and "no deposit" bottles were common following World War II.

As a result, the places where the following kinds of archaeological phenomena, believed to be of recent age, existed were not recorded:

- mine shafts or adits
- mining claims
- mine talus debris
- prospecting holes
- survey markers
- fences
- roads
- isolated historic artifacts or historic trash immediately adjacent to historic roads
- historic road signs
- machine-bladed cuts
- water tanks
- chopped trees
- trees or plants penetrated by nails
- electric communication lines
- isolated horse and mule shoes
- domestic animal bones
- domestic animal trails
- historic artifacts in drainages, obviously removed from any known spatial context.

It should be noted that many of the areas or remains listed above contained no materials diagnostic of age. If remains could have been possibly historic or pre-1945, they were recorded, usually as features of an archaeological site. Because of the mining and ranching interests
within the study area from the 1880s to the present, numerous remains occurred in the area. As an example, many mine shafts or adits were noted along the eastern flanks of the mountains. Few of these were recorded, since there were no associated remains indicative of age and there were too many of these to record. Some information on the period of use of these mining features was obtained during the analysis and report preparation phases. With further research on the study area, the period of use of the remains may be determined.

Collection Policies

Because the removal or disturbance of archaeological materials at a site can have detrimental effects on archaeological research potential, attempts were made to limit the degree of disturbance. The kinds and numbers of artifacts collected were restricted, and detailed notes on their original locations were made so that the sites would be disturbed as little as possible. Although activity interpretations at the sites would have benefited from a more general artifact collection, the collecting of large numbers of artifacts was determined to be impracticable because there was not adequate time, money, or personnel to analyze artifacts. Also, it was found that identification of periods of occupation and times of use of certain artifacts was possible with limited collections, especially if diagnostic artifacts not collected were drawn on the survey forms.

The identification of periods of occupation at a site required that some artifacts be collected and analyzed. Although attempts were made to assign temporal periods to artifacts in the field, many objects unfamiliar to the field crew or identifiable only through literature searches were collected and dated. A greater number and variety of artifacts were collected during the preliminary survey than were collected during the final survey. It was subsequently determined that many of these artifacts had limited value as time indices because they were not characteristic of precise time periods or because historical research has not been extensive enough to aid in their identification. Some of these artifact types include horse and mule shoes, historic earthenware and porcelain sherds, cast-iron fragments, and window glass. The assistance given by William Liesenbein, James Ayres, and Lee Fratt, historical archaeologists at the Arizona State Museum, greatly improved field identification and thus limited collections during the summer, 1976 survey. During the 1976 survey, it was found that field sketches of many historic artifacts were as useful for dating as were actual specimens. This also decreased the time necessary for recording, cleaning, and cataloging collections.

The following policies were used to guide artifact collecting for the final survey:

1. Generally, only potentially datable artifacts were collected. Pieces of chipped stone, however, were occasionally collected
for identifying stone materials or because their locations in roadbeds would have resulted in their being destroyed.

2. No two artifacts of identical type were collected from the same archaeological locus, unless the artifacts were so fragmentary that identifications might not have been possible with only one specimen. Sometimes several decorated sherds from a Post-Archaic Period site were collected. The sherds noted at the sites were small, usually 3 cm to 4 cm in width, and generally contained only a portion of a design element. It was often determined that by collecting several decorated sherds with a range of designs the final identification would be more precise.

3. When adequate descriptions or field sketches of artifacts could be made, artifacts were not collected. Sketches were common for Archaic Period artifacts, such as projectile points, planoconvex scrapers, and retouched flakes; for more formal tools and ground stone artifacts found at sites of other time periods; and for historic artifacts, such as trademarks on bottles, earthenware, and porcelain, and head stamps on gun cartridges and shot shells.

4. Only as many artifacts as were necessary to roughly date a site were collected. In the case of historic sites, it was possible to draw trademarks, headstamps, or other identifying marks of the artifacts at the sites. Artifacts were only collected if their trademarks were uncommon or unusual. No lithic artifacts that could be used as time indicators were collected. As noted above, several sherds had to be collected from some of the Post-Archaic Period sites because they were small and thus contained little of a design element. It was hoped that the sherds could be identified more precisely by collecting more of them. However, even with these procedures, identifications were still general for many of the sherds.

5. Where representative examples of an artifact type were common, attempts were made to select them from disturbed rather than from undisturbed areas. In addition, artifacts were collected from trash or refuse areas before they were collected from areas of other kinds of activities.

6. All collected artifacts were mapped with respect to their relationship to other artifacts. When an artifact was picked up for observation, it was usually replaced in the position in which it was found.

The above policies generally insured against indiscriminate collecting which could have resulted in a loss of important information for studies. The number and kinds of specimens for dating were selectively collected. Although some potential contextual information was probably lost through artifact collecting, it should be noted that:

1. The collected artifacts will be preserved in public collections, as outlined in U.S. Forest Service Guideline 2361.62. There is
a risk at Rosemont, as in other areas, that some artifacts will be destroyed by natural forces and land modification activities or collected by nonprofessionals.

2. The collected artifacts serve as documented and available evidence of many temporal interpretations made in this study.

**Artifact Classifications**

Discussions of the various types of artifacts recorded for the sites will be given by time period in Chapter 6. Certain artifacts were indicators of the different periods of occupation of the study area. Discussions of the dates for the diagnostic artifacts will also be presented.

**Survey Schedule**

A survey schedule for the ANAMAX-Rosemont Project was in part based on that of a project undertaken in southern Mexico. For that project, attempts were made to record important prehistoric sites that were scattered throughout a very large region. Surveyors systematically covered the entire region in a relatively short period of time by finding and only briefly recording material remains on the surface. Assisted by aerial photographs, individuals walked rapidly through the region and quickly mapped and recorded the density of artifactual remains seen on the surface. After a careful examination of the regional map, archaeologists decided which areas were especially significant for their interests and should be more closely evaluated.

A related approach was formulated and tested during the preliminary survey for the ANAMAX-Rosemont Project. Since the results seemed overwhelmingly positive, the system, with some minor variation, was used to complete the final survey. Initially, four study units, each averaging about 1.25 square miles (3.25 km²), were selected from the preliminary 18 square mile Rosemont Study Area for intensive coverage. The three-person survey crew, covering an average of about 160 acres (65 hectares) per day, could completely traverse a study unit in about a week. During this period, archaeological remains were discovered, briefly described, and plotted on 1:4800 scale topographic maps. In addition, field checks were made of biotic community boundaries and notes were made of environmental variables within each community type. During the following week, the archaeologists returned to the study units and recorded in detail all known archaeological remains. In the interim between traversing each study unit and recording remains within it, it was possible to define precisely which set of archaeological remains would be given loci designations as well as outline the exact boundaries of biotic community sections.
This basic schedule was beneficial to the ANAMAX-Rosemont Project for a number of reasons:

1. It was fairly easy to control the schedule of events by using this approach, since certain predictions could be made concerning the manpower and time required to record sites in each study unit.

2. Archaeological remains could be grouped easily into the various recording levels. Environmental types were also more easily grouped into biotic community sections.

3. A preliminary knowledge of the density, diversity, and distribution of archaeological remains usually made recording an organized process.

4. Each study unit, following initial coverage, could be used for estimating the density, diversity, and distribution of archaeological remains in adjacent study units. Surveying and recording time could be more adequately scheduled in these areas.

5. Archaeologists, before recording sites, gained a broad and extensive knowledge of the relationships among archaeological remains and between archaeological and environmental phenomena in study units. Thus, it was possible to make a better estimate of the significance of archaeological remains.

Although the above benefits were important, some problems were encountered which upset the schedule. Because certain study units possessed extremely dense archaeological remains, it was not always possible to traverse and record sites within a two-week period. Only occasionally would a study unit that was only traversed be left unrecorded for several weeks. A few individual large sites were not recorded for as many as 15 weeks after initial coverage. Usually, all sites were recorded within a two-week period after their being discovered.
Preliminary Survey

Based on the January, 1975 proposal, the Arizona State Museum agreed to provide a preliminary survey of 25 to 30 percent of the original 18 square mile study area. The preliminary survey was to determine the feasibility of continuing an intensive coverage of the entire land-exchange region before the land was exchanged. Since there was some question at this time regarding authorization for complete survey of the study area, this preliminary stage emphasized examination of direct impact zones and other nonrandomly selected areas.

The primary goals of the preliminary survey were:

1. To evaluate proposed research problems in terms of appropriateness and feasibility.

2. To adequately survey and evaluate all areas of the land exchange known to have been planned for direct impact from mining operations. During the fall of 1975, the only area of known direct impact was identified as the mine-pit zone encompassed by Study Unit 1.

In order to meet the above goals, the following needs were considered in designing the preliminary survey strategy:

1. To develop a general strategy by which succeeding study units would be defined only after an analysis of information from previous study units was made. The location of a study unit relied on previous knowledge of the Rosemont Study Area; no two study units were selected concurrently.

2. To survey distinct geographical areas in order that surveyors would have knowledge of access and potential traversing problems. This knowledge would be helpful for identifying and alleviating future logistical problems on the survey.

3. To survey relatively large areas in order that estimates of average field coverage could be made for completing the land-exchange survey. As a result, a budget for the final survey and evaluation was based
on a coverage estimate of 25 acres per person-day. Units smaller than the maximum acreage covered by one person per day would have restricted this attempt.

4. To survey areas as economically as possible. Numerous study units in widely dispersed areas and scattered randomly through the Rosemont Study Area would have necessitated greater access and organization time and therefore would have decreased ultimate acreage coverage. Logistically, areas requiring five-day periods for surveying and/or recording worked best. This schedule was based on having weekday working periods and supplies lasting for approximately five days.

5. To survey the archaeological remains in order that knowledge could be gained relative to the diversity and density of archaeological sites in the Rosemont Study Area. It was assumed that some correlation existed between the distribution of archaeological site types and the distribution of environmental types.

Because methodological responses to each of the above considerations were necessarily different, a compromise was made to satisfy some or all of the goals. Ultimately, four different study units (Study Units 1 through 4) were inventoried for their archaeological remains (Figure 2). Although these four units were originally selected as representative environmental regions within the Rosemont Study Area, later study units (Study Units 5 through 26) were selected for their benefits to the scheduling system only (see preceding section). The amount of land surveyed for the four study units totaled about 3150 acres or approximately 28 percent of the original 18-square-mile study area. As a result of this preliminary survey, it was believed that the major environmental and archaeological site types in the Rosemont Study Area had been recovered. The final survey tended to verify this belief, with one important exception: preliminary survey underestimated major drainages and therefore produced a significant underestimate of total site density.

Coverage

The ANAMAX-Rosemont Project was the first large survey project in southern Arizona in a mountainous environment. This prompted the development of appropriate surveying techniques for the area and others like it. During the preliminary survey, several different techniques were used for effectively covering the ground surface, discovering the extent of archaeological remains, and collecting the necessary data in the shortest period of time possible. In these tests, one, two, or three people traversed large areas within a study unit.

At the outset, it was apparent that areas to be covered should be defined topographically. Since long, dissected pediments forming high ridges are the most common topographic forms in the study area, they
were used as standard examples for testing site surveying techniques. It was concluded that two individuals could cover an area better than one or three people. Most topographic features were large enough that two partners who spaced themselves 15 m to 20 m apart could easily cover an area about three times as quickly as a single individual. Although a third person added to the amount of area covered, his inclusion tended to be detrimental, since the walking pattern (discussed later) required that partners be well organized in order that some areas not be missed and others not be rewaked. On extremely wide ridges, such as in Study Units 10 and 11, or on large hills, such as in Study Units 15, 20, and 21, three people were determined to be more efficient.

The following traversing patterns were employed:

1. Walking along the length of a ridge to its end, then turning around and walking parallel to the first transect. This method was awkward because the surveyors often had to backtrack to areas in order to cover ridges on the opposite end from where they ultimately stopped.

2. Walking perpendicular to the length of successive ridges. This method required that surveyors walk up to a ridge line and down the other side. The surveyors then turned around and repeated this procedure until the ridges were covered. This method, because it crosscut topographic features of high relief, contributed to exhausting energy loss.

3. Walking parallel to a ridge, but dividing it into two equal halves for each surveyor to cover. Transects were made by an undulating walking pattern until the entire halves were covered. This was by far the most productive method of surveying. Although there was some up and down walking, the variation in relief was reduced. It also allowed surveyors to finish on the opposite end from which they started, making daily strategies much more convenient.

The above methods were, of course, modified with different topographic situations. On the high slopes of the Santa Rita Mountains ridge line, for example, it was usually necessary to walk parallel to the existing contours. When one elevation was completed, surveyors would drop down or ascend to another.

This study does not represent a full, 100 percent "coverage" of the entire Rosemont Study Area. Coverage here refers to the approximate area that was observed by archaeologists in such detail that surface archaeological remains could be noticed.

In some areas, coverage was excellent, approaching an estimated 100 percent. In other areas, coverage was poor, probably no better than around 10 percent of unit areas of about 50 acres (20 hectares). Coverage for the entire Rosemont Study Area, however, was generally good.
It is believed that all or nearly all of the larger archaeological loci were discovered and that at least most of the moderately sized sites were found. Many archaeological resources consisting of only a few or single artifacts were probably not found; the number of small loci that were found, however, is believed to be sufficiently representative for research problem evaluations. The following variables were mainly responsible for the variation in coverage from one study unit to the next:

1. Topography. Coverage for extremely rugged and precarious terrain was always relatively poor. The amount of time necessary to traverse steep and rocky mountain slopes, for example, was usually several times greater than for traversing flat areas. As a result, high coverage of maximum relief was forfeited in favor of high coverage of minimum relief.

2. Ground litter and vegetation cover. This was a particular problem in mesophytic communities with dense stands of oak trees. In some cases, layers of leaves made it impossible to observe the surface; often these layers of leaves were 20 cm thick. In heavily overgrazed areas, it was much easier to see archaeological remains than in areas that were not overgrazed. Thus, in the case of seasonal forage ranges, archaeologists might expect to find more archaeological remains on winter ranges in winter months than they would during summer months.

3. Archaeological expertise. It is assumed that there is some variability in the frequency with which individuals perceived archaeological resources, particularly those of very low surface artifact density. It is believed that this had no significant effect on survey adequacy.

**Environmental-Archaeological Correlations**

Initially, attempts were made during the ANAMAX-Rosemont Project to develop a very precise model of site distributions with respect to environmental variables. Although it was not possible to develop this model in the expected detail, Chapter 6 provides the results of a more general analysis.

One problem in carrying out a detailed analysis was the insufficiency of archaeological data for accurate identification of site function, cultural affiliation, and age. Because no thorough studies are available for comparable environments, inference about the possible presence and nature of subsurface features is, for example, sometimes tenuous. Environmental data do exist for considerably more detailed interpretation than has been possible here.
It should be noted, however, that the results of this survey suggest that the location of many site types may correlate very poorly with the extremely localized resource distributions. Instead, a broader zone of diverse microenvironments providing a wide range of resources seems to have been critical, with site location within this broad zone largely dependent on the availability of water. This interpretation is discussed in greater detail in Chapter 6.

Recording Biotic Communities

Delineation of the spatial distribution of biotic communities within the study area began with a close analysis of color and black-and-white aerial photographs of the area to the scale of 1:30,000 (1"=2500), produced by Cooper Aerial Survey of Tucson. These photographs had been used for making a series of topographic maps, thus making transcriptions of biotic community boundaries very accurate. The use of U.S. Geological Survey topographic maps (15-minute quadrangles, 1:62,500) for locating even large boundaries, including archaeological sites, was impossible. The scale and accuracy of the U.S.G.S. maps were far inferior to those produced by Cooper Aerial Survey. Larger scale, color aerial blowups of the area were also used and were obtained from the U.S. Forest Service office in Tucson, Arizona. Initially, the photographs, which had 60 percent side-to-side overlap, were scanned under a Fairchild Aviation Corporation F-71 magnifying stereoscope. After the first several study units were mapped, however, the Remote Sensing Laboratory of the Office of Arid Lands kindly allowed us the use of their stereoscope, which had better magnification and resolution and was much easier to operate. Depending on the diversity of environmental patterns, it required from three to nine hours to completely map the boundaries of each community by using the stereoscopes. All classes of environmental types were mapped on topographic sheets to the scale of 1:4800 (1"=4800').

In order of importance, the following variables were used to delineate different environmental or biotic communities before field checks were made:

1. Vegetation structure. This includes dominance, density, and life forms of the plants. Habitat characteristics and available moisture relationships were usually easily discernible based on the vegetation. These included xerophytic, mesophytic, and hydrophytic vegetation types.

2. Topography. Land form types and sizes and cardinal direction of long topographic forms were important factors that determined different environmental patterns.

3. Aspect. The aspect or cardinal direction of a slope related directly to solar radiation and moisture relationships.

4. Slope. This refers to the inclination of land form planes, expressed as degrees below horizontal. It was fairly easy with the binocular stereoscopes to distinguish between steep and gentle slopes.
5. **Substrate.** A general but important category that was recognized as differential coloring and texture on aerial photographs. In the field, substrate refers to the major soil classes, surface rocks, and underlying lithologic types that characterize the edaphic conditions of a community.

Soils are extremely important for developing vegetation. Whittaker (1975:261-262) remarks:

The soil of a natural community is not an inert substrate, it is part of the ecosystem. There is an interactive, complementary relation between the soils that support the community and affect its characteristics, and the community that develops and influences the character of the soil.

In some cases, underlying rock that becomes exposed in a community becomes the parent material of soils. In other cases, soils are the result of transported materials, like those on an alluvial floodplain (Whittaker 1975:262).

While these patterns were being mapped in the laboratory, notes were kept on each preliminary community type to help crews recognize in the field what was perceived in the photographs. These notes included basic information concerning physiography, substrates, and plant classes.

Once the preliminary community maps and notes were taken to the field, the exact perimeters of each community were checked. Then, a Biotic Community Field Sheet which detailed the biotic and abiotic composition of each was completed. Often, after field checks, it was necessary to group two patterns because of their similarities in plants or substrate.
CHAPTER 3
ENVIRONMENT AND ENVIRONMENTAL CHANGE

Introduction

A study of environmental change can be important to any large-scale archaeological investigation evaluating problems of resource utilization, settlement, or activity interpretations. A satisfactory evaluation of these kinds of research problems requires some understanding of the natural environmental setting within which activities and behavioral processes took place.

The natural environment is constantly changing. Numerous archaeologists and paleoecologists (Martin 1963b; Van Devender 1977) in southern Arizona have pointed out that there have been no major climatic or biotic changes in southern Arizona environments for the past several thousand years. Often this point has been made to justify human-ecological research based in part on contemporary environmental situations (such as Goodyear 1975:19, Debowski and others 1976:17; Doelle 1975:7; Grady 1974:2; Fritz 1974:9; Raab 1973:15; Canouts, Germeshausen, and Larkin 1972:8). The important question, however, involving ecological studies is not whether major changes have occurred, but rather whether changes of any kind were sufficient to affect environmental adjustments and resource use by past peoples. The evidence seems to indicate that climatic and biotic changes during the past several thousand years have in fact caused significant changes in the local availability of resources.

Climatic Change

Climatic oscillations, according to Brooks (1951:1008), "are not entirely local events but tend to fit together into a world pattern." In the same article, Brooks presented a chart (1951:1009) showing climatic variations during the Christian era that tended to support his supposition. Although the chart is intended as a general description for a large region, it nevertheless suggests that certain plant and animal species, especially those with a fragile environmental relationship, such as xerophytic plants and hydrophytic plants, might well have changed in density or distribution in response to these fluctuations.

Erling Dorf (1960:6), using data from Brooks (1951), presented a chart showing temperature variations through time from 40 to 90 degrees north latitude on a global scale. His chart indicates that the mean annual temperature has fluctuated between about 29 and 35 degrees F. Presently it is about 32 to 33 degrees F. These data, although applicable on a very large and approximate scale, tend to suggest that climatic and possibly biotic changes have been significant.

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Based on geologic evidence from playa lakes and montane glaciers in the northern Great Basin, Ernst Antevs postulated a sequence of climatic events during the postpluvial or neothermal age (today known as the Holocene Period) from about 7000 B.C. to the present. General temperature ages, including the Anathermal, Altithermal, and Medithermal, reflect major climatic shifts through time (Antevs 1948:9).

In 1954, Antevs (1955) revised the chronologic dating as follows: Anathermal, 8000-5500 B.C.; Altithermal, 5500-2000 B.C.; and Medithermal, 2000 B.C. to present. In many cases, Antevs' trichotomy has been used as a tool for dating prehistoric sites (such as Aschmann 1958:30-31, 33-35).

In 1963, Antevs' climatic reconstruction was seriously threatened by Martin's (1963a:b) conclusion that the Altithermal Period was actually wet instead of dry. In addition, Martin's analysis of palynological sequences, including some from Cienega Creek, demonstrates that biotic changes during the last several thousand years of the Holocene are erratic. Antevs' interpretation, based originally on Great Basin deposits, was used throughout the Southwest, which, unlike the Great Basin, is characterized by predominant summer and winter precipitation patterns. Van Devender and Wiseman (in press:4) write:

In portions of the southwest characterized by summer monsoonal rains, the Altithermal drought has apparently been interpreted to represent both winter and summer drought. However, Martin (1963) interpreted Holocene pollen records from southern Arizona as indicating that the summers were very wet during the Altithermal period. The controversy has not yet been settled...

Martin (1963b:4) argued that the relative amount of summer rains compared with winter rains was a much more crucial variable in appraising environmental conditions than temperature gradients themselves. Not only are plants influenced by simple levels of precipitation, but they respond differently to winter rains and summer rains. Van Devender and Wiseman (in press:6) write that "the transition from woodland to desert or grassland throughout the southwestern deserts 8000 years ago was probably the result of the shift of the Aleutian Low and the winter storm tract into their present northerly position resulting in less winter precipitation." Clearly then, to analyze environmental change with respect to resource availability, it is necessary to interpret not only temperature and rainfall but also the relative amounts and seasonal occurrence of those variables.

At this point, however, it is difficult to determine the origin of summer monsoons or seasonal winds. In the Southwest, these winds are invariably accompanied by large amounts of moisture that are deposited in quick heavy thunderstorm downpours. Hall (1974), for example, argues that most of the moisture west of the continental divide is derived from the Gulf of California and not from the Gulf of Mexico as earlier thought (Bryson and Lowry 1955).
At Howell's Ridge Cave, above the Playas Valley in southwest New Mexico, paleoecologists analyzed Holocene faunal remains in an attempt to document short-term climatic changes through time. The study was based primarily on the relative frequency and diversity of reptile, amphibian, fish, bird, and mammal bones through thick deposits of cave fill from the Little Hatchet Mountains. Changes in the frequency and diversity of animal forms are believed to be directly related to changes in climate and vegetation (Van Devender and Worthington 1977:8). The sequence of changes recorded at Howell's Ridge is supported by a score of carbon-14 dates. Their results (Van Devender and Worthington 1977; Van Devender and Wiseman in press) indicate that significant climatic and biotic oscillations have occurred frequently during the last several thousand years. Like other studies, theirs shows that major vegetation changes in the Southwest ended with a shift from a pluvial to a nonpluvial climate about 8000 years ago (Van Devender and Wiseman in press:8). Van Devender and Worthington (1977:17) write:

At a basic level, the herpetofauna remained stable throughout the Howell's Ridge stratigraphic column. No major change in structure or composition analogous to a change from forest or woodland to grassland or desertscrub occurred at the beginning of or during the Holocene.

Nevertheless, significant changes in species presence and densities suggest that fluctuations must be considered important from a human ecological standpoint. The presence and percentages of the tiger salamander (Ambystoma tigrinum), for example, reflect alternate wet and dry conditions in the Playas Valley. It was inferred that the playa was wet from the Pleistocene until about 4000 to 5000 years ago, again at about 3000 years ago, and finally at less than 1000 years ago (Van Devender and Worthington 1977:18).

By about 3300 years ago, the climate was hotter and drier and probably caused the extinction of most mesic forms of animals from the area. It is believed that the basic composition and structure of faunal species today were probably reached less than one thousand years ago (Van Devender and Worthington 1977:20). In synthesizing their paleoecological interpretations, Van Devender and Worthington (1977:20) write:

The overall Holocene faunal record can be characterized as a major change occurring about 4000-5000 years ago, with minor fluctuations since.

The implication of this biotic record for the Chihuahuan desertscrub communities and the more mesic, desert grassland communities has not been stable. The relative areas of these have fluctuated in response to climatic changes during the Holocene. We suggest that the recent invasion of grassland by desertscrub involved both the recent climatic warming and the environmental perturbations by man (overgrazing, reduced fire frequency, lowering of the water table, etc.; see discussion in Hastings and Turner 1965). Further, the Chihuahuan Desert communities
in high-elevation areas in New Mexico, Arizona, and northwestern Chihuahua must be relatively new to these areas.

The implications of these interpretations are important for the Rosemont area. The Rosemont environment is characterized by woodland, grassland, and scrubland biomes that intermingle to form an abstract mosaic of vegetation communities. Many of the scrubland species, particularly those of limestone and alkaline substrates, are also characteristic of the Chihuahuan Desert forms. This fragile and close relationship among all species suggests that climatic and/or man-induced changes would have drastic effect on environmental resources and processes operating in the Rosemont region.

The Rosemont Environment Today

An environmental inventory of the Rosemont area has been conducted under contract for ANAMAX. This inventory (Davis and Callahan [eds.] 1977) provides information on a broad range of environmental variables in the area. More detailed information on the current environment than that presented here is available in that report.

Climate and Topography

The study area ranges in elevation from a low of 4400 feet in the
northeast to 6300 feet in the mountains. Central and eastern portions of
the study area are characterized by narrow canyons draining the mountainous western portion. Formed by large-scale earth movement during the Tertiary, these mountains, like others of the Basin and Range Province, have eroded to produce sedimentation in the valleys below.

Rocks exposed include sedimentary deposits of Paleozoic, Mesozoic,
and Cenozoic age, as well as Cenozoic volcanic and intrusive igneous types (Hargis and Harshbarger 1977a:43). Unconsolidated alluvium deposited in major washes dates to the Quaternary and includes sands, gravels, silts, and clays. The distribution of various rock types has had a significant effect on other aspects of the environment in the study area, including soils (Hargis and Harshbarger 1977a:55) and vegetation (McLaughlin and Van Asdall 1977:64).

All streams in the study area are ephemeral. Barrel Canyon, which drains northeastward from the southern half of the area, is the most prominent drainage. Major tributaries of this drainage are Wasp, McCleary, and Scholefield canyons. These are characterized by narrow floodplains usually not exceeding 30 m in width.

There are at present six major springs in the Rosemont Study Area, all but one in McCleary and Scholefield canyons (Hargis and Harshbarger 1977b:34).

At present, the Rosemont area averages between 16 and 18 inches of precipitation annually, concentrated in the months of July, August, and
September (Sellers 1977). Frosts occur between mid-November and mid-April, producing an average growing season of about seven months at elevations between 4400 and 5400 feet. Sellers (1977:4) estimates that the average variability of maximum temperatures is 3.5 to 5 degrees F per 1000 feet in elevation, so that lower elevations in the study area are up to 10 degrees F warmer on the average than are higher elevations.

Vegetation

McLaughlin and Van Asdall (1977:82-84) recognized four major types of plant communities in the study area. Woodland communities are composed of evergreen oaks and junipers with rosette shrubs and a dense cover of grasses. These communities are located on north-facing slopes at most elevations and in mountain drainages. Grasslands occur on ridge tops and xeric slopes and include, in addition to a variable grass cover, sparse woody plants and many cacti and shrubs. Limestone scrub communities, with a high density of wood plants and cacti and a low grass cover, are found on all limestone substrates. These are the westernmost occurrences of essentially Chihuahuan vegetation. Riparian communities of deciduous trees and shrubs are found in low-elevation washes.

The overall pattern is one of interlaced grasslands and woodlands in the eastern and central portions of the study area, with riparian environments along only the most substantial drainages. Limestone scrub communities occur at the base of the mountainous western area. The mountains themselves consist of grasslands and woodlands (at the highest elevations concentrated along drainages).

Within each community type there is significant variation, depending on elevation, slope, aspect, and other localized conditions. In general, however, the total coverage of herbaceous plants decreases from the woodland to grassland to riparian to limestone community types (McLaughlin and Van Asdall 1977:82). Succulents are common in riparian environments, while evergreen species are characteristic of the woodlands.

Fauna

Various studies included in the overall environmental assessment of the study area (Davis and Callahan [eds.] 1977) discuss in detail the insects, other invertebrates, fishes, amphibians, reptiles, birds, and mammals of the Rosemont Study Area. Invertebrate fauna were found to be quite sparse, represented by a small number of very common species. Totals of 26 species of reptiles and six of amphibians were noted (Lowe and Johnson 1977:165). One hundred thirty-eight species of birds were identified, with the greatest diversity in riparian habitats (Russell, Mills, and Silliman 1977:193).

The mammalian fauna are basically that of grassland environments (Roth 1977:195). Desert and woodland species are, however, present. Roth identified 44 species representing 29 genera. Eighteen species previously noted in the area but now presumed to be locally extinct were also noted.
A study of game species (Hungerford 1977) is interesting in that many of the animals in this category may have been of economic importance to earlier occupants of the area. Deer and javelina are among the listed species of larger mammals. Bighorn sheep are assumed to have existed in the study area but are now absent. Wild turkeys, found at higher elevations in the Santa Ritas, are absent. Other game species are quail, dove, and pigeons. Hungerford notes that the Rosemont Study Area satisfies the principal criteria for good game habitat (1977:219):

It encompasses several vegetative types, and the diversity or amount of edge between types is increased by the nature of the topography. The numerous small drainages with intervening ridges offer both north and south exposures, and the more mesic semi-riparian conditions in the water courses provide additional habitat diversity. Also, the origin of soil types is variable enough across the area to cause differences in vegetation. This variability increases the total amount of boundary between vegetative types and results in additional diversity. Water is available to game species at natural springs.

The Rosemont Environment in the Past

For two reasons, environmental change and its effect on human behavior cannot be documented satisfactorily for the prehistoric period. First, a detailed chronological sequence of climatic change through the late Holocene has not been developed for southern Arizona. Climatic fluctuations recorded by Martin (1963b) and Van Devender and Worthington (1977) indicate major and minor oscillations over the last several thousand years. Unfortunately, the time control and effect of climatic fluctuations for the Rosemont region are poorly understood. Second, the time control for determining when the Rosemont region was inhabited prehistorically is also poor. Based on the identification of a relatively small number of sherds, it is evident that American Indians were occupying the study area between about A.D. 700 and 1200. As will be argued later, the actual occupation duration may have been much shorter, possibly only a generation or two. Obviously the potential exists for change in environmental conditions for that 400-year period. Archaic Period occupants, several thousands of years earlier, are even more likely to have encountered a different environment than that evident today.

From the late 1800s to recent times, man's activities as an agent in environmental change have probably been most dramatic. The introduction of livestock grazing, suppression of fire, lowering of the water table, and modification of natural drainages have had a significant effect on biotic communities and hydrological features. In addition, historic and recent climatic data suggest that within the past century, southern Arizona has become hotter and drier, a condition which has also had a significant effect on environmental conditions (Hastings and Turner 1965).

McLaughlin and Van Asdall (1977:65) note that probable trends include an overall decrease in plant cover accompanied by increases in runoff, erosion, and arroyo cutting. As grasslands decrease in density of herbaceous
species, woody plants, notably *Prosopis juliflora* (mesquite) and *Acacia* spp., increase. Open woodlands are invaded by *Prosopis*, *Juniperus monosperma*, and various shrubs. Whalen (1971) notes that in Nevada the drying trend beginning about 5000 B.C. is reflected in shifts of grassland communities to elevations above 5000 feet and invasion of older grassland communities by shrubs, a process like that described by McLaughlin and Van Asdall (1977) and by Van Devender and Worthington (1977).

While this climatic variability has doubtless affected the history of human occupation in the study area in ways which cannot be adequately assessed at present, some generalization about the effect of the changes can be made. It is critical to note, first, that climatic change is at issue. Abiotic natural resources of importance to earlier human occupants of the study area are not, with the exception of soils, altered significantly by changes in climate. Stone for tool manufacture and economically important minerals are stable in their distribution.

The distribution of plants and animal habitats is sensitive to climatic change. However, important variables other than climate, most notably topography, substrate, and soils, affect the distribution of biotic communities. All but the last of these are quite stable, and soils, although subject to modification as a consequence of climatic change, retain certain basic characteristics derived from their parent materials.

These constant elements in the environmental setting permit formulation of several assumptions of significance for archaeological interpretation of the study area:

1. While specific plant communities may, and probably do, differ at present from those of the past, the range of variability in plant communities and the distribution of microenvironments relative to one another have undergone no significant change.

2. Since the range of variability and distribution of plant communities are critical elements in formation of good game habitats, those areas which are not good habitats from animals may have been so in the past.

In the study area, numerous individual plant communities were identified during archaeological survey and by members of the biological research team. A larger pattern is present, however. Four types of plant communities, described earlier in this chapter, are present. These form three significant groups. First, the mountainous western portion of the study area includes both woodland and grassland communities. This area (see Figures 2 and 3) is rugged and generally characterized by a lower density of herbaceous plants than similar communities at lower elevations. At the base of the mountains, and within portions of the mountains, running north-south through the study area with only brief interruptions, is the limestone scrub community, which shows affinities with characteristically Chihuahuan rather than Sonoran
vegetation types. Finally, the central and eastern portions of the study area are characterized by a complex mosaic of grassland, woodland, and riparian communities. This area represents an exceptionally great diversity of plant resources as a consequence of its topography. In addition to these plant resources, significant quantities of water are indicated by the riparian microenvironments along several major drainages.

It is this last area that today forms by far the most significant mammalian habitat in the study area. This has been attributed, as noted previously, to the mosaic distribution itself. It is also this area that presents the greatest potential for human use. This is true today and, given the assumptions stated previously, has probably been true throughout the period of human use of the study area.
CHAPTER 4

HISTORY OF ARCHAEOLOGICAL RESEARCH IN THE ROSEMONT REGION

Before the archaeological survey of the ANAMAX-Rosemont Project began, little was known of archaeological remains within the Rosemont Study Area. In 1961, the Historic Sites Committee assigned Arizona State Museum (ASM) site number AZ EE:2:49 to Rosemont, the abandoned mining town located in the center of the study area. Apparently, the site was never actually surveyed and adequately recorded, since no other archaeological information is recorded in the files.

In 1971, James Ayres of the Museum and Adrienne B. Anderson recorded two sites for the Museum Site Survey Files. One, ASM AZ EE:2:52 (ARP X-13-S1-L2), was a sherd and lithic scatter near V-R Ranch (Gayler Ranch). The second, AZ EE:2:53 (ARP M41-S2-L1, M41-S2-L2), was recorded as a sherd and lithic scatter with a historic adobe dwelling. Both sites were pointed out to Ayres and Anderson by local ranchers.

Archaeological research outside the study area but within the Empire Valley has been more extensive and has considerable importance for understanding certain questions about the culture history, settlement patterns and resource exploitation, and past human activities within the Rosemont Study Area. The earliest documented archaeological work in the valley was done by Byron Cummings of the University of Arizona. In 1926, Cummings excavated two human inhumations buried 3.6 m below the surface of Cienega Creek on the Empire Ranch. These burials may date to the Archaic time period (McGregor 1965:126).

Following Cummings' work, Emil W. Haury and various archaeology students also of the University of Arizona conducted archaeological surveys during weekend field trips as late as 1975. Between 1937 and 1955, Haury and his students recorded 17 archaeological sites in the Empire Valley that represent an occupation in the valley from the Archaic Period into the period characterized by villages, with a wide variety of artifact types, especially sherds, and features.

In April, 1955, Haury, E.B. Danson, and five archaeology students participated in a three-day testing and excavation program at AZ EE:2:30, a San Pedro Cochise site exposed in Matty (Mattie) Canyon. Notes of their research were placed on file with the ASM. This site was to be more extensively excavated two years later by Frank Eddy for thesis material.

Between 1948 and 1950, Earl Swanson, a graduate student at the University of Arizona, began surveying and recording archaeological sites in the Empire Valley watershed and areas southwest of Sonoita and south of Elgin. His studies resulted in the preparation of a Master's thesis in anthropology at the University of Arizona (Swanson 1951) and in the recording of 18 sites.
Swanson was interested in classifying sites according to cultural designations and historical periods throughout the region. Following the survey, he felt that "occupation was not particularly heavy," given such a large region and what was apparently a long history of human occupation (Swanson 1951:17). Swanson also concluded that settlement and subsistence from the Archaic Period through Hohokam Sedentary times were primarily based not on agriculture but rather on the seasonal exploitation of wild food resources along drainages (Swanson 1951:49).

In 1956, Frank Eddy, a graduate student with Haury and Danson, began making periodic visits to the Empire Valley which ultimately led to the writing of a Master's thesis in anthropology (Eddy 1958) on the sequence of cultural and alluvial deposits in the valley. In April, 1957, Eddy and two assistants spent three days in a testing program at AZ EE:2:30, a site previously investigated by Haury and Danson. Then, at the end of September, 1957, Eddy spent slightly over two weeks expanding the excavation at the site. An interesting collection of stone artifacts as well as bone and deep pits was uncovered at the site. All of the materials were assigned to the San Pedro Stage of the Archaic Cochise tradition defined by Sayles and Antevs (1941). Radiocarbon dates from the site suggest an occupation during the first millennium B.C. Eddy and his assistants also excavated parts of the two pit houses and related materials at AZ EE:2:10 and AZ EE:2:34. At AZ EE:2:35, Eddy excavated a deeply buried lens of hearth material which produced four radiocarbon dates also suggesting an occupation during the first millennium B.C. Eddy’s research was oriented towards archaeological and geological analyses of the relationship between the cultural sequences and environmental sequences that spanned some 3300 years. In addition to the excavations, Eddy also recorded 11 sites for the ASM Site Survey Files.

In late 1972, Noel Walker and Ann Polk, archaeologists for the Arizona State Museum, crossed the eastern part of the Empire Valley near the Whetstone Mountains on an archaeological survey of the Pantano-Whetstone 115 kV power transmission line for the Arizona Electrical Power Cooperative (Walker and Polk 1973). Along the 32-mile strip that passes through the valley, nine archaeological sites were found. These were divided into four categories: lithic resource sites, abiotic and biotic resource manipulation (A+BRM) sites, and habitation sites.

In summary, little intensive archaeological survey work has been conducted within the Empire Valley. A few sites have been excavated. Only Swanson and Eddy conducted somewhat intensive investigations in limited areas along Cienega Creek and Matty Canyon. Other sites were recorded in the valley as a result of field trips by University of Arizona classes and a corridor survey near the northeastern end of the valley. A wide range of sites was recorded; these included artifact scatters of sherds, sherds and lithics, and lithics; villages with trash mounds and extensive trash deposits; isolated artifacts; and historic sites. Many sites were buried in the banks of Cienega Creek and Matty Canyon. The sites represent the Archaic Period to recent times.
CHAPTER 5

HISTORY OF HUMAN OCCUPATION

The presence of man in the Southwest is documented by the archaeological record for approximately 11,000 years. This record indicates his progression from big-game hunter and wild-food gatherer to modern industrialist. Within the Rosemont Study Area, there is evidence of occupation from the Archaic Period to recent times. Even though no remains were representative of Paleo-Indian groups, the presence of Paleo-Indian remains should be considered. There is at least one fossil site dating to the Pleistocene in Study Unit 18 (Appendix A), and even though no cultural remains were found in direct or stratigraphic relationship with any of the fossilized bones, there is always the possibility that early artifacts may be present.

Archaic Period

In order to set the Rosemont remains in perspective, this section presents a brief review of major works, concepts, and dating attempts that relate specifically to interpreting data from the Rosemont Study Area. The Cochise Culture concept, first proposed by E.B. Sayles and Ernst Antevs in 1941, is basic to southern Arizona prehistory during the Archaic Period. Haury's excavations at Ventana Cave, on the Papago Indian Reservation, and Herbert Dick's excavations at Bat Cave, in west-central New Mexico, showed a long sequence of Archaic Period remains that could be separated stratigraphically through time. In addition, some specific finds from those two sites closely resemble some of the archaeological remains from the Rosemont Study Area. Finally, a cursory survey of absolute dates and attempts to develop an Archaic Period chronology in southern Arizona is discussed. This is particularly important for current research in the study area, since a basic attempt has been made to temporally relate the archaeological remains.

The Cochise Concept

In 1941, Sayles and Antevs published a paper on Archaic Period remains from southeast Arizona which they attributed to the Cochise Culture, a preceramic tradition of nomadic or semi-nomadic hunters and gatherers. This pioneer work in southern Arizona was concentrated along three major drainages, including the San Pedro River, Whitewater Draw, and San Simon Creek. Based on the stratigraphic relationships of particular kinds of archaeological remains in known geologic deposits, they defined three Cochise Culture stages, each with a characteristic artifact assemblage.
The earliest of these, the Sulphur Spring Stage, was believed to date as early as the Pleistocene Epoch. This was followed by the Chiricahua Stage, estimated to date between 7000 and 3000 years before present. The latest, the San Pedro, immediately predated the period (around A.D. 1) when farming and sedentary life styles were basic throughout most of the Southwest. A fourth stage, Cazador, was added in 1958 and stated to be transitional between the Sulphur Spring and Chiricahua stages.

