Fifty Years of Archeology in the California Desert: An Archeological Overview of Joshua Tree National Monument
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# CONTENTS

Illustrations ................................................................. iii
Tables ................................................................. v
Acknowledgements ............................................................. vii
Abstract ................................................................. ix

Part I
A. What is an overview? ................................................... 1
B. Assumptions and definitions .......................................... 3
C. Methods of study ........................................................... 4

Part II
A. Geography ................................................................. 11
B. Flora and fauna ............................................................. 14
C. Human environments .................................................... 15
D. Environmental change .................................................... 17
E. The social environment: ethnographic groups ....................... 21
F. Archeological research in the California Desert .................... 30
G. Current research in the Monument vicinity ......................... 42

Part III
A. Research within the Monument ....................................... 43
B. The Research Management Plan, 1969 ................................. 57
C. A summary ................................................................. 60

Part IV
A. Future research in Monument prehistory ............................ 69
B. Research needs ............................................................ 73
C. Recommendations .......................................................... 74
D. Conclusion ................................................................. 77

Appendix I: Summaries of past research ................................. 79
Appendix II: Previous research recommendations ....................... 108
Appendix III: Comments on National Register eligibility ............. 114
Bibliography ................................................................. 116
ILLUSTRATIONS

Figures
Figure 1: Significant plant and animal resources and when procured ........................................... 16
Figure 2: Idealized Cahuilla and Serrano village segmentation ....................................................... 27

Maps
Map 1: Location of Joshua Tree National Monument .......... 12
Map 2: Geographic and research areas discussed in the text .......................................................... 19
Map 3: Ethnic "boundaries" ......................................................... 22
Map 4: Aboriginal alliances ........................................................ 25
Map 5: Southern California rock art distributions ............... 38
Map 6: Distribution of rock art functions ................................. 39

Base Maps
Base Map A: E.W.C. Campbell collecting districts ............ 44
Base Map B: Properties subjected to systematic survey; excavated sites; approximate locations of minor clearance surveys and other minor inspections ......................... 50
TABLES

Table 1: Comparisons of climatic sequences for the California Desert .......... 20
Table 2: Approximate concordance of chronological sequences .. 34
Table 3: California Desert rock art styles ............... 40
Table 4: Campbell collecting districts in Monument vicinity .. 45
Table 5: Ratios of projectile points to milling tools ....... 57
Table 6: Archeological sites recorded within the Monument as of November 1974 ................. 61
Table 7: Tizon Brown/Lower Colorado River Buff Ware ratios ... 65
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Prior workers in the Monument have given freely of their time, data and advice. George Jefferson, Dennis and Mary O'Neil, Francis and Patricia Johnston, Sylvia Broadbent and Ike Eastvold all provided valuable information and comments on my work. I am grateful to William J. Wallace for his willingness to help.

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ABSTRACT

This overview discusses Joshua Tree National Monument as a physical entity and as a cultural entity, delineating the changes in environment and land use to which it and adjacent regions of the California Desert have been subjected. The author summarizes and evaluates archeological investigations into the area's prehistory, beginning with the Campbells' pioneer efforts. Survey, concentrated in the northwest-central section of the Monument, has dominated research in the overview area, but a few excavations have been reported. Much of the work, until recently conducted almost exclusively by individual scholars and their associates, has suffered somewhat from inadvertent bias and must be characterized as inadequate in terms of modern archeological criteria. With substantial data available on only about 2.5% of the Monument, formulation of precise research problems would be premature, but some general questions about how and why people lived on the desert and about the effects the desert and its inhabitants had on one another are presented as guidelines for future research.
PART I

A. WHAT IS AN OVERVIEW?

This study is an "archeological overview" of Joshua Tree National Monument, prepared in accordance with standards developed by the Western Archeological Center of the National Park Service. In introduction, I need to say something about what it is and what it is not.

The overview is not a comprehensive guidebook to the archeology of the Monument. I am responsible for identifying the major kinds of archeological resources known or suspected to be present and for identifying and evaluating the archeological studies that have been done in the vicinity, but the overview is not designed to provide specific data on each and every known or probable archeological site or site-class. And although the overview is to serve as a management tool, it is not designed with the technicalities of management in mind. This does not mean that I do not appreciate the technical needs of cultural resource management or the requirements for archeological information felt by land managers; it means simply that the overview, as such, is not the place to deal with them. The overview is not designed for use in public interpretation, except in a very restricted sense. Again, this does not reflect a lack of appreciation for the needs of the interpreter; it simply means that the overview is not the instrument to satisfy those needs.

This overview is concerned only with one portion of the archeological record at Joshua Tree National Monument: that which consists of prehistoric sites (defined below). Historic archeological resources will be treated in a forthcoming companion paper by Patricia P. Hickman.

An overview is made to facilitate scientific research, as a general guide and background source for the research utilization of a Park or Monument. Lest this statement be misinterpreted, I will hasten to add that I share with the National Park Service the conviction that archeological resources in National Parks should be PRESERVED, not exploited. It follows that research--especially research which involves destructive activities, such as excavation--should be firmly controlled and, as a rule, discouraged. The overview is not done with the anticipation that the Park or Monument will throw open its gates to researchers; it is, rather, a tool for the management of archeological resources in the interests of future research. Above all else, archeological resources are research resources. They may be beautiful or ugly, interesting to the public or supremely boring, unique or common, big or little, preservable or inevitably doomed by the forces of nature or man. Each of these distinctions provides a potential set of arguments for and against particular management policies, but the basic justification for managing archeological resources at all is that such resources contain information of potential value to the human species and that they can be studied in order to extract such information and put it at our disposal. The overview is aimed at this very elementary level of input to management; it is designed to specify, insofar as possible, what the research value (i.e. information content) of the Park or Monument is, so that when management decisions subsequently are made there will be a basis for evaluating and making plans for the particular resources involved in the decisions.
The level of specificity attainable by the overview naturally is controlled by the amount and kinds of data available on the Park or Monument's resources. Since the data usually are incomplete, the overview must designate the boundaries of reliability within which it is written. This activity provides another interface with management; the overview should indicate just what sorts of data have been gathered on different parts of the Park or Monument, on different historic or prehistoric periods, on sites or areas representing different segments of a settlement system and pertinent to different research questions. These indications provide cues to management staff as to the need for special studies or other actions in connection with future land uses. Further, by stating what needs to be done to gain a satisfactory data base, the overview provides managers with a basis for budgeting and allocation of funds.

The information needs of archeological research vary, however, and our ability to extract data from archeological sites constantly is changing and improving. The overview must be specific about the kinds of research considered by the authors. It is not enough to say, "The resources of Joshua Tree National Monument are of great scientific value;" one must answer the question, "Of value to what?" by developing a set of general research problems for the area. These problems not only may provide guidance to future researchers, they also will indicate the boundaries which the authors have placed on their thinking, enabling future researchers to transcend them. Overview should be updated from time to time as research goals change in the archeological discipline and as new techniques are developed, permitting extraction of previously unimagined kinds of data.

An overview, then, is first a systematic analysis of the archeological studies that have been done as of the date of the overview in and around a given Park or Monument in order to specify the kinds of information available and the kinds of resources that are known or suspected to be present. Secondly, it is a consideration of the kinds of useful research questions the authors can imagine on the basis of those resources. Third, it is a statement of opinion about the kinds of operations which should be undertaken to facilitate the evaluation of particular resources, relative to the general questions.
B. ASSUMPTIONS AND DEFINITIONS

On the pages that follow, I will have occasion to evaluate the work of previous students of Joshua Tree National Monument's past. I wish to make it clear at the outset that such evaluations are not to be taken as critical of the competence, thoughtfulness or professionalism of the individuals or institutions involved. In fact, quite the opposite is the case; archeological studies at the Monument have been characterized by quite high standards throughout. They are subject to criticism not because the archeologists have done substandard work, but because the standards of the times in which the studies were done no longer are regarded as adequate and/or because the goals for the work set by the National Park Service (and, in some cases, the funding provided for the work) were so limited that the results have limited value. When I say that Campbell's sites often cannot be located on modern maps, it must be understood that maps as detailed as those available today were nonexistent for the area when Campbell was doing her work; she had only road maps to go by. Similarly, when I say that Wallace at Sheep Pass in the early 1960s did not adequately describe survey methods, it is with the full realization that no other archeologists working at the time, including the author, were doing much better. When I note that Kritzman and Desautels at Indian Cove did not inspect the rocky cove walls, I recognize that they were already working for free, beyond the funding provisions of their contract, when they surveyed the cove floor. In other words, I am trying to evaluate the work that has been done against the standards of today and the possible data needs of the future; I am not asserting that what was done was inadequate in context.
C. METHODS OF STUDY