Sulphur Spring Stage. The Sulphur Spring Stage of the Cochise Culture was first recognized from archaeological remains at the Double Adobe Site (AZ FF:10:1) and other localities in arroyo bank exposures along Whitewater Draw, the major drainage in the southern portion of the Sulphur Spring Valley. The Double Adobe Site itself was discovered in 1926 by Byron Cummings of the University of Arizona. In the eroded banks, Cummings excavated the maxilla, teeth, and tusks of the extinct mammoth (Mammuthus columbi). Of exceptional significance, however, were stone artifacts exposed in the stratigraphic deposit that actually underlaid that of the mammoth fossils.

Twelve years later, Sayles returned to Double Adobe, where he observed stone tools in association with the fossilized bones of extinct horse (Equus sp.), extinct dire wolf (Canis dirus), bison (Bison sp.), and coyote (Canis latrans) (Sayles and Antevs 1941: 46-47). These finds were apparently in a geologic stratum that was deposited before the stratum containing mammoth bones. Based on the stratigraphic and geologic relationships between artifacts and long-extinct animal forms, Antevs was convinced that the Sulphur Spring Stage materials dated to the pluvial period and were 10,000 years old or older (Sayles and Antevs 1941:48).

Antevs' estimate of the age of Sulphur Spring Stage artifacts was attacked by Martin (1963a), who argued that the remains were of early post-pluvial age. Martin's evidence was based on numerous late radiocarbon dates from the Double Adobe deposits and the fact that the pine pollen record for the site was not consistent with Pleistocene pollen records elsewhere (Martin 1963a:67). Unfortunately, a direct association among pollen strata, radiocarbon samples, and artifacts could not be made. However, three dates (7756 ± 370 B.P., 8200 ± 260 B.P., and 9350 ± 160 B.P.) presented by Martin (1963a:70) were collected by Antevs from deposits associated with Sulphur Spring Stage artifacts (Damon, Long, and Sigalove 1963:293).

According to Sayles (Sayles and Antevs 1941:8), the Sulphur Spring Stage represents the Cochise "basic pattern" and contains "...a great many grinding tools consisting of thin, flat milling stones and small handstones; few percussion-flaked, plano-convex implements for cutting, chopping, and scraping; no points or blades." Pebble hammerstones have also been found at Sulphur Spring Stage sites.

The recognition of the Cochise Culture, Sulphur Spring Stage was most significant to archaeology for three reasons according to Thompson (in Sayles and others 1958:4):

1. The association between human tools and extinct faunal remains suggested that the artifacts were older than 10,000 years, among the earliest known from Arizona and North America.
2. The evidence suggested that there was a stratigraphic sequence and typological development that continued without a break from the Sulphur Spring Stage until the introduction of pottery in the Southwest.

3. A predominantly grinding tool assemblage that was distinct from early projectile point complexes, such as Clovis and Folsom, indicated an intermediate stage between big-game hunters and later sedentary farmers.

The Double Adobe locality represents an extremely complex occurrence of geologic deposits, material culture remains, fossil bones, and pollen deposits that have a significant bearing on the interpretations of Archaic Period occupation in southern Arizona. Concerning the association between extinct faunal remains and artifacts, Whalen (1971:89-90) writes:

In view of their apparent antiquity, the Pleistocene megafauna unearthed at Double Adobe present an enigma, since radiocarbon dates for the Sulphur Spring stage oscillate between 7,910 and 9,350 years ago, with a mean of 8490 B.P., while the extinct faunal remains ostensibly became extinct 2,500 years earlier. It is entirely possible that enclaves of threatened Pleistocene mammals lingered on in particularly congenial environments long after the main body of their species had succumbed to hostile forces -- human or climatic or both -- elsewhere. At present there is no evidence to refute the possibility of that interpretation. On the other hand it is also possible that the megafaunal remains do not occur in primary deposits at Double Adobe as Haynes surmised (Haynes personal communication 1971), but only in secondary ones. If that were so, the animal bones and teeth could be older than the geological levels in which they repose, and the dates ascribed for cultural remains would in no way apply to animal remains.

Furthermore, did those animals expire as victims of human predation or did they die from natural causes? The literature mentions burned and broken animal bones without identifying whether the bones belonged to extinct or extant species. If they belonged to extinct species, then human hunters presumably dispatched them before 9,000 B.C., a date incompatible with those obtained radiometrically for the Sulphur Spring stage. If the herbivores (and dire wolf also) were annihilated by Sulphur Spring hunters (Cazador aspect) in the seventh or eighth millennium B.C., then they must represent relict populations that managed to survive beyond the terminal date usually acknowledged for their extinction. If, on the other hand, the charred and burned bones belonged to extant species, the Pleistocene fauna could be well over 11,000 years old but encapsulated at Double Adobe in a secondary deposition.
If the sedimentary deposits at Double Adobe are mixed, or if the bones are in secondary deposits, it seems also possible that some or all of the artifacts may also represent redeposition. One might hypothesize, therefore, that the Sulphur Spring and possibly the Cazador stages are actually much later in the Cochise sequence than is thought at present. It is even conceivable that the artifacts from these early stages are representative of Chiricahua or San Pedro stages but became mixed with Double Adobe deposits. Two corollary hypotheses result from this argument. 1) There does not exist a local evolutionary sequence from a big-game hunting stage to a hunting and gathering stage. This implies that a hiatus of several thousand years exists between Paleo-Indian and Archaic Period occupations in southern Arizona. 2) There does not exist a long Cochise tradition involving evolutionary changes of tool types from the earliest to the latest stages. Wormington (1957:171-72) questioned a complete typological continuity for the Cochise tradition when she wrote that "although it appears to be possible to trace an evolutionary sequence from the Sulphur Spring stage through the Chiricahua to the San Pedro, there is a definite typological break between the last two." Sayles (Sayles and others 1958:113) responded to Wormington's statement by writing:

The typological continuity of the Cochise culture from the Sulphur Spring stage into the Early Pottery horizon is clearly documented by the sequence of grinding tools, first, by the persistence of earlier forms into later stages, and second, by the developmental relationship of the new forms to earlier prototypes. The chipped stone tools are not as useful in demonstrating this continuity, but they contribute to [the] overall picture.

It is interesting, however, to note some discrepancies between Sayles' statement and a chart he provides (Sayles and others 1958) showing tool type comparisons through all four stages. In both the Sulphur Spring and Cazador stages, only one type of nether milling stone is known. In the Chiricahua and San Pedro stages, however, five different types are known from each stage. Only one type of handstone is known from the Sulphur Spring Stage, and two types are known from the Cazador Stage. Again, however, five types each are known from the Chiricahua and San Pedro stages. Sampling error probably does not account for the comparisons. Based on the artifact assemblage for each stage, then, there is a trend toward diversity but little evidence supporting typological evolution from one stage to the next. The question of whether the Cochise "tradition" represents a sequence of evolutionary "stages" for several thousand years is still open to debate.

If the faunal remains at Double Adobe represent redeposited bones, then they might easily represent animals that died long before human occupation at the site. If, however, the Sulphur Spring Stage artifacts and fossil bones are in primary context (see Haury 1960), then a number of different hypotheses can be formulated. Antevs (in Sayles and others 1958:43) argued that the heavy weight of certain osteological remains, such as tusks, and the partial articulation of some bones indicated that the mammoth from Double Adobe had died at the locality. The hypotheses include the following:
1. The date for the extinction of certain animal species, such as horse, mammoth, and dire wolf, is locally much later (at least two millennia) than it was elsewhere in the Southwest.

2. The date for Cochise occupation is as early as Antevs' original estimates. This hypothesis implies that the radiocarbon dates must be inaccurate or do not represent either human occupation or animal death.

3. Sulphur Spring Stage groups were involved in hunting to a fairly significant extent. If Whalen is correct in his interpretations of the Cazador Stage (see next subsection), then there is support for this hypothesis.

4. The Double Adobe artifacts do not represent Cochise artifacts but rather Paleo-Indian artifacts. This implies that the stone tools represent specific and, as yet, undocumented activities by Paleo-Indian groups such as the Clovis hunters.

                    Whalen (1971:67) concluded that the Sulphur Spring Stage dates from 7500 to 3500 B.C., basing this on a series of dates from Double Adobe. However, although an origin about 7500 B.C. is consistent with dates presented by Whalen and those available from the sites in southern Arizona, these radiocarbon dates do not demonstrate continuation of this phase after 6000 B.C.

                    Cazador Stage. The Double Adobe locality also yielded artifacts of a Cochise Culture stage, the Cazador, which was introduced in 1958 in an unpublished manuscript on file with the Arizona State Museum (Sayles and others 1958). The Cazador artifact assemblage consists of basin-shaped milling stones, small shaped handstones, and pressure-flaked projectile points (Antevs, in Sayles and others 1953:45). Rationale for the new stage designation seems to have been based primarily on the discovery of biface "bladed," leaf-shaped flakes; heavily barbed, corner-notched projectile points; leaf-shaped projectile points; and bone implements with radiocarbon dates of the fifth and sixth millennia B.C. from pollen profiles (Martin 1963b:38, 57). In addition, the sediments at Double Adobe, which contained Cazador Stage artifacts, were apparently deposited after those containing fossil bones of extinct species.

                    Whalen (1971:68-9), however, has more recently written that "the Cazador [stage] does not seem to qualify as a distinct stage, or cultural entity in the Cochise sequence, but rather as a functional variant of the Sulphur Spring stage." Whalen (1971:70) would prefer "to amalgamate the Cazador complex to the Sulphur Spring stage as a hunting aspect of that period."

                    Obviously, much more work must be accomplished before adequate conclusions can be made concerning the relationships between the Sulphur Spring and Cazador stages.
Chiricahua Stage. The Cochise Culture stage known as the Chiricahua was first recognized at a large, peat-covered midden near the mouth of Cave Creek on the eastern flanks of the Chiricahua Mountains, as well as from erosion channels, or arroyos, in Whitewater Draw (Thompson, in Sayles and others 1958:3). The material culture associated with the stage consists of milling stones with shallow basins, handstones, both planoconvex and bifacial percussion-flaked tools, hammerstones, and pressure-flaked projectile points. Sayles and Antevs (1941) believed that the Chiricahua Stage demonstrated a typological relationship with the Sulphur Spring Stage artifact assemblage and was ancestral to the later San Pedro Stage artifact assemblage. According to Antevs (in Sayles and others 1958:49), the Chiricahua Stage artifact assemblage differs from the Cazador assemblage chiefly in having a greater frequency and variety of flaked implements.

Chiricahua-style artifacts, particularly projectile points, once thought to have been intrusive (Sayles and Antevs 1941:18), are known from southwestern Arizona to northern Chihuahua to west-central New Mexico. In stratified deposits, Chiricahua Stage artifacts appear to be earlier than the San Pedro remains and much later than Sulphur Spring remains. Sayles (in Sayles and Antevs 1941:19) writes:

The place of the Chiricahua Stage in the [Cochise] sequence is also well-fixed. Material has been found in situ in horizons superimposed on the earlier stratum of the Sulphur Stage. The erosion channels containing material assigned to the Chiricahua Stage are earlier than those of the San Pedro Stage. The geological evidence for this is not well-established, but the typological correlations confirm the geological supposition that this stage is earlier than the San Pedro. There is no doubt of its being later than the Sulphur Spring, since it is found in direct superposition.

Excavations elsewhere in the Southwest (Dick 1965; Haury 1950) have supported the temporal relationship between the Chiricahua and San Pedro stages that Sayles noted.

San Pedro Stage. The last stage of the Cochise, identified as the San Pedro (Sayles and Antevs 1941), is known from at least the same geographic range as the Chiricahua Stage. The stage is characterized by both ground and flaked artifacts, but the latter are more frequent and varied than the former. Ground and/or battered stone artifacts in the San Pedro assemblages include milling stones with deep, oval basins; handstones that are larger than those of preceding stages; mortars; pestles; and hammerstones. Flaked artifacts include scrapers and planoconvex and biface axes. Polished, cruciform-shaped objects have also been found among San Pedro remains (Sayles and Antevs 1941:24; Cattanach 1966:18). Although Cattanach feels that these objects represent much later Salado (14th and 15th centuries) occupation, in northern Chihuahua they are commonly found in Archaic Period sites, most of which are represented by San Pedro Cochise projectile points (for example, Phelps 1968).
In summary, the Cochise Culture, as defined by Sayles and Antevs (1941), represents a major Archaic Period tradition that is restricted to the southern sector of the Elementary Southwestern Culture as defined by Irwin-Williams (1967). Many artifact types or "traits" of the Cochise tradition are similar to those of the greater Desert Culture (Jennings 1956). The Cochise Culture remains represent a hunting and gathering period in Arizona prehistory between the time of big-game-hunting Paleo-Indians and that of the later sedentary horticulturalists.

Ventana Cave

Between 1940 and 1942, the Arizona State Museum excavated the site of Ventana Cave under the overall direction of Emil W. Haury. Wilfred C. Bailey was in charge of the first two seasons, and Julian D. Hayden supervised during the last season. The site is located about 19 km west-northwest of Santa Rosa in the Castle Mountains of the Papago Indian Reservation in southern Arizona.

For most of the excavations, 50-cm arbitrary levels were used, particularly through the middle strata, where the stratigraphy was homogeneous. In the deeper strata, however, natural lines of stratification were followed (Haury 1950:48).

Research at Ventana Cave supported a sequential relationship between the Chiricahua Cochise and the San Pedro Cochise and suggested that the Archaic sequence at the site was influenced significantly by groups in California. There was no evidence of domesticated plants at Ventana during the Archaic Period. Haury did argue that the material remains indicated that the Hohokam were of local origin and represented cultural evolution from the Archaic Period hunters and gatherers (Haury 1950). Haury would modify his interpretations today.

Basically, three major strata contained cultural materials. The uppermost and most extensive stratum was that of the Midden (Haury 1950:54-8). Much of this stratum was dry and yielded invaluable perishable remains including baskets, sandals, cloth, wood, and mummified human burials. Most of the Archaic remains were assigned to the Chiricahua-Amargosa II Complex or to the San Pedro Complex.

The next lowest stratum containing significant archaeological remains was that of the Red Sand (Haury 1950:61). Charcoal, stone implements, and bones of modern animals were well represented in this layer. The prehistoric artifacts were assigned to the Ventana-Amargosa I Complex. A distinctive projectile point type which Haury called the Ventana-Amargosa was found in this level; points of this type resemble many of those from the Rosemont Study Area.

The lowest stratum yielding artifacts was termed Volcanic Debris (Haury 1950:62-7), which contained about 90 lithic artifacts, charcoal, and bones of modern and extinct animals. The presence of
extinct animal species suggests that some or all of these deposits are Pleistocene in age. Artifacts in this stratum were assigned to the Ventana Complex.

Attempting to date the Ventana-Amargosa I Complex, Haury compared four possible chronologies based on the work of Antevs, Hack, and Bryan (1950:528). These could place the origin of this assemblage as early as 8000 B.C. or as late as 2500 B.C. At present, interpretations of the Amargosa chronology are still founded on very few data. No radiocarbon dates are available. The Chiricahua-Amargosa II Complex immediately precedes the San Pedro at Ventana, and contemporaneity with the Chiricahua Cochise, at least in part, can be inferred. Ventana-Amargosa I may be contemporaneous with the earlier Chiricahua Cochise or may precede that phase altogether.

A significant shift in regional relationships is suggested by the data from Ventana. While the assemblage associated with the latest Archaic occupation at this site (San Pedro Stage) is very similar to that of Cochise sites in southern Arizona, the earlier phases more closely resemble the Amargosan assemblages to the west.

Bat Cave

In 1947, 1948, and 1950, Herbert Dick directed the excavation of Bat Cave, a large stratified site in western New Mexico that yielded many sherd, lithic, bone, horn, shell, and perishable remains. The site lies at about 7000 feet near the edge of Lake Augustín, which is of Pleistocene age. Most known occupation took place during the Archaic Period, and certain finds are especially important for the Cochise tradition. The site represents the only locality in the Southwest with a long evolutionary maize sequence (Jennings 1956:123). The sequence begins with a small, primitive, pod-pop type of corn and ends with types resembling modern races. These finds suggest that at least some groups during the Archaic Period were not only hunters and gatherers but also farmers, for the corn types found were fully domesticated forms that require human husbandry for survival.

The site is also important because it produced a sequence of artifact types, especially projectile points, that strengthened and added to the chronology of point types known for the Cochise tradition. Many of the point types from Bat Cave resemble those found in the Rosemont Study Area.

Both the corn and Archaic sequences, however, are only sketchily documented because of major problems in dating. First, the midden strata with human deposits were mixed (Dick 1965:Figure 10) and contorted in many parts of the site. Human disturbance from later occupations may account for much of this, but wood rat disturbance was also substantial (Dick 1965:Figure 10). Thus, it is clear that artifacts deposited from early periods are mixed with those of later periods. Second, the site was excavated in carefully controlled, 12-inch arbitrary levels. If single episodes of human deposits were laid down in
deposits of less than 12 inches, which they undoubtedly were, then it would be impossible to distinguish among artifacts from one episode and another. It is possible, in fact, that scores of single episodes of human deposition were represented in a single 12-inch level. This problem is compounded by the fact that the deposits at Bat Cave were not all laid down horizontally, the surface having been contorted at several times. Then, during excavation, the arbitrary levels might cut through several strata from different periods.

The inadequacies of the excavation technique are reflected by the inconsistencies in the radiocarbon dates (Dick 1965:17), which are somewhat questionable. When the samples were collected (1948 and 1950), radiocarbon dating was still in the experimental stage, and several C-14 samples are based on materials (such as corn cobs) that are less desirable than charcoal for dating. Five samples collected in 1948 were derived from corn cobs and wood from two small shelters adjacent to the main deposit in Bat Cave. Unfortunately, the exact proveniences of these first five specimens cannot be ascertained (Dick 1965:18). The second set of radiocarbon dates was analyzed in 1951 (radiocarbon dating was still in its incipient stage). Of this second set of samples,

most of the dates were obtained from small pieces of charcoal, picked by hand throughout a 12 inches level in a 5 by 6 feet block. It was necessary to use this method to obtain enough charcoal, and this might well account for some of the discrepancies in the dates (Dick 1965:18).

Dick (1965:18) further writes: "From the sampling standpoint, the most accurate date from the group may well be the date B.C. 3981 ± 310 years, from a hearth in the top of the buff sand." No domesticated plant forms, including maize, were found in the Buff Sand stratum. No C-14 samples were collected from Level VI, which contained maize remains. Dick brackets the age of the deposits, however, with two radiocarbon dates: 2981 ± 310 B.C. for the Buff Sand hearth and 3655 ± 290 and 912 ± 250 B.C. for Level V. Again, the discrepancies in radiocarbon dates (over 2000 years) suggest mixed materials and/or poorly controlled sampling techniques.

Only one date (2655 ± 290 B.C.) was run in 1953. Although it was based on charcoal and in "association" with the most primitive corn, the discrepancies in dates, mixed materials, and inappropriate sampling methods should suggest considerable skepticism in accepting the 3655 B.C. date as reflecting that of the earliest corn of the Southwest. It seems far more probable that the date of 912 B.C. for Level V is closer to the earliest corn date, but even this must be questioned.

It is interesting to note that at Tularosa Cave near Reserve, New Mexico, a primitive pod corn was found which is similar to the Bat Cave specimen (Dick 1965:93), but has been dated from about 300 B.C. to about 150 B.C. (Johnson [ed.] 1951:17-8). The dates from Tularosa Cave are much more useful than those from Bat Cave in determining the date of the introduction of corn into the Cochise Culture.
Dick designated 12 different projectile point types of Archaic Period age. Although there are problems in dating these types, a general trend can be defined (Dick 1965:Figure 24). Lanceolate-shaped and triangular-shaped points with straight or contracting stems are usually found in the lower levels. Triangular-shaped points with concave bases and side notches are next, while the latest styles are corner-notched with expanding bases. This general trend is duplicated throughout the southwestern United States during the Archaic Period.

Archaic Chronology

Determining the age of Archaic Period sites in southern Arizona has been an important archaeological problem since the period was first recognized. To date, a satisfactory temporal model for the period cannot be derived from the scant information available. More datable samples, extremely careful interpretations, and a reanalysis of past interpretations must precede a complete and final temporal model for the Archaic Period.

Initially, dating of the Archaic Period in southern Arizona was accomplished through geological interpretations. This method relied basically on geomorphological principles and associations with extinct and modern animal forms (for example, Sayles and Antevs 1941). Later, palynological analyses were used to correlate pollen spectra for inferring temporality (for example, Martin 1963b). The best evidence for interpreting the age of Archaic remains is based on radiocarbon dating techniques developed during the middle of this century (Libby 1955). Archaeomagnetic and dendrochronological samples have not been used, since clay hearths and datable wood have not been discovered. Obsidian hydration, which has some potential in southern Arizona, since many Archaic Period artifacts are made of obsidian, has also not been sufficiently developed.

Archaeological Evidence from the Rosemont Study Area

Thirteen archaeological loci have artifact assemblages containing early Archaic point styles. The earliest styles resemble those from Ventana Cave which Haury (1950:204) labeled Ventana-Amargosa. These points have triangular blades with parallel-sided stems, although there may be a slight expansion or contraction near the base. The bases from the Rosemont specimens are uniformly straight or slightly convex. Bruce Huckell (personal communication) reports the occurrence of this type at sites in the Tucson vicinity. In California, this point style is apparently associated with early Archaic assemblages of Pinto Basin age (Haury 1950: 203-04). Archaeological loci with artifact assemblages containing points that resemble the Ventana-Amargosa type are found in Table 3.

A single example of a Chiricahua Cochise point (such as Sayles and Antevs 1941:Plate XIc, d, f, g) was recovered. The point has notched sides and a concave base.
A few projectile points resemble those that Dick called Augustín points (1965:27-8). Generally, this style is small, thick, and roughly diamond-shaped. Both stems and blades are usually triangular, but the bases may be pointed or rounded. A few from Rosemont have serrated edges like those from Bat Cave (Dick 1965:27).

Archaic points represent diverse styles, and it has not been possible to assemble all the styles into any historical sequence yet defined on a local level. Some of the point styles resemble those from Ventana Cave, others from Bat Cave and other sites. An attempt was made to differentiate "Early Archaic" types from "Late Archaic" types for discussing possible behavioral changes during the Archaic Period. Early Archaic projectile points are represented by styles that are similar to Ventana-Amargosa types (Haury 1950:204), Chiricahua Cochise types (Dick 1965:26-7; Sayles and Antevs 1941:Plate XI), Augustín types (Dick 1965:27-8), and other point styles associated with pre-San Pedro Stage assemblages.

Late Archaic projectile points are those identified as San Pedro Cochise types (Dick 1965:25; Haury 1950:288-90; Sayles and Antevs 1941:25; Cattanach 1966:16) and styles that are equivalent in age to the San Pedro Stage. Late Archaic projectile points are generally characterized by corner notches and expanding stems, although there is a great deal of morphological variation among these styles.

In addition to sites having diagnostic projectile points, others have been tentatively identified as Archaic on the basis of similarities in overall assemblage with those sites having projectile points. Inclusion of these produces a total of 19 probable Archaic sites. It is likely that further research in the study area will add significantly to this number by permitting identification of sites now listed as "unknown aboriginal" as Archaic.

Post-Archaic Period

The occupation from 300 B.C. to A.D. 1400 or 1450 is represented by a semiagricultural adaptation to the Basin and Range Province in the Southwestern deserts. In 1950, Haury delineated the differences and similarities in material culture found along the main, permanent watercourses in southern Arizona and the impermanent streams of the desert areas. He termed those groups of related people who lived along the Salt, Gila, and Santa Cruz rivers the River Hohokam. The Desert Hohokam, then, occupied the area known as the Papaguería, which essentially is that area between Tucson and Ajo, on the east and west, and the United States-Mexico International Boundary and the Gila River Basin on the south and north. In general, River Hohokam culture is characterized by permanent habitation sites and temporary limited-use sites, wattle-and-daub construction, platform mounds, ball courts, water runoff retention and distribution devices, cremation of the dead, ornate items of shell and stone, and, except for the earliest periods, a distinctive red-on-buff pottery. It was the River Hohokam, as noted above, who settled along
the Santa Cruz River Valley and who influenced the development of the San Pedro and Empire valleys. These three areas, adjacent to the Rosemont Study Area, have been investigated for archaeological remains. The development of the cultural sequences for these three areas has relevance for the occupation of the study area.

Tucson Basin

The Tucson Basin can be defined as the area bounded by the Santa Catalina Mountains on the north, the Rincon Mountains on the east, the Santa Rita Mountains and Empire Mountains on the south and southeast, respectively, the Sierrita Mountains on the southwest, and the Tucson Mountains on the west. It is bisected by the Santa Cruz River and contains other major drainages, such as Pantano Wash, Rillito Creek, and Cañada del Oro, along which many archaeological sites have been located.

Little mention was made of the archaeological remains before the 1920s. Bandelier, in his travels throughout the southern portion of Arizona, made brief mention of archaeological ruins in the Tucson Basin (Betancourt 1978). In the early 1900s, a famous geographer visiting the Carnegie Desert Laboratory (now the University of Arizona Tumamoc Hill Laboratory) visited many of the known large archaeological sites in the Tucson Basin (Betancourt 1978:6). It was not until the 1920s that archaeologists began research projects in the Tucson Basin. These projects from the 1920s to the 1960s were sporadic and unsystematic and were focused on large sites situated along the major drainages; some limited survey work was conducted by students from the University of Arizona in order to locate archaeological sites for excavation. Other students undertook survey projects during this time to satisfy the requirements for graduate study.

This early work in the Tucson Basin formed the basis for the chronological sequence used today. It was during this first period of archaeological research that investigators tried to define and later refine the phase sequence from A.D. 1 to A.D. 1450. The data gathered on the projects are still being used today in the analysis of settlement and subsistence systems in the basin.

From the 1960s to the present, the impetus for archaeological research has come from salvage excavations and contract archaeology, as well as from research for graduate studies. Some projects were conducted as a result of highway construction activities, in compliance with existing state and federal legislation, or as institutional research projects.

Tucson Basin Post-Archaic Period culture history exhibits a sequence related to the Gila Basin sequence. Interpretation of the archaeology of the time period has been based on the surveys and excavations
undertaken. The Gila Basin was occupied as early as 300 B.C. In contrast, the earliest evidence for Post-Archaic Period settlement in the Tucson Basin is represented by ceramics and pit houses of the Snaketown Phase, A.D. 300 to 500, at the Hodges Site. One house was attributable to the Snaketown Phase. Phases earlier than the Snaketown Phase are represented at the Hodges Site by Gila Basin ceramics of the Sweetwater Phase. These ceramics were found in stratified contexts, but were not associated with structures.

The Hodges Site lies at the junction of the Santa Cruz River with Rillito Wash on the east side of the river, on the terrace above the floodplain. It was an extensive site, covering approximately 30 acres. Sheet trash was characteristic of the cultural debris; this was accumulated to depths of 0.5 m to 2 m. Even though there were some deflated trash mounds with possible stratified trash, tests in these produced unsatisfactory results. Some ceramics of the Snaketown Phase were also noted at the Hardy Site (AZ BB:9:14). Little information on subsistence and settlement patterns is available for this time period.

By A.D. 500, the Cañada del Oro Phase is represented at the Hodges Site and at the Punta de Agua sites, largely by the presence of sherds. Kelly (1978) defined the Cañada del Oro, Rillito, and Rincon phases on the basis of the ceramics associated with pit houses at the Hodges Site and the comparison of this material with the Gila Basin Hohokam sequence. Four houses with associated ceramics were identified as of the Cañada del Oro Phase. Greenleaf (1975) notes the presence of less than 25 examples of Cañada del Oro Red-on-brown at Punta de Agua that appear to represent a transitional type between the Cañada del Oro and Rillito red-on-browns.

Sedentary village sites first become the norm during the Rillito and Rincon phases (A.D. 700-900 and A.D. 900-1200, respectively). This time period saw a significant number of small villages placed along primary and secondary drainages in the Tucson Basin. During the Rillito Phase, there were more small villages located in secondary drainages than in the primary drainage of the Santa Cruz River. The Rincon Phase is characterized by settlements throughout the valley, in both primary and secondary drainages. All had shallow, rectangular pit houses and red-on-brown painted pottery. The villages also contained numerous grinding implements for processing plant foods, probably both wild and domesticated.

Few sites dating to the Rillito and Rincon Phases have been excavated in the Tucson Basin. Rillito and Rincon Phase pit houses were identified at the Hodges Site, the Punta de Agua sites, AZ BB:13:4, and the Hardy Site. At the Hodges Site, few houses could be identified as of the Rillito Phase, since construction of the later Rincon and Tanque Verde Phase houses destroyed the majority of the earlier phase occupation. The chronological sequence Snaketown, Cañada del Oro, Rillito, Tanque Verde was exhibited by house superposition; there was no definite structural relationship between Rincon and Tanque Verde. This transition was noted, however, in the stratified trash.
The Hardy Site, located on the west bank of the Pantano Wash and south banks of the Rillito Wash on a terrace above the Pantano-Rillito floodplain, yielded materials representative of the Rincon-Tanque Verde Phase transition. This transition has been poorly understood in the Tucson Basin. Greenleaf (1975), at the Punta de Agua sites, found structures from the Rillito into the Tanque Verde Phase. Of the ten Punta de Agua sites investigated in the salvage operations during 1965 and 1966, only five are discussed in Greenleaf's (1975) report. The sites were located 4 km south of Martinez Hill on ridges between arroyos or on the upper terrace of the earliest west channel cut by the Santa Cruz River. Opposite the sites on the floodplain of the Santa Cruz River is a large mesquite bosque which would have been a good habitat for a variety of animals. Two-thirds of the houses were assigned to the Rincon Phase, thus making it the major time of occupation. The long development during the Rincon Phase was indicated by pottery seriation, architectural superposition, introduction of new architectural shapes and stylistic embellishments, change of construction methods and remodeling, and, finally, by some transitional architectural experiments. The late structures were effectively dated by archaeomagnetic dates which extended the end of the Rincon phase into the beginning of the thirteenth century" (Greenleaf 1975:108).

A transitional period between the Rincon and Tauque Verde phases was also present at the Punta de Agua sites. Greenleaf (1975:50) notes that the Rincon Phase ceramics show a mixture of styles and technologies, and that "Rincon Red-on-brown clearly shows its evolution from transitional Rillito Red-on-brown to the described Rincon style and, finally, to the angular late Rincon types that presage the development of Tanque Verde Red-on-brown." Greenleaf discusses the late Rincon ceramics at length and also names Rincon Polychrome. Rincon Polychrome was also present at the Hodges Site.

Some authors have chosen to propose a new phase for this transitional time period. However, the evidence with which to do so is meager. Kelly (1978) did introduce a Cortaro Phase.

Salvage excavations conducted at AZ BB:13:4 south of Tucson in a bank of the Santa Cruz River revealed an occupation of the Rincon and Tanque Verde phases (A.D. 900 to 1300). The only features observed were rock-filled hearths. Four burials and two cremations yielded plainwares, Rincon Red-on-brown, Tanque Verde Red-on-brown, and chipped stone representing a tool kit for cutting and scraping tasks (Hemmings 1969).

The Classic Period in the Tucson Basin is represented by two phases: the Tanque Verde (A.D. 1200 to 1300) and the Tucson (A.D. 1300 to 1450). These phases represented times of change in
architecture and in ceramics, and most archaeological survey and excavation in the Tucson Basin has concentrated on them. The sites or projects discussed above also produced evidence of Classic Period occupation. These include the Hodges Site, the Punta de Agua sites, and the Hardy Site.

During the Tanque Verde Phase, pottery decoration became quite different from that of the earlier phases, emphasizing rectilinear design elements rather than the earlier curvilinear and repetitive motifs. In the Tucson Phase, other styles of ceramic decoration appeared, including Tucson Polychrome and Tonto Polychrome. This change was accompanied by introduction of a new architectural style consisting of rectangular, multiroomed, adobe structures standing entirely above the ground surface and surrounded by compound walls. This contrasts with the single-room pit houses of earlier phases. Burial of the dead shifted from cremation to inhumation. The sites most characteristic of this late period are the Martinez Hill Site and University Indian Ruin. The abrupt changes often are attributed to an alien population, for which the terms "Salado occupation" or "Salado influence" have been used.

Middle Santa Cruz River

South of the area defined as the Tucson Basin lies the middle Santa Cruz River Valley. This portion of the river has been defined as the area from Palo Parado to the Tucson Basin; it is bounded by the Sierrita Mountains on the northwest, the Santa Rita Mountains on the northeast, the Tumacacori Mountains on the southwest, and the San Cayetano Mountains on the southeast. All recent work accomplished in the middle Santa Cruz has been under salvage or contract archaeological programs. Such projects as those at Palo Parado (Brown and Grebinger 1969), Potrero Creek (Grebinger 1971a, 1971b), Punta de Agua (Greenleaf 1975), and Baca Float were done under contract with the Arizona Department of Transportation as a part of the statewide highway salvage program. The development of a cultural and chronological sequence for the area has been based on the knowledge gained from the above projects.

The earliest appearance of ceramics is at Palo Parado and Potrero Creek, where some Sweetwater and Shaketown ceramics were located but were not associated with any structures from those phases. In two surveys along the Santa Cruz (Danson 1946; Frick 1954), no settlements prior to the Colonial Period (pre-A.D. 500) were identified.

Danson (1946) surveyed the Santa Cruz Valley from its origin in southern Arizona into Sonora, Mexico, and north to Tubac, Arizona, covering approximately 50 km. His report contains no
map indicating areas surveyed or location of archaeological sites, but he notes that "the land surveyed, although for the most part lying directly on either side of the river, ran back in some places into the mountains, and followed a few tributary streams" (Danson 1946:3). Six types of sites were recorded; these included camp sites, house-ring sites, sherd areas, sherd and mound areas, compound sites, and miscellaneous sites (such as rock mounds and depressions, rectangular stone house-outline sites, rock-walled sites, and cave sites). Based upon the decorated ceramics, the settlements were dated from A.D. 800 to 1400.

The Cañada del Oro Phase is represented in the Santa Cruz by the Punta de Agua sites (Greenleaf 1975). Only ceramics were recovered; these materials are the first examples of the ceramic divergence away from the Gila Basin red-on-buff tradition. This red-on-brown tradition of the Mogollon parallels the design style of the red-on-buff wares, but exhibits smudging, polish, a darker paste color, and a general absence of slip.

By A.D. 700-900, many settlements were located in the Santa Cruz and its secondary drainages. This pattern in the middle Santa Cruz is also to be found in the Tucson Basin. The Potrero Creek Site (Grebinger 1971b), the Palo Parado Site, and three of the Baca Float sites (Doyel 1977) were occupied during the Rillito-Rincon phases.

All Baca Float sites were situated on the first terrace west of the Santa Cruz River. These three sites have been identified as habitation sites containing artifactual material characteristic of the Rillito-Rincon phases. The sites possessed plainwares, redwares, local red-on-brown wares and polychromes, and intrusives such as Rillito Red-on-brown, Rincon Red-on-brown, Nogales and Rincon polychromes, Rincon Red, and Trincheras Purple-on-red; a wide variety of ground stone artifacts; a general lack of projectile points; certain amounts of jewelry of shell and other nonutilitarian items; habitation structures; and a highly variable chipped stone assemblage, with a low ratio of finished tools to total assemblage. The subsistence data indicate a strong emphasis on domesticated and wild plant processing (Doyel 1977:95-6).

The Potrero Creek Site, located just north of Nogales, lies on a flat crest of a low hill near the fork of Nogales Wash and Potrero Creek, a secondary drainage of the Santa Cruz River. The site contained ceramics dating from A.D. 100-300 to A.D. 1450. However, architectural units at the site were characteristic of the Rillito and Rincon phases, dating from A.D. 700-1100. Apparently, the site was abandoned on the advent of the Classic Period. The analysis of the Potrero Creek Site materials focused on a distributional study of material culture aimed at delineating the structure of maintenance activities. Activities
identified at the site included plant or animal-skin processing areas and cooking areas. These activities were identified on the basis of distributions of lithic tool types, ceramics, pollen data, and nonarchitectural features. Based on his analysis, Grebinger (1971b:50) concluded that the substantial size of the site, the presence of the fully constructed dwellings and the kinds and structure of activities carried on there are characteristic of seasonal or permanent occupation. This leads to the conclusion that the Potrero Creek Site was not a temporary camp at which only one or two specialized activities were carried out.

Palo Parado is situated on a western terrace above the Santa Cruz River. The prehistoric Hohokam component at the Palo Parado Ruin (DiPeso 1956) was summarized by Doyel (1977:98), whose discussion will be utilized here.

The Hohokam component was substantial, consisting of approximately 50 houses arranged in irregular rows, a possible ceremonial house, a possible dance area and at least 75 cremations (DiPeso 1956:225-227). Large quantities of various pottery types were recovered, including northern wares, buffwares, red-on-brown wares and Trincheras wares, suggesting widespread contacts. Quantities of shell artifacts of various types, carved stone vessels and eccentrics, figurines, and other artifacts were present in abundance. A canal system may have served the village. All of these attributes generally reflect the character of primary village sites in the Hohokam core area located to the north.

According to Frick (1954), many settlements dating to this time period were noted in the Santa Cruz drainage between Tubac and Sahuarita. Frick's survey concentrated on the floodplains and river terraces, where access was good, and excluded most of the foothills of the Santa Rita and Sierrita mountains. He located sherd areas, compounds, and mesatop rock enclosures that fell within the Rillito, Rincon, Tanque Verde, and Tucson phases. Since most of the survey was undertaken on the floodplains and terraces, these are the areas identified as having the majority of the sites, most of which were Rillito Phase sites. Fewer sites were found in the foothills and were of the Rillito or Rincon Phase. Frick also noted the presence of cleared areas, indicated by rock piles, associated with the Rillito and Rincon phases. These cleared areas possibly suggest the practice of dry farming in the area.

After A.D. 1000 to 1150, there are few sites of the Tanque Verde and Tucson phases in the middle Santa Cruz. A Classic Period occupation exists at the Palo Parado Ruin (DiPeso 1956). At the Potrero Creek Site, the area was abandoned upon the advent of the Classic Period. Frick (1954) noted some sites of the Classic Period in his survey area, but most of these sites lacked architectural features.
According to DiPeso, the area was occupied up until A.D. 1000 by indigenous farmers called the Ootam. Doyel (1977:6) has summarized the events after A.D. 1000, noting that the indigenous culture had begun absorbing many Hohokam traits, such as pottery decoration styles and cremation burial. At this time and up until A.D. 1250-1300, according to DiPeso, the local Ootam were also being influenced by the puebloan Mimbres who introduced, among other things, the practice of using a white slip as a base color for pottery. Following this reconstruction, the culture of A.D. 1300 is seen as a blend and an outgrowth of three distinct populations, the local Ootam, the Hohokam, and the Mimbres. In actuality, it remains to be seen if different groups of people were moving into the area, or the changes in the local culture, whether Ootam or Hohokam, may be explained by participation in a widespread trade and interaction network.

After A.D. 1300, more changes became evident. At Palo Parado, the people began building houses of adobe situated in clusters surrounded by walls. Burial practices vary widely during this phase from several types of inhumation to several types of cremation. New ceramic styles, including polychrome, are added to the long lived local red-on-brown tradition which in itself had undergone considerable stylistic change. The origin and inspiration for all these changes which occur in this late period are not well understood.

The length of this late phase is not known, but may have persisted into historic times.

Empire Valley

The Empire Valley consists of an area of approximately 1300 square km about 80 km southeast of Tucson, Arizona. It is bounded on all sides by mountains; on the east are the Whetstone and Mustang mountains, on the south are the Canelo Hills, on the west are the Santa Rita Mountains, and on the north are the Empire Mountains. The primary drainage is Cienega Creek, which flows into the Pantano Wash in the Tucson Basin. It is along Cienega Creek and its secondary drainages that most archaeological research has been conducted. Two archaeological projects in the valley have provided information on the Post-Archaic cultural history of the valley. These are Swanson's (1951) survey of the valley and Eddy's (1958) survey and excavation in a more restricted area, that of the junction of Cienega Creek and Matty Canyon. Both projects provide information on settlement and subsistence patterns during the Post-Archaic Period.

Swanson spent three years carrying out an extensive survey of the Empire Valley. He defined an extensive survey as one that "...covers a larger (as opposed to a more restricted) geographic area, and surface material is gathered at random over each entire site, depending upon sampling for accuracy of information" (Swanson 1951:4). Attempts were
made to collect specimens from all portions of the valley. All collections were of surface materials. It appears that Swanson concentrated his survey along the primary and secondary drainages in the valley, since Figure 1 in his thesis indicates sites only around the drainages.

Fifty sites were located on the survey. These were classified as non-pottery sites, pottery sites, and historic sites. Of importance to this discussion of the Post-Archaic are the pottery sites, which were cross-dated by the presence of known types. All pottery sites were discussed under a scheme of early, middle and late periods, with the early period beginning at A.D. 300.

The two early period sites were characterized by a possible pit house; Alma Plain, San Francisco Red, and a possible Mogollon brown-ware; and basin metates, handstones, and few chipped stone tools, which when noted were found to be poorly made. The artifactual assemblage at one site consisted of milling stones, scraping tools, early pottery types (none painted), and a dog skeleton associated with the pit house. Implements of bone, shell, and projectile points and chipped blades are absent. The other site, on a small terrace above Sonoita Creek, contained Dos Cabezas Red-on-brown, San Francisco Red, and Alma Plain. Other materials characteristic of the Dos Cabezas Phase were not present. The pit house site probably belongs to the Penasco Phase of the San Simon Branch, and the surface scatter indicates the presence of the Dos Cabezas Phase of the San Simon Branch.