The overview was requested by Dr. Keith Anderson of the Western Archeological Center and was authorized under terms of purchase order PX810050065. The Center provided copies of all manuscripts resulting from contract archeological fieldwork at the Monument, plus file data on the area's archeology and most directly pertinent publications. An initial visit was made to the Monument in November of 1974; here additional data were obtained and conferences held with Superintendent Homer Rouse, Park Naturalist Don Black, Archeologist Daniel McCarthy and Mr. and Mrs. John Kelly, who are working with the Campbell collection. Visits also were made to previous investigators in the area and to other students of local archeology and ethnography, including George T. Jefferson, Dennis and Mary O'Neil, P.J. Wilke, Ike Eastvold, Francis and Patricia Johnston and Harry Lawton. William J. Wallace was not visited, but was contacted by mail. The files and reference libraries at the University of California at Riverside, Riverside Municipal Library and the Bureau of Land Management Riverside District Office also were consulted. Patrick Barker at the UCR Archeological Research Unit and Herrick Hanks and Alan Garfinkle at the BLM provided access and assistance. The History Preservation Section of the California State Department of Parks and Recreation was contacted about properties on or nominated to the National Register of Historic Places and about state landmarks. That office confirmed that while several historic sites and structures have been nominated to the Register, no prehistoric sites have been nominated or listed.

All reports of fieldwork in the Monument, both written and verbal, were described and evaluated in terms of a standard format developed by the Center, insofar as this was applicable. The descriptions and evaluations were then sent to Jefferson, the Johnstons, the Kellys, McCarthy, the O'Neils and Wallace, as well as to the Center, for review and comment. Most correspondents replied with helpful comments and criticisms, which are incorporated into the final descriptions and evaluations in Appendix I.

The text of the report was then written and selected portions were reviewed and criticized by P.J. Wilke, T. Jackson King and Robert Bettinger. The entire manuscript was reviewed by Keith Anderson and Patricia Hickman. I have tried to attend to the comments of all reviewers in preparing the final text. Responsibility for errors and omissions, of course, is my own.
Bias: My central bias, in this and in other studies, is toward the idea that archeology is not an empirical gathering of facts which ultimately form by themselves into a truthful pattern. Archeology is a search for regularities—truths—in human behavior. It utilizes material remains and their contextual relationships as its evidence. The search is an exercise of the mind. Archeology consists of setting up trial regularities, derived from data, hunches, guesses or dreams, and comparing their expected results among material remains with those that actually exist. It involves a constant interplay between thinking and data and a wrong guess can be as useful as a right one if it leads to valuable ways of looking at data. One function of an overview is to make guesses. Another is to look at the guesses that others have made in the past, critique their reasonableness, see where they have led and rephrase the ones that appear useful in terms that will facilitate their reuse.

One thing that follows from this bias is that I do not believe there is an inclusive and exclusive theory-base for archeology. Archeology must have theory to make its questioning of the past efficient; it is a lot more practical to frame questions and to look for answers than to expect answers to unmasked questions to creep up and seize one about the legs. Efficiency also demands that archeological questioning proceed in a systematic, step-by-step fashion from the currently answerable toward the presently unanswerable. It is more efficient, for example, to seek terrestrial reasons for the intaglios scraped into the California Desert pavement than to set out to test the proposition that they are guideposts for prehistoric spaceships; this is not because they could not be guideposts, but because we have no way of finding out at present and because there are plenty of terrestrial explanations to consider first. These are issues of practicality; they have nothing to do with truth. The number of theoretical approaches potentially applicable to archeological data presumably is infinite and I do not propose to restrict myself here to any particular theoretical frame. In evaluating the work of previous scholars I find myself expressing biases against those who have avoided asking explicit questions and against those who seem not to have thought through the bases for their assertions, while favoring those who ask about things and think about potential answers. Thus, I like E.W.C. Campbell because she is curious and tries to specify connections between her curious questions and her data. I like Daniel McCarthy for much the same reasons, even though I am relatively at a loss to say much about what to do with the esoteric, psychological nature of his data-base. I admit a bias against many of the contract workers in the Monument, who simply have not specified what they hoped to find or how they hoped to find it, in spite of the technical rigor with which they engaged in its pursuit.