The middle period in the Empire Valley exhibited a change from the previous period, in that Mogollon pottery types were no longer present. One site had some Cascabel Red-on-brown, a type that shows Mogollon influence. Another site, above Cienega Creek, is distinguished by Gila Butte Red-on-buff and Gila Plain. Both sites were small, had few potsherds, and even fewer lithics (no diagnostic materials), and were assigned to the Cascabel and Gila Butte phases.

The late period in the Empire Valley exhibits the majority of the sites and was the time of densest occupation. This occupation was attributed to the Babocomari people. These sites were divided into Phase I and Phase II sites. Phase I sites, characterized by large amounts of trade wares (Tucson Polychrome, Gila polychromes, St. Johns Polychrome, Santa Cruz Polychrome, Trincheras Purple-on-red, Tanque Verde Red-on-brown, and Sells Red) found in association with Babocomari wares (Babocomari Plain and Polychrome), correspond to the Huachuca Phase. The only extensive site in the valley represented this phase. The site contained numerous stone-lined hearths and middens without any structures, and was situated on a terrace above Cienega Creek. In contrast, Phase II sites are small in size, lack middens or fire hearths, and contain trough metates, oblong manos, and keeled scrapers. They also lack trade wares so common during Phase I, except for Tanque Verde
Red-on-brown, which is found with the Babocomari wares. Phase II corresponds to the Babocomari Phase. Remains of both the Huachuca and Babocomari phases are present at some of the sites in the Empire Valley. Materials present are full-trough metates and three-quarter-grooved axes. Pit houses appear to be absent.

Swanson based his San Simon Branch phase assignments on the cooccurrence of certain ceramic and chipped stone artifacts and on a certain style of pit house in the Empire Valley that resembled those same artifacts and features in the San Simon area. At the early period sites, the presence of a pit house, a pottery assemblage characteristic of the Penasco Phase, and the association of certain chipped stone tools with Penasco Phase ceramics supported Swanson's assignment of this material to the Penasco Phase. Similar associations of artifacts accounted for the assignment to the Dos Cabezas Phase of another site of the early period.

Because the middle period sites exhibited Gila Butte Red-on-buff and Gila Plain and Cascabel Red-on-brown, they were assigned to the Gila Butte Phase and Cascabel Phase, respectively. Neither of the sites of this period contained any distinctive ground or chipped stone tools.

For the late period, the association of Phase I and II with the Huachuca and Babocomari phases was possible due to the large number of sites and to the definition of Babocomari wares as indigenous. The Huachuca sites were distinguished from the Babocomari sites by the almost complete lack of trade wares in the Babocomari Phase.

Swanson compared his survey findings with existing data on ceramic dates, geological associations, and other cultural traits in order to develop a chronology for the Empire Valley. It should be noted that there was a lack of trade wares during the early period on which to date the beginning of the period. The chronology (Swanson 1951:48) is presented below.

<table>
<thead>
<tr>
<th>LATE:</th>
<th>Babocomari: A.D. 1350-1450</th>
<th>A.D. 1150-1450</th>
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<tbody>
<tr>
<td></td>
<td>Huachuca: A.D. 1150-1350</td>
<td>(Babocomari)</td>
</tr>
<tr>
<td>MIDDLE:</td>
<td>Cascabel: A.D. 900-1000</td>
<td>A.D. 700-1000</td>
</tr>
<tr>
<td></td>
<td>Gila Butte: A.D. 700-900</td>
<td>(Mogollon-Hohokam)</td>
</tr>
<tr>
<td>EARLY:</td>
<td>Dos Cabezas: about A.D. 400</td>
<td>A.D. 300-500</td>
</tr>
<tr>
<td></td>
<td>Penasco: about A.D. 300</td>
<td>(Mogollon)</td>
</tr>
</tbody>
</table>
In 1957, Eddy (1958) began his field work in the Empire Valley in the V-shaped, 5-square-km junction of Matty Canyon and Cienega Creek. He was concerned with the interrelationship between culture and environment. In particular, he noted that cultural materials were associated with recent alluvial deposits in the study area. This suggested that the surface available for occupation was gradually rising due to alluviation. Thus, since the human cultural remains would be vertically spread throughout the alluvial depth, Eddy hoped to be able to identify the order of cultural and environmental events and to reconstruct the environmental setting of the past occupations. By using diagnostic artifacts from the archaeological sites, some of which could be cross-dated with types known elsewhere in southern Arizona, the alluvial stratigraphy could be correlated with the archaeological remains.

Post-Archaic cultural materials in the Cienega Creek Basin represented a possible Vahki-Estrella Phase through a Tanque Verde Phase. Recovered ceramics are affiliated with those found in the Tucson Basin. However, as discussed above, Swanson (1951) noted a shift in influences and intrusion of the people or traits from the Babocomari Valley and northern Sonora; he subsumed this influence under the Huachuca and Babocomari phases.

Eddy (1958) identified a shift in settlement pattern during the Post-Archaic. From the earliest phase, Vahki-Estrella, through the Rillito Phase, floodplains were used predominantly for the villages and camp sites. With the onset of the Rincon Phase, occupation occurred more often on ridges adjacent to the floodplains. The subsistence pattern was one of a mixed economy. Hunting, gathering, and small-scale agriculture were practiced. According to Eddy (1958: 104-05), conditions considered bountiful for the Archaic Period hunters and gatherers were limiting factors for the Post-Archaic agriculturalists. The Archaic Period occupants established temporary and semipermanent camps near cienegas, where water and plant foods would likely be more plentiful. The extensive grasslands would have yielded many species of grass for meal and game. Other environmental zones containing cacti, legumes, and other nuts or seeds would have been accessible. The factors limiting full-scale agriculture in the Cienega Creek Basin would have been "...a shorter growing season, denser growth covering the alluvial flats, restricted flood-plain area for farming, and isolation" (Eddy 1958:105). Furthermore, evidence of trade goods is generally absent, which suggests no major surplus of goods and only a minor exchange system. No evidence of irrigation agriculture was noted.

San Pedro Valley

The San Pedro River is a major northward-trending tributary of the Gila River. The river originates some 40 km south of the international border in Sonora, Mexico and flows for a distance of more than
240 km to its juncture with the Gila River at Winkelman, Arizona. The San Pedro River Valley can be divided into an upper and lower basin at about its midpoint. The upper San Pedro Basin extends from the international border to a point 18 km north of Benson known as the "narrow."). The lower San Pedro Basin extends from the narrow to the river's mouth at Winkelman.

A cultural hiatus exists in the San Pedro Valley from the end of the Cochise Culture (about 300 B.C.) to the arrival of Hohokam immigrants from the Gila River Valley during the early part of the Christian era. This situation is most likely artificial, being fostered in part by the lack of systematic survey and excavation. It is possible that an early Mogollon population such as that noted in the nearby San Simon and Sulphur Spring valleys (Sayles 1945) will eventually be found to fill the gap.

The Hohokam appear to have settled in the San Pedro Valley sometime prior to A.D. 500. Evidence for this early assignation stems from the presence of Pioneer Period ceramics and diagnostic items such as figurines at at least three sites in the lower San Pedro Basin. These three large village sites, Sosa Wash Ruin (AZ BB:11:18, ASM), Redington Ruin (AZ BB:11:2, ASM), and the Big Ditch Site (AZ BB:2:2, ASM), are interesting in that their long-lived occupancy, sizable trash mounds, and the presence of both "Snaketown"- and "Casa Grande"-style ball courts make the villages smaller scale models of the Hohokam type site of Snaketown (Gladwin and others 1937). There is little doubt that these villages must have served as integrative focal points for the Pioneer through Sedentary Period Hohokam populations in the San Pedro Valley. While there is no direct evidence for the use of canal irrigation at these sites, their location near the mouths of the tributaries to the San Pedro River with their broad, fertile floodplains argues for a subsistence pattern similar to that practiced in the Gila and Salt River valleys.

The Big Ditch Site (AZ BB:2:2) is one of the largest and longest-lived of the known Hohokam settlements in the San Pedro Valley. Based on the quantity of recovered sherds of Snaketown Red-on-buff and Pioneer Period styled clay figurines, it appears likely that the initial occupation of the site occurred during the Snaketown Phase, approximately A.D. 350-550. However, the major focus of occupation occurred during the following three Phases, Gila Butte (A.D. 550-750), Santa Cruz (A.D. 750-950), and Sacaton (A.D. 950-1150). On the basis of ceramic evidence, the Santa Cruz Phase and possibly the Sacaton Phase saw the largest number of occupants spread over the greatest spatial extent of the site. Presumably sometime during the Santa Cruz Phase (or possibly the Gila Butte Phase), a large, Snaketown-style ball court was constructed near the southeast margin of the site. Later, probably during the Sacaton Phase, a smaller Casa Grande-style ball court was built near the center of the Big Ditch Site.
The last occupation at the site took place sometime after the end of the Sacaton Phase. This most likely occurred before A.D. 1300, and is represented by several large, rectangular structures utilizing free-standing adobe walls reinforced with large cobbles. The presently known houses are all isolated units, but the possibility of at least a few contiguous rooms is great. A compound wall appears to be concentrated in a 2-3 acre area of the west-central portion of the site. However, it is notable that one of the earthen embankments of the Snaketown-style ball court is somewhat flattened and appears to contain linear arrangements of boulder-sized rocks. This phenomenon is probably attributable to the intrusion of these late prehistoric houses upon the earlier ball court. The only other conceivable explanation for the linear arrangements of rocks is that they represent some kind of reinforcing feature contemporaneous with the use of the ball court. However, this is an almost unheard of practice for ball courts tested so far in southern Arizona.

Not long after the Hohokam established themselves in the San Pedro River Valley, an interesting amalgamation of the Hohokam and possibly peripheral Mogollon populations such as that represented at San Simon Village (Sayles 1945) produced what has been termed the "Dragoon" Culture (Fulton and Tuthill 1940; Tuthill 1947). It is difficult to determine when this supposed cultural blending took place, but it seems to have occurred sometime between A.D. 500 and 800. By A.D. 900, the Dragoon Culture, with its distinctive red-on-brown pottery, possible inhumation disposal of the dead, and moderately deep pit house architecture, was established in southeastern Arizona. The nature of the relationship between contemporary groups of the Hohokam and the Dragoon Culture has yet to be explained, although it appears to have been an amicable one. The Dragoon Culture can best be thought of as a regional variant of the Hohokam of the Gila and Salt River valleys in much the same way as is the Tucson Basin Hohokam Culture.

The farthest extension of the Hohokam Culture in the San Pedro Valley, and in the Southwest in general, appears to have occurred during the late Colonial and Sedentary periods. A 5-mile-long survey of the terraces along the west side of the San Pedro River near San Manuel was recently accomplished (Masse, in prep.). Eleven small villages representing this period of expansion were located on the second and third terraces. On the basis of surface sherds, six of these villages appear to contain pure Sedentary Period components, while the other five also include Colonial and/or Classic Period components.

An interesting correlation is entertained between these villages and the presence of dry farming areas. Literally thousands of acres of dry farming fields consisting of rock piles, check dams, and contour terraces are to be found on the second, third, and fourth terraces between Redington and Winkelman (Masse, in prep.). It has been previously suggested
that these fields are the product of the Salado Culture (Hammack 1971). In support of this view, it was noted during the survey that, in some cases, agricultural features actually extended over areas of Sedentary Period pit house occupation. However, the seemingly nonrandom spreading out of these 11 villages in association with terraces with large field areas and the fact that five villages are adjacent to fields which, if more recent, should have intruded into the villages suggest that this subsistence technique may have originally been employed by the pre-Classic Hohokam in the San Pedro Valley. The idea of dry-farming agriculture may have been spread by contact with the Mogollon of east-central Arizona, where similar techniques appear to have been practiced at a slightly earlier date (Woodbury 1961).

The close of the Hohokam Sedentary Period and the century following (A.D. 1150-1300) was a period of population movements throughout the Southwest and extensive changes in previous culture patterns. Unfortunately, this period of time is poorly known in the San Pedro Valley. Of the handful of prehistoric sites which have been excavated and reported on, only Alder Wash Ruin (AZ BB:6:9), Una Cholla (AZ BB:6:17), and possibly Second Canyon Ruin (AZ BB:11:20) witnessed occupation during this turbulent period.

Alder Wash Ruin is a sizable village on the second terrace a few kilometers north of Redington (Masse, in prep.). The occupation of this site began late in the Colonial Period and lasted throughout the whole of the Sedentary Period. Of interest are four house structures which are stratigraphically later and noticeably different in appearance from others at the site. Three of these houses are rectangular with square corners and utilize free-standing adobe walls reinforced with either evenly spaced, large upright cobbles or posts. The floors of the houses have long lateral entry ways of more than a meter in length. One house exhibits a four-corner major roof-support post pattern, while another contains a confusing array of 21 interior postholes; the last house has only one interior posthole.

The floor-associated ceramics from these structures, although limited in number, indicate a substantial reduction in contact with the Gila and Salt River Valley Hohokam. The two pottery types most commonly occurring are San Carlos Red and an unnamed plain obliterated corrugated ware. Smaller quantities of Mimbres Black-on-white, San Francisco Red (Peppersauce Variety), Encinas Red-on-brown, and possibly Playas Red Incised were found.

The fourth house at Alder Wash Ruin appears to have been a large Sedentary Period pit house which was later remodeled. While the original subrectangular shape of the structure was not altered, the entry way, hearth, and two major central roof-support posts were relocated. Floor-associated sherds of an early style of Casa Grande Red-on-buff, Mimbres Black-on-white,
Rincon Polychrome, and plain obliterated corrugated ware suggest an early Classic Period remodeling. A possibly contemporaneous semi-circular cobble wall more than 50 m in length partially surrounds the structure.

A remodeled house at Una Cholla (Masse, in prep.) also falls within this time period. This shallow pit house, rectangular in shape with squared corners, has a long lateral entry way and may have utilized free-standing adobe walls. Ceramics associated with the two floor levels of the structure include San Carlos Red, San Carlos Red-on-brown, Tucson Polychrome, St. John's Black-on-red, Tanque Verde Red-on-brown, and a plain obliterated corrugated ware. Sherds of Mimbres Black-on-white, Reserve Black-on-white, and Gila Red found in extramural contexts may also be associated with this occupation.

On the basis of associated ceramics, these late houses at Alder Wash Ruin and Una Cholla appear to date to sometime between A.D. 1150-1250. It is worth noting that these cultural manifestations are strikingly similar to contemporaneous developments occurring in other portions of southern and central Arizona. Nearly identical houses have been reported from the Tanque Verde Phase of the Tucson Basin (Zahniser 1966; Fraps 1935). The ceramic assemblages are also similar, except that the San Pedro Valley sites contain only small amounts of Tanque Verde Red-on-brown.

Post-Archaic Period Occupation in the Rosemont Study Area

There are 104 sites representative of the Post-Archaic Period occupation within the study area. All sites fall within the time period A.D. 700 to 1400-1450.

Protohistoric Period

Introduction

One of the most significant research problems facing archaeologists in southern Arizona involves the history of Piman Indian groups. The modern Pima and Papago Indians are descendants of groups who occupied most of southern Arizona west of the San Pedro River and south of the Gila River during Spanish contact. The most important groups during early contact included the Papago, Gila Pima, Sobaipuri, and Soba or Sand Papago. Dynamic and drastic changes in the economic, religious, social, and territorial relationships of these groups took place throughout the Historic Period. Because of these changes, it has been extremely difficult to trace the historical development of Piman groups through time.
In addition to changes since Spanish contact, it is also apparent that significant changes occurred during the prehistoric era as well. Hence, southern Arizona archaeologists are particularly interested in understanding the relationships between prehistoric groups, such as the Hohokam, and later Piman groups. The time period from about A.D. 1450 to 1700 has been termed the "time gap" (DiPeso 1953: 2) in Southwestern archaeology. Archaeological evidence of the existence of human occupation is missing or confusing for many parts of the Southwest. In southern Arizona, most archaeologists recognize that the hiatus between prehistoric and historic times began with the end of the Classic Period Hohokam or Salado. This period includes the span of time between A.D. 1200 and 1450, during which large towns were situated along major rivers such as the Salt, Gila, Verde, San Pedro, and Santa Cruz. It is the period immediately following the Classic Period that has so confused archaeologists. To date, no archaeological site is known to represent the transition between the Classic Period Hohokam or Salado and the Early Piman occupation of southern Arizona.

Reliability of the "Time Gap" in Southern Arizona

There are relatively few absolute dates from prehistoric sites in southern Arizona and even fewer that indicate habitation after A.D. 1400. Five sites, including three large Classic Period Hohokam settlements and a smaller Salado ruin near Globe, have yielded absolute dates after A.D. 1400. These dates are summarized in Table 1.

At Escalante, on the Gila River near Florence, Arizona, the latest archaeomagnetic sample, from Room 16, produced a tentative date of A.D. 1425 to 1465 (Doyel 1974: 269-70). Three other late dates give a time range from well before A.D. 1380 to 1449. The walls of Room 6 at this site abutted those of Room 16, indicating that it was constructed some time after that structure was (Doyel 1974: 129). There is no evidence indicating construction at the site after the completion of Room 6.

The site of Las Colinas in Phoenix, Arizona has yielded most of the post-A.D. 1400 dates yet recovered. Of eight late dates, seven cluster around A.D. 1380 to 1420, and the single remaining date ranges from A.D. 1433 to 1467. Based on superpositional analyses, archaeologists noted that Feature 74, from which the date came, was one of the latest habitation structures at the site (Masse, personal communication).

From a Classic Period site (ASM AZ U:13:22) on the western fringes of the large site of Snaketown (ASM AZ U:13:1) on the Gila River, Haury reports three archaeomagnetic dates after A.D. 1400 (Haury 1976: 331-333). Haury does not discuss possible house construction sequences, even though numerous contiguous rooms were excavated. The period of overlap among all three late archaeomagnetic samples is A.D. 1420 to 1437; however, the plus or minus range for the dates does not encourage speculation on the time of abandonment for each room at the site.
Table 1. Post-1400 archaeomagnetic dates from southern Arizona

<table>
<thead>
<tr>
<th>Site</th>
<th>Provenience</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ U:15:3 (Escalante) after Doyel (1974:269-270)</td>
<td>Room 2, floor, compound</td>
<td>1430 ± 19</td>
</tr>
<tr>
<td></td>
<td>Room 4, hearth, compound</td>
<td>1410 ± 9</td>
</tr>
<tr>
<td></td>
<td>Room 16, floor, compound</td>
<td>1445 ± 20</td>
</tr>
<tr>
<td></td>
<td>Room 22, hearth, compound</td>
<td>1385 ± 18</td>
</tr>
<tr>
<td>AZ T:12:10 (Las Colinas) courtesy L. C. Hammack (unpublished tentative dates)</td>
<td>Feature 114</td>
<td>1385 ± 22</td>
</tr>
<tr>
<td></td>
<td>Feature 35, S. Hearth?</td>
<td>1395 ± 12</td>
</tr>
<tr>
<td></td>
<td>Feature 39</td>
<td>1385 ± 24</td>
</tr>
<tr>
<td></td>
<td>Feature 34, W. Hearth</td>
<td>1390 ± 36</td>
</tr>
<tr>
<td></td>
<td>Feature 41</td>
<td>1400 ± 17</td>
</tr>
<tr>
<td></td>
<td>Feature 40a</td>
<td>1410 ± 23</td>
</tr>
<tr>
<td></td>
<td>Feature 34, E. Hearth</td>
<td>1415 ± 23</td>
</tr>
<tr>
<td></td>
<td>Feature 74</td>
<td>1450 ± 17</td>
</tr>
<tr>
<td>AZ U:13:22 (near Snaketown) after Haury (1976:331-333)</td>
<td>Room 7</td>
<td>1410 ± 44</td>
</tr>
<tr>
<td></td>
<td>Room 8</td>
<td>1410 ± 27</td>
</tr>
<tr>
<td></td>
<td>Room 10</td>
<td>1440 ± 20</td>
</tr>
<tr>
<td>Hagen Site</td>
<td>Room 1</td>
<td>1385 ± 21</td>
</tr>
<tr>
<td>North Ruin</td>
<td>Room 6</td>
<td>1400 ± 47</td>
</tr>
<tr>
<td>South Ruin</td>
<td>Room 9</td>
<td>1430 ± 47</td>
</tr>
</tbody>
</table>

± = precision at 95% confidence level
At Snaketown, Haury reports a late radiocarbon date of A.D. 1600 ± 100 years. The date is based on fine charcoal from a crematorium (Haury 1976: 334). It is believed to be one of several erroneous dates from numerous samples collected at Snaketown (Haury 1976: 333). Fortunately, Haury collected two other samples from similar archaeological contexts which produced close dates (A.D. 865 to 1020 and A.D. 895 to 1075) in agreement with the basic chronology outlined by Haury. Of the latest date, Haury (1976: 166) writes:

Crematorium 1:10D, on the basis of an associated Sacaton Red bowl, was attributed to the Sedentary Period. Mesquite charcoal from this pit... dated A.D. 1660 ± 100.

Once again, something is drastically amiss with this value. Beyond the fact that we have no evidence that Sacaton Red lasted later than about A.D. 1200, the bones in the pit, those of a child, rested at a depth of about 1.5 m under undisturbed trash of the Sacaton Phase. The probability that this was a late intrusion is ruled out by the physical evidence. The reoccupation of Snaketown by the Pimas did not take place until more than 200 years after this date, and historically they did not cremate except when warriors were killed away from home. Furthermore, they did not make Sacaton Red pottery. The unacceptability of the two radiocarbon dates derived from crematory charcoal raises the disconcerting question about the reliability of other age values based on radiocarbon assays.

At the Hagen Site, a late Salado ruin south of Gila Pueblo near Globe, Young (1972: 90) reports three preliminary archaeomagnetic dates. Excavation has thus far been limited, and it is apparently impossible to document a building sequence for the pueblo. The three dates obtained for the site are useless for estimating a relatively accurate abandonment date, since the average plus or minus factor is 38 years, or a span of 76 years.

Assuming that the above absolute dates are accurate, there is strong evidence that southern Arizona was occupied in the third decade of the 15th century and possibly as late as the 1460s. In terms of relative dating, no late 16th or 17th century pottery wares, such as Zuni Polychrome, Sityatki Polychrome, or late Rio Grande Glaze Wares have been found in direct association with any habitation remains in southern Arizona. A Hopi polychrome bowl in association with a female burial was recovered from excavations at San Xavier; it probably dates to about 1700 (Ayres 1970). In addition, there is almost no superposition evident to suggest significant building expansion after the dates reported here. The question of a time gap, then, between the mid-1400s and the arrival of Europeans is a valid one. At this point, however, there are numerous hypotheses to explain why the gap exists, including regional and site sampling errors, lack of adequate preservation, and, finally, abandonment of the region during the "time gap."
The Hohokam-Pima Continuum Hypothesis

In his monumental book, *The Hohokam—Desert Farmers and Craftsmen* (1976), Haury presents the most recent statements supporting the Hohokam-Pima continuum hypothesis. He writes:

I nevertheless believe that Piman culture at the time of white contact was a watered-down version of the Hohokam system (1976:353).

Reasons for believing in the probability of a Hohokam-Pima continuity (including the Papago) have been outlined a number of times ... and repeatedly alluded to herein.... Long involvement with both the Hohokam remains and the Pima leads one into the gray area of subjectivity in thinking about their kinship. Such behavior among the Pima as holding victory dances on natural mounds becomes a signal of connections with observances held on artificial mounds of old; apparent similarities in the dance form, the circle dance, the enclosing of ritual areas with palisades, Mound 16, and the contemporary Children's Shrine, assume increasing importance as elements in the puzzle. Not the least of these factors is an inferred similarity in tribal outlook toward others. Snaketown was not a defensive site. It enjoyed an exceptionally long life and its occupants had no over-developed weaponry. It appears that the Pima reputation as a peaceful, nonaggressive people so well demonstrated in their helpfulness to whites during their westward expansion in the nineteenth century has been honestly won as an inheritance from antiquity. At the more basic level of economic dependence, similar irrigation practices, the same varieties of corn, heavy use of the tepary bean, and fish-eating have something to say about the continuity of product and habit.

But looking beyond these points, to assert that there was no connection between the Piman people and the Hohokam requires the removal of the latter from the area by about A.D. 1450 and the introduction of the Pimans with an impressively similar lifeway almost immediately. Contacts in the sixteenth and seventeenth centuries by Europeans indicate that the Pimas were comfortably adjusted to their desert habitat, a "fit" that bespeaks a long residence rather than exceptional cultural adaptability (1976:357).

As Haury admits, his evidence for supporting the continuum hypothesis (including both cultural and historical aspects) is mainly subjective, as it was in earlier assertions (Haury 1945: 211-12; Haury 1950: 542-43). It is also important to note that as far as ethnohistorians can tell, there are no European accounts confirming the presence of Pima or even Upper Pimans (Pima, Papago, Sobaipuri, and Soba)
during the 16th century. Furthermore, Europeans in the 17th century did not provide detailed descriptions of Piman groups in what is now Arizona until the 1680s. Even after contact, however, the documentary sources indicate all but a "comfortable adjustment" to their habitat (Doelle 1975; Ezell 1961).

The Sobaipuri-Salado Continuum Hypothesis

Based on excavations in the San Pedro River Valley from 1950 to 1952, Charles DiPeso arrived at the conclusion that:

Although there are several breaches in our understanding, the work thus far completed in the San Pedro Valley verifies the belief that there is no "cultural gap" in the above-mentioned time span [A.D. 1400-1700]. The supposed hiatus of culture may be nothing more than a failure to recognize the culture continuum in the area after 1450 A.D. (1953:253) . . .

The suggestion tendered in this report is that the Sobaipuri peoples of historic times came from an old indigenous stock which lived in the San Pedro Valley from approximately 10,000 B.C.

And concerning his most important site, Quiburi, DiPeso reports:

The ruin, which encompassed approximately 2,500 square meters, contained the remains of early Spanish buildings plus the trash of early Spanish contact ceramics in association with certain known prehistoric wares. Excellent association was indicated (1953:1).

Unfortunately, the excavations and conclusions relating to the site and DiPeso's research leave much uncertainty concerning the time gap in the San Pedro River Valley (Gerald 1968; Fritz 1977; Stacy 1977).

The Piman Immigration Hypothesis

One hypothesis relating to Piman origins suggests that there is no historical continuum in southern Arizona between local prehistoric inhabitants and early Piman groups. This hypothesis (Fontana, personal communication, 1979) involves the probability that, by the mid-1400s, southern Arizona was abandoned or, at least, its population was greatly decimated. This hypothesis complements those proposed for many other regions in the Southwest which also lack evidence for post-1400 or 1450 occupation during the prehistoric period. Early Piman groups are seen as immigrants to the region just prior to Spanish contact. It is possible in fact that Spaniards actually witnessed, albeit unknowingly, part of the Piman movement. The likely place of origin is the Tepehuan region of Mexico, since the inhabitants there belong to the same Pima-Tepehuan language stock (Kroeber 1934).
Protohistoric Period Occupation in the Rosemont Study Area

Only four sites are representative of the protohistoric occupation within the study area. Three of these four sites contained structures, and all contained ceramics similar to Whetstone Plain wares.

Historic Period

The Rosemont Study Area, located in the northeastern portion of the Santa Rita Mountains, was little affected by historical events in southern Arizona until after the Civil War. This was mainly due to its location, topography, and resources. Early Spanish and Mexican settlements were invariably located on the larger drainages, where water, level terrain, and fertile land were available. The Santa Rita Mountains parallel the eastern edge of the Santa Cruz Valley, while the San Pedro Valley lies at least 50 km to the east. Thus, the Rosemont Study Area was not adjacent to any major routes of travel or settlement areas. Only the Apache inhabited the area during the early historic period.

Several of the early Spanish explorers passed near the Santa Ritas, although no mention was made of them. Fray Marcos de Niza in 1539 and Francisco de Coronado in 1540 traveled through the San Pedro Valley in their search for the "Seven Cities of Cibola." In the 1690s, Father Eusebio Kino made several trips through southern Arizona. By the early 1700s, Jesuit missions and visitas had been established along the Santa Cruz River at Quebavi, Tubac, Tumacacori, and San Xavier del Bac.

The Pima uprising of 1751 momentarily drove the Spanish from southern Arizona. But by the next year, Spanish troops had returned and established a presidio at Tubac, mainly to control the Apache, who were ravaging the San Pedro and Santa Cruz valleys from the west. By the end of the 1760s, the San Pedro had been completely abandoned to the Apache. Until Mexico gained its independence in 1827, Spanish troops managed to keep the Apache in check, partly through subsidies, so that ranching, farming, and mining activities could be carried out in the Santa Cruz Valley.

With the removal of Spanish troops, there was a resurgence of Apache raids upon the settlements of the Santa Cruz. By 1850, most settlers had retreated to the Tucson area, leaving Tubac and Tumacacori abandoned. Cattle and men on their way to the gold mines of California were subject to constant danger to life and property. After the Gadsden Purchase of 1853, Camp Moore was established by the United States Army at Calabasas, south of Tucson. The garrison was moved east to the Sonoita Valley in 1857. Fort Buchanan was established here in order to provide protection against the Apache (Sacks 1965).

The outbreak of the Civil War caused all troops to be withdrawn from southern Arizona. Apache raids became more frequent. At this time, occupation of the Santa Cruz Valley was confined to Tucson and Pete Kitchen's Ranch, the only outpost between Tucson and Magdalena, Sonora.
Immediately after the Civil War, renewed efforts were made to contain and defeat the Apache. In 1867, Fort Crittenden was established near the former site of Fort Buchanan on Sonora Creek, and in 1877 Fort Huachuca was built on the northeast side of the Huachuca Mountains. Troops from these forts pursued Apache under Geronimo and Cochise and protected the ranches and mines which were springing up in the area (Brandes 1960:26-7, 40).

With the lessened danger, the new Territory of Arizona began to attract greater numbers of Anglo settlers, both solid citizens and outlaws. Mines and ranches were established in formerly undeveloped areas. The Southern Pacific Railroad was completed through southern Arizona by 1881, and in 1882 a branch line connecting Benson and Nogales was constructed by the New Mexico and Arizona Railroad, opening new markets and improving transportation facilities. The end of the 19th century marked the beginning of widespread economic development in southern Arizona, including the Santa Rita Mountains.

Apache

It is generally agreed that the entry of the Athabaskan Apache into the Southwest corresponded roughly with the first Spanish explorations (Schroeder 1974; Wilcox 1973). The Apache entered New Mexico from the north some time between A.D. 1400 and 1600. Spanish documents describe Athabaskans east of the Pecos in A.D. 1541. By 1680, the Gila Apache had spread south and west. During the next several years, they leagued with the Jano, Jocome, Manso, and Suma tribes and spread into south-eastern Arizona and Sonora.

The Gila Apache developed into the Chiricahua and Western Apache. Goodwin (1942:2-5) lists five groups and as many as 20 bands and semibands of Western Apache. In addition to the White Mountain, Pinal, Bylas, Tonto, and Aravaipa groups, there were 100 to 300 Manso or "tame" Apache living near Tucson in the early 1800s. The exact locations and names of these specific groups are difficult to sort out from the early accounts of military officers and Indian officials.

During the first half of the 19th century, the Apache developed a strong raiding pattern which reached its peak during the 1850s. The Mexicans had little ability to control Apache activities in Arizona, and when the United States acquired the area with the Gadsden Purchase, they also acquired more Western Apache to control. Although a tentative peace was reached with the White Mountain group in 1857, the Pinal and Tonto continued to terrorize the Santa Cruz and Sonora valleys, Tucson, Fort Buchanan, and the Pima (Bender 1974:52).
The outbreak of the Civil War and the consequent withdrawal of troops brought renewed raids. In March of 1861, a settlement in Sonoita Valley was attacked and burned.

Lieutenant A.D. Evans of the Seventh Infantry led a detachment from Fort Buchanan into the raided area. Proceeding down the valley of the Sonoita, the troops scoured the mountains south of the Santa Rita Copper mines. With a tame Apache as a guide, the scouting party traveled over a rough and rugged country on the west side of the Santa Rita range of mountains, but no Indians were discovered on the trail (Bender 1974:52).

Later in the same year, Apache raided Tubac and fled into the Santa Ritas. These raids were so severe that the town was abandoned. Sylvester Mowry complained that "we are eaten up alive by this cursed vermin. Every week they kill somebody and drive off scores of horses, mules, and cattle" (Bender 1974:28).

Until after the Civil War, there is little mention of the eastern side of the Santa Ritas. Due to the intense Apache activity north of the Sonoita Valley, this slope of the range was not exploited or settled until the late 1860s. In 1867, Fort Crittenden was established on Sonoita Creek to protect the ranchers and miners of the area.

In August 1870 a slaughter took place in Davidson Canyon, 35 miles southeast of Tucson. A mail courier reported that 75 Apache had killed 6 men, including "Curley Bill." He reported to the commanding officer at Camp Crittenden, who dispatched Capt. Moulton with three lieutenants and two companies of the 1st U.S. Cavalry, who went to the canyon where the remains of the wagons and men were found. They followed the Apache trail to Vail's station and to Rincon Canyon where they skirmished for 15 minutes. Capt. Moulton, realizing he was badly outnumbered, ordered withdrawal of the command and they returned to Crittenden (Brandes 1960: 27).

Two years later another incident took place in Davidson Canyon when two army officers from Ft. Crittenden were tortured and killed by Apache (Thrapp 1967:115).

In 1869, a new reservation policy was started. Camp Apache, Camp Grant, and Camp Verde were established but were not successful, as only one half of the Apache were gathered onto the reservations. General Howard established the San Carlos Reservation and settled the Chiricahua on reservations in eastern Arizona in 1872. Four years later, they were transferred to the San Carlos Reservation. General Crook's campaign finally solved the problem of the Western Apache, and in 1873 the last of the renegade Apache surrendered.

But in May, 1885, 124 Chiricahua Apache under Geronimo and Nachez jumped reservation at Camp Apache and San Carlos. During the next year, they attacked ranches and mines throughout southern Arizona. By this time, Fort Crittenden had been abandoned, and Fort Huachuca was the center
of military operations against Geronimo. Lieutenant Bigelow and his "buffalo soldiers" pursued Apache along the western slopes of the Santa Ritas in May, 1886. He mentions that many of the ranches were abandoned at that time (Bigelow 1958:185). In 1887, the Apache Kid and his band went down the east side of the Santa Ritas, stole horses at E.L. Vail's Ranch (V-R Ranch), and killed an old miner near old Camp Crittenden. In the same period, Freeman (1915) also reports a band of Apache "killing a rancher named Floyd, four miles north of Pantano, stole the horses of Ed Vail and George Scholefield near Rosemont, and passing on south, killed a man named Wimple, near Greaterville."

Geronimo and his warriors surrendered in August, 1886 and were shipped to a reservation in Florida. After this time, there was no more danger from Apache, and mineral development and settlement on the eastern slopes of the Santa Ritas began in earnest.

Apache in the Rosemont Study Area. Although we have abundant documentary records of Apache activity in the area, no direct archaeological evidence was recorded during the survey that could be attributed to their occupation. When the ephemeral nature of Apache raiding camps is considered, this is not to be wondered at. To date, only two Apache sites have been recorded in southern New Mexico and Arizona (Ferg 1977:302). There are no established criteria for identification of Apache material culture in the field. It is hoped that future excavation in the Rosemont Study Area will result in some material evidence of historic Apache occupation and use.

An isolated .45-70 caliber cartridge recorded on the north bank of Oak Tree Canyon may be related to military operations against Geronimo in 1886 and 1887. The head stamp indicates that it was manufactured at the Frankford Arsenal in 1884. This cartridge was the typical government issue for the Model 1873 Trapdoor Springfield carbine used in the Geronimo campaign.

Papago

In early Spanish times, the Upper Santa Cruz and San Pedro valleys were occupied by Sobaipuri Indians of Upper Piman extraction (Hackenberg 1964). These tribes were considered to be generally more warlike than the Papago to the west, and were used as a buffer against the Apache, particularly along the San Pedro River. But in 1762, the Sobaipuri abandoned the San Pedro and moved to missions along the Santa Cruz. Many of them succumbed to disease, and the rest consolidated around the missions of Tumacacori and San Xavier. At the same time, efforts were made to add Papago to the mission population, and by 1800 half of the mission Indians in the Santa Cruz were Papago. It is believed that most came from the Santa Rosa area. By 1850, the Santa Cruz, with the exception of San Xavier, was depopulated of Indians. At this time, the San Xavier Indians were predominantly Papago.
Spanish records indicate that Sobaipuri settlements were restricted to the main river valleys. By the 17th and 18th centuries, the Apache had gained control of the mountainous regions east of the Santa Cruz. Thus, we have no indication of historic use or occupation of the Santa Rita Mountains by the Sobaipuri Indians. For the more recent Papago occupation of the Santa Cruz Valley, more extensive documentation is available. Although the San Xavier Papago gathered wild plants frequently in the Tucson Mountains and occasionally in the Santa Catalinas, there is no record of their use of the Santa Ritas for this purpose (Hackenberg 1964:143; Fontana, personal communication).

Papago in the Rosemont Study Area. Historic Papago ceramics were identified at seven sites within the study area, listed in Table 2.

Table 2. Sites containing Papago ceramics

<table>
<thead>
<tr>
<th>Site</th>
<th>Type</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>X17-S4-L4 (SU3)</td>
<td>historic camp</td>
<td>1895-1950</td>
</tr>
<tr>
<td>M41-S2-L2 (SU18)</td>
<td>Chapo Ranch</td>
<td>1870-1920</td>
</tr>
<tr>
<td>X88-S1-L1 (SU23)</td>
<td>Rosemont</td>
<td>1870-1930</td>
</tr>
<tr>
<td>X88-S2-L1 (SU23)</td>
<td>Rosemont</td>
<td>1905-1920</td>
</tr>
<tr>
<td>HP18-S4-L3 (SU23)</td>
<td>Rosemont</td>
<td>1885-1925</td>
</tr>
<tr>
<td>HP18-S5-L3 (SU23)</td>
<td>Rosemont</td>
<td>1900-1930</td>
</tr>
<tr>
<td>HP18-S5-L4 (SU23)</td>
<td>Rosemont</td>
<td>1900-1930</td>
</tr>
</tbody>
</table>

In all instances Papago sherds were associated with mining or ranching activities dating back to the late 1800s and early 1900s. Although there are no records of actual Papago occupation in this area, the use of Papago ollas for water jars by both Mexicans and Anglos is well documented historically. According to Fontana and Greenleaf (1962:39), the chief item of Indian trade, it would seem, was pottery. Large earthenware water jars, or ollas, were the best containers available in which to keep drinking water cool. Papago women made these jars by the hundreds and today sherds from them can be found in abandoned ranches and mining camps all over southern Arizona. This trade probably began during the 1860's, reached its peak in the late 1880's through about 1910, and died as recently as the 1920's.

A photograph taken in Greaterville in 1896 (Figure 5) shows "a party of Papago Indians who came once a year to sell pottery" (Sherman and Sherman 1969:71). These same Papago may have also sold their wares in nearby Rosemont, or the vessels may have been sold in Tucson. There is no evidence of Papago use or occupation of the Rosemont Study Area.
There is no record of homesteading undertaken by Papago, and they were seldom hired for work in the mines. Poston observed in 1856 that they would not submit to the regimentation of the mines and were never any serious challenge to the Mexicans' almost complete monopoly on mine labor (Park 1961:79).

Lumbering

In 1851, the Santa Rita Mountains were described by A.B. Gray (Bailey 1963:79) as "covered with a dense growth of timber." These forests provided the raw materials for the first lumber to be produced in Arizona. In 1856, the Sonora Exploring and Mining Corporation, under the direction of Charles D. Poston, established their headquarters in the abandoned Tubac presidio. In order to refurbish the buildings and timber, the Santa Rita Mines crews were sent into the mountains to cut pine and manufacture lumber with whipsaws (Shenk and Teague 1975:14).

In the same year, William Kirkland established the first saw pit in Madera Canyon to produce lumber for local mines and military camps. He supplied lumber to Camp Moore near Calabasas and also to Solomon Warner's General Store in Tucson (Matheny 1975). In 1860, Kirkland sold out to Wm. S. Grant and T.W. Talaferro, government contractors. Shortly afterward, Grant also began lumbering operations in Sawmill Canyon. These early operations made use of a pit dug into the ground, over which the uncut logs were laid. Whipsaws were handled by one man standing in the pit and one on top of the logs.

At this time, there were a number of small-scale operations by private individuals, ranchers, and traders in the Santa Ritas. Danger from Indians was always present, as illustrated by the experiences of Larcena Pennington (Lockwood 1968:55-8). While her husband was cutting timber further up Madera Canyon, the young woman was abducted from camp by a small group of Apache. She was taken 25 km from camp, stabbed in the back with lances, and left for dead beside the trail. Upon reviving, she slowly made her way back to camp, a journey which took over two weeks due to her weakened condition.

During the Civil War, lumbering became difficult due to increased Apache raiding. Although timber was still cut in the Santa Ritas, sawing operations were moved to Tucson.

After the Civil War, lumbering revived in the Santa Ritas. During the 1860s, Thomas Gardner and J. Lander Young had a large mechanical mill in Sawmill Canyon. A decade later, Henry Lazard and Samuel Hughes had a steam mill operation in the same area. On the east side of the range, Thomas Gardner and Edward N. Fish had a mill in Gardner Canyon which supplied Camp Crittenden, Tucson, and Greaterville. It is likely that the lumber for Rosemont also came from this mill.
Lumbering never grew into a primary industry in southern Arizona, due to lack of population and transportation. It depended upon local trade and remained a secondary business of ranchers and traders. The construction of the Southern Pacific Railroad brought competition from California which resulted in the decline of local mills. After the 1880s, northern Arizona became the center of lumbering in Arizona.

Lumbering in the Rosemont Study Area. There is no evidence, either documentary or archaeological, that any lumbering operations were carried out in the study area. The altitude is under 5800 feet, and the larger trees are restricted to live oak, juniper, and small stands of pine. The lumber incorporated into the town of Rosemont and other mining camps probably came from Tucson or from the mill in Gardner Canyon.

Ranching

Since the 18th century, cattle ranching has been an important industry in southern Arizona. By 1700, Father Eusebio Kino had established the beginnings of ranching in the valleys of the Santa Cruz, the San Pedro, and the Sonoita (Wagoner 1952:10). Although these original herds were largely wiped out by Apache raids and Pima uprisings in the mid-18th century, by the 1780s there was a significant increase in livestock. Indians were kept in check by Spanish troops, and haciendas were established on large land grants. Although these grants were originally given for the development of mining, cattle became their most dependable source of income.

After Mexican independence in 1827, most ranches were abandoned due to increased Apache raids. Ranching did not become reestablished in southern Arizona until the 1870s. Herds of wild cattle were reported by travelers, but most of these were eventually killed off by the Apache. The lack of cattle in Arizona was so acute that livestock for the mines in California and, later, for the United States military forts and Indian agencies established after the 1853 Gadsden Purchase was driven from further east. Even in the 1860s, when American military protection allowed development of mining, cattle ranching was still risky. During the Civil War, troops were withdrawn and Apache raids increased. After the war, strenuous efforts were made to contain the Apache. Finally, in 1887 the Chiricahua Apache were shipped to Florida, and by 1890 the Apache wars were over.

According to an 1870 census, of the 5132 cattle in Arizona, only 1800 were south of the Gila River (Wagoner 1952). But as soon as the Apache danger was past, word spread of the excellent grazing in southern Arizona. Prior to 1880, most of the cattle were small herds of Mexican breeds handled by Mexican ranchers. By the early 1880s, all of the better grazing lands had been appropriated, and several large Anglo ranches had been established.
One of these was the Empire Ranch, located in an area of permanent water at the eastern edge of the Santa Rita Mountains. The 160-acre ranch was originally acquired by E.N. Fish from a nameless Mexican for $3000 in 1870. In 1876, Walter L. Vail and Herbert Hislop purchased the property from Fish. At that time, the headquarters consisted of an adobe house and corral, well, stable, and 20 acres of fenced fields. Within five years, the Empire Ranch had absorbed a great many of the smaller ranches in the vicinity and eventually included an area of 2600 square km (Stewart 1974:43-55).

The completion of the Southern Pacific Railroad through southern Arizona in 1881 provided easier access to markets and gave impetus to the ranching industry. Droughts in Texas during the 1880s caused many cattle to be moved into the lush grazing land of southern Arizona. These factors contributed to the overstocking and overgrazing which resulted in a 50 to 75 percent mortality during the drought of 1893 (Wilson 1967). Continuing droughts in the early 1900s and depressions in the cattle market forced many small holdings out of business or into consolidation. Stock was reduced and artificial water was developed. Since the beginning of the 20th century, ranches in southern Arizona have been devoted mainly to breeding, selling off calves and yearlings each year.

Ranching in the Rosemont Study Area. The historic ranches located within the study area reflect much of the general history of ranching in southern Arizona. Because of its location away from the main river valleys where Spanish and Mexican land grants were commonly situated, it is not surprising that no features or artifacts from this early period were identified. There is no evidence that the study area was utilized for stock raising prior to the latter half of the 19th century.

Five ranch sites have been identified within the study area (Figure 8). All were established or homesteaded before 1900. Three appear to have been abandoned by 1925.

Apache raids presented a definite hazard to these early ranchers. As late as 1886, a band under Geronimo stole stock from the ranches of Ed Vail and George Scholefield (Freeman 1915). These two ranches, V-R Camp and Hidden Valley Ranch, are still in operation. Corrals and water troughs throughout the study area attest to its continued use as range land.

Mining

The major economic and historic importance of the Santa Rita Mountains lies in their mineral wealth. Since the 1700s, they have been exploited for gold, silver, and copper. According to an old Spanish
account, "in the year 1769 a region of virgin silver was discovered on the frontier of the Apaches...at the place called Arizona, on a mountain ridge which hath been named by its discoverers Santa Rita" (Hinton 1878: 195). In 1817, Dionisio Robles led an expedition of 200 men from Mexico to find silver in the Santa Ritas. Although the expedition was attacked by Apache and driven out, they collected much silver (Hinton 1878: 196). Although the Spanish and Mexicans eventually located a number of small silver mines on the west side of the Santa Ritas, they found them extremely difficult to work because of Apache raids.

In 1856, the Sonora Exploring and Mining Company under the direction of Charles Poston and Herman Ehrenberg established headquarters in the abandoned Tubac presidio (Shenk and Teague 1975: 14). The company acquired title to 24 veins of silver ore, many of which had been previously discovered and worked by the Spanish and Mexicans of the Santa Cruz Valley. Labor was imported from Sonora, and in 1856 there were 1000 Mexicans residing in Tubac (Park 1961). During this early mining period, ore was extracted without elaborate machinery by the Mexican workers with techniques suited to areas where fuel and water were scarce. Mill-like arrastras and stone and adobe roasting ovens and smelters were common.

After American troops were withdrawn from Arizona at the start of the Civil War, claims in the Santa Ritas were again abandoned because of Apache attacks. In 1861, Tubac itself was deserted after "the Apache under Cochise came down from the Santa Rita Range in large force" (Hinton 1878: 188). From the outbreak of the Apache War until the peace treaty with Cochise in 1872, mining remained dormant in southern Arizona.

During the 1870s and 1880s, mineral exploration resumed in both the east and west flanks of the Santa Ritas. Placer gold was discovered in 1874, and by 1879 the town of Greaterville had grown to accommodate 250 Anglo miners and 500 Mexican laborers and their families. Water for the town had to be carried from Gardner Canyon by burro. By 1881, the richer streams had been worked out and the gold miners had left the district (Sherman and Sherman 1969).

Prior to the Civil War, little attention had been paid to copper exploitation in southern Arizona. Poor transportation made it difficult to economically mine and smelt other than extremely high-grade ore. However, announced plans for a railroad through the region caused a sudden flurry of exploration. The completion of the Southern Pacific Railroad to El Paso in 1881 started a copper mining boom which lasted for the next four years. Heavy machinery and raw materials for smelters could now be easily transported long distances.

The Helvetia District, which included Rosemont, was the major copper mining area in the Santa Rita Mountains. In 1879, the Narragansett Mine was discovered by J. K. Brown, and shortly thereafter Old Frijole and Old Dick mines were founded on the west side of the ridge. In 1881, the Omega Copper Company was organized by Tully, Ochoa and Company,
F. C. Hughes, and T. S. Jeffords to exploit the ore bodies on the west side of the ridge. In the next year, Columbia Copper Company was founded for the same purpose. Both companies built small blast furnaces which shortly closed down due to the 1884 depression and drop in copper prices (Tenney 1927-1929:252).

For the next ten years, little was done beyond exploration in the Helvetia District. In 1894, the expanding use of electricity increased the demand for copper. That same year, the Rosemont Copper Company was incorporated and built a 50-ton blast furnace on the east side of the ridge. This company was sold to Lewisohn Brothers of New York City in 1896.

In 1899, Helvetia Copper Company of New Jersey bought most of the claims on the west side of the ridge and developed the mining town of Helvetia. They built a new 200-ton blast furnace and a tramway. At the turn of the century, Helvetia was a boom town. A number of stage lines ran to Tucson, and the town boasted several saloons, a boarding house, school, Chinese laundry, shoemaker, barber shop, and a variety of mercantile stores (Feil 1968:85). Although the smelter machinery was operated by Anglo-Americans, a large proportion of the population was Mexican. These miners were paid wages averaging $2 to $3 per day and were usually in debt to the company store, where they bought all of their supplies (Park 1961).

Between 1901 and 1903, both the Helvetia and Rosemont camps were idle due to the fall of copper prices and company difficulties. The smelter at Helvetia had been destroyed by fire, causing 50 percent of the labor force to be laid off (Feil 1968:91). The Narragansett Mine, which was independently operated, continued to produce during this period (Report of the Governor of Arizona 1902:46).

The Michigan and Arizona Development Company reopened the Helvetia mines in 1903. Another blast furnace was built. In 1909, Schrader (1915:97) visited the town and reported that the company employed over 300 men, mainly Mexicans. The smelter had proven unsuccessful and had been shut down in 1907. Sixty tons of ore were hauled daily to the Vail railway station by wagon and shipped to the Old Dominion smelter at Globe.

In 1911, a combination of circumstances caused the final shutdown of the Helvetia mines. Not only did the price of copper fall drastically, but the ore body was exhausted. After this date, mining operations ceased permanently on the west side of the ridge in the Helvetia District.

During the first World War, there was a resurgence of activity on the eastern side. The Rosemont group of mines was reopened by Lewisohn Bros., and the Narragansett Copper Company stepped up production at their mine. Invention of the flotation-reduction process in 1916 made
extraction of copper from the ore more efficient and eliminated the necessity for large smelter works. After World War I, the mines became idle again except for intermittent shipments by lessees.

Mining in the Rosemont Study Area. Rosemont Camp and mines are located on the eastern slopes of the Santa Rita Mountains, approximately 6.5 km southeast of Helvetia. The major copper ore bodies run below the crest of the ridge at the heads of Wasp and McCleary canyons. Individual mining camps were established close to the major mines and particularly in areas of springs and running water. Rosemont Camp, with the smelter, hotel, post office, company headquarters, and various businesses, was located at the junction of Wasp and Barrel canyons.

In addition to the extensive deposits of copper in the western portion of the Rosemont Study Area, a small gold mine is located in the northeast corner, between Papago and Mulberry canyons. The Helena Mine was discovered in 1894, and was owned and operated by the Rosemont Mining and Milling Company in the early part of the 20th century (Schrader 1915:139). At that time, a camp of Mexican laborers and a mill were located nearby.

The major resource of the study area is copper, and most of the historical activity revolved around the mining and processing of this ore. The Helvetia-Rosemont Mining District produced predominantly copper, with silver forming less than 4 percent of the production and lead and zinc only about 2 percent (Popoff 1940:16).

The first recorded claims were established by William B. McCleary in the late 1870s and early 1880s. Born in Pennsylvania in 1852, he was brought to Tucson in 1879 by the lure of silver and General Crook's Indian Campaign. He immediately began prospecting in the Furnace Gulch area on the east side of the Santa Rita Mountains (Figure 6). During the early 1880s, he located and developed 30 claims in partnership with J. L. Rose of California (McCleary n.d.). At this time, the Chicago Mine was the major producer, and ore was transported by burro over the ridge to the Mohawk smelter near Helvetia.

In 1894, the Rosemont Copper Company was formed, headed by Rose and McCleary. The Report of the Governor of Arizona to the Secretary of the Interior for this year mentions Rosemont as an important copper-producing center. A small 50-ton smelter was erected by the company, and Rosemont, formerly McCleary's Camp, began to form around it. A post office, with McCleary as postmaster, was established on September 27, 1894 (Sherman and Sherman 1969:130). Unfortunately, the furnace frequently broke down and finally blew up.

Rosemont Copper Company ran into financial difficulties, and McCleary and Rose sold their claims and smelter site to Lewisohn Brothers of New York City in 1896 (Arizona Daily Citizen, June 26, 1896).
Figure 5. Papago Indians at Greaterville, 1870 (Arizona Historical Society)

Figure 6. William B. McCleary as a prospector (Arizona Historical Society)
The limited number of artifacts at this locus and their distribution in a relatively small area, could mean these were deposited during one or several occupations. Possibly these occupations included temporary habitation, such as a seasonal camp.

At this locus, soil deposition on larger artifacts is as much as 3 cm; possibly smaller artifacts may remain buried. Lack of evidence of erosion, a slightly sloping surface, and clustered distribution of artifacts favorably indicate a good preservation of the original context. However, that most artifacts are on the surface indicates a potential for other incidental disturbances by cattle and human activity noted in the vicinity.

XI-S2-L1 (ASM AZ EE:2:62)

The locus is on a low, flat-topped ridge near the edge of a broad, dissected pediment that slopes from the base of the Santa Rita ridgeline (Figure). Lithic artifacts are scattered over about a 2,700 m² surface that covers most of the ridgetop. Features noted are two concentrations and a sparse scatter of artifacts through the remaining area (Figure).

These artifacts are of varied materials, many, a distinctive blue-gray chert. Others are of white, gray, brown-gray and white mottled cherts, banded agate, yellow and brown jaspers, light gray and milky white chalcedonies and limestone. Also, one small obsidian flake from a small nodule was found. Some of these materials in small quantities may have been available in the vicinity. Others are probably not indigenous, which indicates they were brought from elsewhere for use at the locus. Most artifacts have signs of retouch or wear from use, which infers a hypothesis that some may have been brought as ready-made tools. Only the quantity of blue-gray chert at the locus indicates it may have been broken down from raw cobbles into flakes and core fragments, which possibly were intended for use as tools.

The larger concentration in a 250 m² area in the center of the locus is a scatter of 11 artifacts of varied materials. Among these are several edge-retouched flakes and core fragments, a patinated limestone "blade" (a long, thin flake), an unretouched core fragment, and a small plano-convex shaped core. The latter (Figure) has tiny, irregular flake scars and battering marks along part of its edge that may have come from use as a scraping or light chopping tool.

The smaller concentration in about 150 m² includes eight artifacts. Among these are two unretouched and an edge-retouched core fragments; and an edge-retouched "blade." Also, there are two plano-convex shaped artifacts; one is discoidal and the other, half discoidal. Both are similar to the illustration in Figure. There are also two thin bifaces that may be projectile points; one is a thin chalcedony flake fragment that may be the base of a roughly diamond-shaped projectile point. The other thin biface has the tip and possibly side tangs broken off (Figure).

About 16 artifacts were found scattered outside these two concentrations. These were one unmodified, non-indigenous cobble, three small, unretouched flakes, and several bifacial and unifacial edge-retouched or utilized flakes. Two of
Although Lewisohn Brothers erected a second one-stack 60-ton furnace, it was idle in 1898, and ore was hauled to Vail's siding to be shipped by railroad to El Paso (Report of the Governor of Arizona 1898:53).

During the late 1890s, Rosemont appears to have been a thriving camp. In addition to the smelter, it boasted a hotel, post office, and several mercantile establishments, one of which was run by Verdugo and Barcelo (Feil 1968:84). A news clipping from the period mentions an abundance of water and the possibility of a stage route from Tucson. Rosemont Camp appears to have been the administrative and supply center for the many individual mining camps which were located closer to the mines themselves.

The smelter was put into operation in June, 1899. Sulphide ore was heap-roasted in Helvetia, then brought over the ridge to be smelted. At this time, over 2000 tons of ore were piled at the surface of the Mohawk Mine waiting to be smelted (Report of the Governor of Arizona 1899:90). W. G. Schultz of Casa Grande was contracted to haul the smelted ore to Vail Station and deliver the 10 tons of coke consumed daily at the smelter. This coke was being brought from Virginia to Vail via the Southern Pacific Railway.

The subsequent history of the Rosemont Mines is sparsely documented. In 1908, the mines and smelter were closed due to an industrial depression (Popoff 1940:14), and by 1910 Rosemont Camp was almost deserted and the post office was discontinued.

It was not until the rise in copper prices during the first World War that the Rosemont group of mines was reopened. More than 1000 tons of copper with a value of $6,000,000 were produced yearly (Popoff 1940:14). Forty percent of this ore came from the Narragansett Mine at the head of McCleary Canyon in the northern part of the Rosemont District. This mine had been a steady producer even when other mines in the area had been forced to shut down. In 1915 and 1916, the Narragansett Mining Company employed 137 men and was producing 1400 tons per month (Arizona Mine Inspector's Report 1915-16). There is no mention of a mining camp in the vicinity, but it might be assumed that the miners were living nearby rather than in the abandoned town of Rosemont. The flotation-reduction plant just south of Rosemont probably is associated with this period of activity.

After the first World War, most of the mines remained idle. A 1927 news clipping mentions that eight men were employed to mine surface and shallow ores at Rosemont and that there were plans to run a tunnel into the Record-Excelsior Mine. However, production continued to be extremely low in the Rosemont District until the present day.
CHAPTER 6
SETTLEMENT AND RESOURCE EXPLOITATION:
INTERPRETATIONS OF THE ARCHAEOLOGICAL DATA

Introduction

This chapter deals with research problems related to the use of natural resources and the distribution of sites. The complex relationships between the location and organization of human settlements and group economic activities have often been recognized. In the Rosemont Study Area, it is possible to examine a variety of social and economic systems which operated over thousands of years. The basic outline of this long history is easily described. Archaic populations dependent on wild resources and living in small, relatively mobile groups were followed by post-Archaic agriculturalists. The intensity and nature of this later prehistoric occupation are surprising, since there is evidence of long-term villages and probable agriculture in the drainage areas in addition to the expected evidence of hunting and plant gathering. These prehistoric agriculturalists were followed by protohistoric groups, such as the Sobaipuri, by Apache, and ultimately by the miners and ranchers, who have been present during the past hundred years. Through these changes, the ways and places in which people live have been shaped by their need for resources and by the technologies available to them for exploiting these resources. Defining and explaining these changing strategies is necessarily an important focus of archaeological research in the study area.

Several kinds of data are useful in reconstructing these aspects of the prehistory and history of the study area. Functional interpretation of features and artifacts is among the most useful, but the environmental context of a site is also of great importance. While it cannot be assumed that current distributions of resources accurately reflect those of the past, they can provide suggestions. Data available from site excavations and, in particular, those derived from the study of pollen and of floral and faunal remains can eventually allow more accurate reconstructions of past environments.

The social environment also assumes importance in reconstructing prehistoric and historic settlement distributions. Trade as an important element in an economic system usually produces change in local subsistence activities and may lead to the development of central villages where this economic activity can be centralized. Archaeological data are the principal source of information on this aspect of the site environment.

The chapter is organized by major time periods: Archaic, Prehistoric, Post-Archaic, Protohistoric, and Historic. Survey data relevant to major research problems can be found in the accompanying volumes of site descriptions.
Archaic Period

Introduction

Archaic Period sites in the Rosemont Study Area provide an interesting opportunity for study of change in social and economic aspects of human behavior among hunting and gathering populations. Survey evidence suggests a lengthy occupation of the area during the Archaic. It should ultimately be possible to develop a reconstruction of shifting economic strategies, technological change, and related trends in social organization, and on the basis of this reconstruction to examine possible explanations for these events.

The first step in such a study is definition of a basic chronological sequence. Unfortunately, data from the Rosemont survey permit only a preliminary reconstruction of Archaic Period development.

Based on excavations like Ventana Cave (Haury 1950) and Bat Cave (Dick 1965), a few of the Archaic Period sites from the study area can be chronologically ordered on a relative scale through comparison of projectile point typologies. Points resembling those from the Red Sand layer of Ventana Cave are believed to represent the earliest evidence yet found for human occupation in the study area. Points resembling those from San Pedro Cochise sites in southern Arizona are believed to be the latest evidence for Archaic Period occupation. Whenever possible, archaeological sites are designated early Archaic (pre-San Pedro Cochise) or late Archaic (San Pedro Cochise).

Several chronologies of Archaic development in southern Arizona have been proposed. Some of the problems associated with these are discussed in Chapter 5. However, evidence currently available strongly supports the concept of a long Archaic development in the Southwest, originating at the end of the Pleistocene as faunal extinctions led to major shifts in subsistence strategies. Radiocarbon dating of samples from Sulphur Spring Stage sites in southern Arizona, including not only Double Adobe but also Lehner and Ventana, suggests that southern Arizona does not differ significantly from this pattern.

The following sections describe the kinds of artifacts that were used to identify Archaic Period sites and the activities inferred to have produced those sites. These two sections lay the groundwork for evaluating settlement distribution, stone material exploitation, faunal resource procurement and processing, and wild plant resource procurement and processing. It must be pointed out that these evaluations are tentative. Intensive research involving excavation, detailed analyses, experimentation, and regional comparisons should be conducted in the future.

Archaic Period Indicators

The best evidence of Archaic Period occupation of the Rosemont Study Area is the presence of small to medium bifaces with shaped and
retouched edges; these are believed to have been points for atlatl darts. When compared with ost-Archaic arrow points (which were extremely rare in the study area), these implements are heavier and thicker. They are usually produced by percussion flaking techniques. Their center of gravity is usually below midsection toward the base. The reader should refer to Chapter 5 for a discussion of the various types of projectile points found on the survey. Table 3 lists the archaeological loci that contained Archaic Period projectile points.

Thirteen sites have been identified definitely as Archaic on the basis of diagnostic projectile points. Many more archaeological loci are believed to represent Archaic Period activities, but diagnostic projectile points were not found at them. Besides points, the next best indicator of Archaic Period sites in the study area is a small to medium flake or core fragment that has been intentionally shaped or trimmed to form a circular, oval, or trapezoidal tool with a relatively steep, sharp edge. These artifacts include, but are not restricted to, forms called "thin flake discoidal scrapers" by Haury from specimens discovered at Ventana Cave (1950:323). Like those from the cave deposits, the Rosemont specimens are usually concave or slightly convex on their bulbar surfaces. Rarely, a specimen was found with secondary flakes removed from a bulbar surface. Normally this face showed no chipping. The material selected for these tools was predominantly chert, but some chalcedony examples were found.

The edges of these artifacts have been carefully retouched, and in many cases they show edge polishing due to abrasion during use. The edge angles of these artifacts vary from specimen to specimen and along different edges of a single specimen. Generally, the angles are estimated at 30 to 45 degrees, although more acute and obtuse edges were seen. At least one of these tools had an edge angle approaching 90 degrees after having been reworked, presumably to form a sharper edge. Table 4 lists the ten archaeological loci at which these artifacts were found; those marked with an asterisk included Archaic Period projectile points.

Two other possible indicators of Archaic Period remains in the Rosemont Study Area are 1) the relatively high percentage of edge-retouched flakes in an assemblage and 2) the dominance of siliceous stone artifacts over quartzite and rhyolite artifacts. At sites of known post-Archaic Period age, retouched flakes were less frequently found than at earlier sites. This has been noted in other regions of southern Arizona where Cochise assemblages and Hohokam assemblages have been compared.

Assemblages of known Archaic Period age seldom contained many artifacts of quartzite. Chert, jasper, chalcedony, and other siliceous materials predominated. Post-Archaic Period assemblages typically contained both quartzite and chert, but the former material seems to be dominant more often than not. It was concluded, therefore, that sites with a high siliceous/quartzite ratio (greater than 55 percent) may be more likely to be of Archaic age, while those with a low ratio may more often be of post-Archaic age.
Table 3. Archaic Period sites with projectile points

<table>
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<th>Site Number and Provenience</th>
<th>Material</th>
<th>Type*</th>
<th>Condition</th>
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</thead>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>X1-S2-L1, F4, AE23</td>
<td>Red-brown jasper</td>
<td>Ventana-Amargosa I</td>
<td>Tip broken</td>
</tr>
<tr>
<td>X1-S2-L1, F4, AE31</td>
<td>White chert</td>
<td>Unidentifiable</td>
<td>Base only</td>
</tr>
<tr>
<td>X1-S2-L1, F5, AE19</td>
<td>Milky chalcedony</td>
<td>Ventana-Amargosa I</td>
<td>Broken barb and broken tip</td>
</tr>
<tr>
<td>X1-S2-L1, F5, AE31</td>
<td>Possibly argillite</td>
<td></td>
<td>Broken tip and possibly barbs</td>
</tr>
<tr>
<td>X1-S3-L2, F1, AE21</td>
<td>Argillite</td>
<td></td>
<td>Broken tip and base; tip is a fresh break, and base is an old break.</td>
</tr>
<tr>
<td>X1-S3-L2, F2, AE7</td>
<td>Argillite</td>
<td>Ventana-Amargosa I</td>
<td>Broken tip (old break); artifact in 2 pieces due to fresh break.</td>
</tr>
<tr>
<td>SU2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X10-S26-L1, F2, AE1</td>
<td>Gray chert</td>
<td>Ventana-Amargosa I</td>
<td>Most of midsection and base present</td>
</tr>
<tr>
<td>X11-S1-L1, F1, AE1</td>
<td>Gray and brown chert</td>
<td>Ventana-Amargosa I</td>
<td>Complete</td>
</tr>
<tr>
<td>SU3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XMIXI-S5-L2, F1, AE1</td>
<td>Mottled chert (pink, white, brown, gray)</td>
<td>San Pedro</td>
<td>Broken at mid-blade; only base remaining; old break.</td>
</tr>
<tr>
<td>SU8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X22-S6-L1, F1, AE2</td>
<td>Rhyolite</td>
<td>San Pedro</td>
<td>Broken tip; old break, Tip and tangs broken</td>
</tr>
<tr>
<td>X83-S2-L4, F5, AE2</td>
<td>Possible chert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SU11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X10-S7-L5, F1, AE1</td>
<td>Black basalt-like</td>
<td></td>
<td>Tip and portion of base broken</td>
</tr>
<tr>
<td>SU18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X43-S1-L1, F2, AE2</td>
<td>Chalcedony (red, clear)</td>
<td>Bat Cave ?</td>
<td>Tip and one spur broken</td>
</tr>
<tr>
<td>X43-S1-L1, F2, AE3</td>
<td>Black silicate</td>
<td>San Pedro?</td>
<td>Broken at mid-blade; tip portion absent.</td>
</tr>
</tbody>
</table>
Table 3. Archaic Period sites with projectile points (continued)

<table>
<thead>
<tr>
<th>Site Number and Provenience</th>
<th>Material</th>
<th>Type*</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU21 M55-S1-L3, F1, AE3</td>
<td>Gray chert</td>
<td></td>
<td>Base broken</td>
</tr>
<tr>
<td>SU22 XI7-S8-L1, F4, AE2</td>
<td>Gray chert</td>
<td></td>
<td>Broken tip and possibly a tang; old break.</td>
</tr>
<tr>
<td></td>
<td>Blue-gray chert</td>
<td></td>
<td>Broken tang and possible small piece of tip.</td>
</tr>
<tr>
<td></td>
<td>Brown and white mottled chert</td>
<td>One edge serrated</td>
<td>Complete?</td>
</tr>
<tr>
<td></td>
<td>Pink rhyolite</td>
<td></td>
<td>Tip broken and one spur; badly weathered.</td>
</tr>
<tr>
<td></td>
<td>Not available</td>
<td></td>
<td>Tip broken</td>
</tr>
<tr>
<td></td>
<td>Clear quartz</td>
<td></td>
<td>Part of base broken and tang broken; portion of broken area is reworked.</td>
</tr>
<tr>
<td></td>
<td>Gray chert</td>
<td></td>
<td>Tip broken; heavily patinated.</td>
</tr>
<tr>
<td>SU23 X71-S3-L1, F2, AE1</td>
<td>Smoky quartz</td>
<td>San Pedro</td>
<td>Tip broken</td>
</tr>
<tr>
<td></td>
<td>Chalcedony</td>
<td>San Pedro</td>
<td>Tip, tangs, and part of stem broken</td>
</tr>
<tr>
<td></td>
<td>Smoky quartz</td>
<td></td>
<td>Tip broken and one side broken (including notch)</td>
</tr>
<tr>
<td></td>
<td>Brown quartzite</td>
<td></td>
<td>One tang and tip broken, flaked after break</td>
</tr>
<tr>
<td></td>
<td>White chert</td>
<td>Chiricahua-Amargosa</td>
<td>Complete</td>
</tr>
<tr>
<td></td>
<td>Obsidian</td>
<td>Chiricahua-Amargosa</td>
<td>Tip and portion of blade missing</td>
</tr>
<tr>
<td></td>
<td>Chalcedony</td>
<td>&quot;Fluted&quot;</td>
<td>Tip broken</td>
</tr>
<tr>
<td></td>
<td>Fine, dark silicate</td>
<td>Chiricahua-Amargosa</td>
<td>Tip broken</td>
</tr>
<tr>
<td></td>
<td>Gray chert</td>
<td>Chiricahua-Amargosa</td>
<td>Tip and one tang (?) broken</td>
</tr>
<tr>
<td></td>
<td>Possibly chert</td>
<td></td>
<td>Tip and tangs broken</td>
</tr>
</tbody>
</table>

* Points resemble the types listed
Survey data are, however, inadequate to serve as a basis for reliable generalizations concerning these characteristics of assemblages. Collection, laboratory analysis, and statistical analyses would be essential in determining whether there is significant variability with respect to material choice. It is also important to note that since sites were identified as Archaic primarily on the basis of two functional tool types, and post-Archaic sites on the presence of ceramics, our data are necessarily biased. A high percentage of retouched and utilized flakes at some Archaic sites may be characteristic of one or more activity sets, possibly associated with hunting. It is probably also significant that X17-S8-L1, with the greatest diversity in functional tool types of the known Archaic sites, has a lithic assemblage apparently composed of over two-thirds coarse-grained materials, which suggests that the preference in lithic material noted elsewhere may be specific to particular tool types.

There are doubtless many Archaic sites other than those now known (Table 5) in the study area. Identification of these sites must await further investigation. This will be a critical step in further studies, so that the distribution of functional site types associated with Archaic and post-Archaic occupations can be defined.

Activity Indicators

This section describes the inferred activities associated with five artifact types: projectile points, scrapers, cores and core fragments, utilized flakes, and flakes. Occurrences of these and other artifact types at sites thought to be Archaic are listed in Table 5.

Those artifacts described above as projectile points represent the best direct evidence of hunting activities in the study area. They are found in artifact assemblages ranging in size from two to 75 objects. At this point, it can only be assumed that the Rosemont specimens were used for hunting large (greater than dog size) game. Analyses in other regions have shown that many objects presumed to be projectile points were actually used for a variety of purposes.

In most cases, it was possible to determine whether fracturing was recent or prehistoric. Most of the points exhibited some patination or weathering of their modified surfaces. A recent break, then, was easily detected if the flake or fracture scars did not exhibit the same patination or weathering as the rest of the artifact. This permits determination of whether a point was broken or complete when discarded.

The planoconvex unifaces or scrapers are believed to have functioned as scraping and possibly cutting implements. The sharp edges are believed to have been rubbed perpendicularly against a material softer than the stone to pull or shear off layers of materials being scraped. The planer or bulbar edge was forced towards the scraped material. This seemed evident from Rosemont specimens, since tiny flake scars, apparently removed during use, had often been produced along the perimeters of the convex face of the objects.
Table 4. Archaic Period sites with planoconvex scrapers

<table>
<thead>
<tr>
<th>Site Number and Provenience</th>
<th>Material</th>
<th>Sites Containing Archaic Projectile Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Unit 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X1-S1-L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1, AE1</td>
<td>Light gray chert</td>
<td></td>
</tr>
<tr>
<td>X1-S2-L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4, AE27</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>F4, AE30</td>
<td>Mottled agate</td>
<td></td>
</tr>
<tr>
<td>F5, AE22</td>
<td>Milky chalcedony</td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>Fine-grained material</td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>Fine-grained material</td>
<td></td>
</tr>
<tr>
<td>X1-S6-L4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1, AE17</td>
<td>Mottled agate</td>
<td></td>
</tr>
<tr>
<td>Study Unit 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X17-S1-L4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1, AE1</td>
<td>Chert</td>
<td></td>
</tr>
<tr>
<td>Study Unit 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X40-S10-L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2, AE3</td>
<td>White chert</td>
<td></td>
</tr>
<tr>
<td>F2, AE4</td>
<td>Gray-black chert</td>
<td></td>
</tr>
<tr>
<td>F2, AE8</td>
<td>Speckled chert</td>
<td></td>
</tr>
<tr>
<td>X43-S1-L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2, AE14</td>
<td>Chert</td>
<td></td>
</tr>
<tr>
<td>Study Unit 22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X17-S8-L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4, AE14</td>
<td>White chert</td>
<td></td>
</tr>
<tr>
<td>F4, AE20</td>
<td>White chert</td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>Blue-gray chert</td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>M61-S2-L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1, AE1</td>
<td>Quartzite (dark purple)</td>
<td></td>
</tr>
<tr>
<td>Study Unit 23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X73-S10-L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1, AE10</td>
<td>White chert</td>
<td></td>
</tr>
<tr>
<td>F1, AE12</td>
<td>Red chert</td>
<td></td>
</tr>
<tr>
<td>X73-S15-L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2, AE2</td>
<td>Pink-white chert</td>
<td></td>
</tr>
<tr>
<td>F2, AE3</td>
<td>Dark gray chert</td>
<td></td>
</tr>
</tbody>
</table>
Table 5. Archaic sites and isolated artifacts in the Rosemont Study Area

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Study Unit</th>
<th>Stage</th>
<th>Artifact Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. X1-S2-L1</td>
<td>1</td>
<td>Unknown</td>
<td>Scrapers, cores, core tools, metates, flakes, utilized flakes</td>
</tr>
<tr>
<td>2. X1-S2-L1</td>
<td>1</td>
<td>Ventana-Amargosa</td>
<td>Points, cores, core tools, scrapers, flakes, utilized flakes, bifaces or preforms</td>
</tr>
<tr>
<td>3. X1-S3-L2</td>
<td>1</td>
<td>Ventana-Amargosa</td>
<td>Points, cores, core tools, other ground stone, flakes, utilized flakes</td>
</tr>
<tr>
<td>4. X1-S6-L4</td>
<td>1</td>
<td>Unknown</td>
<td>Scrapers, cores, flakes, utilized flakes</td>
</tr>
<tr>
<td>5. X10-S26-L1</td>
<td>2</td>
<td>Ventana-Amargosa</td>
<td>Points, flakes, utilized flakes</td>
</tr>
<tr>
<td>6. X11-S1-L1</td>
<td>2</td>
<td>Ventana-Amargosa</td>
<td>Point, utilized flakes</td>
</tr>
<tr>
<td>7. XM1X1-S5-L2</td>
<td>3</td>
<td>San Pedro</td>
<td>Points, cores, flakes, utilized flakes</td>
</tr>
<tr>
<td>8. X17-S1-L4</td>
<td>3</td>
<td>Unknown</td>
<td>Scrapers, flakes</td>
</tr>
<tr>
<td>9. X22-S6-L1</td>
<td>8</td>
<td>San Pedro</td>
<td>Points, cores, core tools, flakes</td>
</tr>
<tr>
<td>10. X83-S2-L4</td>
<td>8</td>
<td>San Pedro</td>
<td>Points, flakes, cores, core tools, bifaces, hammerstones</td>
</tr>
<tr>
<td>11. X10-S7-L5</td>
<td>11</td>
<td>Unknown</td>
<td>Point, cores, flakes</td>
</tr>
<tr>
<td>12. X40-S10-L1</td>
<td>18</td>
<td>Unknown</td>
<td>Scrapers, cores, preforms, flakes, utilized flakes</td>
</tr>
<tr>
<td>13. X43-S1-L1</td>
<td>18</td>
<td>San Pedro</td>
<td>Points, scrapers, cores, preforms, hammerstone, utilized flakes, flakes</td>
</tr>
<tr>
<td>14. M55-S1-L3</td>
<td>21</td>
<td>Unknown</td>
<td>Points, flakes</td>
</tr>
<tr>
<td>15. X71-S8-L1</td>
<td>22</td>
<td>Unknown</td>
<td>Points, scrapers, cores, core tools, biface, metates, manos, hammerstones, flakes, utilized flakes</td>
</tr>
<tr>
<td>16. X71-S3-L1</td>
<td>23</td>
<td>San Pedro</td>
<td>Points, cores, hammerstone, flakes, utilized flakes</td>
</tr>
<tr>
<td>17. X73-S10-L1</td>
<td>23</td>
<td>Chiricahua-Amargosa</td>
<td>Points, scrapers, cores, knife, preform, flakes, utilized flakes</td>
</tr>
<tr>
<td>18. X73-S15-L1</td>
<td>23</td>
<td>Unknown</td>
<td>Scrapers, mano, flakes, utilized flakes</td>
</tr>
<tr>
<td>19. M61-S2-L1</td>
<td>22</td>
<td>Unknown</td>
<td>Scraper (isolated)</td>
</tr>
</tbody>
</table>
It is possible that Archaic scrapers of this type were used in preparing animal hides for use, although they may have served other functions as well. Before skin dressing, for example, it is necessary to remove several layers of fat and membranous tissue from the flesh side of animal pelts. If this is not done, then softening of the skin by pulling, chewing, or other means becomes very difficult. If the skin is to be tanned, or preserved with some chemical solution, then the tissue tends to prevent the tanning solution from permeating the skin. With at least some skins, such as deer and particularly pronghorn, it is best to remove the membranous tissue immediately after the hide has been removed from the carcass. Otherwise, there is a tendency for the hair follicles to decay, which causes the hair or fur to "slip" or fall out. This is especially true if fresh skins have not been preserved with salt or other chemicals to retard spoilage and decay. Based on limited experimentation with self-manufactured tools of this kind, it was found that this type of scraper served as an excellent implement for removing these tissues from deer and other mammal skins. It should be mentioned, however, that although much of the tissue and fat must be shaved or sheared off, large portions can be pulled off by hand. The process is completed most quickly by a combination of pulling, cutting, and scraping.

Similar tools are described in the ethnographic literature as having served this purpose. Mason (1891: Plate LXXVII) shows a hafted chert and jasper scraper, identical to those from Rosemont, that was used by Eskimos of Point Hope, Alaska for scraping animal hides in skin dressing activities. Mason describes such tools as follows:

Scraper blades among the northwestern Eskimo are made from a plano-convex spall of black chert, jasper, etc., kept flat on the under face and chipped into shape on the upper face. The cutting edge is rounded and chisel-shaped, and is usually the broadest part of the blade. The general outline varies from circular, or even a flattened ellipse through infinite varieties, to an oblong parallelogram rounded at either end. Indeed, one and the same blade may be all of these forms at various periods of its existence (1891: 585).

Alternative uses for these objects might include the scraping of hair, wood, or other plants for domestic or subsistence purposes. It is curious that no similar artifacts were found in most site survey collections from the Empire Valley. Two "side scrapers" reported by Eddy from AZ EE:2:30, a San Pedro Cochise site, have general morphological characteristics of those from the study area but appear to be heavier, larger, and with less regular edges (1958:44). The one illustrated by Eddy (1958:Figure 10i) is about twice as large as most of those from Rosemont.

Cores were also found at Archaic Period sites, and many are of materials that are not common in the study area. Nonindigenous stone includes several varieties of chert, variegated jasper, and colored chalcedony. When quartzite cores were found, they were generally of
a fine-grained variety. Since lithic artifacts were generally not collected and no provisions were made for laboratory analyses, it is difficult to speculate on whether many of the lithic materials are indigenous to the study area or not. The information presented here is based on subjective impressions gained by the field crew during the survey. It was usually possible to determine if materials were indigenous to site areas or biotic community sections, and often an individual recognized a material type that had been seen at a quarry site or as natural nodules in an area. Future studies should organize sampling programs for obtaining information on raw material types, densities, and distributions throughout the region. In addition, carefully controlled comparisons can be made between lithics from quarry sites and those from habitation and limited-use sites.

With the exception of one large quarry site, all but two sites of known or assumed Archaic age lacked lithic concentrations of the same material. Elsewhere these are interpreted as flaking stations. This might suggest that flake production was generally performed only when individual tools were needed. This contrasts sharply with quarry sites and isolated flaking stations, where large numbers of flakes were removed from a core in one small locality.

Utilized flakes were also commonly found in Archaic Period assemblages. This refers to flakes that show evidence of intentional edge retouch or edge damage due to use. Unfortunately, it was seldom possible to differentiate between the two types of wear in the field. Some quarry sites also produced flakes with retouched edges. For the most part, these are believed to represent initial tool-processing activities.

The most common category of artifacts from Archaic Period sites was that of primary and secondary flakes which showed no observable evidence of having been utilized. These were generally recorded as small (3 cm), medium (3 cm to 5 cm), or large (5 cm) in size. The lack of observable evidence of use is probably the result of the following:

1. Some flakes, after being removed from cores, were discarded as waste and never used as tools. In some cases, several flakes from a single core were found together at a locus. These probably represent waste flakes.

2. Although not observable by eye, microscopic analyses will reveal that many "unutilized" flakes do show evidence of having been tools.

3. Some flakes, even though they have been used as tools, do not exhibit evidence of use either macroscopically or microscopically. Usually the finer, more glass-like materials show utilization better than denser, coarser materials. Use in processing different materials may also account for this variability.
The last two factors are particularly important to this study because many apparently unutilized flakes may prove to have been used as cutting implements. If they are not interpreted as tools, then other explanations must be proposed to explain the widespread and frequent occurrence of isolated or single flakes struck from a single core and often imported from outside the study area. No other logical explanation is proposed here. Bayham (1976), in an analysis of lithic distributions near Florence, Arizona, reached similar conclusions.

In developing activity reconstructions on the basis of the presumed functions of these and other artifact types, the observations of Whalen (1971:174) in his study of Cochise sites in the San Pedro drainage should be considered:

While it would simplify matters considerably to be able to assign only one or two functions for any given tool, ethnographic evidence... confirms the wide range of activities in which any single type of tool could be successfully employed. Since a tool is amenable to many different uses, its particular function at a site or subsite can be inferred with some degree of specificity by considering its association with other tools.

Therefore, only study of the full range of tool types present at each site will enable us to make acceptable reconstructions of the activities represented.