My bias, in short, is toward asking and attempting efficiently to answer questions about human behavior through a study of the past. I am not particular about the theory behind specific questions and answers and though I like to see the connections among theory, data and operations thought through, I probably am guilty of glossing over a good deal of methodological sloppiness on the part of people who ask things and try to answer them. In spite of deliberate efforts to be fair and objective, this bias probably is evident through this study.
Definitions: The following terms either might not be familiar to some readers or are subject to various interpretation. They are defined here as I use them.

**Anthropology:** A social science, having as its general object the understanding of why human beings, generally social groups of human beings, behave, think, perceive, evolve and change as they do.

**Archeology:** The study of the behavior--generally the social behavior--of human groups that have become extinct or of the past behavior of living groups through the systematic interpretation of material remains. In America, archeology normally is a subdiscipline of anthropology.

**B. P.:** "Before the Present." Conventionally, years B.P. are calculated from a standard "present" of 1950 A.D., but for general shorthand purposes the "present" is conceived of as 2000 A.D.; in other words, Jesus Christ was born about 2000 years B.P.

**Budding:** When a given population grows to a point at which a portion of it (often a particular lineage or family) leaves and takes up residence someplace else, that population has budded.

**C14 or Radiocarbon:** An isotope of carbon which disintegrates at a more or less fixed and measureable rate of speed. The relative amount of C14 remaining in a piece of archeological organic material is, within limits, a function of the material's age. The C14 or radiocarbon method is the technical means of approximate age determination by measuring C14 content.

**Contact:** Generally, culture contact. In this study I have reference to the contact between Indian societies and the society of the invading whites. The period when this took place is referred to as the "contact period."

**Cross-cousin:** Your mother's brother's child or your father's sister's child. Your mother's sister's child and your father's brother's child are your parallel cousins.

**Culture:** Broadly, the system of behavior, beliefs, institutions and objects that human social groups use to cope with the environment.
Culture history: The attempt to put together archeological data to form a historical sequence for an area. The culture historian seeks to reconstruct the sequence of cultures or of cultural changes in his area of study.

Ethnography: The study and description of living human groups or of groups that have lived recently enough that living people retain transmittable memories of them. Ethnography is a method of anthropology.

Exogamy: Marrying outside of a social unit. If one cannot marry someone who is a member of one's own group, the society is said to be exogamous.

Facility: A construction or semi-construction used for performing some task: a hearth, a storage pit, a cache cave, etc.

Historic: Historic sites, of course, are those sites which reflect human activities that occurred after the advent of written records in the area, up until roughly the present.

Holocene: The period since the end of the Pleistocene, roughly the last 10,000 years.

Hypothesis: An hypothesis is a specific proposed explanation for a particular phenomenon, derived from some general body of theory. The words "proposition" or "prediction" sometimes are substituted.

Lineage: A smaller group, the subset of a sib if sibs are present, generally occupying a single village and claiming a shared original ancestor.

Mano: A mano is the hand-sized, loaf-shaped stone used to grind seeds on a metate.

Metate: A metate is a flat stone slab upon which hard seeds (eg. those of sage) were ground.

Midden: Midden is decomposed garbage or other discarded material that has usually become darkened or otherwise discolored soil, often with bone fragments or other debris. Midden is a common element of prehistoric sites.