Stone Material Exploitation

As mentioned earlier, it is difficult to discern the origin of many of the rock types that were used to produce tools during the Archaic Period. The original research design was not detailed enough to determine the specific kinds of data necessary for evaluating this. A few notations, however, based on subjective inference and qualitative data can be made.

Archaic period groups were selecting fine-grained, siliceous materials like chert and chalcedony over coarse-grained igneous and metamorphic materials like rhyolite and quartzite. Although some chert and white chalcedony nodules were discovered during the survey, many material types seen at Archaic period sites were not found, suggesting that they had been imported for use from outside the study area. A likely source for some of these materials is the region to the north and northeast, particularly the Empire Mountains. Limestone, a dominant rock type in that region, often contains deposits of chert. However, specific chert deposits are not known.

In the study area, chert is predominantly found as relatively dense deposits in the northern one-half of Study Unit 3, in certain portions of Study Unit 24, and in Study Unit 8, and as isolated pebbles or cobbles through out the eastern two-thirds or so of the study area. One site, XMIX2-S1-L1, encompasses most of the dense chert deposits from Study Unit 3. Thousands
of lithic artifacts are scattered over a large hill and encompass over 200,000 m². The densest artifact concentrations are found on top of the hill, but cores, core fragments, and flakes are sparsely scattered along most of the slopes.

The artifacts are predominantly medium to large primary flakes of a variety of gray and brownish cherts, graywacke, and quartzite that are all probably indigenous to the immediate vicinity. Many flakes of fine chert, pink rhyolite, and colored chalcedony represent material types that may or may not be indigenous to the areas wherein they were found. Some of the flakes and core fragments have retouched edges, possibly indicating the manufacture of tools; both bifaces and unifaces are represented. Others have tiny, irregular flake scars along their edges which might be the result of wear. Small, unshaped quartzite cobbles have battered edges and were probably used as hammerstones for removing flakes from cores. Some features, interpreted as flaking stations, are visible, but because of the density of artifactual remains, many others may have been obscured.

The large size of this site and unusually large number of artifacts suggest that activities continued here for a long period of time. Flakes of identical materials were often found in nearby Post-Archaic Period sites, and many were recognized at Archaic Period sites. It is possible that other activities not directly related to lithic exploitation were also performed at the site. A single concentration of artifacts on the south edge may represent such activities (see site descriptions).

The other workable materials sparsely scattered in the study area include varieties of chert, quartzite, white chalcedony, and rhyolite. Quartzite and rhyolite, although present, were infrequently found with known Archaic Period remains. White chalcedony, distinct and probably inferior in flaking quality to colored chalcedony, occurred as small nodules on gravel-strewn ridge tops. Only seldom had they been broken, and no flaking stations exhibiting this material were found.

Chert nodules were also predominantly of small to medium size, but numerous cobbles over 10 cm in diameter were found. Usually these were coarse-grained materials, but some are indistinguishable from lithics found at Archaic Period sites. Due to a thick, light-colored coat of patina, their presence was often overlooked. These are located in a variety of places, such as hills, ridges, washes, and boulder outcrops. Often these were broken, some naturally, and some possibly representing attempts to "test" materials for their flaking quality (the places where these nodules were found were generally not recorded as archaeological loci). Flaking stations, represented by cores and flakes of isolated nodules, indicate that stone exploitation involved the procurement of these scattered materials as well as materials from quarry sites.

Variegated blue and gray chert was frequently found as pebbles, cobbles, or nodules in bedrock outcrops. Some Archaic Period assemblages include a relatively high percentage of this material, and it was originally
believed to be a possible Archaic indicator. Subsequent finds, however, demonstrated that blue-gray chert was also found at Post-Archaic Period sites. There is probably excellent potential for comparing other material types for determining source and usage of stone types.

To summarize Archaic Period stone exploitation, it has usually been impossible to determine whether lithic materials were obtained from within the study area or from without. The density of quarried stone from XMIX2-S1-L1 that resembles many Archaic lithics suggests that the locus is a likely source area for some of the artifacts. Others, including blue-gray chert, were probably collected as isolated nodules from several localities in the study area. Many material types, including colored chalcedony, jasper, and varieties of variegated cherts, must have been procured from outside the study area. It is possible that some or all of these nodules were collected in conjunction with other activities.

Faunal Resource Procurement and Processing

The following discussion attempts to define the relationships of archaeological remains to a general animal procurement and processing system. Arguments are presented for inferring certain kinds of activities, and hypotheses are formulated for dealing with the problem in the future.

Unfortunately, without better dating controls, it has been impossible to document changes in Archaic hunting through time or to assign relative dates to many of the archaeological remains thought to be Archaic. When possible, however, some notation is made distinguishing between the few known early and late Archaic Period sites.

Working Model. Since hunting was an inferred activity, a generalized model was postulated that indicates the activities and activity remains associated with aboriginal procurement and processing of animal resources for food and other uses (Figure 7). The model is based on assumptions concerning historic and contemporary hunting behavior by American Indians. Associated activities involving ceremonial rites are not considered, since evidence for their occurrence would probably not be represented in the archaeological record.

Any particular flow of activity as outlined in the model could produce different archaeological evidence. If animals were killed and transported to eviscerating sites, for example, the only evidence for the kill might be the discarded projectile point(s) used in the kill. If some cutting were involved to eviscerate or dismember the animal, the implements used may have been discarded and might be represented in the archaeological record. If the carcass was butchered, reduced, and utilized at one site, then there might be evidence for those activities. Note that negative evidence is not conclusive in evaluating hunting activities, since there is no guarantee that what was recorded during the survey was necessarily representative of artifactual remains at a locus or that certain tools would enter the archaeological record at all.
Fig 7
As is indicated in Table 3, only 13 sites contained projectile points of recognizable Archaic types. These sites may be assumed to have some association with hunting activities. Some of the remaining sites thought to be Archaic may reflect the activities to be described in the discussion which follows, although many can be expected to reflect other subsistence activities, such as plant procurement. The following discussion presents possible ways in which these sites may be related to hunting activities.

Procurement and Preliminary Processing Sites. This section describes the inferred activities associated with animal procurement and preliminary resource processing. Differences among artifact assemblages are discussed in terms of activity interpretations, and hypotheses have been formulated to help explain assemblage diversity.

Preliminary processing of mammals involves the evisceration, dismemberment, and butchering of animal carcasses for eventual use. As in the hypothetical working model (Figure 7), these activities need not be performed at the same locality. Terminal processing involves reduction of butchered animal carcasses into usable remains for consumption or for the production of tools or other items of material culture.

Based on the working model (Figure 7), it might be hypothesized that isolated flake implements were used to eviscerate animals at the kill site. Many of the isolated chert flakes, other single flakes, and projectile points in the study area are believed to represent kill and gutting sites. The presence of only two projectile points at these sites may represent the possibility that points were brought back to camp sites while in the carcass or for further use. This hypothesis is supported by the large number of broken and damaged points found at terminal processing camps.

The archaeological loci with two or more flakes and points as the only artifact types may also represent preliminary processing activities. The distribution of these sites is roughly the same as that of isolated flakes. For those sites listed, there is a higher percentage of artifacts of different source materials than there is of artifacts of one source material. Many of these sites, too, probably represent kill sites as well as eviscerating and/or dismemberment localities.

Cores and core fragments often comprise a relatively large percentage of site artifact inventory. In addition, the maximum core to flake ratio appears to be fairly low, which suggests that intensive flake production (such as at flaking stations) was not an activity at these sites. In addition, the majority of siliceous cores are of material types that are not indigenous to the localities in which they were found. This suggests that cores were carried to sites and discarded following their use. It is not known whether most of the cores had been exhausted. Many were fragmentary, and most were of medium size or smaller, but they may not have been usable.
It is also not possible to give a precise estimate of the number of flakes in an assemblage that were removed from cores in the assemblage. While this information was usually not recorded on the site forms, the percentage of flakes removed from cores at the loci appears to be variable. In many cases, there was no material correlation between cores and flakes to suggest that any of the flakes in an assemblage had been removed from the particular cores found at a site. If cores represent flake manufacturing activities, it would be expected that many more flakes would be found. Even if flakes were removed for use elsewhere, it is expected that some small flakes would be represented.

Most artifacts from these sites are medium to large flakes. Although some flakes showed edge retouch, few or none seemed to have been intentionally shaped. Occasionally, surveyors observed use wear in the form of polished edges or tiny flake scars, but flakes were seldom inspected in such detail. Future lithic studies should involve microscopic analyses for determining flake utilization. The greater number of medium flakes over large flakes may be determined by the sizes of available raw chert nodules; usually, medium-sized nodules were found, and only rarely were large chert cores found. In some cases, the medium flakes probably represent the large implements available for cutting. It may be generally presumed that large flakes were more desirable for cutting, since they usually have a greater edge length. For short-term, limited use on carcasses, however, this preference may not have been important.

In summary, it seems that cores, not raw materials, were carried to processing localities where individual flakes were removed for specific use. In many cases, these flakes were discarded because they were undesirable or because they were used and no longer needed. Others may have been removed from the sites for use elsewhere. Still other flakes were intentionally brought to processing localities for use. Presumably they were discarded or lost.

Numbers of artifacts vary from one site to another. A series of hypotheses, some of which may be mutually inclusive, is suggested for explaining these variations:

1. In order to adequately complete eviscerating and dismembering activities, it was necessary to use a greater number of stone implements. Gould, Koster, and Sontz observed that gutting by Australian Aborigines requires only a single stone flake (1971: 163). Presumably, however, dismemberment would require more durable tools (such as metal knives), frequent resharpening of tools, or replacement of tools. The hypothesis also implies that processing of smaller animals required fewer tools, while that of larger animals required a greater number of tools.

2. Sites with larger numbers of artifacts represent areas where two or more activities, conducted at different times, overlapped in the same place. It seems unlikely at this point that coincidence such as this was very common, given the fact that the sites are both numerous and usually limited in space.
3. Peripheral activities, such as tool maintenance, were also performed at these sites. These activities probably did not include the manufacture or repair of stone tools. If this hypothesis is credible, then future studies should be aimed at distinguishing among several activities that involved the use of stone flakes.

4. These sites represent spots that were frequented periodically for the same purpose. This implies that hunters had choice areas for preliminary processing activities.

5. The different numbers of stone artifacts represent different levels of animal resource processing. Single flakes might represent only eviscerating activities. The lack of shaped unifacial scrapers, however, suggests that the full set of these activities is not represented.

6. The different numbers of stone artifacts represent different group sizes. Future studies should consider the possibility that different material types or numbers of cores might also reflect group sizes.

7. Larger assemblages represent the processing of larger numbers of animals. This hypothesis implies that single animal kills were brought to a central area or that groups of animals were slaughtered at the same place.

8. The different numbers of artifacts among the assemblages are due to different species being procured. Specifically, differences in skin thickness, cartilage mass, and tendons may require different numbers and possibly different types of tools.

Terminal Processing Sites. The largest and most dense archaeological sites may represent localities where butchered animal carcasses were reduced for use and possibly where camps were established. The artifact assemblages differ from those of preliminary processing sites in several important respects.

First, the number of cores in assemblages from these sites is much lower than that at other sites. Those that are found are usually fragmentary or very small, indicating that they were probably exhausted. The only two flaking stations at Archaic sites are at those sites believed to be terminal processing localities based on the portable artifact assemblage. This suggests that a large number of flakes was produced in a relatively short period of time. In general, tool manufacture does not seem to have been a major activity.

Second, there is a high percentage of utilized flakes in the assemblages. Many of these have retouched edges or use wear. This suggests that tool maintenance and tool use were important activities. In addition, the variation among these kinds of artifacts is high.
Third, intentionally shaped unifacial scrapers are commonly found in these assemblages and could have been used in skin dressing. These artifacts were not found at small lithic scatters of the type believed to have been preliminary processing sites.

Wild Plant Exploitation

The use of wild plant resources by Cochise populations has been documented in a number of studies and has been discussed earlier in this chapter. Specific plants in use by Archaic populations have been identified at Ventana Cave (Haury 1950), Bat Cave (Dick 1965), and Tularosa Cave (Martin and others 1952). These include sunflower seeds, pine nuts, juniper berries, prickly-pear buds, red berries, walnuts, cattail seeds, fescue seeds, bluegrass seeds, Trisetum seeds, bulrush seeds, acorns, goose-foot seeds, salt-bush seeds, amaranth seeds, sagebrush seeds, primrose seeds, bear-grass seeds, blue grama seeds, coffee berries, saguaro buds and seeds, blue palo-verde seeds, mesquite seeds, cottonwood and willow seeds, and agave and yucca tubers. Many of these species are available in the study area today. As was noted in Chapter 3, however, it can be expected that climatic change has altered to some extent the distribution of plants and animals in the study area.

Whalen (1971:67) dates the Chiricahua Cochise at 3500 to 1500 B.C. and the San Pedro from 1500 B.C. until the introduction of ceramics at 300 to 200 B.C. The dating of Amargosan sites is uncertain, however. It is possible, therefore, to make only very general observations regarding the period of Archaic occupation in the study area. Occupation between 1500 and 300 B.C. seems certain. Earlier Archaic occupation probably dates between 3500 and 1500 B.C. and possibly earlier.

A period of relatively dry and warm conditions is thought to have existed after about 5000 B.C. (Chapter 3). While subsequent fluctuations have been noted, there is some disagreement about the intensity and effect of any changes. An apparent increase in moisture has been noted at about 1000 B.C., but Mehringer and Haynes (1965:23) note little evidence of major change. The effect of increasingly warm and dry conditions would be evident principally in elevational shifts in plant communities rather than in regional change in plant or animal availability. In the absence of a more detailed climatic reconstruction and a more precise notion of the period of occupation, it is not possible to accurately identify the role that such changes may have played in the Archaic occupation of the study area. However, it seems probable that occupation occurred sometime after a shift to a more desiccated environment, with an associated increase in the dominance of grasslands in the Santa Ritas. The importance of this for Archaic populations may be inferred from the list of exploited plants given previously.

Plant Exploitation Sites. On the basis of Rosemont survey data, only those sites having metates and manos in association with diagnostic points or scrapers have been identified as likely to have been associated
with Archaic Period plant-processing activities. These are X17-S8-L1 and XI-S1-L1. Many other sites were doubtless associated with plant procurement and processing but cannot be identified at this stage of study.

Whalen (1971:180-181) suggests a number of tool types which may have functioned in plant procurement and processing. These include blades (cutting), choppers (cracking nuts, chopping limbs from trees and leaves from agave), knives (cutting plant foods and meat, whittling wood), manos (grinding seeds, berries, nuts; cracking nuts), metates (grinding base for berries and seeds), planes (scraping, shredding, and chopping plant food), preforms (cutting), side scrapers (trimming wood, shredding plants for fiber), and unmodified flakes (cutting and scraping). This list suggests the wide range of tools which may be directly associated with plant procurement and processing in the study area.

Those sites identified as Archaic plant-processing locations on the basis of data from this survey are, of necessity, sites where multiple activities were carried out. These sites were identified as Archaic by the presence of projectile points or the characteristic discoidal scrapers described previously. X17-S8-L1 is a base camp with evidence of intensive occupation. Features, including cobble alignments and a possible structural foundation, are present. The range of artifacts includes, in addition to those already mentioned, cores and core tools, a biface, a hammerstone, flakes, and utilized flakes. The site is located on a hilltop close to a substantial secondary drainage.

XI-S1-L1 is similarly situated, but is located at the base of the mountainous areas in the western portion of the survey area. The assemblage at this site consists of a metate, a scraper of the diagnostic type, cores, core tools, flakes, and utilized flakes. Several chipping stations were identified, and evidence of use on some of the resulting flakes suggests manufacture of tools for use at the site.

Settlement Distribution

Amargosa and Cochise. The Amargosa and Cochise are unusual in that even in the earliest stage, Sulphur Spring, substantial reliance on plant foods has been documented. In the study area, however, all pre-San Pedro projectile points have been identified as Ventana-Amargosa I and Chiricahua-Amargosa. No evidence of Sulphur Spring Stage Cochise occupation or of "pure" Chiricahua Stage Cochise occupation was found. As was noted earlier (Chapter 5), the Amargosa is a very poorly understood phenomenon. At Ventana, the Ventana-Amargosa I assemblage did not include grinding stones or choppers. In the later Chiricahua-Amargosa II, several varieties of choppers as well as metates, manos, and a pestle were found (Haury 1950:340). The evidence from Ventana suggests some shift in Amargosan subsistence between these periods, if not in overall reliance on animals and plants for food, then possibly in kinds of plants exploited, the locations of these resources, or strategies for their procurement and processing.
A model of the settlement distribution and subsistence strategy of the Cochise in the Chiricahua and San Pedro stages has been proposed by Whalen (1970), who suggests that, rather than adapting to particular ecozones, groups emphasized specific plants and animals, many of which occurred in both riverine and hill environments, moving about seasonally to hunt or collect and taking advantage of successive "crops" available at varying elevations. Thus, any one functional site type might be expected to occur in several different environmental zones. Base camps might also be expected to occur in varying environments. Whalen supports this model with references to data from Ventana Cave, Bat Cave, and Tularosa Cave as well as from his own studies of sites in the San Pedro Valley.

Whalen also attempts to account for apparently more intensive occupation of hill environment sites by proposing aggregation of smaller bands specifically for exploitation of deer and pinyon nuts, which could be expected to be more dense in the higher elevations. Whalen proposes that the impetus for the final major shift in this pattern was the evolution of tripsacoid corn, replacing the much less productive chapalote available to at least some Cochise groups as early as the Chiricahua Stage.

The Rosemont Study Area. Since the ANAHAX-Rosemont Project represents the first large-scale intensive survey in the Empire Valley region and Santa Rita Mountains, it is difficult to analyze Archaic settlement patterns and distributions in relation to the surrounding region. It is interesting to note, however, that distribution maps for the Empire Valley show a marked difference between early Archaic sites and late Archaic sites. The Archaic Period designations are based on the presence and identification of projectile points, even though other sites, particularly those buried deep in the alluvial deposits of Cienega Creek, are certainly of late Archaic age (Eddy 1958).

The settlement distribution map shows that late Archaic sites are widely scattered in the Empire Valley as well as in the eastern part of the study area. Early Archaic sites, however, are almost all restricted to the mountainous areas. Four hypotheses are offered to explain this differential distribution pattern:

1. The settlement differences reflect different land-use strategies between early Archaic groups and late Archaic groups. The former groups were exploiting resources restricted to mountains and high pediments, while the latter were exploiting a wider range of resources from drainage marshes to pediment environments.

2. Archaeological remains of early Archaic settlement in the lower elevations have not been readily identified because of undiagnostic materials or because the evidence of their activities is sparse.

3. Remains of early Archaic groups have been removed or buried by natural processes.
4. Survey in the Empire Valley has been insufficient to locate early Archaic sites there.

While it is not possible to account for the absence of early Archaic sites in the adjacent valleys, it is relatively simple to broadly define the attraction of the study area for Archaic populations of any period. Archaic sites are located exclusively within the mosaic microenvironments of the eastern and central study area. No Archaic sites were situated in the limestone scrub communities or in the mountains to the west.

Reher and Witter (1977) have examined the importance of vegetation for distribution of Archaic sites and conclude that diversity of plant resources is the most critical variable. This is not confined to specialized plant procurement and processing sites, but includes work and base camps as well. The rationale for this is the mobility of hunters and the presence of children and hunters. It should be noted, in addition, that hunting activities can be expected to fall within the same environmental range. As is mentioned in Chapter 3, these environments provide suitable habitats for game animals.

Evidence from the study area strongly supports this interpretation of site distribution. Not only are all known Archaic sites within this area, but the possibility of specialized sites not yet identified as Archaic existing in the other environmental zones is negated by the nearly complete absence of any sites in these areas. Only one isolated flake was found in the limestone scrub communities; nothing was found in the mountains to the west. It can be confidently argued that Archaic use of the study area was oriented towards exploitation of the broad range of resources, both plant and animal, by a strategy designed to minimize the energy expended in acquiring these resources.

This differs from the model proposed by Whalen. There is no evidence that procurement took place at the highest elevations, even though the presence of communities similar to those below suggests that at least some desirable resources were available there. Although it is possible that differing climatic conditions made some critical difference in the species available, the Rosemont data suggest a pattern precisely the reverse of that proposed by Whalen. Whatever species were of interest to Archaic populations in the study area, emphasis was on use of an environmental complex concentrated within a clearly bounded area.

This does not, of course, deal with many pertinent aspects of Archaic subsistence strategy and site location in the study area and in the region. While it defines a broad strategy, there is much more significant information to which we now have no access.

Given the absence of a firm Amargosan chronology, it is unclear whether the area was occupied in the earliest phase of the Archaic. Ventana-Amargosa I may date to this time, but may represent a somewhat later period. It is consequently impossible to do more than speculate on what change in regional population distributions, environment, or
economy led to initial occupation of the study area. It is possible that the area was inhabited by the early post-Pleistocene as an increase in the reliance on plant resources made environments like this one more desirable. Alternatively, occupation may date to the Altithermal transition to a drier environment, shifting optimal gathering and hunting areas to cooler and wetter elevations. A change in economic strategy to a focus on environments like that of the study area might have happened in the absence of any climatic change. Finally, population in Rosemont and the surrounding areas may simply have been very low or nonexistent prior to the known Archaic occupation.

The survey data are also insufficient to define subsequent changes in the study area. Within the strategy suggested, emphases may have changed in the economic importance of various resources. Group organization may have altered with respect to group size, with possible seasonal aggregation. Domesticates may have been introduced into the study area, as they were elsewhere during the San Pedro Stage, potentially altering reliance on wild plants and animals as well as settlement distribution and group structure. Attempts to resolve issues of this sort must await further data.

Post-Archaic Period

The Post-Archaic Period within the Rosemont Study Area refers to the period between A.D. 1 and A.D. 1400 to 1450. It is characterized by permanent or semipermanent community settlements, some of which have cobble or possible subsurface structures; a dependence upon domesticated as well as wild plant foods; and the use of numerous kinds of tools and other artifacts that differ from those of or are unknown during the previous Archaic Period. Evidence within the study area cannot support the sequence of human development found in the Tucson Basin, Santa Cruz River Valley, or Empire Valley. In all, 102 loci of archaeological remains within the Rosemont Study Area represent Post-Archaic Period occupation (Table 6). Approximately three-fourths of the sites contained ceramics that could not be precisely identified or dated.

Post-Archaic Period Indicators

Like the Archaic Period, a number of different kinds of material remains can be used to document Post-Archaic Period occupation in the Rosemont Study Area. Some of these remains are better indicators than others. The following discussion will focus upon those types of remains, portable and nonportable, that are characteristic of the Post-Archaic Period occupation.

The best evidence for identifying Post-Archaic Period remains is based upon the presence of broken ceramics or potsherds. A variety of
Table 6. Post-Archaic Period sites in the Rosemont Study Area

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potsherds was found during the survey. These consisted of plain and
decorated types from the Tucson Basin, the Gila-Salt river valleys, the
Nogales, Arizona area, and the San Pedro River Valley (Dragoon series).
One hundred ninety-seven collections of potsherds were taken from the
Post-archaic Period sites; 47 of these are of undecorated ceramics and
the other 150 are of decorated ceramics. Unfortunately, most
of the ceramics on the sites were too small or too badly eroded to be
typed to a definite phase or time period. Because of this situation,
Bruce Huckell, archaeologist with the Arizona State Museum, had to use
broad categories and less definite identifications for the potsherd types.
This was especially the case when potsherds resembled certain types but
could not be definitely assigned to a type; they were termed possible
eamples of those types. The broad categories included Tucson Basin Series,
pre-Tanque Verde Red-on-brown, Rillito-Rincon Red-on-brown, possible
Rillito Phase plainware, unknown plainware, and unknown decorated.

The majority of the ceramics noted at the post-archaic sites were
plainwares which lacked any surface decoration such as paint. The sur­
faces of the plainware ceramics at the sites exhibit various hues of red,
orange, brown, or gray. Frequently, the exterior surfaces had been smoothed
and not polished. Tempering material usually included sand and/or mica. Sherd thicknesses averaged between 0.5 cm and 1.0 cm, and in many cases
there were noticeable differences in sherd thickness for single specimens.

The plainware ceramics collected from sites in the study area were,
for the most part, impossible to identify as to type. Most of these ceramics
were identified as unknown; a few could be identified as Tucson Basin plain­
wares or as Salt-Gila River Basin buffwares. Since many of these ceramics
could not be identified as to type, there is the possibility that they could
have been locally produced. Some usable clay sources were noted in the
study area.

Doyel (1977:26) summarized the difficulties in identifying plainwares
for the Santa Cruz drainage. These problems are applicable to those in the
study area for identifying plainwares. Doyel noted that:

Plainware pottery from the Santa Cruz drainage has traditionally defied
the typologist, so much so that Kelly (1978) and Greenleaf (1975) did
not attempt to name the types represented in the Tucson area. This is
apparently due to the generalized nature of the type and to the large
amount of variability found in any assemblage at any point in time.

The redwares noted at the archaeological sites resembled those
redwares in the Tucson Basin Series and Dragoon Series. These redwares are
slipped on either the interior or exterior surface or both. Temper is
mostly sand with some mica, and the color of the surfaces is a distinctive red.
Greenleaf (1975) has presented a type description for Rincon Red which
seems to fit some of the redware sherds from the study area. Haury's (1936)
description of San Francisco Redware likewise fits some of the sherds found
in the Rosemont Study Area.
The decorated wares of the study area are representative of the Tucson Basin series and Salt-Gila River Basin red-on-buff wares. Greenleaf (1975:45) aptly cites Officer (1961) on the relationship of the Tucson Basin ceramics to other areas. Officer observed that Tucson pottery appears to be intermediate between Hohokam red-on-buff and Mogollon red-on-brown, an ambivalence entirely expectable from its intermediate location. On the one hand it has pronounced Mogollon affinities in its close-grained paste, its polish, its relative absence of slip, its utilization of smudging; and, in certain vessel forms, a preference for geometric ornament. The Gila Basin rose-colored paste with its excessive porosity, its chalky slip, its fugitive pigment, and its mat (matte) surface seems generally foreign to Tucson. On the other hand, shape and ornamentation adhere closely to the Gila Basin patterns (Officer 1961:19) . . .

In the last analysis, therefore, our dating rests upon the establishment of local phases stylistically, and presumably temporally, equivalent to those of the Gila Basin (Officer 1961:12).

While the red-on-brown ceramics could be distinguished from the red-on-buff series at Rosemont based upon the above observations, the types Rillito and Rincon Red-on-brown were often difficult, if not impossible, to sort. Many of the potsherds that were small in size did not contain complete design elements. Identifications could only be made as possible Rillito, possible Rincon, Rillito-Rincon, or pre-Tanque Verde. Doyel (1977:30) has noted the problems in trying to distinguish Rillito and Rincon Red-on-brown:

Of all the Hohokam and Hohokam-related decorated pottery, perhaps the most difficult to sort typologically are the Santa Cruz-Sacaton and Rillito-Rincon series. There are certain hallmark or "classic" indicators as to type, but many designs and technological attributes tend to overlap and merge, leaving only a small set of attributes which can be sorted with some confidence. This is to be expected with pottery types which involve long term developmental histories.

Nevertheless, some potsherds were sorted as Rillito Red-on-brown. In general, Rillito Red-on-brown exhibits unslipped surfaces, small amounts of mica temper, and a deep red paint. Designs are well executed with thin line work. The most common designs are curvilinear with "running independent or connected elements placed in horizontal or diagonal lines" (Doyel 1977:30). Other common design elements are discussed by Doyel (1977:30):

Fringing elements and trailing lines are strongly represented, and cross-hatching is common, as are alternating bands with hatching. Animal forms are also common in the Rillito phase material from the Tucson Basin.

The Rincon Red-on-brown wares are an outgrowth of the Rillito materials. As Greenleaf notes (1975:48-49),
it is heavier, designs are more cursive and open, and the brushwork is more careless. Smudging appears deliberate and increases in favor. Bowl interiors may be smudged and polished over the decoration. As a result, many sherds appear red-on-gray or red-on-black. ... Exterior trailing lines are fewer ... In general, Rincon designs are noted for plaited band arrangements, an increase in fringed lines and panels, and an increase in hatched bands and in single scrolls.

The red-on-brown series in the Tucson Basin is paralleled by the Gila-Salt Basin red-on-buff series. The only red-on-buff ware identified to type at Rosemont is Santa Cruz Red-on-buff. This type has many of the characteristics of Rillito Red-on-brown, except it is slipped with a buff, chalky slip, has a more micaceous temper, more examples of life forms, and more eccentric vessel forms. The typical design elements and layouts are similar to those described for Rillito Red-on-brown.

Few potsherds of Trincheras Purple-on-red were noted in the study area. Doyel (1977:42) discusses the locations of this type in southern Arizona, where it is much less common than in northern Sonora, Mexico. The type has been dated from A.D. 800 to 1100. Designs exhibited on vessels of this type are mostly linear. Slip occurs on both the exterior and interior surfaces and is usually red, but can range from tan to gray-brown to brick red on the exterior.

Doyel noted that the Trincheras Purple-on-red potsherds found in the Santa Cruz Valley at the Baca Float sites were not locally produced. This indicated that this pottery was likely traded into the area, probably from northern Sonora. The potsherds found at Rosemont may also be representative of this trade network.

Other portable artifacts indicative of the post-Archaic occupation at Rosemont include small, thin, shaped, pressure-flaked bifaces with pointed tips (projectile points); a wide variety of ground stone items, such as mortars and pestles, manos and metates, axes, hoes, and miscellaneous pieces of ground stone; shell and stone ornaments; and many types of exotic minerals. Even though some of these items do occur at Archaic Period sites in southern Arizona, it is their increased number, variety, and occurrence with other Post-Archaic Period architectural and ceramic indicators that make these items significant for the Post-Archaic time period.

Projectile points for the Post-Archaic Period have been described and discussed in the Snaketown report (Haury 1976), the Baca Float report (Doyel 1977), and the Gleeson Site report (Fulton and Tuthill 1940). Generally, the projectile points usually average less than 4 cm or 5 cm in length, are triangular in plan, and have straight to concave bases. Many of the points have serrated edges. Some are stemmed and side-notched.

The ground stone items at the Rosemont post-Archaic sites are typical of other items from post-Archaic sites in southern Arizona. Manos consisted of handstones, small subrectangular manos, and larger loaf-shaped manos. These manos were made of basalt, quartzite, rhyolite, and
sandstone. Slab, trough, and boulder metates were made of the same materials as the manos. In addition, many pestles of quartzite and sandstone were noted at Post-Archaic Period sites.

Features common to Post-Archaic Period sites within the study area include earthen mounds with bone, charcoal, and artifacts (refuse mounds) and cobble alignments or concentrations that are believed to be the remains of structures. There is also the possibility that many remains may be buried at Post-Archaic Period sites, since the sites with structures are frequently located in areas of much alluviation.

Protohistoric Period

The protohistoric sites are those "in which there is evidence of non-aboriginal culture but which were occupied before the arrival of nonaborigines on the immediate scene" (Fontana 1965:62). The Protohistoric Period pre-dates written records of historical events in a local area. Five identifiable protohistoric sites were located during the archaeological inventory survey (Table 7). Of these sites, one is a habitation site with at least four oval cobble structures, two are possible habitation sites that contain evidence of a few structures, and two are scatters of sherds and chipped stone presumed to represent specialized activities in the study area.

Table 7. Protohistoric Period sites in the Rosemont Study Area

<table>
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<tr>
<th>Study Unit 3</th>
<th>Study Unit 18</th>
<th>Study Unit 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>XI7-S6-L1</td>
<td>X40-S7-L1</td>
<td>X62-S1-L1</td>
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<tr>
<td>XI7-S7-L2</td>
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<tr>
<td>XMIX1-S3-L1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Protohistoric Period Indicators

Diagnostic artifacts identified at these sites were Whetstone Plainwares; these were found at both artifact scatters. The remaining three sites possessed oval cobble structures characteristic of protohistoric sites in southern Arizona as well as Whetstone Plainwares and a range of artifact types generally more varied than that present at the two scatters. These sites are located near Barrel Canyon and near Davidson Canyon in the eastern portion of the study area, which probably reflects the greater availability of resources in drainage areas.

Locating protohistoric sites in southern Arizona is made difficult by the sparseness of artifact scatters and by the relatively low visibility of structures. The structures typically consist of oval cobble outlines of partially buried stones, often located on cobble terraces that reduce feature and artifact visibility. Most protohistoric sites identified in southeastern Arizona have been habitation sites; this is undoubtedly due to the presence of structures, which allows greater site visibility as well as more confident temporal identification.
Protohistoric sites are usually quite shallow. Structures lack prepared floors, although the occupational surface can be defined on the basis of associated artifacts and features. Typical artifact types include small concave-based projectile points, Whetstone Plainwares, other chipped stone and ground stone, shell, and bone. In the Santa Cruz Valley, Doyel (1977:126-130) found redwares dissimilar to any previously described for the area and decorated red-on-brown pottery. None of the protohistoric sites excavated in the San Pedro Valley contained decorated ceramics.

Virtually nothing is known of the Protohistoric Period people in montane grassland environments in southeastern Arizona. Archaeological work for this time period has concentrated along major drainages such as the Santa Cruz and San Pedro, where the occupations have been identified as either Sobaipuri or Upper Pima. This issue of ethnic identity cannot be resolved with current data. Doyel (1977:134-5) has discussed this problem. He comments that:

The material from the sites AZ DD:8:129 (England Ranch Ruin) and AZ DD:8:128 (Tinaja Canyon Site), Locus B, closely resembles the assemblages found at the San Pedro sites of Alder Wash Ruin and Santa Cruz de Gaybanipitea. These San Pedro sites have been referred to as Sobaipuri. Throughout this report, the material from our sites has been referred to as 'Upper Pima'. This has been done for several reasons. Most importantly, DiPeso (1953:141) has clearly stated that the Sobaipuri of the San Pedro are the historic counterparts of the prehistoric Salado populations who occupied the area between A.D. 1300 and 1450. This is based upon the evidence obtained from historic sites such as Quiburi, where compound architecture and Gila Polychrome pottery are present, purportedly representing a portion of the indigenous Sobaipuri adaptation. On this basis, I cannot accept the term Sobaipuri for the occupants of AZ DD:8:129 and other such sites in the Santa Cruz drainage, as I can see no possible connection between these sites and the prehistoric Salado.

There is certainly abundant room for argument when considering DiPeso's position on this matter. The site of Santa Cruz de Gaybanipitea, which yielded a pattern similar to AZ DD:8:129, is considered a Sobaipuri site of the historic period. The lack of solid or rock reinforced walled dwellings and compounds at this site is interpreted as a lack of necessity for defense against raids. DiPeso further states that the people who occupied this site were the direct descendants of the people who made red-on-brown pottery (1953:139).

It can be argued that the site of Quiburi is not representative of the indigenous late prehistoric pattern in the San Pedro area, but is rather a result of Spanish and Indian activity. Furthermore, the site is a multi-component site, which no doubt resulted in the mixing of early with late material, which was later analysed as being contemporary. If this position is tenable, and I think it is, then we can dispose of the postulated connection between the Salado and the historic population of the area. This leaves the site of Santa Cruz de Gaybanipitea, which corresponds well with the site of Alder
Wash Ruin, as representative of what is called the Sobaipuri pattern of the San Pedro area at the time of contact. If this argument is accepted, and only if so, I would agree that the material in the Santa Cruz could be called Sobaipuri.

Due to the above cited problems, I have refrained from labeling the late material in the Santa Cruz as Sobaipuri, even though historic documents tell us that people called Sobaipuri did in fact inhabit the Santa Cruz Valley. Matter of factly, DiPeso (1953:9) has referred to the mission of San Xavier near Tucson as a Sobaipuri site. Since I cannot agree with DiPeso's historical reconstruction of the Sobaipuri, I have opted for the more general term of Upper Pima for the inhabitants of AZ DD:8:129. This term is little more than a geographic reference for a group of people exhibiting local differences who spoke similar languages and occupied much of southern Arizona at the time of historic contact.

This option introduces another problem in that DiPeso (1956) has referred to the late occupation of the Palo Parado Ruin as Upper Pima. I personally consider this an unfortunate use of terms, in that the late occupation of Palo Parado is essentially a Classic period phenomenon with some associated Papaguerian material. There is also the possibility of some indirect contact with the Spanish during the protohistoric period (Grebinger 1976:39). It should be made clear that I see no connection between what I have called Upper Pima at sites such as AZ DD:8:129 and the material called Upper Pima at the Palo Parado Ruin. There may ultimately prove to be a connection here, but the time period which separates the two components remains to be documented.

Protohistoric sites within the study area could contribute information regarding the distribution of populations during this time period, through examination of these sites and comparison with those in the San Pedro (Masse, in preparation) and the Santa Cruz (Doyel 1977) valleys. Comparison of material culture and of site distributions will be helpful.

On a regional level, the study area sites can contribute to our understanding of the land-use pattern and economy of these people. As was the case for the Post-Archaic Period, the current knowledge of the Protohistoric Period is based upon archaeological investigations along major drainages and not in montane environments of southeastern Arizona. The primary research objectives will be to identify the organization of the sites and to gather management information for the development of a more effective mitigation program. The data needed during the testing phase should be relevant to identifying the range of artifacts associated with this phase in the study area, so that comparison with sites of undetermined cultural and temporal association can be made and the full range of protohistoric sites in the study area identified. It will also be necessary to determine the presence of subsurface cultural material and the characteristic internal distribution of artifacts and features within these sites in order to design an adequate mitigation program.

It will also be important to identify the frequency and kinds of European goods, if present, at these sites, as well as the context in which they occur. This will serve to define the extent to which the effect of the European presence in the region on local material culture and economy might be a productive focus of further research.
Historic Period

Introduction

Evidence for the Historic Period is represented by ranching, mining, and miscellaneous isolated artifacts and trash scatters. Eighty-two historic sites within the Rosemont Study Area have been identified (Figure 8 and Table 8). These indicate a major historic occupation of the study area from the late 1800s to the early 1900s. The study area is still being used today in ranching and mining pursuits; in addition, many people use the area for recreation, since most of the study area is within the Coronado National Forest.

Historic Period Indicators

Most archaeological sites of historic age were identified by the presence of artifacts dating to the late 19th and early 20th centuries. A description of these artifacts and their presumed dates is necessary in order to understand the development of the Historic Period.

The dating of historic artifacts proved to be a valuable yet time-consuming study. Because the Rosemont Historic Period is so short (about 1880 to 1945) and involves numerous short-term changes, it is important to obtain relatively accurate dates for activities during that time period. Several dating techniques, some of which were used here, are available for use in the Rosemont region. Artifact analyses were particularly useful for obtaining rough estimates of the age of certain sites. In a few cases, it was possible to date architectural remains through the use of old photographs. Several features at X88-S1-L1 in Study Unit 23 that included the remains of a two-story hotel are illustrated in a photograph on file with the Arizona Historical Society (Figure 15). The photograph is dated 1900.

Another way of obtaining an estimation of the age of certain activities involved tree growth around wire. At many historic archaeological loci, tree trunks were utilized as fence posts by wrapping barbed wire around the outside bark. Through time, the trunk expanded while the wire remained stationary. Today it is possible to find several old barbed wire strands that appear to pass through a tree trunk. Although it may be possible to date the event of wire fencing by dendrochronological methods, unfortunately most of the trees used were of Emory oak or Arizona white oak, which are not exceptionally useful species for dendrochronological research. During the field survey, it was possible only to intuitively determine that a fence was "old" if wires passed through tree trunks.

The use of maps was helpful for determining the approximate age of some sites. In particular, these maps contained the locations of early ranches in and near the Rosemont Study Area. These maps are listed in Tables 9-11. Four of them are presented in Figures 9-12.
Table 8. Major Historic Period loci in the Rosemont Study Area

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<th>Study Unit</th>
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<th>Description</th>
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<td>Martinez Ranch</td>
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<td>9</td>
<td>X13-S1-L6</td>
<td>V-R Ranch</td>
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<td>16</td>
<td>M82-S1-L1</td>
<td>Lopez Ranch Corrals</td>
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<td>18</td>
<td>M41-S2-L2</td>
<td>Chapo Ranch</td>
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<td>21</td>
<td>X52-S4-L2</td>
<td>Scholefield Ranch</td>
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<td>21</td>
<td>HS29-S1-L1</td>
<td>Helena Mine (camp)</td>
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<td>23</td>
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<td>23</td>
<td>X72-S3-L5</td>
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<td>Tent platform</td>
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<td>Cobble foundation, tent platform</td>
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<td>23</td>
<td>HP18-S6-L1</td>
<td>Ranger station</td>
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<td>Mine shafts</td>
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<td>M39-S1-L2</td>
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Table 9. Maps used in locating historic sites in and near Rosemont Study Area

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<tr>
<td>1879</td>
<td>Territorial Post Offices of Arizona Case 2, Drawer 13 5/10, Pima County</td>
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<tr>
<td>1881</td>
<td>Helvetia Mining District Map of Arizona Territory Dewey and Co.</td>
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<tr>
<td>1884</td>
<td>Map of Arizona W.W. Elliot and Co.</td>
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<tr>
<td>1893a</td>
<td>Official Map of Pima County School Districts</td>
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<td>1893b</td>
<td>Official Map of Pima County</td>
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<td>1898</td>
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<td>Greaterville Placers Case 2, Drawer 6 9/53, Pima County</td>
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<td>1905</td>
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<td>1914</td>
<td>Geologic Map of Santa Rita and Patagonia Mountains, Arizona</td>
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<td>1919</td>
<td>Pima County, Arizona, Highway Department</td>
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<td>1922</td>
<td>Empire Ranch Quadrangle Grid Zone F and Helvetia Quadrangle Grid Zone F</td>
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<tr>
<td>1932a</td>
<td>Official Relief Map of Pima County</td>
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<tr>
<td>1932b</td>
<td>Pima County, Arizona, Highway Department</td>
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<td>1958</td>
<td>U.S.G.S. Empire Mountains Quadrangle, 15 minute series, Pima County, Arizona</td>
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<tr>
<td>1962</td>
<td>Official Road Map of Pima County, Arizona</td>
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Table 11. Historic sites dated through use of historic maps

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<th>Map Date</th>
<th>Survey Date of Map</th>
<th>Site Name</th>
<th>ARP Locus Number</th>
<th>ASM Site Number</th>
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<tr>
<td>Patagonia Quadrangle</td>
<td>1:125,000</td>
<td>1905</td>
<td>1903-1904</td>
<td>Chapo Ranch</td>
<td>M41-S2-L2 (SU 18)</td>
<td>AZ EE:2:53</td>
</tr>
<tr>
<td>(Topographic Map)</td>
<td></td>
<td></td>
<td></td>
<td>Lopez Ranch</td>
<td>M81-S1-L1 (SU 16)</td>
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<td>Helena Mine</td>
<td>HS29-S1-L1 (SU 21)</td>
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<td>Martinez Ranch</td>
<td>HP2-S1-L1 (SU 1)</td>
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<td>Scholefield Ranch</td>
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<td>V-R Ranch</td>
<td>X13-S1-L6 (SU 9)</td>
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<td>HP7-S1-L1 (SU 9)</td>
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<td>Empire Ranch Quadrangle</td>
<td>1:62,500</td>
<td>1922</td>
<td>1916</td>
<td>Chapo Ranch</td>
<td>M41-S2-L2 (SU 18)</td>
<td>AZ EE:2:53</td>
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<td>and</td>
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<td>Helena Mine</td>
<td>HS29-S1-L1 (SU 21)</td>
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<td>Helvetia Quadrangle</td>
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<td>Scholefield Ranch</td>
<td>X13-S1-L6 (SU 9)</td>
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<td>V-R Ranch</td>
<td>HP7-S1-L1 (SU 9)</td>
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Table 11. Historic sites dated through use of historic maps (continued)

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<th>Map Name</th>
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<th>Map Date</th>
<th>Survey Date of Map</th>
<th>Site Name</th>
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<th>ASM Site Number</th>
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<tr>
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<td>Hidden Valley Ranch (previously Scholefield Ranch)</td>
<td>X52-S4-L2 (SU 21)</td>
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<td>V-R Camp</td>
<td>X13-S1-L6 (SU 9)</td>
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<td></td>
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<td>HP7-S1-L1 (SU 9)</td>
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<td></td>
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<td>T18S, R16E, Section 29, SW 1/4</td>
<td>M74-S1-L1 (SU 23)</td>
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<td>Chapo Ranch</td>
<td>M41-S2-L2 (SU 18)</td>
<td>AZ EE:2:53</td>
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<tr>
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<td>Scholefield Ranch</td>
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<td>V-R Ranch</td>
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<td>McClary</td>
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<td></td>
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<td>Young</td>
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Figure 9. 1898(?) map including Rosemont Study Area (map name and author unknown)
Figure 10. Patagonia Quadrangle topographic map (1905)
Figure 11. Empire Ranch Quadrangle Grid Zone F and Helvetia Quadrangle Grid Zone F (1922)
Figure 12. USGS Empire Mountains Quadrangle, Arizona, 15-minute series (1958)
At X1-S5-L2 (Martinez Ranch) in Study Unit 1, a tombstone was located with a date of 1933 for the deceased. This was an interesting find, since most of the artifactual remains at the site dated from 1870 to 1925, and the ranch site is to be found on a 1905 map of the area.

By far, the most important dating technique involved the analysis of the historic artifacts. During the initial survey, attempts were made to collect a wide variety of artifact types for obtaining appropriate dates of past activities. Unfortunately, only a small percentage of these yielded appropriate dates, and an exceptionally large number of hours were spent with each piece. One problem with dating the historic artifacts at Rosemont dealt with the age of the specimens. Usually, older specimens required less analysis time than younger specimens. This is because most historic archaeological research in southern Arizona has concentrated on Spanish or pre-territorial American history. Thus, little research work has been conducted on later materials, which are more common in the Rosemont region. In order to adequately date historic materials of this sort (excluding any functional identification or historical background of the specimens), it is necessary to spend long hours with most specimens and to be familiar with innumerable references on historic artifacts. The analysis of the Tucson Urban Renewal (TUR) Project artifacts, directed by James Ayres of the Arizona State Museum, has involved the dating of historic remains. Personnel undertaking the research on the TUR Project were most helpful in the identification and dating of the historic remains from the ANAMAX-Rosemont Project.

Metal Artifacts

Tin Cans. Tin cans can provide valuable information on subsistence, economics, and trade as well as some indication of when sites were occupied. For the most part, tin cans were used only for dating purposes in the field. Initially, samples were collected for further identification (such as refined dates, contents, and manufacturer), but the time expended to gather additional information was too great. Cans with special embossing, such as baking powder lids, were often recorded in detail in the hope of obtaining accurate age estimates for the specimens. Although some of these marks were researched, most were not. Because tin cans are so fragile, they were usually found badly deformed or rusted. In general, tin cans from older sites were more rusted and decomposed than cans from younger sites. This may indicate a rough approximation for the age of tin cans but cannot be relied upon.

The most common method of estimating the age of specimens involves manufacturing techniques. Before about 1900, the seams of many tin cans were soldered (Hunt 1959:8-10). The Tucson Urban Renewal Project research indicates that "hole-in-cap" cans predate the late 1920s in Tucson (William Liesenbein, personal communication). May (1937:95) reports that hole-in-cap
cans were manufactured until 1922. She writes (May 1937:95):

Twenty-one years elapsed before the open-top can gained general acceptance in the canning industry. Not until 1922 did the old-style hole-in-cap can become a museum piece.

However, hole-in-cap cans were in use at least as late as 1926. According to the U.S. Department of Agriculture (1926:8), "At least two types of tin cans are in use at present. The first type [is] the cap and hole..... The second type ... is sealed by a double seaming of the cover onto its edge." These cans have a variety of side seams, including soldered, lapped, and locked and lapped, but end seams are almost always soldered. The large fill hole which was capped with a circular piece of tin (cap) was also soldered to the end of the can; in addition, a tiny gas hole in the center of the cap was soldered. Soldering was and is still used on certain cans referred to as matchstick-top cans. Some of the earlier matchstick-top cans had soldered end seams, but most only had a small soldered spot over a tiny gas hole in the center of the can. This is the same basic method used today on evaporated milk cans, which were introduced in 1885 but are still in use today (May 1937:438).

Sardine cans were well represented at historic sites. Machine-made cans were introduced in 1900, but Fontana and Greenleaf (1962:72) report that "only since 1904 has the sardine can been exclusively made by automatic machinery." In 1918 this style of can was modified to the open-top type (Bitting 1937:823-824). In 1906, Charles W. Graham invented a machine that produced locked and lapped side seams on open-top cans which was used by the Sanitary Can Company (May 1937:92-93). According to Fontana and Greenleaf (1962:73), the open-top style of tin can with double side seams successfully appeared in 1918, but it was not until 1922 that this new can had general acceptance. A diagnostic feature of this style of can is the locked and lapped side seam. After about 1920, some cans with side seams were made. The use of aluminum for end seams and aluminum cans in general is believed to postdate World War II.

Miscellaneous Metal Objects. Besides tin cans, several other varieties of metal artifacts were found at the Rosemont sites. The most common varieties of artifacts included: sheet metal, wire, nails, bolts and nuts, cast-iron objects, hand-forged metal pieces, shovels, buckets, pipe, barbed wire, road signs, horse and mule shoes, automobile parts, miscellaneous hardwares, enameled-ware kitchen utensils, spoons and forks, cartridge cases, and shot shells. Less common were items such as a boot spur, buttons, bedsprings, harmonica fragments, watch fragments, and a pocket knife.

Sheet metal was found in both flat and corrugated types. Usually, these appeared to have been used for roofing of permanent or temporary dwellings and wells and latrines. Wire of numerous gauges was exceptionally common at historic sites. Most commonly, wire was used to repair or
bind parts of larger artifacts. Nails were of several kinds including wire and square-cut nails. According to Fontana and Greenleaf (1962:46,50), "the cut nail industry reached its hey day...in the period between about 1850-1888." Then, in 1900, the square-cut nail industry had a momentary resurgence; today, these nails are produced for special purposes only. In 1875 the first wire nails were produced; these were always the dominant type of nail at all historic sites. Fontana and Greenleaf (1962:48) report that by 1895 the number of wire nails produced represented just under three-fourths of the total nail output in the United States. The presence of construction nails at certain sites suggested that temporary structures were once present even though structural remains were not visible. In other cases, structural remains of brick or masonry in association with large numbers of nails suggested that the superstructure was made of wooden boards even though these had been removed or had decayed. The excellent work by Fontana and Greenleaf (1962) demonstrates the usefulness of dating nails. It was not possible to analyze the Rosemont specimens in detail, but there exists considerable potential for the development of a local chronology, as well as the possibility of suggesting the presence of past features at historic sites. Only a few rusted examples of possible hand-forged nails were seen.

Cast-iron objects were well represented in site assemblages, but it was usually difficult to infer their use. Many pieces were probably parts of wood- or coal-burning stoves; some of these were decorated or had letters or numerals stamped on them, but these were of little use in identifying their function or estimating their age. Stove parts do suggest the presence of habitation structures whether the remains of those structures were visible or not.

Several hand-forged steel and iron objects were discovered. Although there is no direct evidence of a blacksmith building in the Rosemont region, it is possible that the hand-forged artifacts were made locally.

Fragments of shovels, pails, and buckets were common at many historic sites. Most of these were probably used in mining activities. One shovel from M1-S3-L1 in Study Unit 1 bore part of a manufacturer's stamp "LINDSAY -T---." Barbed wire was also common at historic sites, as were horse and mule shoes. Those found as isolated artifacts were not recorded, since loose or pastured animals may have lost them. Horse and mule shoes are valuable clues to the types of animals used historically and hence to the kinds of activities that were performed. All shoes showed some kind of wear; many were worn in half. Both machine-made and hand-forged shoes were represented in the assemblages.

Automobile parts were also found during the survey. One abandoned Ford truck was recorded as an archaeological locus. The history of transportation through the Rosemont region is particularly interesting, and significant information from photographs, maps, oral accounts, and artifacts can be easily gathered.
Kitchen or eating utensils, including enameled ware (also called granite ware), spoons, and forks, were occasionally found at historic sites. Only occasionally were marks deciphered which could be used in dating pieces. The presence of silver-plated flatware at mining camps is interesting because these items were relatively expensive in historic times. In 1927, for example, Sears, Roebuck and Company advertised sets of silver-plated teaspoons for $1.05 to $3.75 per set of six (Mirken 1970: 756-757).

Cartridge Cases and Shotgun Shells. Cartridge cases and shot shells represented some of the most widespread historic artifacts in the study area. Many probably represent hunting activities since they were found as isolated specimens. Often cartridge cases provided fairly good estimates of the earliest possible date for particular historic activities. But even more than other historic indicators, it is difficult to determine how late they were used. The popularity of many of the older guns, availability of military surplus, and the ability to reload obsolete cartridges make it extremely difficult to estimate when a cartridge was fired and the case discarded. Occasionally, associated material culture proved helpful in this regard. Otherwise, a rough indicator of age involved the relative amount of corrosion on the specimens. Presumably this criterion would be affected by the particular acidity quality of the soil in which the objects were found. By and large, however, newer, more modern cartridge cases appeared cleaner and brighter, while cases from older cartridges appeared relatively dull and corroded.

A total of 32 cartridge cases was recorded or collected during the ANAMAX-Rosemont survey (Table 12). This represents only a portion of the rifle or pistol cartridges and shot shells observed, as nonpatinated cases were judged to be of relatively recent origin and not recorded. The decision to collect casings was based upon head stamp dates, obsolete brand names, and degree of patination. As discussed above, none of these elements is a sure indicator of age.

Nineteen different calibers are represented in the cartridge collection (Figure 13). These calibers, when considered in conjunction with their associations and head stamps, indicate a variety of activities in the Rosemont Study Area between the 1880s and 1950s. The following discussions are taken mainly from Barnes (1965).

Fifteen of the 32 cartridges were isolated finds. The calibers of isolated cartridges include: .25-35, 7.35 mm, .30-06, .30-30, .38, .38-55, .45-60, and .45-70. All except the .45-70 example were probably expended during game-hunting activities throughout the Historic Period. The .25-35 cartridge was originally developed for the level-action Winchester Model 1894, an accurate weapon for small game and varmints. The World War II surplus Italian Carcano, which takes a 7.35 mm shell, is an excellent deer rifle. The most common caliber, both in the Study area as a whole and in the isolated examples, is the .30-06 cartridge. It was developed in 1906 for the Springfield Model 1903 service rifle and has also become an extremely popular big-game cartridge. Five of
Table 12. Cartridge cases and shotgun shells from the Rosemont Study Area

<table>
<thead>
<tr>
<th>Caliber/Gauge</th>
<th>Head Stamp or Brand (Figure 8 references in parentheses)</th>
<th>Date of Manufacture</th>
<th>References</th>
<th>Site No., Feature No., and Artifact No.</th>
<th>Context</th>
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</thead>
<tbody>
<tr>
<td>.22 Short</td>
<td>no information</td>
<td>recent?</td>
<td></td>
<td>(SU1)X1-S9-L1 F6, AE13</td>
<td>Mining camp, approximately 1925</td>
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<tr>
<td>.22 Long or Long Rifle</td>
<td>no information</td>
<td>recent?</td>
<td></td>
<td>(SU23)X72-S3-L5</td>
<td>Rosemont smelter</td>
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<tr>
<td>.25 Auto</td>
<td>WRA (Winchester Repeating Arms) (a)</td>
<td>1930-present</td>
<td>Logan 1959:109, Barnes 1965:149</td>
<td>(SU2)X10-S32-L1</td>
<td>Recent camp site</td>
</tr>
<tr>
<td>.25-20</td>
<td>WRA (Winchester Repeating Arms) (b)</td>
<td>1895-1930</td>
<td>Barnes 1965:74, 20</td>
<td>(SU22)X88-S1-L1 F13, AE7</td>
<td>Rosemont Hotel trash 133</td>
</tr>
<tr>
<td>7 mm Mauser</td>
<td>R-P (Remington-Peters) (c)</td>
<td>1960-present</td>
<td>Barnes 1965:30, Bearse 1966:52</td>
<td>(SU3)XM1X2-S2-L1 ARP 210</td>
<td>Historic glass scatter, pre-1920</td>
</tr>
<tr>
<td>7.35 mm Carcano</td>
<td>SMI 939 (Italian) (d)</td>
<td>1945-present</td>
<td>Logan 1959:191, Barnes 1965:186</td>
<td>(SU22)X64-S1-L2 ARP 411</td>
<td>Isolated artifacts</td>
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<td>.30-06</td>
<td>R-P (Remington-Peters) (e)</td>
<td>1960-present</td>
<td>Bearse 1966:52</td>
<td>(SU1)HP2-S1-L1 F3, AE N</td>
<td>Mining camp</td>
</tr>
<tr>
<td>.30-06</td>
<td>FA-5-07 (Frankford Arsenal) (f)</td>
<td>1907</td>
<td>Bearse 1966:44</td>
<td>(SU4)M9-S1-L1 F1, AE1</td>
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<tr>
<td>.30-06</td>
<td>DM 42 (Des Moines Ordnance Plant) (g)</td>
<td>1942</td>
<td>Bearse 1966:43</td>
<td>(SU13)M18-S1-L1 F1, AE1</td>
<td>Isolated artifact</td>
</tr>
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<td>.30-06</td>
<td>FA 43 (Frankford Arsenal) (h)</td>
<td>1943</td>
<td>Bearse 1966:44</td>
<td>(SU18)X37-S3-L1 F1, AE1</td>
<td>Isolated artifact</td>
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Table 12. Cartridge cases and shotgun shells from the Rosemont Study Area (continued)

<table>
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<th>Caliber/Gauge</th>
<th>Head Stamp or Brand (Figure 8 references in parentheses)</th>
<th>Date of Manufacture</th>
<th>References</th>
<th>Site No., Feature No., and Artifact No.</th>
<th>Context</th>
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<td>30-06</td>
<td>SL 55 (St. Louis Ordnance Plant) (i)</td>
<td>1955</td>
<td>Bearse 1966:53</td>
<td>(SU18)X39-S6-L1 F1, AE 1</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>30-06</td>
<td>Super X (Western Cartridge Co.) (j)</td>
<td>1898-1931</td>
<td>Bearse 1966:54</td>
<td>(SU19)X33-S1-L5 F1, AE 1</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>30-06</td>
<td>RA 18 (Remington Arms Co., Hoboken, NJ) (k)</td>
<td>1918</td>
<td>Bearse 1966:51</td>
<td>(SU23)HP18-S5-L1 F1, AE 1</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>30-06</td>
<td>Frontier (l)</td>
<td>recent?</td>
<td>Barnes 1965</td>
<td>(SU24)X65-S3-L3 ARP 345</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>30-30</td>
<td>Super X (Western Cartridge Co.) (m)</td>
<td>1898-1931</td>
<td>Bearse 1966:54, 105</td>
<td>(SU8)X22-S3-L3</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>30 WCF</td>
<td>WRA Co. (Winchester Repeating Arms) (n)</td>
<td>1895-1930</td>
<td>Bearse 1966:105</td>
<td>(SU23)X88-S1-L1 F13, AE 9</td>
<td>Rosemont Hotel trash</td>
</tr>
<tr>
<td>30-30</td>
<td>FC (Federal Cartridge Co.) (o)</td>
<td>1960?-present</td>
<td>Bearse 1966:47, 105</td>
<td>(SU24)X67-S6-L9 F1, AE 1</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>30-40</td>
<td>FA-2-07 (Frankford Arsenal) (p)</td>
<td>1907</td>
<td>Bears 1965:40, 106</td>
<td>(SU19)M1-S2-L2 ARP 173</td>
<td>Mining camp</td>
</tr>
<tr>
<td>32 LCF</td>
<td>UMC (Union Metallic Cartridge) (q)</td>
<td>1875-1912</td>
<td>Bearse 1966:55, 155</td>
<td>(SU23)X88-S1-L1 F12, AE 12</td>
<td>Rosemont Hotel trash</td>
</tr>
<tr>
<td>32 ACP</td>
<td>REM-UMC (Remington-Union Metallic Cartridge) (r)</td>
<td>1912-1934</td>
<td>Bearse 1966:52</td>
<td>(SU23)X88-S1-L1 F12, AE 14</td>
<td>Rosemont Hotel trash</td>
</tr>
<tr>
<td>Caliber/Gauge</td>
<td>Head Stamp or Brand (Figure 8 references in parentheses)</td>
<td>Date of Manufacture</td>
<td>References</td>
<td>Site No., Feature No., and Artifact No.</td>
<td>Context</td>
</tr>
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</tr>
<tr>
<td>.32-20</td>
<td>R-P (Remington-Peters) (s) 1960-present</td>
<td>Bearse 1966:52</td>
<td>(SU23)X73-S9-L3</td>
<td>Mining camp, modern camp site</td>
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</tr>
<tr>
<td>.32-20</td>
<td>Western (Western Cartridge Co.) (t) 1898-1931</td>
<td>Bearse 1966:54</td>
<td>(SU23)HP18-S6-L1</td>
<td>Ranger station</td>
<td></td>
</tr>
<tr>
<td>.32-20</td>
<td>8 m 60, 35 (u) 1894-WW II</td>
<td>Barnes 1965:21</td>
<td>(SU22)X60-S3-L2</td>
<td>Isolated artifact</td>
<td></td>
</tr>
<tr>
<td>.380 Auto</td>
<td>REM-UMC (Remington-Union Metallic Cartridge) (v) 1912-1960</td>
<td>Barnes 1965:162</td>
<td>(SU23)X73-S9-L1</td>
<td>Mining camp, modern camp site</td>
<td></td>
</tr>
<tr>
<td>.38 WCF</td>
<td>WRA (Winchester Repeating Arms) (w) 1900-1930</td>
<td>Bearse 1966:278</td>
<td>(SU2)HP1-S3-L2</td>
<td>Isolated artifact</td>
<td></td>
</tr>
<tr>
<td>.38-55</td>
<td>UMC (Union Metallic Cartridge) (x) 1870-1912</td>
<td>Bearse 1966:55</td>
<td>(SU2)HP1-S3-L2</td>
<td>Isolated artifact</td>
<td></td>
</tr>
<tr>
<td>.41 long</td>
<td>DC Co. (Dominion Cartridge?) (y) 1877-1920</td>
<td>Bearse 1966:43</td>
<td>(SU23)X88-S1-L1</td>
<td>Rosemont Hotel trash</td>
<td></td>
</tr>
<tr>
<td>.44 WCF</td>
<td>WRA Co. (Winchester Repeating Arms) (z) 1873-1930</td>
<td>Bearse 1965:61</td>
<td>(SU23)HP18-S4-L1</td>
<td>Mining camp-Rosemont</td>
<td></td>
</tr>
<tr>
<td>.45-60</td>
<td>none (aa) 1880s</td>
<td>Barnes 1965:110</td>
<td>(SU22)X60-S7-L3</td>
<td>Isolated artifact</td>
<td></td>
</tr>
<tr>
<td>.45-70</td>
<td>C-84-F-5 (Frankford Arsenal) (bb) 1884</td>
<td>Bearse 1966:42</td>
<td>(SU2)X10-S34-L1</td>
<td>Isolated artifact</td>
<td></td>
</tr>
<tr>
<td>.45-70</td>
<td>none (cc) 1873-1877</td>
<td>Barnes 1965:111</td>
<td>(SU23)HP21-S1-L1</td>
<td>Mining camp</td>
<td></td>
</tr>
<tr>
<td>.50-70</td>
<td>WRA (Winchester Repeating Arms) (dd) 1876-1930</td>
<td>Barnes 1965:111</td>
<td>(SU3)X17-S4-L4</td>
<td>Mining camp</td>
<td></td>
</tr>
</tbody>
</table>
Table 12. Cartridge cases and shotgun shells from the Rosemont Study Area (continued)

<table>
<thead>
<tr>
<th>Caliber/ Gauge</th>
<th>Head Stamp or Brand (Figure 8 references in parentheses)</th>
<th>Date of Manufacture</th>
<th>References</th>
<th>Site No.; Feature No.; and Artifact No.</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-gauge</td>
<td>Winchester &quot;New Rival&quot; (ee)</td>
<td>post-1900</td>
<td>Vinson 1968:91</td>
<td>(SU23)x88-S1-L1 F13, AE 19</td>
<td>Rosemont Hotel trash</td>
</tr>
<tr>
<td>12-gauge</td>
<td>Winchester &quot;New Rival&quot; (ff)</td>
<td>post-1900</td>
<td>Vinson 1968:91</td>
<td>(SU23)x88-S1-L1 F13, AE 2</td>
<td>Rosemont Hotel trash</td>
</tr>
<tr>
<td>12-gauge</td>
<td>WRA Co. &quot;Rival&quot; (gg)</td>
<td>1870-early 1900s</td>
<td>Vinson 1968:91</td>
<td>(SU23)x88-S1-L1 F2, AE 2</td>
<td>Rosemont Hotel trash</td>
</tr>
<tr>
<td>12-gauge</td>
<td>WRA Co. &quot;Repeater&quot; (hh)</td>
<td>1901-présent (new primer)</td>
<td>Vinson 1968:91</td>
<td>(SU23)x88-S1-L1 F2, AE 2</td>
<td>Rosemont main area trash deposit</td>
</tr>
<tr>
<td>12-gauge</td>
<td>Remington &quot;UMC Arrow&quot; (ii)</td>
<td>1925-1960</td>
<td>Vinson 1968:91</td>
<td>(SU23)x88-S1-L1 F2, AE 1</td>
<td>Rosemont main area trash deposit</td>
</tr>
<tr>
<td>12-gauge</td>
<td>WRA Co. &quot;Leader&quot; (jj)</td>
<td>1901-1930 (new primer)</td>
<td>Vinson 1968:91</td>
<td>(SU3)x48-S9-L3 F1, AE 1</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>12-gauge</td>
<td>REM-UMC &quot;Nitro Club&quot; (kk)</td>
<td>1912-1960</td>
<td>Vinson 1968:91</td>
<td>(SU21)x54-S1-L4 F1, AE 1</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>12-gauge</td>
<td>Peters &quot;Ideal&quot; (ee)</td>
<td>1887-1934</td>
<td>Vinson 1968:91</td>
<td>(SU3)x48-S9-L4 F1, AE 1</td>
<td>Isolated artifact</td>
</tr>
<tr>
<td>16-gauge</td>
<td>WRA Co. &quot;Repeater&quot; (mm)</td>
<td>1901-1930 (new primer)</td>
<td>Vinson 1968:91</td>
<td>(SU1)HP2-S1-L1 ARP 93</td>
<td>Mining camp</td>
</tr>
<tr>
<td>16-gauge</td>
<td>REM-UMC &quot;Nitro Club&quot; (nn)</td>
<td>1912-1960</td>
<td>Vinson 1968:91</td>
<td>(SU23)x88-S1-L1 F17, AE 2</td>
<td>Rosemont main area miscellaneous trash</td>
</tr>
</tbody>
</table>
Figure 13. Cartridge cases and shotgun shells from the Rosemont Study Area
the examples are military issue from a variety of ordnance plants and arsenals and were probably purchased by civilians as surplus. Head stamp dates range from 1907 to 1955, but this is in no way indicative of actual discard date, as they may have been reloaded or surplus. The .30-30 Winchester was the second most popular caliber in the study area and also represents an extremely popular hunting cartridge. It was developed in 1895 for the Winchester Model 1894 repeater, and two examples may date to before the turn of the century. The .38 and .38-55 caliber cartridges would also have been effective for deer and smaller game, but were not as popular as the above examples. The .45-60 caliber cartridge was developed for the Winchester 1876 Centennial Model rifle, which was discontinued in 1897. The blank head of the example from the study area indicates that it was probably manufactured in the 1880s. With the exception of the .25-35, all of the cartridges listed were most probably utilized for game hunting. Deer and javelina are the only recorded large game in the Santa Ritas and would have provided meat for the miners and ranchers in the area as well as sport for outside hunters. It is significant that most of the isolated cartridges were recorded on the terraces and ridges above the major drainages in the study area.

The final isolated cartridge casing, which was recovered from the north bank of Oak Tree Canyon, can be related to military use of the study area. The .45-70 caliber cartridge was used in the government issue Model 1873 Trapdoor Springfield rifles and carbines during the 1885-86 campaign against Geronimo in southern Arizona. It is known that Apache were frequently pursued through the Santa Ritas by troops from Fort Huachuca (Chapter 5), and this cartridge may have been expended in these activities. Although the head stamp dates to 1884, there may have been some delay in issuing the ammunition.

The remainder of the cartridges were associated with historic mining camps or more recent camp sites. Many probably represent casual target shooting or "plinking," either recent or historic. The .22 caliber shells noted at the Rosemont smelter and at the 1920s mining camp and the .25 automatic cartridges at a recent camp site along Oak Tree Canyon are good examples of recent small arms target shooting. Some of the cartridges from the Rosemont Hotel trash are probably indicative of target shooting or small-game hunting by the hotel residents. The .25-20 was made for the Winchester Model 92 rifle, which was good for small game, while the .30-30, discussed above, was excellent for larger game. The two .32 cartridges were used in revolvers, particularly the New Police model manufactured between 1896 and 1905 by Colt.

The recent .30-06 cartridge associated with the large mining camp in Study Unit 1 was probably associated with the hunting of deer that were attracted to the spring. The same interpretation can be placed on the .30-40 Krag case from another nearby mining camp. This bears another early military issue head stamp and may have been acquired through surplus and reloaded. The recent 7 mm Mauser shells associated with historic trash beside the Rosemont Road were also probably expended during hunting.
A recent .30-20 and a .380 Colt Automatic pistol shell were recovered from a camp site on the ridge between Wasp and McCleary canyons. Another earlier .32-20 shell came from the ranger station below Rosemont. This caliber is now semio obsolete but was popular with ranchers for small game and varmints.

The .44-40 from one of the Rosemont mining camps was developed for the Winchester 1873 level-action repeater, a good deer rifle. A .45-70 shell with a blank head may have been manufactured between 1873 and 1877 (Herskovitz 1978:50), and is probably contemporary with the mining camp in McCleary Canyon where it was found. The final cartridge, .50-70 caliber, was made for the Springfield rifle used by the military from 1866 to 1873. It was a popular cartridge during the 1870s and 1880s for large game.

Although the ten shot shells represent only a quarter of the total cartridges collected during the Anamax-Rosemont survey, they are suggestive of activities in the area, particularly during the historic mining period. Shotguns allow a great variety of hunting and have a particular advantage in densely populated areas. Three different gauges are represented in the collection (Figure 13). Ten-gauge is made for a larger bore shotgun and is only effective for long-range bird hunting. The majority of the shot shells were 12-gauge, the most popular and widely used bore, appropriate for both birds and small game. The less popular 16-gauge shotgun is also appropriate for the same game taken with 12-gauge, but is slightly smaller. Both the 12- and 16-gauge could have been used on quail, turkey, dove, rabbit, and coyote, as well as for skeet or target shooting (Barnes 1965:284 ff.).

A great variety of shot sizes, loads, shell lengths, and types of powder have been manufactured since the 1860s, when the Union Metallic Cartridge Company was founded. Over 6500 different factory loads were available prior to 1920 (Barnes 1965:284 ff.). Unlike some rifle and pistol cartridges, manufacturing dates were never included on the head stamp, and there is little information available on the range of manufacturing dates for specific brand names. Generally, dates are based upon head stamp changes due to new leads, company mergers, or transfer of ownership.

Six out of the ten shot shells appear to have been associated with historic mining activities in the study area prior to 1930. Three, representing a variety of gauges, were collected from the main trash deposits associated with the Rosemont Hotel. It is possible that trap or skeet shooting was a featured activity for guests during the late years of the hotel. Two shot shells, both 12-gauge, were located near an early historic camp site alongside the main road to Rosemont Camp and may represent hunting activities from this camp. The last early shell was recovered from a mining camp at the head of Wasp Canyon.

The remainder of the shot shells could date to anywhere between 1912 and the present. They probably represent quail and dove hunting activities in the area. The number of recent shot shells charted does not reflect actual quantities observed, as the majority of shells which appeared to be recent were not recorded.
Hunting, particularly of large game, appears to have been a major activity in the Rosemont Study Area throughout the Historic Period. The early miners and ranchers probably supplemented their food supply in this way, and the area continues to be popular for hunting. Many of the firearms, such as revolvers, may have been kept for personal protection, and there are indications that target shooting was popular in the early 1900s as well as today. Finally, the 1884 .45-70 carbine casing supports historical documentation of military activities against the Apache in this portion of the Santa Rita Mountains.

Glass

Bottles. Probably the best material objects for dating the occupation of historic sites are glass bottles. During the Historic Period (about 1880 to 1945) in the study area, numerous bottle manufacturers using a number of distinctive bottle manufacturing methods were in operation. Recognizing the methods of manufacture and the marks of certain manufacturers is important for determining approximate dates of manufacture of bottle artifacts. Like other artifacts, however, bottles are reusable, and many of the specimens from Rosemont may represent later use of older bottles.

Few complete bottles were discovered during the survey; most specimens consisted of tiny fragments of glass. Where deposition has accumulated, such as in trash dumps, latrines, or under alluvial fill, it is expected that whole specimens will be found. Because of the fragmentary nature of most of the bottles, it was extremely difficult to determine what their original contents were. Tops and shoulders of bottles often indicated that they were originally used for beer, medicine, ketchup, wine, and whiskey and/or bitters. Embossing of brand name, contents, manufacture, ingredients, kind of product, or bottle manufacturer often indicated the bottle's original use. Information of this kind can be used in the study of economics, subsistence, entertainment, trade, and dating. Determining this information from bottle fragments will require researchers with exceptional experience and time. Only a few bottle fragments were labeled "Tucson"; all other city names were from states other than Arizona.

A wide variety of colors was used for making the bottles from the Rosemont Study Area. These colors included shades of green, dark blue or cobalt, pale aqua, and amber (brown). Only a few fragments of so-called "black glass" were found. These were extremely dark green pieces. The production of black glass ended during the first quarter of the 20th century. Probably the most common shade of bottle glass was clear, but these pieces occur throughout the historic sequence at Rosemont. Purple glass was also common, particularly at earlier sites. The purpling of glass results when glass containing manganese is exposed to sunlight. The higher the manganese content and the longer and more intense the solar radiation, the darker the glass becomes. Sometimes bottle fragments that were partially buried were one-half purple and one-half clear pale aqua. The use of manganese in glass was generally discontinued during the first World War, and purple glass artifacts generally indicate a pre-1920 date of manufacture.
In the late 18th century, practically all bottles were made in molds and had hand-finished tops; however, a few were still produced by "free blowing." Free-blown glass refers to bottles that were blown without a mold. No free-blown bottles were recognized from the Rosemont Study Area. Bottles with hand-finished tops were made by blowing glass into 2-, 3-, 4-, or multiple-piece molds. The tops were either manually applied or tooled. Applied tops were formed separately before being attached to the neck of the bottle. Often this method formed a glob of irregular glass which surrounded the space where the top joined the neck. Tooled tops indicate use of a lipping tool which formed the upper part of the neck to make the top. Often horizontal ring-like marks are found circling the necks and tops of bottles, indicating hand tooling. Most early bottles found in the Rosemont Study Area were formed by this method. Bottles that were blown in molds but had hand-finished tops show seam marks along the sides where the pieces of mold came together. An exception to the presence of these seams are bottles, that were produced by the turn-mold process, in which seams were eliminated by rotating the entire blown bottle within the mold prior to removing it. "Turn-mold" bottles are easily recognized by the lack of side seams, a highly polished surface, and shallow horizontal ridges that were pressed into the glass surface as it was turned (Munsey 1970:40). Few mold bottle fragments were identified from the Rosemont sites.

In 1903, Michael J. Owens patented the first successful fully automatic glassblowing machine. Munsey (1970:33) gives the following account of the importance and early history of the Owens patent:

This device eliminated the need for a mold boy and was one of the first steps taken to reduce the use of child labor in the glassblowing industry. Beginning in 1899 he started working on a fully automatic glassblowing machine. The first successful model was in production by 1903. By 1905, Owen's automatic machines were leased to and installed in plants in Pennsylvania, Illinois, and Ohio. By 1910, modified versions of the automatic glassblowing machines were each turning out approximately 33,000 bottles daily. By 1914 there were 172 of Owen's machines in operation; each one capable of producing forty bottles a minute or 57,600 per day. These figures are very impressive when it is realized that in the 1880s it took a shop of three men and three boys to produce approximately 1500 bottles a day.

About the turn of the century, bottles were made with metal caps; these eventually replaced types that required cork stoppers (Fontana and Greenleaf 1962:100). Also around 1900, the crown top was used to accommodate a crimped metal cap (Freeman 1964:484). In 1938, beer bottles were embossed with "no return" marks. These were almost always found at sites which post-dated World War II at Rosemont.

Bottle makers' marks, usually found on the bottoms of containers, were extremely helpful in estimating manufacturing dates. The only extensive coverage of such marks available is in Bottle makers and their marks (Toulouse 1971). As a result of the Tucson Urban Renewal studies,
however, Liesenbein (personal communication) has found a number of erroneous dates reported in the Toulouse volume. Thus, the reliance on Toulouse (1971) should remain tentative until a more critical evaluation can be made.

Because automatic machine-made bottles are blown in one operation, the mold seams extended from one end of the bottle to the other. This process also eliminated the need of hand-finishing the top through tooling or application of a separate piece of glass. Besides seam scars that extend to the top of the container, other markings also indicate automatic machine-made bottles. One or more seams encircling the tops of bottles indicates late manufacture (Munsey 1970:41). The presence of suction-machine cutoff scars also indicates machine-made bottles. These are irregular circular marks found on the bottoms of bottles which are the result of the severing of the glass after it had been automatically sucked into the mold (Munsey 1970:40). Machine-made valve marks, often found on the bottoms of bottles made between about 1930 and 1940, were not recorded in the field, although some were present on late bottles.

Hand-finished tops were supplanted by machine-molded tops around World War I. Wilson and Wilson (1971:7) estimate that by 1914 about 50 percent of American medicine bottles were manufactured with automatic machines.

Other Glass Objects. Other glass objects found at Rosemont sites included drinking glasses, pitchers, fruit jars, medicinal and cream jars, window glass, fancy hollow ware, and novelty items. Drinking glasses and window glass were usually clear, but patination on their surfaces often produced iridescent colors. Some old window glass was often thicker at one end than another. This is a result of actual melting or slipping of the glass when set vertically. Many fragments of very thick, flat glass were found. Most of these are believed to have been parts of mining helmets, but some are undoubtedly window glass fragments for vehicles.

Medicinal and cream jars were mostly made of opaque milk glass, but some dark cobalt blue jars were also recorded. Fancy hollow ware such as candy jars or bowls was fairly well represented. All were of clear pressed glass resembling brilliant-cut designs. Most of these fragments were colored purple from solar exposure. A very few fragments of colored, opaque marble glass were found. For the most part, glass objects other than bottles have not been used for dating purposes.

Ceramics

Ceramics refer to objects made from field clay. These include earthenware, porcelain, native clay and filler pottery, stoneware, and bisque.
Earthenware and Porcelain. Both of these categories, often referred to as 'china', can be distinguished from other ceramics because the impermeable bodies of earthenware and porcelain fire white. Practically all earthenware from the Rosemont sites is white; however, a few pieces of creamware (also called ivory ware or queens ware) (Godden 1966: xv) may be represented at a few sites.

Porcelain can be easily distinguished from earthenware by its translucence when held up to the light. Because porcelain is fired at much higher temperatures, it is more glass-like than earthenware, and large fragments produce a clear, pure ring when hit, while earthenware produces a dull sound (Godden 1974: 12). Both porcelain and earthenware have glazed surfaces; however, earthenware surfaces are often crazed. Crazing is the cracking of the glaze surface after the fired ceramic has cooled. It results from a contraction of the thin glaze over the thick and more resistant pottery body.

Unless large or whole specimens are available for study, printed or painted designs are usually of little use in determining accurate dates of manufacture. Overall, however, the thin polychrome prints, mostly of floral patterns, are typical of turn-of-the-century to about 1940s styles. These were the most common decorated ceramics found. Most sherds were either undecorated or had simple gilded lines.

The most usable indications of age on porcelain and earthenware were manufacturers' marks on the bases of the vessels. A few common marks can be used for the Historic Period at Rosemont; however, not all of these marks were necessarily found on Rosemont specimens.

The letters 'Ltd' or 'Ld' postdate 1860 on ceramics, but only a few specimens had these marks. English registration marks in a diamond-shaped outline date from 1842 to 1883, but none was found on Rosemont sherds, nor were printed registration numbers found, which were first used from 1884 and are still in use. The words 'Trade Mark,' which first appeared in 1862 but were seen rarely before 1875, were found on a few sherds. With the McKinley Act of 1891, 'England' (or other countries of origin) was painted on imported wares. From around 1900 to the present, the mark 'Made in England' has become popular. This last mark was common on many ceramic bases from historic sites. Finally, marks of individual pottery companies have been useful in estimating the age of some sites.

Other Ceramic Objects. In addition to porcelain and earthenware, a variety of other ceramic objects was also found. Fragments of bisque dolls were collected along with clay marbles and other toys. These objects are especially important indicators of the presence of children and can be used in the study of family life at mining camps, ranches, and the town of Rosemont.
The brightly glazed earthenware recovered from a number of sites is probably of Mexican origin and may be related to the numerous Mexican laborers employed at the Rosemont Mines. Fragments of stoneware, jugs, and crocks were also common, although no identifying marks were observed. Finally, fragments of clay assaying crucibles were occasionally found. One was stamped "Morgan Crucible Company."

Ranching

Five ranch sites have been identified within the Rosemont Study Area. These have been identified through correlating map locations with architectural remains and chronology and types of trash deposits. Remains of corrals associated with house foundations and domestic artifacts; lack of mining machinery, slag, or ore samples; locations along major water sources; and corresponding historic map references were used as historic ranch indicators.

All identified ranch sites appear on the 1905 Patagonia Quadrangle topographic map. These are Chapo's Ranch, Lopez's Ranch, Martinez Ranch, Scholefield Ranch, and V-R Ranch. All but Lopez's and Martinez Ranch also appear on the 1893 Official Map of Pima County School Districts. These two ranches are not shown on the 1922 Empire Ranch Quadrangle map and were probably occupied for only a short time. The Chapo Ranch appears on the 1922 Empire Ranch Quadrangle map but not on any later maps. Two of the original five, the V-R Ranch (V-R Camp) and Scholefield (Hidden Valley) Ranch, are currently occupied and have not been completely recorded.

It should be noted that, with the exception of the Martinez Ranch, all ranch sites are located near one of the major drainages, such as Davidson, Barrel, and Scholefield canyons. The most successful locations appear to be downstream. Ranches located in the headwaters of these canyons were soon abandoned. It is not known whether this is due to increased danger from Apache in the rougher terrain or lack of sufficient water supplies.

Martinez Ranch (X1-S5-L2): The location of this ranch site has been tentatively identified by means of early map locations. No documentation of ownership has been traced. Although several Martinez individuals are named in connection with the early cattle industry in Pima County, no locations are given for their ranches, and at least two other Martinez ranches were located in and near the Santa Rita Mountains in the late 1800s.

Remains include a cobble foundation, a circular depression, deposits of domestic trash, and a grave. Datable artifacts place occupation of the site between 1870 and 1925. The grave is marked with a bronze plaque labeled "W.J. PFENNINGER 1862-1933" and probably postdates the abandonment of the ranch. Although the site is not located on a drainage, a nearby
mining camp, HP2-S1-L1, includes a spring excavated from the banks of a drainage at the head of Wasp Canyon. This is still used today to water stock and may have provided water to the Martinez Ranch as well as to later miners.

V-R Ranch (X13-S1-L6, X13-S1-L4, HP7-S1-L1). This currently occupied ranch is located on the west bank of Barrel Canyon. It was originally homesteaded by Edward L. Vail and Risely (thus the name) in the later half of the 1880s. By 1899, Vail had 1600-2000 head of cattle and had bought Risely out. In 1903, E.L. Vail sold his 3000 head of cattle to Walter Vail and Gates of the Empire Ranch (Vail n.d.). E.L. Vail was the brother of Walter Vail, owner of the Empire Ranch and later a prominent citizen of Tucson. No further research has been done at this time on the subsequent history of the ranch.

The sites recorded as HP7-S1-L1 and X13-S1-L4 are small, historic trash scatters near the main ranch complex. Artifacts indicate use of the areas prior to 1920.

Lopez Ranch Corrals (M81-S1-L1). Historical records indicate that the Lopez Ranch was purchased by the Empire Ranch in 1886 (Heffner 1960). This is probably the same ranch which was homesteaded on the east side of the Santa Ritas by the grandfather of Mrs. Francisco Escalante Cota (Cota n.d.) and subsequently lost to the Vail Company.

At the present time, no remains of structures or historic trash are to be found within the surveyed area. According to historic maps, the Lopez Ranch was located within the boundaries of patented land, just south of M81-S1-L1 in Study Unit 16, and a preliminary reconnaissance located extensive historic remains in this area which were not recorded. This site consists of two corrals constructed of barbed wire, wooden posts, and boards on the west side of McCleary Canyon. Although recent use is evident, some antiquity is suggested by the depth to which the wire is embedded in the tree trunks.

Chapo Ranch (M41-S2-L2). No documentation could be found at this time for this ranch in the upper reaches of Davidson Canyon. Since it appears on several maps between 1893 and 1932, it is hoped that future research can clarify its history.

Architectural remains consist of an adobe brick house foundation, a possible barn of the same material, and remains of a post corral. The walls of the dwelling are extant to a height of 2 m. No definable trash deposits were observed, although historic artifacts are widely scattered in the area. These include Papago Red and Papago Red-on-brown pottery, purple glass, metal, and earthenware. Artifact dates range from 1870 to 1920.
Scholefield Ranch (X52-S4-L2). This ranch was one of the first Anglo settlements in the area, and early routes into the east side of the Santa Ritas passed through it. It is located on the south side of Scholefield Canyon, named for the original homesteader. The exact date of its foundation is unknown, but W.B. McCleary states in his reminiscences (n.d.) that in 1886 Mr. George Scholefield (Figure 14) was living there. Little more is known of the ranch's history.

At the present time, the Scholefield Ranch is known as the Hidden Valley Ranch. The modern ranch consists of a main dwelling, large stable, corrals, water tank, and scattered debris. Some additions to the ranch house and other structures appear to be recent.

Mining

Four distinct areas relating to mining activities can be defined within the Rosemont Study Area as a whole: Helena Mine, Rosemont Camp, Rosemont Mines, and Narragansett Mine-New Rosemont (Figure 8). A variety of sites can be associated with the mining activities throughout the last century in the Rosemont area. These include mining shafts, smelting and reduction works, isolated features, and trash deposits. Sites have been grouped on the basis of geographical proximity, functional relationships of features, datable artifacts, and historical maps and documentation.

**Helena Mine.** Helena Mine first appears on the 1893 Official Map of Pima County, although Schrader (1915:138-141) states that it was discovered in 1894. It continues to appear on the most recent map of the area, the 1958 U.S.G.S. Empire Mountains Quadrangle map. It is located on the ridge dividing Mulberry and Papago canyons, approximately 1.5 km north of the Scholefield (Hidden Valley) Ranch. In the early 1900s, the mine was owned by the Rosemont Mining and Smelting Company and worked by Mexican labor. Although Schrader mentions a camp and mill associated with the gold mine, no historic remains were recorded which might correspond to these structures.

**HS29-S1-L1** appears to have been a small individual camp occupied at the turn of the century and was probably associated with the Helena Mine. It is located on the east bank of Papago Canyon. Features include a rectangular cobble outline of a tent or other impermanent structure, a hearth, and associated domestic trash.

**Rosemont Camp.** The mining camp of Rosemont, known as McCleary Camp prior to 1894, was located at the junction of Wasp and Barrel canyons, with the main structures on the north side of Wasp Canyon. In 1894, the Rosemont Smelting and Mining Company was incorporated by William B. McCleary (Figure 6) and L.J. Rose for the purpose of developing their numerous
Figure 14. George Scholefield (Arizona Historical Society)
copper claims. A post office was established with McCleary as postmaster, and a small smelter was erected. Within the next year, the smelter furnace blew up and the company ran into debt. In 1896, McCleary and Rose sold the smelter site and their claims in the area to Lewisohn Bros. of New York City (Arizona Daily Citizen, June 26, 1896). This company erected a one-stack, 60-ton smelter in Rosemont. By 1900, the camp boasted a hotel, school, and several stores which provided services for the over 100 men working the mines and their families (Sherman and Sherman 1969:130).

In 1907, an industrial depression caused the mines and smelter to be closed, and by 1910 the town was almost deserted and the post office discontinued (Popoff 1940). Although mining activities were recommenced sporadically in later years, the site of Rosemont Camp was never the center of these operations.

Rosemont differs from many of the mining camps of the period in that most of the miners it served did not live near the camp itself. The few domestic tent sites were probably inhabited by men who worked in the smelter and flotation reduction complexes. The majority of the miners lived near the mines, which were over 1.5 km away at the heads of Wasp and McCleary canyons.

A total of 18 sites was recorded within a 0.8 km radius of the Rosemont Hotel (Table 13). These include remains of the post office, smelter, and flotation reduction complex; a number of cobble and cement foundations; and associated trash.

Today, little remains of Rosemont Camp, and identification of several of the archaeological features is based upon a single photograph taken around 1900 (Figure 15). It shows the hotel with a possible post office-store-mine office in the foreground (X88-S1-L1) and the smelter stack and chute (X72-S3-L5) in the background. With the exception of the flotation reduction complex (M74-S1-L1), the original function of many of the sites is difficult to determine from surface remains. Not only were the original structures probably flimsy and temporary, but it can also be assumed that much of the lumber, tin, and brick was salvaged to construct mining camps in McCleary Canyon when the Narragansett Mine was reopened in 1916.

The foundations of the Rosemont Hotel (Subunit A, Feature 6) are located on a small rise on the north side of Wasp Canyon. Surface remains consist solely of two chimney foundations and a row of brick pillar bases which originally supported the front porch. Remains of an early porcelain toilet, broken sewer pipe, and water pipes protruding from the ground indicate that the building had indoor plumbing facilities. An extensive trash dump (Subunit B, Feature 13) is located to the east of the hotel foundation. Although extensively disturbed by bottle hunters, the deposits have great potential for yielding significant information regarding the period around the turn of the century. Artifact dates cluster closely around 1900.
Table 13. Historic sites in Rosemont Camp area

<table>
<thead>
<tr>
<th>ASM Site Number</th>
<th>Field Site Number</th>
<th>Dates</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not assigned at this time.</td>
<td>X88-S1-L1</td>
<td>1870-1930</td>
<td>Rosemont Hotel and associated trash deposits, office or store, and storage shed</td>
</tr>
<tr>
<td>Decisions to assign ASM site numbers will be made after evaluation of results of further research.</td>
<td>X72-S3-L5</td>
<td>1879-1888</td>
<td>Smelter location and slag dump</td>
</tr>
<tr>
<td></td>
<td>X72-S3-L3</td>
<td>prior to 1920</td>
<td>Trash deposit of slag, copper ore, crucible, other mining remains</td>
</tr>
<tr>
<td></td>
<td>M74-S1-L1</td>
<td>1900-1920</td>
<td>Flotation reduction complex</td>
</tr>
<tr>
<td></td>
<td>HP18-S5-L4</td>
<td>1900-1930</td>
<td>Cement foundation and tank, trash deposit</td>
</tr>
<tr>
<td></td>
<td>HP18-S5-L3</td>
<td>1900-1930</td>
<td>Hearth and trash associated with HP18-S5-L4</td>
</tr>
<tr>
<td></td>
<td>HP18-S4-L3</td>
<td>1885-1925</td>
<td>Cobble foundations, trash</td>
</tr>
<tr>
<td></td>
<td>HP18-S4-L2</td>
<td>prior to 1925</td>
<td>Cobble foundation, trash</td>
</tr>
<tr>
<td></td>
<td>HP18-S4-L1</td>
<td>1880-1950</td>
<td>Tent platform, hearth, cement tub, domestic trash</td>
</tr>
<tr>
<td></td>
<td>M76-S1-L1</td>
<td>1880-1900</td>
<td>Tent platform, domestic trash</td>
</tr>
<tr>
<td></td>
<td>X88-S2-L1</td>
<td>1905-1920</td>
<td>Cobble foundation, possible tent platform clearings, hearth, domestic trash</td>
</tr>
<tr>
<td></td>
<td>X73-S5-L1</td>
<td>1886-1928</td>
<td>Isolated broken bottle</td>
</tr>
<tr>
<td></td>
<td>M76-S1-L2</td>
<td>no date</td>
<td>Isolated glass jug and earthenware bowl</td>
</tr>
<tr>
<td></td>
<td>HP18-S4-L1</td>
<td>prior to 1920</td>
<td>Trash scatter</td>
</tr>
<tr>
<td></td>
<td>HP18-S5-L1</td>
<td>no date</td>
<td>Isolated cartridge</td>
</tr>
<tr>
<td></td>
<td>X71-S8-L1</td>
<td>prior to 1920</td>
<td>Trash deposit</td>
</tr>
<tr>
<td></td>
<td>X68-S3-L1</td>
<td>1904-1907</td>
<td>Isolated glass bottle base</td>
</tr>
<tr>
<td></td>
<td>HP18-S6-L1</td>
<td>1920-1950</td>
<td>Probable U.S.F.S. ranger station, house foundation, well, water troughs, other associated remains</td>
</tr>
</tbody>
</table>
The structure directly in front of the hotel (Figure 15) may have been the post office, although it may also have functioned as a mine office and store. The large, windowless shed beside it would have been for storage. Roskruge's 1898 map of the Rosemont Copper Mines (Figure 16) places the post office approximately 150 m southwest of the hotel, making HP18-S4-L1 an alternate possible location for this facility.

The smelter and its prominent slag dump (X72-S3-L5) are located on a steep hillside to the northwest of the hotel. This would conform to either the Old Put or Chicago mill sites on the 1898 Roskruge map. As it is the only smelter location evident at Rosemont, it can be assumed that the Lewisohn Bros. constructed their operation on the site of the former Rosemont Mining and Smelter Company furnace, which exploded in 1895. At the present time, the site consists of an extensive slag pile extending toward Wasp Canyon from a large platform excavated into the hillside. A large boiler is lying on the platform, and there is a possibility that additional machinery is buried under the talus slope. A road leads up the western slope of the hill to the top of the excavation, where a chute led into the smelter. The early dates for the observed artifacts cannot be considered representative of the actual smelter operations since there is little datable debris associated with the smelting. The datable artifacts can probably be attributed to three tent platforms which may antedate construction of the original smelter.

A large flotation ore extraction complex, M74-S1-L1, represents a later period of mining activity in the Rosemont area. It is located on a steep ridge and small drainage which runs into Barrel Canyon. A series of round cement tanks, troughs, and connecting pipes form a gravity system for ore flotation. A litter of wood scraps and fragments of a galvanized tin conduit leading from the tanks down the narrow wash represent the remains of the sluice. At the top of the ridge is a platform for the ore-crushing machinery and a large capped pipe which probably supplied the water for the operations. To the west of the site, in a side drainage to Wasp Canyon, is a well site with piping leading toward the flotation complex. The large metal gravity tank which originally was on top of the upper tower now lies at the bottom of the wash. The entire area is dissected by a number of roads providing access to the various operations.

This site represents some of the best preserved historic remains in the study area. It appears to date to between 1916, when the flotation process was invented, and 1920, and is probably associated with the reopening of the mines during World War I. The location of this facility would have been determined by the availability of ample water supplies, and necessitated ore hauling from the outlying mines in McCleary Canyon to this more central location.
Figure 16. Roskrug's map of the Rosemont copper mines (1898)
The remainder of the sites associated with Rosemont Camp consist of a number of cobble and cement foundations of unknown function, several tent platforms, and isolated trash deposits and artifacts. Occupation of the camp appears to have begun in the 1880s and lasted sporadically until 1920. As the area has been used for camping and cattle raising since then, several of the sites show a more extensive occupation span.

Below the junction of Wasp and Barrel canyons, HP18-S6-L1 represents a later use of Rosemont Camp by the U.S. Forest Service. A ranger station was established beside the road in the 1920s. Architectural remains include a substantial concrete house foundation with a front veranda, several water troughs, a well house, and a number of intrusive chinaberry trees. This site is included in the Rosemont Camp discussion because the well was probably used by the camp as early as the 1890s. It is located on the 1898 Roskruge map (Figure 16) approximately 230 m east of the Rosemont Hotel. The well is still used by local ranchers and miners.

Rosemont Mine Area. The major area of mining activity associated with Rosemont Camp lies at the head of Wasp Canyon, over 1.5 km from the smelter and company headquarters. Over 25 claims are listed on Roskruge's 1898 map (Figure 16). Schrader (1915) locates the Old Pap, Old Put, Chicago, Pickwick, Coconino, Gray Copper, Sweet Bye and Bye, and Record Excelsior mines in this area. Only three mining sites were recorded during the survey, although a great number were observed in the field. Those shafts and adits currently being worked were not recorded, nor were workings which had no definite evidence of being worked during the historic occupation of Rosemont. The majority of the 13 sites recorded were tent camps and associated domestic trash (Table 14). These appear to be contemporary with the main occupation of Rosemont Camp and support the hypothesis that the main work force lived close to the mines.

MI-S1-L1 corresponds to the general location of the Old Put and Old Pap mines on Schrader's (1915) map. The site consists of a mining shaft and two adits associated with several surface pits and a pump house foundation. The trash scattered among these features appears to be recent. Slightly to the east of the mining site is a cobble-outlined tent platform and trash deposit at MI-S5-L. The artifacts indicate an occupation prior to 1920.

The second recorded mining site is M4-S1-L1. A vertical shaft with a wooden tower, pulley, and chute above it are excellent examples of the typical mechanism for removing ore from the mine. A concrete slab with bolts, which probably held a winch and a wooden platform of unknown function, is located approximately 5 m from the shaft. Other features of the site are a short adit with a wooden door, probably used for storage, and several shallow excavations. Trash in the vicinity indicates that major mining activity has taken place here since 1900. The location corresponds to either the Chicago or Pickwick Mine on Schrader's map (1915).
Table 14. Historic sites in Rosemont Mine area

<table>
<thead>
<tr>
<th>ASM Site Number</th>
<th>Field Site Number</th>
<th>Dates</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not assigned at this time.</td>
<td>M1-S1-L1</td>
<td>1910</td>
<td>Three shafts, pump house, water storage ponds--Old Pap or Old Put Mine.</td>
</tr>
<tr>
<td>Decisions to assign ASM site numbers will be made after evaluation of results of future research.</td>
<td>M1-S5-L1</td>
<td>1920</td>
<td>Cobble foundations, domestic trash</td>
</tr>
<tr>
<td></td>
<td>X1-S5-L3</td>
<td>no date</td>
<td>Drilling rig, miscellaneous machinery</td>
</tr>
<tr>
<td></td>
<td>HP2-S1-L1</td>
<td>1895-1950</td>
<td>Extensive mining camp, spring, cobble foundations, tent platforms</td>
</tr>
<tr>
<td></td>
<td>X1-S5-L1</td>
<td>no date</td>
<td>Trash deposit, probably associated with X1-S5-L3 and HP3-S1-L1</td>
</tr>
<tr>
<td></td>
<td>X1-S6-L1</td>
<td>1870-1940</td>
<td>Tent platform, domestic trash, claims</td>
</tr>
<tr>
<td></td>
<td>M1-S2-L2</td>
<td>1860-1950</td>
<td>4 tent platforms, domestic trash</td>
</tr>
<tr>
<td></td>
<td>X1-S9-L1</td>
<td>1925</td>
<td>Tent platform, hearths, domestic trash</td>
</tr>
<tr>
<td></td>
<td>X1-S10-L1</td>
<td>1900-1925</td>
<td>7 tent platforms, domestic trash</td>
</tr>
<tr>
<td></td>
<td>M1-S4-L1</td>
<td>1920</td>
<td>Trash associated with X1-S10-L1</td>
</tr>
<tr>
<td></td>
<td>X1-S8-L2</td>
<td>1890-1920</td>
<td>Tent platform, domestic trash</td>
</tr>
<tr>
<td></td>
<td>M4-S1-L1</td>
<td>1900</td>
<td>Shaft and adit, wooden winch tower, trash--Chicago or Pickwick Mine</td>
</tr>
<tr>
<td></td>
<td>M1-S3-L1</td>
<td>1900-1920</td>
<td>Cobble foundation outlines, domestic trash</td>
</tr>
</tbody>
</table>
Five individual mining camps were located in the vicinity of this mining site. X1-S8-L2 has at least one definite foundation and a large cleared area where other temporary structures may have been erected. Artifacts recorded from the extensive trash scatter indicate the site was occupied prior to 1920. M1-S3-L1 consists of one definite cobble outline, several cobble features of indeterminate function, and scattered trash which may date anywhere between 1900 and 1945. A total of seven tent platform foundations can be distinguished at X1-S10-L1. The associated trash and nearby trash deposits at M1-S4-L1 point to an occupation during the first quarter of the 20th century. X1-S9-L1 appears to have been a later temporary camp with a single structural foundation and several hearths. Four tent platforms and associated trash deposits with a wide range of dates (1860-1950) were recorded at M1-S2-L2. Occupation of this group of mining camps appears to have taken place at the turn of the century, during the heyday of Rosemont Camp.

The third complex with a mining operation and associated camps is located near the site of Martinez Ranch. Just to the east of the ranch is a recent drilling site, X1-S5-L3, surrounded by lumber and various machine parts. To the west of the ranch site is another area, X1-S5-L1, of lumber, cable, tin, and other miscellaneous items, which also may be related to historic mining operations in the area. No dates can be assigned to these sites, although they appear to be recent.

An extensive mining camp is located in a side wash at the head of Wasp Canyon. HP2-S1-L1 includes several prepared foundations for impermanent structures, a pen for small animals, springs and wells, a footbridge connecting the spring and habitations, remains of an early automobile, and extensive domestic trash deposits. Occupation can be traced from the turn of the century until the 1950s, and several of the wells and springs are presently being used for watering cattle. Another small camp nearby, X1-S6-L1, consists of a single tent clearing, several claim markers, and trash dating between 1870 and 1940. The long historic occupation in this area can be directly related to the presence of springs which explain both the location of the Martinez Ranch and the reuse of the camp sites through time.

It is evident from the number of individual camps recorded in the vicinity of the mines that the miners preferred to live close to their work rather than in the company camp at Rosemont. This is supported by the dates for the occupation of these camps. They appear to have been established in the late 1800s, with most intensive occupation at the turn of the century. Unlike Rosemont Camp, there is little evidence for permanent structures, and the habitations were probably flimsy temporary shelters. A series of photographs of the Mexican mine workers' camp at nearby Helvetia in 1899 gives some idea of what the camps in the Rosemont area may have looked like. The Helvetia camp had no formal arrangement, with tents, shacks, wagons, tanks, and the general detritus of daily life strewn over
the landscape (Figure 17). The structures themselves exhibit great ingenuity and variety, being composed of tents, grass, tin, parts of packing cases, lumber, or combinations thereof (Figure 18). It is evident why so little is left today of these sites other than the cleared and outlined tent platforms.

Narragansett Mine-New Rosemont. Seven historic sites were recorded in the upper portion of McCleary Canyon, which is included in National Forest land (Table 15). These are all mining camps and associated trash deposits dating to the turn of the century. It is known that a number of mines and camps are located within the unsurveyed patented lands just to the west of these sites. It is believed that both the recorded and unrecorded sites are part of an extensive mining camp associated with the mines located at the head of McCleary Canyon. Schrader's (1915) map locates the Eclipse, Narragansett, Exile-King, and Mohawk mines in this area. As in the Rosemont Mine area, miners would have preferred to live close to their work and use Rosemont Camp as a supply center during the late 1800s and early 1900s. Furthermore, the Narragansett Mine was reopened during the First World War. The Arizona Mine Inspector's Report for 1915-1916 states that the Narragansett Mine, with R.G. Ramesdell as supervisor, was producing 1400 tons per month and had 137 men employed. With the exception of the Rosemont Mine, which only employed 12 men, the Narragansett appears to have been the major producing mine in the Rosemont area at that date. Rosemont Camp had been discontinued by this time, and it is logical to assume that materials were salvaged to establish camps closer to the Narragansett Mine.

HP21-S1-L1 consists of two 5 m by 4 m cobble wall foundations and associated domestic trash scatters located in the floodplain of McCleary Canyon. An isolated broken purple glass vessel, X72-S5-L2, was recorded on the terrace directly above these foundations. The cobble foundations probably supported wooden tent platforms, and the scantiness of the trash deposits indicates that the sites may have been occupied for only a short period sometime prior to 1920.

Farther up McCleary Canyon, four historic sites are associated with a spring. Both the spring and indications of a structure appear on Schrader's topographic map, surveyed in 1903, and on the 1958 U.S.G.S. Empire Mountains Quadrangle 15-minute series map (Figure 12, Table 11). It is probable that all four sites are part of the same complex, although the ranges of dates vary somewhat. X82-S1-L1 and HP21-S2-L1 include a small cobble foundation, a cleared tent platform, several cobble platforms, and a buried tank on the terrace above a covered spring and water tank complex. X82-S1-L2 and HP21-S2-L2 consist of two trash-filled pits and an animal pen associated with a cobble house foundation. The structure had running water, as evidenced by the presence of water pipes protruding through the floor fill. Dates for the sites range from the turn of the century through 1950. The major period of occupation was undoubtedly during 1900 to 1920, with sporadic use of the area later due to the presence of the spring, which is used today for watering cattle.
Figure 17. The Helvetia mining camp (Arizona Historical Society)

Figure 18. Structures characteristic of the Helvetia mining camp (Arizona Historical Society)
Table 15. Historic sites in Narragansett Mine-New Rosemont area

<table>
<thead>
<tr>
<th>ASM Site Number</th>
<th>Field Site Number</th>
<th>Dates</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not assigned at this time.</td>
<td>HP21-S1-L1</td>
<td>prior to 1920</td>
<td>Cobble foundation, domestic trash</td>
</tr>
<tr>
<td>Decisions to assign ASM site numbers will be made after evaluation of results of future research.</td>
<td>HP210S1-L2</td>
<td>prior to 1920</td>
<td>Cobble foundation, domestic trash</td>
</tr>
<tr>
<td></td>
<td>X72-S5-L2</td>
<td>prior to 1920</td>
<td>Isolated broken purple glass vessel</td>
</tr>
<tr>
<td></td>
<td>X82-S1-L1</td>
<td>1920-1950</td>
<td>Structure foundation, buried tank, domestic trash</td>
</tr>
<tr>
<td></td>
<td>HP21-S2-L1</td>
<td>1920-1950</td>
<td>Spring, water troughs, cobble retaining walls for platforms, trash</td>
</tr>
<tr>
<td></td>
<td>X82-S1-L1</td>
<td>1905-1920</td>
<td>Cobble house foundation, trash-filled pits</td>
</tr>
<tr>
<td></td>
<td>HP21-S2-L2</td>
<td>1895-1950</td>
<td>Animal pens, retaining walls, trash</td>
</tr>
</tbody>
</table>

Reconnaissance of the unsurveyed patented land to the west of McCleary Canyon indicates that there has been intense historic occupation of this area. The individual mining camps observed ranged in date from the turn of the century through the 1930s. It would appear that the mines at the head of McCleary Canyon were worked intensively at a later date than those in Wasp Canyon, providing an opportunity for comparative studies of mining camps from the 1880s to the post-Depression era.

Miscellaneous Sites Related to Mining Activities. Ten additional sites were recorded within the Rosemont Study Area which appear to be related to the mining activities in the district (Table 16). Three are camps located along the old road into Rosemont Camp, while a fourth is alongside the road between Wasp and McCleary canyons. Another small, isolated camp was discovered on a tributary of Sycamore Creek which drains Study Unit 4. A platform of unknown function was excavated into the ridge above the present Highway 83. Isolated artifacts in the vicinity of these sites may be related to their activities. The final mining-related site is a boulder survey marker and broken purple glass vessel in a side tributary of Barrel Canyon.
Three individual camps, X17-S4-L4, X48-S9-L2, and HP4-S1-L3, appear to be related to the old road up Barrel Canyon from Pantano to Rosemont and Greaterville. The first two include tent or structure foundations with associated domestic trash which may date to the 1880s. The third consists of an apparently recent hearth with a scatter of glass dating prior to 1920. An isolated purple glass break at nearby XMIX2-S2-L1 is probably related to these remains. Two shotgun shells were recovered close to X48-S9-L2 at L3 and L4 and may represent hunting activities from the camp site.

X73-S9-L3 is located in a saddle beside the road connecting Wasp and McCleary canyons. It may have been a rest area for the wagons hauling ore between the mines and smelter at Rosemont, as the only features present are hearths, a pile of ore, and a light scatter of trash dating prior to 1920.

The cobble outline and scanty trash at X8-S1-L1 probably represent a temporary prospecting camp to the north of the main mining area. It can only be dated to sometime prior to 1930 by the few tin cans present.

Just south of Rosemont, on a narrow ridge to the west of Barrel Canyon, a possible mining claim (X73-S2-L1) consisting of a circular outline of boulders is associated with a few pieces of purple glass dating prior to 1920.

Table 16. Miscellaneous sites relating to mining activities

<table>
<thead>
<tr>
<th>ASM Site Number</th>
<th>Field Site Number</th>
<th>Dates</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not assigned at this time.</td>
<td>X17-S4-L4</td>
<td>1895-1950</td>
<td>Cobble foundation, domestic trash, pit</td>
</tr>
<tr>
<td>Decisions to assign ASM site numbers will be made after evaluations of results of future research.</td>
<td>X48-S9-L2</td>
<td>1875-1920</td>
<td>Cleared space, slag, trash</td>
</tr>
<tr>
<td></td>
<td>X48-S9-L3</td>
<td>1901-?</td>
<td>Isolated shotgun shell</td>
</tr>
<tr>
<td></td>
<td>X48-S9-L4</td>
<td>prior to 1945</td>
<td>Isolated shotgun shell</td>
</tr>
<tr>
<td></td>
<td>HP4-S1-L3</td>
<td>prior to 1920</td>
<td>Hearth, purple and clear glass</td>
</tr>
<tr>
<td></td>
<td>XMIX2-S2-L1</td>
<td>prior to 1920</td>
<td>Isolated broken purple glass</td>
</tr>
<tr>
<td></td>
<td>X73-S9-L3</td>
<td>prior to 1920</td>
<td>Hearths, ore pile, trash</td>
</tr>
<tr>
<td></td>
<td>X8-S1-L1</td>
<td>prior to 1930</td>
<td>Cobble outline, trash</td>
</tr>
<tr>
<td></td>
<td>M39-S1-L2</td>
<td>post-1905</td>
<td>Excavated platform, wagon and harness parts</td>
</tr>
<tr>
<td></td>
<td>X73-S2-L1</td>
<td>prior to 1920</td>
<td>Mining claim?, purple glass</td>
</tr>
</tbody>
</table>
M39-S1-L2, although located just to the east of present Highway 83, was in an area of very little activity during the first part of the 20th century. A large platform has been excavated out of the side of a hill and may have supported a temporary structure. There is a noticeable lack of domestic trash around the platform. Artifacts in the area appear to be related solely to wagon and harness components. All metal items are hand-forged, indicating an early date. The presence of slag indicates that an ore wagon may have been repaired at the site, but there are no roads located in this area on the early maps.

Of the 81 historic sites in the study area, 50 can be related to mining activities. The majority of these date prior to 1910, with the most intensive occupation being at the turn of the century. The sites present a cross section of both domestic and industrial activities relating to copper mining between 1880 and 1950.

Isolated Artifacts and Trash Scatters

Thirty-one sites which were recorded in the study area cannot be definitely related to either historic ranching or mining activities (Figure 8). The majority of these consist of isolated artifacts, including tin cans, broken glass, vehicle parts, and 13 cartridge casings or shot shells. The latter have been identified and dated in Chapter 6 and can be attributed to hunting activities throughout the Historic Period. Most of the other isolated artifacts are probably due to casual discards by prospectors or ranchers.

The remainder of the sites consist of trash deposits of varying size and age. Several have possible hearths but no other features associated with the trash. These may represent very temporary hunting or traveling camps. X10-S32-L1 and HP1-S3-L3, along Oak Tree Canyon, are good examples of this type of site. The latter site, with its farming tools, may indicate attempts to farm along this wash. Deposits with no other features probably represent dumping by ranchers or miners. HS11-S1-L1, just over the ridge from the Scholefield Ranch, may have been one of the main dumps for the ranch headquarters. At this time, these isolated sites cannot be related to any definite activity within the study area.

Table 17. Isolated historic artifacts and trash scatters

<table>
<thead>
<tr>
<th>Field Site Number</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X10-S32-L1</td>
<td>1905-1922</td>
<td>Possible hearth, ash, trash pit, scatter</td>
</tr>
<tr>
<td>HP1-S3-L3</td>
<td>1920-1950</td>
<td>Farming tools</td>
</tr>
<tr>
<td>X10-S34-L1</td>
<td>1884</td>
<td>Cartridge</td>
</tr>
</tbody>
</table>

*Note: No ASM numbers will be assigned to isolated artifacts.
Table 17. Isolated historic artifacts and trash scatters (continued)

<table>
<thead>
<tr>
<th>Field Site Number</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP1-S3-L2</td>
<td>1885-1930</td>
<td>Roadside trash</td>
</tr>
<tr>
<td>HS2-S3-L2</td>
<td>post-1905</td>
<td>Broken glass</td>
</tr>
<tr>
<td>HS2-S3-L4</td>
<td>1902-1930</td>
<td>Broken glass</td>
</tr>
<tr>
<td>X17-S4-L4</td>
<td>1895-1950</td>
<td>Extensive trash, possible campsite</td>
</tr>
<tr>
<td>X17-S1-L1</td>
<td>1925</td>
<td>Broken glass</td>
</tr>
<tr>
<td>M9-S1-L1</td>
<td>1907</td>
<td>Cartridge</td>
</tr>
<tr>
<td>X22-S3-L3</td>
<td>1898-1931</td>
<td>Cartridge</td>
</tr>
<tr>
<td>X14-S3-L1</td>
<td>pre-1920</td>
<td>Purple glass</td>
</tr>
<tr>
<td>HP1-S2-L7</td>
<td>pre-1920</td>
<td>Trash scatter</td>
</tr>
<tr>
<td>HP1-S2-L9</td>
<td>1905-1920</td>
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</tr>
<tr>
<td>HP1-S2-L10</td>
<td>pre-1922</td>
<td>Trash scatter</td>
</tr>
<tr>
<td>X25-S2-L3</td>
<td>no date</td>
<td>Ford truck parts</td>
</tr>
<tr>
<td>X25-S4-L2</td>
<td>pre-1922</td>
<td>Hole-in-cap can</td>
</tr>
<tr>
<td>M18-S1-L1</td>
<td>1942</td>
<td>Cartridge</td>
</tr>
<tr>
<td>X41-S6-L1</td>
<td>no date</td>
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</tr>
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<td>X37-S3-L1</td>
<td>1943</td>
<td>Cartridge</td>
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<td>X39-S6-L1</td>
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<td>1898-1931</td>
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<td>X54-S1-L4</td>
<td>1912-1960</td>
<td>Cartridge</td>
</tr>
<tr>
<td>X60-S3-L2</td>
<td>1894-WWII</td>
<td>Cartridge</td>
</tr>
<tr>
<td>X60-S7-L3</td>
<td>1880s</td>
<td>Cartridge</td>
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Table 17, Isolated historic artifacts and trash scatters (continued)

<table>
<thead>
<tr>
<th>Field Site Number</th>
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<tr>
<td>X64-S1-L2</td>
<td>1945-present</td>
<td>Cartridge</td>
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<td>HS11-S1-L1</td>
<td>1911-1931</td>
<td>Large trash concentration</td>
</tr>
<tr>
<td>X65-S3-L3</td>
<td>recent</td>
<td>Cartridge</td>
</tr>
<tr>
<td>X66-S1-L3</td>
<td>pre-1922</td>
<td>Hole-in-cap can</td>
</tr>
<tr>
<td>X67-S6-L9</td>
<td>1960-present</td>
<td>Cartridge</td>
</tr>
<tr>
<td>HP18-S3-L1</td>
<td>pre-1920</td>
<td>Trash</td>
</tr>
</tbody>
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CHAPTER 7
SIGNIFICANCE OF THE ARCHAEOLOGICAL RESOURCES OF
THE ROSEMONT STUDY AREA

Introduction

Four categories of significance will be defined and discussed in order to understand the value of the cultural resources located within the Rosemont Study Area. These categories have been defined by Moratto (1975) and by Scovill, Gordon, and Anderson (1972). The four categories include legal significance, historical and scientific significance, and social significance. These are important as elements in determining eligibility for the National Register of Historic Places.


Scientific and historical significance will be discussed together. In order to answer questions of scientific significance, the historical values of the resources to be discussed must be understood. The processes of cultural change cannot be adequately evaluated if the relative order of events is unknown. Historical significance, then, has been defined as the potential of cultural resources for yielding information on "specific cultures, periods, lifeways, and events" (Scovill, Gordon, and Anderson 1972). The recognition of cultural patterns and periods representative of those patterns constitutes historical significance.

Interrelated with historical significance is scientific significance, which is the potential of cultural resources to contribute to the understanding and exploration of cultural processes. Since the information contained at archaeological sites is indicative of past life ways, all sites can be considered significant. However, the degree of that significance will vary depending upon the nature of the cultural resources and the type of research problems being addressed. As noted by McGimsey and Davis ([eds.] 1977:31):

It is generally recognized, however, that defining significance implies some frame of reference, problem orientation, geographic, temporal or other context, against which an archaeological phenomenon is to be
evaluated. A site is therefore more or less significant relative to some criterion or criteria.

If "all" of the sites within a drainage have been surveyed and the region itself has been well studied, relative scientific significance can be established with considerable confidence. If the site in question is the only one of its type known for the drainage (and most of the rest of the drainage and region is unknown) the archaeologist has no choice but to determine that the site is significant.

Scientific significance refers to the potential of cultural resources to contribute to studies of past cultural development and behavior; to general anthropological issues, such as population dynamics; and to the solving of methodological problems within the discipline. In addition, archaeological remains can be significant for other disciplines. The study of past environmental changes can be aided by the recovery of fossil pollen and macrobotanical remains. The recovery of animal bones at archaeological sites can be relevant to zoologists in the study of past animal communities.

The assessment of scientific significance is a consideration of the following:

(1) the relative abundance of the resources to be affected; (2) the degree to which specific resources and situations are confined to the project area; (3) the cultural and environmental relationship of the archaeology of the project or program area to the surrounding culture province or provinces; (4) the variety of evidence for human activities and their environmental surroundings that is contained in the project or program area; (5) the range of research topics to which the resources may contribute; and (6) specific deficiencies in current knowledge that study of these resources may correct (Scovill, Gordon, and Anderson 1972:21).

Social significance refers to the ways in which cultural resources can contribute to society. Benefits to society have been discussed by Scovill, Gordon, and Anderson (1972:21) and include:

(1) the acquisition of knowledge concerning man's past; (2) indirect benefits received by educational and research institutions and their communities, from salaries and funds supporting archeological studies and in increased opportunities for professional training; (3) the acquisition and preservation of objects and structures for public exhibit and enjoyment; (4) educational and economic benefits from tourism attracted by archeological exhibits; and (5) practical applications of scientific findings acquired on archeological research.

In addition, cultural resources or an area where a project was conducted may be significant to Native American groups. These groups may have been related to the past inhabitants that utilized the resources of the area.
Legal Significance

The definition of significance established by the federal government is to be found in the Procedures for the Protection of Historic and Cultural Properties, which was developed by the Advisory Council on Historic Preservation (Federal Register, Vol. 29, No. 18, Part II). The definition is as follows (36 CFR 800.10):

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association and:

(1) That are associated with events that have made a significant contribution to the broad patterns of our history; or

(2) That are associated with the lives of persons significant in our past; or

(3) That embody the distinctive characteristics of a type, period, 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

(4) That have yielded, or may be likely to yield, information important in prehistory or history.

These are the criteria established for inclusion on the National Register of Historic Places.

Scientific and Historical Significance

The sites located within the Rosemont Study Area are representative of a broad temporal span ranging from the Archaic Period into the Historic Period and offer an opportunity to investigate changes in subsistence strategies and settlement systems through time.

Archaic Period

There are many gaps in our understanding of the Archaic Period occupation in southern Arizona. Reference is made in Chapters 5 and 6 to the important problems that are still unresolved. These can be briefly summarized as follows, omitting those (like the chronological placement of the Sulphur Spring Stage) for which no direct evidence is expected in the Rosemont Study Area.
Amargosa. Prior to 1500 B.C., much of southwestern Arizona shows affinities with the western Amargosan tradition rather than with the Cochise tradition commonly identified with southeastern Arizona. Various chronologies have been proposed; none is supported by firm absolute dates. It is only possible to state that complexes identified as Ventana-Amargosa I and Chiricahua-Amargosa appear prior to the San Pedro Stage of the Cochise. At Ventana Cave, the only excavated site where these complexes are represented, Ventana-Amargosa I lacks the grinding tools normally associated with plant-processing activities. The Chiricahua-Amargosa assemblage contains, however, substantial evidence of a mixed economy based on plant and animal procurement. This difference may be the result of changes in emphasis in the total subsistence base or simple variation in strategy for plant procurement and processing. In the absence of data from a wider range of sites and a firm chronology, reconstruction of economy and settlement distribution and the possible role of environmental conditions in forming these are largely matters of speculation.

Cochise. The Cochise tradition is characterized by a well-established, diversified subsistence base throughout its history. From the Sulphur Spring Stage (presumed to include the Cazador) through the Chiricahua and San Pedro stages, wild seeds, fruits, and other plant products were intensively used by the Cochise.

Whalen (1971) proposed a model of Chiricahua and San Pedro subsistence involving focus on individual plant and animal species rather than concentration on particular local environments. There is evidence of strong continuity between these stages in both technology and subsistence strategy. The introduction of domesticates in the San Pedro Stage appears to have had little effect on the Cochise for about a thousand years after introduction. Whalen attributes this to the relatively unproductive early variety of corn (the first domesticate to appear) compared to later varieties.

The San Pedro Stage marks a geographical expansion of the Cochise phenomenon. At Ventana, the San Pedro assemblage suggests close ties with the Cochise, superseding the earlier dominance of Amargosan influences. It is unclear what implications this might have for overall reconstruction of the organization and economy of Archaic populations in southern Arizona.

At several centuries B.C., the Archaic comes to an end with increased reliance on domesticates and the beginnings of sedentism. Although Haury (1950) saw the Cochise as the source of later Hohokam agriculturalists, this is still debated. It is often proposed that the Hohokam represent an overlay of Mesoamerican agricultural technology introduced by an intrusive population which coexisted with these local populations.

The Rosemont Study Area. Eighteen Archaic sites and one isolated artifact have been identified in the study area. These include sites apparently associated with hunting
and with plant processing. There is at least one probable base camp, which predates the San Pedro Stage. All of these sites are located in the eastern and central portions of the study area, where woodland, grassland, and riparian plant communities form a complex mosaic and where conditions are good for game habitats.

Many other Archaic sites, probably associated with specialized plant and animal procurement and processing activities, are doubtless located within the study area. Those sites now identified as "unknown aboriginal" include many lithic scatters possibly dating to the Archaic. Detailed comparisons of lithic technology should permit broad temporal classification of these sites so that they may be considered in reconstruction of the Archaic occupation of the area.

The discussion that follows outlines the problem areas for which Rosemont data can be expected to have relevance.

Resolution of many of the important questions about Archaic development in Arizona depends upon determination of reliable absolute dates for the earlier Archaic stages. Sites in the Rosemont area may contain datable hearths which would allow us to place the Ventana-Amargosa I and Chiricahua-Amargosa II complexes into a usable temporal framework. Without this framework, it is impossible to evaluate these phases in terms of environmental effects or regional cultural relationships.

In addition, such dates would be important to the reconstruction of models of behavioral-environmental relationships. At what time was the Rosemont Study Area (and presumably others like it) first inhabited? Does this correspond to any other known event in the natural or social environment -- the terminal Pleistocene, the initiation of the Alithermal, or major changes in the Cochise tradition in southeastern Arizona? It is possible, for example, that Ventana-Amargosa I may fall within the period 6000-3500 B.C. No radiocarbon dates for Archaic occupations in southern Arizona fall within this range. As the predecessor of Chiricahua-Amargosa, this stage is at least a likely candidate for this place in the sequence. If so, this would resolve the question of whether there was a period in which the region was essentially depopulated.

A model of Archaic development in southern Arizona can be proposed as a starting point for investigation. It should be noted that it cannot be claimed that the available data strongly support this model, only that the data do not conflict with it and that it represents a reasonable reconstruction which can be examined further.

The stylistic affinity of the early Archaic at Rosemont with Ventana assemblages has been noted. Ventana-Amargosa I can with confidence be placed between 8000 B.C. and 2000 B.C.; beyond this, dating is speculative. Acknowledging this, it can still be argued that the most likely chronological placement for this stage is within the 6000-3500 B.C. period.
This is based simply on its preceding the Chiricahua-Amargosa levels at Ventana and on an obvious, if exceedingly inconclusive, observation. In southern Arizona, we have a time period without a stage, and a stage without a time period. This stage, Ventana-Amargosa I, is known from only one excavated site, Ventana, and is absent in the excavated localities of southeastern Arizona.

This period coincides roughly with the dates generally given for the Altithermal, usually seen as extending from about 5000 B.C. to about 3000 B.C. This period, as is noted in Chapter 3, is believed to have been characterized by increasing dessication and, as a consequence, shifts of plant communities to higher elevations. It can be argued, therefore, that Ventana-Amargosa I represents an adaptation to drier Altithermal conditions. Populations in southern Arizona may have shifted their exploitative strategies to hill environments like that of Rosemont. This would account for the absence of evidence of this stage at most known excavated sites, which tend to be located at lower elevations. At 3000 B.C., a shift to wetter conditions has been noted. Expansion of the subsistence strategy to include lowland environments might have become desirable once more.

This reconstruction largely ignores the Cochise-Amargosa distinction. Ventana has been seen as an area of cultural contact, with the Cochise tradition locally following the Amargosa-Cochise amalgam by the San Pedro Stage. There is, however, little evidence that this distinction is very meaningful. The presence of a similar sequence at Rosemont is evidence that Ventana may not represent a narrow area of culture contact in which one tradition finally dominated, but a reasonably widespread phenomenon with changing affinities to adjacent traditions.

The potential of the Rosemont sites to yield data pertinent to the proposed model is great. It is possible that dates conflicting with this reconstruction might be found. Alternatively, it may be possible to substantiate this chronology. If so, palynological and other biological studies which could serve to clarify the basic issue of subsistence base might be possible. Identification of lithic technology and functional assemblages can permit identification of a greater number of Archaic sites as well as reconstruction of site distributions and the range of subsistence activities. It should then become possible to evaluate the mechanisms of social change in the Rosemont Study Area in the Archaic and, to a greater extent than has been possible before, in the region. Reconstructions like that of Whalen (1971) can be examined in greater detail. It has already been noted that the Rosemont data seem to conflict with that model. However, there is no reason to believe that subsistence strategies were consistent throughout the Archaic in the study area, and use of the area may have been more limited at some times than at others.
A final problem for which the Rosemont data may have relevance is the transition to agriculture. It has been proposed (Haury 1950) that the later Hohokam populations of southern Arizona developed from an indigenous Archaic population. It has also been suggested that the absence of sites showing a clear developmental sequence from the Cochise to the Hohokam is a consequence of late Archaic focus on environments other than the riverine floodplains favored by the Hohokam. Study of areas like Rosemont can provide crucial data on late Archaic adaptations to the desert and on the extent to which the late San Pedro shows characteristics which might be reasonably seen as antecedent to the Hohokam.

Post-Archaic Period

The Salt-Gila Basin was colonized around 300 B.C. (Haury 1976) by a migrant group from Mexico. The characteristics common to this occupation belong to the Vahki Phase, which persisted from 300 B.C. to A.D. 1. Few ceramics dating to this phase have been identified outside the Salt-Gila Basin. In southern Arizona, ceramics of the Vahki Phase were found at a San Pedro Stage site in Matty Canyon in the Empire Valley; ceramics of this time have not been located within the study area.

The earliest evidence of occupation in areas surrounding the study area is represented by ceramics of the Sweetwater and Snaketown phases, A.D. 100-500. Some structures of the Snaketown Phase have also been excavated. These early ceramics and features still indicate affinities with the Salt-Gila Basin. However, with the Cañada del Oro Phase of the early Colonial Period, a divergence from the red-on-buff ceramic style to a red-on-brown ceramic style occurs.

It is this red-on-brown ceramic style that is represented within the Rosemont Study Area. The study area appears to have had its most intensive occupation during the late Colonial and Sedentary periods. This occupation is indicated by the ceramics of the Rillito and Rincon phases. A wide variety of other artifact types is present, indicating possibly agriculture and wild resource gathering and processing. The villages during this time period appear to be small, with no sites containing more than 6 to 8 habitation structures, and the majority of these sites are located near the major drainages in the study area. This location near available water may indicate the farming of domesticated resources. However, in order to understand and interpret the survey data for this time period, more precise dates are necessary. The majority of the sites have dates that range from A.D. 700 to 900 or 1200, so that an explanation of the changes in subsistence and settlement patterns through time will have to await further information.

During this same time that the study area shows affinities with the Tucson Basin and middle Santa Cruz drainage, the Empire Valley exhibits an amalgamation of traits from the Mogollon culture and the Hohokam culture. In addition, the intensive occupation of the Empire Valley seems to occur slightly later than that of the study area. It is indeed curious that few ceramics of the Mogollon culture were noted within the study area. Why did the occupants of the Empire Valley appear to have more interaction (as indicated by material items)
with other groups to the east than did the occupants of the study area? It would seem reasonable to assume that the Santa Rita Mountains acted as a barrier between the study area and the Tucson Basin and Santa Cruz drainage. However, the study area seems to exhibit closer ties to the Tucson Basin than to the Empire Valley. Excavation of sites of the Rillito and Rincon phases within the study area may yield information on the interaction among the San Pedro Valley, the Empire Valley, and the study area, and how this interaction contributed to the development of the subsistence and settlement system within the study area.

The Rosemont Study Area is a complex mosaic of many plant communities that contain a wide range of available resources. Cutting through these plant communities are major drainages that served as focal points for settlement locations, as evidenced by the survey data. Since the study area contains a wide range of resources within relatively short distances, how did adaptation to this environment affect the settlement and subsistence patterns? Was floodwater- and rainfall and runoff-dependent agriculture practiced? To what extent did the occupants rely upon the gathering of wild plant foods and animals? Are the settlements seasonal or permanent?

The survey data did not reveal any ball courts or other features that could have served as focal points for integrating people in socioreligious functions or ceremonies. Little data are available with which to study possible sociopolitical organization of the prehistoric populations of the study area.

The presence of nonutilitarian items, such as marine shell and quartz crystals, and of ceramics of other traditions indicates that the inhabitants of the study area interacted with the groups in southern Arizona. There appears to have been contact with groups mainly to the east and to the south.

Doyel (1977) has presented a model for the Rillito-Rincon Period cultural development in the middle Santa Cruz Valley. In that model, he suggests that the Rillito-Rincon Period was a time of population expansion into an empty niche. The social groups filling that niche would have been organized in a dispersed settlement pattern and would have probably practiced dry-farming, gathered wild resources, and hunted. He further suggests that the dispersed settlement pattern may have been due to the redundancy of resources in the environment. Less emphasis would have been placed upon complex social systems and status positions.

The Post-Archaic Period occupation of the Rosemont Study Area initially appears to support Doyel's model of population expansion during the Rillito and Rincon periods. Most of the post-Archaic sites with decorated ceramics were dated from A.D. 700 to 1200. However, use of the model suggested by Doyel depends upon more precise dating than the range of dates represented by the Rosemont sites. The model does seem to be compatible with the evidence from the study area, since the majority of the Post-Archaic Period sites were dated to the Rillito-Rincon Period. There was no evidence of complex social systems as would be indicated by the presence of ball courts, abundant and varied nonutilitarian items, and canal systems, and the environment contains a diversity of biotic and abiotic resources. Future work within the study area should consider this model proposed by Doyel.
The Hohokam Classic Period may be represented by a few sites within the Rosemont Study Area. This general absence of sites of the Hohokam Classic Period in the study area contrasts with an abundance of sites of the period in the Empire Valley. This apparent shifting of settlement locations may have been caused by environmental factors. In the Tucson Basin, there are also shifts in settlement location during the Hohokam Classic Period.

Protohistoric Period

A few sites of the Protohistoric Period were located in the study area. They have been tentatively identified as Sobaipuri habitation and limited-activity loci. Other sites dating to this time period have been excavated in the San Pedro and Santa Cruz valleys. The sites within the study area would contribute to the meager knowledge of the settlement and subsistence systems of these groups and of any interaction that may have occurred among the surrounding areas.

The presence of these sites in a montane situation is most interesting. Previously recorded Upper Pima or Sobaipuri sites have been located along the Santa Cruz drainage (Doyel 1977) and along the San Pedro drainage (DiPeso 1953; Hammack 1971), although Spanish documents refer to the presence of Upper Pima Indians in other environmental settings (DiPeso 1953). One important aspect of research which may be addressed in the Rosemont Study Area is the definition of what subsistence activities were being pursued. Was floodwater agriculture being practiced, or were the Upper Pima drawn here by wild plant and animal resources not found in abundance along the major rivers? In addition, is there evidence for differential activities between the two sites which contain evidence of structures and the three sites which are simply artifact concentrations? Comparative analyses of artifact assemblages can certainly be of use in this regard; samples of assemblages obtained from Alder Wash Ruin (Hammack 1971) and the Baca Float sites (Doyel 1977) will be of value as well.

The temporal range of the sites should also be evaluated. It is doubtful that archaeomagnetic samples will be present at any of the localities, given the nature of previously investigated Piman sites; radiocarbon samples, however, may be encountered. The dating of these could have importance in the problem of a possible Hohokam-Pima continuum, and may also be of value with regard to assessing the time of Pima entry into the Rosemont region. Spanish trade items may also be found at these sites; these would be of aid in at least establishing a rough time range for the Upper Pima use of the area. At a more general level, the nature of Spanish trade goods, if present, may also indicate how the impact of European contact was influencing the Upper Pima economy and subsistence practices.

What can be learned of the nature of Upper Pima social organization from these sites? DiPeso (1953:61-62, 125-32) has investigated the site of Santa Cruz de Gaybanipitea, a village visited by Kino and Manje prior to
its destruction in 1698. These two Spaniards described it as a village of 25 houses and 100 individuals (DiPeso 1953:62); DiPeso located a total of 21 native structures and a Spanish adobe "fortress." On this basis, it may be estimated that an average of four persons occupied each house; this estimate can be further checked in other Spanish documentary sources. In any case, it should be possible to define the probable size ranges of the populations represented at the two village sites in the Rosemont Study Area. These figures can then be compared with those for village sites along the San Pedro and Santa Cruz rivers. In addition, village layouts and the positions of structures and other features relative to one another can be examined for clues to intrasite organization and how such organization varies from site to site.

While these protohistoric sites form only a small percentage of the total culture resource base in the Rose Study Area, it is clear that they are very important and have excellent research potential.

Historic Period

Introduction. A total of 86 historic sites was recorded in the ANAMAX-Rosemont Study Area. These range from isolated cartridges to ranches and mining camps. With the exception of some of the isolated artifacts and trash deposits, the majority of sites can be directly related to past ranching or mining activities (see Chapter 6). There is no evidence, either documentary or archaeological, of historic occupation of the area until the late 1870s. Prior to 1873, the western slopes of the Santa Rita Mountains were considered uninhabitable due to Apache, and it can be assumed that this group used the area as a temporary base for raiding forays. Although ranches were homesteaded and mining claims staked in the early 1880s, the main period of mining activity took place during those decades just prior to and after the turn of the century. There was a brief revival of mining activity during the First World War, and two of the ranches continue in operation at the present time, but most of the archaeological remains can be considered as representative of Victorian America.

The Value of Historical and Industrial Archaeology. As a subdiscipline of history and anthropology, historical archaeology has become an important tool for the recording and interpretation of the more immediate past. Although there is usually historical documentation of major events and people, the life of the common individual is often ignored. Ascher (1974:10) characterizes historical archaeology as "archaeology of the inarticulate," or those who are ignored by both historians and the documents of their own times. He goes on to stress that, unlike traditional prehistoric archaeology, where the change in man-made objects is assumed to be slow and more or less continuous, in the last few centuries the change in culture content has been explosive, uneven, and rapid (Ascher 1974:13). As a consequence, historical archaeology must be concerned with:
allowing a more penetrating view into some of the areas of past patterned human behavior than has hitherto been possible through dealing with the traditional archeological materials. The historical archeologist has an increasingly expanding responsibility to inquire beyond the mere validation of an historic site through correlation with documentary evidence; beyond merely listing the presence or absence of artifact types for establishing the temporal position of the site; beyond the revealing of architectural features for the purpose of reconstruction and restoration; beyond exposing ruins for the entertainment of the visiting public to historic sites; and beyond the process of recovery and preservation of relics from the past hoarded into repositories and museums! (South 1968:54).

An understanding of the life and events of the ordinary man is made possible through the techniques of historical archaeology, particularly artifact patterning (South 1977). The rapid change in artifact technology, combined with the fact that most sites are horizontal and have little depth, results in historical archaeology being based on a stratigraphy of technology rather than a stratigraphy of soils. Recognition of inter- and intrasite patterns in the artifact assemblages is the key to a meaningful interpretation of the daily lives of the inhabitants and their relationships within the larger sphere of the surrounding society.

Industrial archaeology is a subdiscipline of historical archaeology. Although, as commonly conceived, it is concerned mainly with the recording of the products and processes of the Industrial Revolution, mere accumulation of data is insufficient. According to Raistrick (1972:13), "industrial archaeology must be an integration of man at work, with the tools, structures, and materials with which he works, and the immediate environment in which his work is done." The industrial site and its interpretation should involve multidisciplinary cooperation. The entire historical setting, including past methods, production, working conditions, daily life, social patterns, and economic organization should be explored (Sande 1976: vii). Thus, this branch of historical archaeology incorporates the aims of the parent discipline in its broadest sense.

Historic Sites within Context of Previous Research. The mining camps and ranches within the Rosemont Study Area should be considered in relationship to the total culture of their inhabitants. From the mid-19th century until the First World War, American culture was dominated by Victorianism. Both American and British Victorianism were characterized by Anglo-Saxon Protestantism, industry, steady work, punctuality, conspicuous consumption, and an emphasis on schooling and communication by a bourgeois urban middle class. American Victorianism differs from the British mainly in the cultural diversity produced by the presence of ethnic minority groups and their relationship to the dominant Victorian culture. This culture marked the crucial transformation of America, particularly its industrialization, population growth, changing
race relations, and geographic expansion. Essentially, it was an era
in which there was an important interrelationship among culture,
society, and economy (Howe 1976).

In spite of the obvious importance of the Victorian era, only a
few late 19th century and almost no early 20th century sites have been
excavated in America. Furthermore, the majority of the later historical
sites archaeologically investigated in the western United States have been
either military sites or trading posts (Baker 1977:13).

A number of archaeological projects involving 19th century historical
sites have been carried out in the vicinity of the Rosemont Study Area
and can provide excellent comparative data. The Tucson Urban Renewal
Project of the Arizona State Museum was started in 1967 and has dealt
with vast quantities of material from the Victorian era. Although little
has been published on this project so far, it is expected to yield excellent
data on material culture through time and in relation to the many ethnic
groups in Tucson.

Johnny Ward's Ranch (Fontana and Greenleaf 1962) was excavated
south of the Rosemont Study Area in the Sonoita Valley. The analysis
and excellent report of this late 19th century Anglo-American ranch have
provided a useful body of data on the material culture and chronology
of the period. Another small ranch, Punta de Agua (McGuire 1979), was
excavated just south of Tucson on the Papago Reservation. This site
was abandoned in the 1870s after a short Anglo occupation. The report
gives an excellent view of material culture at a southern Arizona ranch
prior to the advent of the railroad.

Fontana (1967:61) points out that "no archaeologist has yet
indulged in serious ranch archaeology." The above two studies were
restricted to the habitation and its immediate surroundings, rather than
examining the whole ranch as a functioning unit and its relationship
with other areas. Both deal with the period prior to 1900. In effect,
there is little archaeological information available on early 20th
century Victorian ranching in the Southwest.

Fortunately, there is a much greater body of literature available
on the archaeology of mining camps. Vast amounts consist of "ghost town"
histories and bottle collectors' guides. Extinct mining camps have been
a focus of amateur excavators throughout the Southwest, and there are
very few trash deposits which have not been zealously churned in the
search for bottles.

The majority of the professional work on mining sites and camps
has been directed towards historical restoration and reconstruction.
The Reed Gold Mine in North Carolina; Georgetown, Colorado; and the
Garnett Project in Montana are typical of this approach (Baker 1977:25).
Several recent historical archaeological projects have involved more
sophisticated research problems. The Ten Mile Canyon Project included a large number of railroad construction and mining camps of the late 19th century. Although the focus of investigation is on testing models for different types of industrial work sites, the project should provide extensive data on small camps in the Rockies (Buckles 1975). An intensive archaeological, oral, and documentary historical study of the late 19th and early 20th century mining town of Ouray, Colorado has resulted in tight temporal and cultural contexts for studies of comparative data (Baker 1977:26).

Professional archaeological studies have concentrated upon the larger gold-mining centers of Colorado and California. With the exception of the Ten Mile Canyon Project, they have tended to ignore the smaller, more commonplace sites which were outside the mainstream of history. Furthermore, the heyday of the much studied Rocky Mountain gold camps ended in 1890, approximately the date when mining in Arizona began to develop.

Within Arizona itself, a single historic mine complex has been excavated. The Jackrabbit Silver Mine is located in the northern portion of the Papago Reservation. The mining and processing, habitation, and trash areas were photographed, described, and collected. No subsurface excavations were done. A summary of the history of the site and a brief analysis of activity areas have been published (Reynolds and others 1974).

The Rosemont Mining District is typical of the small copper operations which proliferated in Arizona at the turn of the century. The sites include not only the mines and processing centers, but also an excellent cross section of domestic remains, from a hotel to small individual tent camps. No professional archaeological study of such a complex has been attempted at this time, although excavation of the Reward Mine complex by the National Park Service was scheduled for early in 1979.

Thus, the historic resources of the Rosemont Study Area offer unprecedented possibilities for an archaeological and documentary investigation of late Victorian ranching and mining. Details of the interrelationships between individual sites, when placed in the context of neighboring ranches and mines, Tucson and other urban centers, transportation and communication networks, and world events, may allow a reconstruction of socioeconomic conditions in a small corner of Arizona.

Research Potential and Problems of Historic Sites. Historic utilization of the Rosemont Study Area has been confined almost entirely to ranching, mining, and occasional hunting. The period of greatest activity occurred during the late 1800s and early 1900s. National
and regional influences as well as traits of Victorian America are reflected in the historic resources of the study area.

Mining and ranching activities occurred simultaneously and often utilized the same terrain, as witnessed by the location of the Martinez Ranch in close proximity to the main Rosemont mining area. Historical records indicate that ranchers occasionally mined on the side and that the early ranchers and miners maintained close economic and social ties. The miners relied upon local ranches for much of their meat and produce, and social events included both ranch hands and miners. This inter-reliance was particularly evident during the period of Geronimo's raids.

Nevertheless, there were essential philosophical, economic, and material differences between the two groups. Ranchers had an investment in the long-term development of their property, while miners tended to have a transient, "get rich quick" attitude toward both business and environment. This dichotomy should be reflected in a comparison of construction techniques, layout, and material culture of the two groups of sites. Ranch buildings tended to be constructed for permanence, as is evident in the massive adobe remains of the Chapo Ranch and the still existing structures of the V-R and Scholefield (Hidden Valley) ranches. In contrast, there are few visible remains today of either mining camps or associated commercial and industrial structures in the study area. Hastily constructed of flimsy materials, they were soon abandoned and salvaged by subsequent groups of miners.

Comparisons can also be made of the internal arrangement of ranches and mining camps. With the exception of company towns, mining camps were usually thrown together haphazardly, as photographs of nearby Helvetia (Figure 17) testify. Ranches, on the other hand, tend to exhibit patterns of structural arrangements which relate to their function.

Nevertheless, several common factors had their effect upon all occupants of the Rosemont Study Area. Neither ranchers nor miners were economically self-sustaining or socially isolated. They were dependent upon one another and upon outside sources for many of their supplies. Transportation networks were important in obtaining supplies and maintaining communications with the rest of the world. This was particularly true of the mines, whose access to machinery and raw materials such as coke depended upon haul roads for connections with Helvetia, Tucson, and the railway. Examination of the development of the road networks in relation to the ranches and mines may reveal temporal patterns. Of particular importance was the construction of the many railroads which tied southern Arizona to California, Nogales, El Paso, and the eastern seaboard. Ties with Tucson were particularly strong, as evidenced by newspaper accounts of activities in the Santa Ritas. Contacts with Nogales and other areas of Mexico were also probably important to the inhabitants of the Rosemont Study Area. The railroad provided easy connections, and many of the laborers in the mines and ranches were of Mexican origin. These ties and changes through time in the dependence
upon wild game and locally manufactured goods, including those from Mexico and native Indian tribes, should be reflected in the documentary and archaeological evidence.

The physical environment also had its effects upon all of the inhabitants during the Historic Period. Sites should exhibit local adaptation to climate, water supplies, and other available resources. These effects are reflected in location, materials, and density of occupation, all factors which can be compared to other areas in order to establish patterns of regional adaptation. In the Rosemont Study Area, availability of water appears to have been of primary importance in the location of ranches, mining camps, and processing complexes. Domestic establishments were clustered in areas of springs which are still in use today for watering cattle. There is much evidence of the use of local materials, such as adobe, in ranches. This trend was not as apparent at the mining sites, which seemed to rely on materials hauled in from Tucson and other neighboring communities. Homesteading records can be compared with records from the nearby Empire Valley in order to discern possible patterns.

In spite of problems common to both ranching and mining sites, each group has its own unique contributions to make to historical archaeology. Fontana (1967) points out that the archaeology of post-18th century ranches should relate to the concept of pastoralism, rather than be a hunt for mere "cowboy" artifacts. This should involve a study of types of livestock raised and their physical requirements in the environment, distributions of trails, transportation and markets, and the locations and functions of all structures within the ranch boundaries. Peculiar to the Rosemont Study Area itself are questions of ethnic origin and social status of the ranchers and what factors determined the success or failure of an individual homestead.

The sites relating to mining activities in the Rosemont Study Area present a greater variety of problems. They are not only more numerous than ranching sites, but they also encompass more varied activities. A complete cross section through time of the technological and social aspects of a small mining district are represented. The study area contains a range of mining activities that includes procurement of raw materials, ore extraction, smelting, transportation, and both the commercial and domestic activities of employees and employers.

Fenenga (1967) has stressed that archaeology can reveal few new data on the technological aspects of mining, since mining engineers have carefully documented tools, equipment, and techniques. However, although technology may be of minor importance, all tangible evidences should be recorded for future reference. The presence or absence of specific traits can indicate local sensitivity to technological and economic change.
Archaeological research can provide more information on the socio-cultural aspects, which were less well historically documented. Little is known of the social and economic conditions of the many small mining areas of Arizona. Comparisons of individual camps with the hotel and main settlement areas may reveal social stratification and ethnic differences based upon quantity and quality of goods consumed. Attempts should be made to determine whether bachelor camps can be distinguished from family camps. The physical layout and location of tent camps should also be examined for significant patterning and variation.

An important problem in the Rosemont Study Area is the interaction of various ethnic groups. It is well documented that manual labor in the copper mines was done principally by Mexicans (Park 1961), while the technical and administrative positions were held by Anglos. At least one general store in Rosemont Camp was operated by Mexican-Americans. It remains to be seen whether differences in food preferences, camp location and arrangement, or construction techniques and materials can be observed. Variations in butchering practices have already been documented by the Tucson Urban Renewal Project, and further distinguishing ethnic characteristics may be established within the Rosemont Study Area.

Unlike prehistoric archaeology, historic research involves two separate techniques: documentation and excavation. Many aspects of the above problems can be clarified by intensive examination of historic records. Some of these sources include census records, BLM land patents, homestead claims, railroad manifests, county records, and newspapers. Additional insights can be obtained through oral histories obtained from inhabitants of the area and their descendants. Archaeological excavation should avoid duplicating research which can be more accurately accomplished through historic documentation. Where there is a lack of adequate records, appropriate archaeological techniques of recording and analysis should be employed.

In conclusion, the historic resources of the Rosemont Study Area present an unparalleled opportunity for an in-depth analysis of a mining complex and neighboring ranches. Although visible architectural remains are few, foundations can be delineated and defined through proper excavation techniques. Material culture in the form of trash concentrations and surface scatters can yield important information on social and economic changes through time. Thus, the archaeological study of the historic resources of the Rosemont Study Area can add immeasurably to our knowledge of the daily life of the common inhabitants of southern Arizona.

Social Significance

Archaeological resources are significant to society for a number of reasons. Many people have a curiosity about and desire for information concerning man's past. Recreational and educational facilities have been
developed to satisfy the human need for a sense of heritage. Many national parks and monuments throughout the United States serve not only as recreational facilities, but also as educational sources; many of these parks and monuments contain archaeological and historical resources. Programs developed at these parks and monuments inform visitors of the past life ways of the people who once inhabited the area.

The potential for the development of interpretive exhibits on the archaeological resources of the Rosemont Study Area does exist. The area has a rich and long history. Exhibits could be designed to emphasize the past cultural development and to show a reconstruction of the settlement and subsistence system that may have existed for each time period. Mining-related exhibits could also be developed; these could center around the early development of copper mining in Arizona and the changes in technology and the life ways of the different groups and statuses of people who worked the mines.

The archaeological resources should also be considered for their significance to Indian groups that may be related to the past inhabitants. Apache and possibly Papago groups visited the Rosemont Study Area. Some sites within the study area were identified as Sobaipuri sites. The occupants of these sites may be related to the historic Papago, who also may have utilized the study area.
CHAPTER 8

RECOMMENDATIONS

This chapter presents recommendations for the management of the cultural resources within the Rosemont Study Area. There are 750 areas of archaeological remains within the study area that will be directly affected by the land exchange between the U.S. Forest Service and ANAMAX. These sites would be either destroyed or substantially altered by the proposed land exchange and subsequent plans for development of the open-pit mine and related facilities. Chapter 7 presented the significance of the cultural resources that would be affected by the proposed undertaking.

Three alternatives are available to ANAMAX and the U.S. Forest Service for dealing with the loss of the cultural resources that would result from the land exchange. These include: (1) site preservation in the project area through avoidance of the cultural resources; (2) data recovery at all sites to be impacted; and (3) adequate mitigation of impact through modification of project plans, or a combination of both partial data recovery and project modification. This chapter will discuss each of these alternatives.

Preservation

The first option is that of site preservation through protection and avoidance. Such a course of action might range from retention of all the proposed land-exchange area in Forest Service control to the exclusion of certain portions of the study area from the exchange. If all or part of the area were withheld from exchange, the sites would be retained in public ownership and, as part of the national forest system, would be protected and preserved under existing federal laws. None of the sites would thus suffer any impact, and they would be preserved. Because archaeological sites are nonrenewable resources, their preservation is to be sought wherever possible.

However, withholding the entire study area from the exchange does not seem to be an archaeologically desirable alternative; too many portions of it are devoid of archaeological resources. Exchange of only those areas without such resources would not permit mine development and therefore is not a realistic option if any exchange is agreed upon. Attempting to break the areas having resources into segments which would be exchanged and others which would not should be considered, particularly with respect to areas
east of Highway 83; this, however, presents a number of problems. Apart from the administrative and technical difficulties of managing a series of parcels which would be placed upon the Forest Service, the definition and application of criteria to be used in determining which archaeological sites would be preserved in parcels would be extremely difficult. As is argued below, it is the mixture of different site types, ages, and cultural entities which makes the proposed land exchange most valuable from an archaeological point of view. The preservation alternative, which would involve withholding the entire study area from exchange, is not believed to be the best management plan for the Rosemont area.

Mitigation

The second alternative is mitigation of the effects of the land exchange through data recovery or the detailed investigation of the archaeological sites in the area. Such a program could be quite variable in scope, ranging from total investigation of all sites to investigation of some specified sample of the sites. Data recovery operations might entail excavation, surface collection, mapping, or whatever strategies would permit the acquisition of information from these sites prior to the impacts of the land exchange and mine development which would destroy or damage them.

It is clear that an exhaustive investigation of all the archaeological remains within the land-exchange area is unrealistic. Enormous investments of both time and money would be required, and cannot be justified. However, data recovery operations conducted within the framework of explicit research designs on a specified statistical sample of the sites is a feasible alternative. The details of such a plan would be structured according to current research problems in southern Arizona prehistory, and the work could be phased in accordance with the plans of both ANAMAX and the Forest Service.

Mixed Preservation and Mitigation

The third alternative is to recommend a combination of preservation and mitigation. Such a course of action would see certain areas removed from the proposed land exchange and mitigation by data recovery in those areas of land which remained in the exchange.

One advantage of such a plan would be the ability to make adjustments to final land-exchange boundaries. If archaeological areas worthy of preservation do fall near the edge of the exchange boundaries, they could be withdrawn from the exchange and made part of the areas which would remain under Forest Service control. Isolated parcels wholly within the larger exchange area could also be created, although once again boundary definitions for these parcels would be difficult. Data recovery operations would present no problems other than those outlined in the previous section,
but would not be undertaken in those areas designated as preserves. In summary, a program of mixed preservation and mitigation is useful as another consideration in defining final land-exchange boundaries.

**National Register Considerations**

A consideration of the Rosemont Study Area in terms of the National Historic Preservation Act (NHPA) of 1966 (80 Stat. 915, 16 U.S.C. 470) and the related Advisory Council on Historic Preservation Procedures for the Protection of Historic and Cultural Properties (36 CFR 800) is pertinent to the discussion. The NHPA established the National Register of Historic Places, which is the register of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture. The Advisory Council Procedures specify the means for implementing the protection of historic and cultural properties. Included in the procedures are the criteria for evaluating the potential Register properties (see Legal Significance discussion in Chapter 7). The criterion that is most relevant to the Rosemont Study area is the one stating that properties "that have yielded, or may be likely to yield, information important in prehistory or history" (36 CFR 800.10) should be evaluated for nomination to the Register.

Pursuant to the National Historic Preservation Act of 1966, the National Park Service took steps to expand the National Register of Historic Places and the historic preservation program (36 CFR 60, August 29, 1975). As a result, the National Historic Preservation Act of 1966 provides a means for states to nominate properties of state and local significance, regardless of location within the state and whether publicly or privately owned, for placement on the National Register of Historic Places. Inclusion of properties on the National Register affords properties protection through preservation from destruction. While nomination to the National Register does not provide for means of enforcement or management, the consultation process required under the Advisory Council Procedures may result in an agreement that does provide adequate safeguards.

The National Register permits the inclusion of districts, and it appears that the archaeological sites recorded within the study area would best be considered as parts of a district. It has been indicated in the preceding chapters that the study area contains a number of sites representing different cultures and different time periods. These sites provide evidence of the utilization of the region through time, showing how these different groups exploited the resources afforded by the area. The sites thus represent a valuable record of differential resource use not only through time but also within a given period of time. While the definition of a district is never an easy matter, Figure 19 presents proposed boundaries for the Barrel Canyon District. These boundaries were drawn utilizing a combination of natural topographic features, archaeological survey results, and proposed land-exchange boundaries. As Figure 19 illustrates, the Barrel Canyon drainage net is the primary feature of this district. It embraces
most of the project area, and contains the majority of the archaeological sites as well. The eastern portion of this proposed district includes one of the upper reaches of Davidson Canyon; the eastern boundary is necessarily an arbitrary one following the proposed land-exchange boundary. Further survey work in the future could redefine this boundary and permit it to be drawn in a less arbitrary fashion, although this is outside the scope of this project.

Recommendations

The survey of the proposed ANAMAX-Rosemont land-exchange area has demonstrated that this 65 square km area contains a large number of important archaeological sites. Taken as a group, these sites provide evidence of man's use of the region over a 6000-8000 year period. The sheer numbers of sites, the time periods that they represent, and the minimal disturbance of them make for a detailed record of human history seldom encountered in one small part of southern Arizona.

A two-part program of preservation and mitigation by data recovery is recommended as the most effective management plan for the cultural resources in the Rosemont area. As discussed above, it is suggested that the preservation option be employed as one aspect or consideration in the finalization of boundaries for the land-exchange area. This would probably be of the most value in the eastern portion of the proposed land-exchange as it now exists, particularly that part lying east of State Highway 83. A relatively high density of sites has been recorded in this portion of the proposed land-exchange area, making preservation a viable consideration. Modification of the northern, western, or southern boundaries on the basis of archaeological criteria is unnecessary, due to extremely low site densities in these areas.

A soundly based data recovery program is recommended to deal with the archaeological resources in that portion of the land exchange which is finally agreed upon. The scope of such a program will be dependent upon the finalized exchange boundaries, but will definitely include detailed investigation of statistically meaningful samples of sites representing all the major periods of occupation in the study area. It is impossible on the basis of survey data alone to design a specific program of data recovery. Reasons for this are two-fold: 1) the full significance of individual sites or even classes of sites is not presently understood, and 2) there are no bases upon which to construct time and cost estimates for a mitigation program. Significance assessments for the various resources cannot be made until sufficient information on site depth, content, and preservation may be obtained. In addition, large numbers of sites cannot at present be placed within a cultural or temporal framework; these are now included in the category of unknown aboriginal remains. Whether or not these sites can yield information important to prehistory is open to question.
Consideration of the eligibility of the proposed Barrel Canyon Archaeological District for inclusion within the National Register of Historic Places is ultimately dependent upon the significance of all the sites within it.

Insofar as the second consideration is concerned, adequate time and cost estimates for a data recovery proposal cannot be made until the significance assessment is completed. These estimates are dependent upon site size, depth, content, and preservation, those factors crucial in site significance. Until these are determined, it is not possible to adequately plan the work at a single site, let alone specify which sites or samples of particular classes of sites should be investigated.

Because of these difficulties, it is recommended that a testing program be instituted. Such a program would involve limited excavation, mapping, and surface collection at several sites, followed by laboratory analysis of the recovered data. This work would be carried out on small samples of sites chosen from each of the major time periods or groups of sites identified by the survey: Archaic, Post-Archaic, Protohistoric, Historic, and Unknown Aboriginal. For the Historic Period sites, documentary research coupled with site visitation rather than excavation might be more productive. Such a testing operation would produce the types of information needed for significance assessment and for final mitigation proposals. The production of a specific testing proposal outlining these objectives and the strategies through which to attain them is recommended. Following completion of the testing, a detailed report and mitigation proposal will be produced. This will be submitted to the Forest Service, to the State Historic Preservation Office, and to ANAMAX for comment. After it is finalized, it will be submitted to the National Advisory Council for final approval and determination of district eligibility for the National Register. A memorandum of agreement between ANAMAX and the archaeological contracting agency will then be executed, and the final mitigation will proceed prior to the land exchange.
APPENDIX A

PRELIMINARY REPORT ON THE ANAMAX FOSSIL SITE

by

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The ANAMAX Rancholabrean faunal site, located in the SE 1/4 of Section 27, R16E, T18S, was visited with Gigi Bayliss, Bruce Huckell, and Gary Nabhan on September 4, 1976. The site lies on a dissected terrace of a tributary of Davidson Wash and is at an elevation of approximately 4550 feet (1388 m).

A recent gully system has exposed the stratigraphy shown in Figure 20 and described in Table 18. On the basis of lithology, depositional sequence, and faunal content, I would tentatively correlate the deposits with similar units in the San Pedro Valley. Units E, D1, and D appear to correlate with the Murray Springs formation, with E being equivalent to the Coro marl, D to the Sobaipuri mudstone, and D1 to the Moson sand, keeping in mind the possibility that the latter could correlate with the Millville alluvium. The black mats (F2a and F3a), the intermediate marl (F2b), and the overlying silt (F3b) are remarkably similar to units of the Lehner formation—respectively, Clanton clay, marl facies, and the Donnet silt. Unit G correlates with either the Wiek alluvium or Hargis alluvium of the Escapule formation.

The depositional sequence of Units D1, D, and E indicates a change from a relatively high-energy fluvial (or spring-discharge) system during sand and gravel deposition to a low-energy pond or marsh environment of deposition for the clay and marl deposits. These events were followed by desiccation and entrenchment before deposition of the black organic clays, the interbedded marl, and the overlying clayey silt again in a relatively low-energy depositional environment. The erosional hiatus between Units D and F probably represents several millennia.

If these correlations are correct, as eventual radiocarbon dating of the "black mats" might tell, Unit D would be 28,000 or more years old, Unit E between 13,000 and 27,000 B.P., Units F2a and F2b 11,000 to 9500 B.P., Units F3a and F3b 9500 to 7500 B.P., and Unit G less than 6000 B.P. All of the fossil remains have so far been observed in Units D and D1 and are therefore 28,000 years old or older.

Thick (approximately 0.7 cm) fragments of enamel of the bunodont cusps of a molar of mastodon (Mammut) were observed in the upper part of Unit D along with poorly preserved fragments of bone. These remains appear to be in situ and would be of the same geologic age as the unit. This, the second find of mastodon remains reported from the late Quaternary of Arizona, is of the same geologic age as the first find made at the Lehner Site in 1975 (Mead, Haynes, and Huckell 1979).
Figure 20. Section of arroyo wall, AMAMAX fossil site
Table 18. Stratigraphy of the ANAMAX fossil site

<table>
<thead>
<tr>
<th>Unit</th>
<th>Description</th>
<th>Thickness*</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Sand-Brown (not measured), clayey, silty, soft sand with fragments of reddish yellow marl. Weak to moderate soil development. Erosional basal contact.</td>
<td>2.00</td>
</tr>
<tr>
<td>Soil F</td>
<td>Al, AB, B2tca and Cca horizons developed in F3b</td>
<td></td>
</tr>
<tr>
<td>F3b</td>
<td>Silt-Grayish brown (7.5YR5/2, 4/2W to 5YR4/1, 3/2W),** soft, clayey, sandy silt. Moderate to strong, fine to medium prismatic breaking to blocky. Numerous rootlet molds and clay skins in middle of unit (B2tca) with moderate secondary carbonate coatings. Moderate to strong soil development. Loose in area of bioturbation. Lower contact gradational over 5 cm (conformable).</td>
<td>1.10</td>
</tr>
<tr>
<td>F3a</td>
<td>Clay—very dark gray (5YR2/1, 2/1W), firm, organic silty clay. Strong fine angular blocky, wavy irregular lower contact (conformable-bioturbational).</td>
<td>0.35</td>
</tr>
<tr>
<td>F2b</td>
<td>Marl—Reddish yellow to gray (7.5YR8/6-5YR6/1), friable to firm microcrystalline CaCO3. Massive with vertical cracks and burrows. Sharp, conformable basal contact.</td>
<td>0.45</td>
</tr>
<tr>
<td>F2a</td>
<td>Clay—Black (5YR2/1,2/1), firm, organic silty clay. Strong fine to medium angular blocky. Sharp, erosional basal contact.</td>
<td>0.05</td>
</tr>
<tr>
<td>E</td>
<td>Marl—white, firm, weakly banded clayey calcium carbonate. Lower contact gradational over 10 cm. Not examined in detail.</td>
<td>0.40</td>
</tr>
<tr>
<td>D</td>
<td>Clay—Light, brownish gray (2.5Y6/2, 5/2), firm sandy clay. Strong medium to coarse prismatic breaking to angular blocky. Basal contact gradational over 5 cm. Conformable (?). Contains vertebrate bones and teeth, including mastodon, in some exposures and is marly with mollusks in others.</td>
<td>0.85</td>
</tr>
<tr>
<td>D1</td>
<td>Gravel—light, brownish gray (2.5YR6/2,5/2), clayey, sandy, subangular, fine to medium pebble gravel. Firm to hard carbonate cemented with dispersed cobbles. Contains vertebrate bones, including Camelops and Microtus, in some exposures. Erosional basal contact.</td>
<td>0.40</td>
</tr>
</tbody>
</table>
| B    | Conglomerate—Reddish brown (color not measured), sandy, clayey, hard, very calcareous, subangular to subrounded, pebble to cobble gravel with streaks of calcium carbonate. Some outcrops in the area show faulting. Unit is probably of Tertiary age. | 3.+

*Maximum observed thickness in meters

**Soil color measurements based on Munsell Soil Color Charts (1975 edition)
No human remains or artifacts have been observed in the F units or older ones at the ANAMAX site, but because of the close similarities to the known Paleo-Indian sites of the adjacent San Pedro Valley, the ANAMAX site should be watched closely to see if subsequent exposures yield archaeological remains. The deposits appear to have formed in a shallow water table or cienega type of environment which would have been attractive for prehistoric peoples. That this situation persisted into the Historic Period is indicated by the ruins of an adobe house and out-buildings a few tens of meters downstream of the area just described. The homestead (?) is on cienega-type alluvium similar to Unit G that suggests a later, shallow water table environment. A Historic Period cienega or spring may have been the reason for the homestead being where it is. The name of the original owner would perhaps be a more appropriate name for the site.
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1. Location of radiocarbon dating samples; 1-3
2. Location of pollen samples; 1-2
3. Location of wood identification sample
4. Mastodon tooth fragments
5. Mollusk samples; 1-2
6. SITE DESIGNATIONS