Moiety: When a society regards itself as being divided into two parts, each of which has obligations of some kind to the other, each part is called a "moiety."
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Mortar:</td>
<td>A mortar is a stone bowl used for grinding softer, pulpier plant or animal materials than are readily processable with a metate and mano. In the California Desert, mortars often are ground directly into bedrock slabs and are called bedrock mortars.</td>
</tr>
<tr>
<td>Normative:</td>
<td>Referring to the general state of a phenomenon rather than to the variability within it. A normative study of an archeological site would seek to generalize about the modal nature of the phenomena discovered rather than dealing with the reasons for variability within the phenomena.</td>
</tr>
<tr>
<td>Patrilateral:</td>
<td>Marrying into one's father's lineage. The obverse is matrilateral.</td>
</tr>
<tr>
<td>Patrilineal:</td>
<td>Tracing descent and/or inheriting things through one's paternal line. The obverse is matrilineal.</td>
</tr>
<tr>
<td>Patrilocal:</td>
<td>Tending to reside in one's father's village. The obverse is matrilocal.</td>
</tr>
<tr>
<td>Pestle:</td>
<td>A pestle is the elongate cobble used to grind things in a mortar; sometimes it may be finely finished to a cylindrical or conical shape, but in the California Desert it usually is simply a long cobble with signs of battering and wear on one or more ends.</td>
</tr>
<tr>
<td>Pleistocene:</td>
<td>The glacial era or &quot;ice age,&quot; when the northern part of the continent and many mountain ranges were glaciated.</td>
</tr>
<tr>
<td>Point or Projectile Point:</td>
<td>A point is the flaked stone tip of a projectile - spear, dart, or arrow.</td>
</tr>
<tr>
<td>Pothunter:</td>
<td>One who digs up or otherwise damages an archeological site in order to get objects (for sale, for a museum, for oneself) or in order to find out about the site without the archeological training to do so properly.</td>
</tr>
<tr>
<td>Precambrian, Paleozoic, etc.:</td>
<td>Geological eras during which the mountains and valleys of the Monument were formed. Pinto Gneiss is derived from the Precambrian era of more than 600 million years ago, while most of the Monument's granites were formed during the Mesozoic (63-230 million years B.P.) era.</td>
</tr>
</tbody>
</table>
Prehistoric: Some archeological sites are prehistoric, that is, they reflect human activity that took place prior to the time when written records began to be made about the general area. In the Joshua Tree National Monument area, prehistory extends up to the latter part of the 19th century. Naturally, many archeological sites were occupied during both prehistoric and historic times and it often is impossible to distinguish between the two.

Process: Changes in the condition of something according to rules. Archeologists who explicitly seek to understand why certain processes occur in human societies (i.e. to find out the rules) are sometimes referred to as "processualists."

Rock Art: Rock art comprises petroglyphs--designs pecked or scratched into rock surfaces--and pictographs--designs painted on such surfaces. Sometimes both pictographs and petroglyphs occur together or in close proximity.

Shelter or Rockshelter: Many archeological sites in the Monument are in shelters or rockshelters, places where overhanging rock provides shelter from the elements. Some shelters are relatively broad and shallow, while others are narrow and deep caves, sometimes with many chambers and passageways. Most, if not all, shelters at the Monument are exogene, that is, they were hollowed out by external elements, such as wind and surface water, not by underground solution, erosion or volcanic activity.

Sherd or potsherd: A potsherd, sherd for short, is a fragment of pottery--implicitly aboriginal pottery in my context. Pottery customarily is classified into wares in archeological practice, each ware being (presumably) observably distinct from all others. Two wares are common in the area of Joshua Tree National Monument: Tizon Brown Ware and Lower Colorado River Buff Ware; other wares occur with lower frequency.

Sib: A large group of lineally related kinsmen; a landholding multi-village group that traces its ancestry to some shared real or mythical ancestor.

Site: Generally, an archeological site: that is, a property which shows some evidence of past human activity.
**Theory:**
An organized, self-conscious, but general way of approaching the study of something. Each archeologist proceeds with his work on the basis of some body of theory. I do not use theory here in the vernacular sense of "I have a theory about why Sally slapped John." In making that kind of statement I would use the work "hypothesis."

"**Type Fossils**":
In archeology, an artifact that is regarded as a marker for some particular time period. Derived, of course, from paleontology.

**Vandal:**
One who destroys (in this case) archeological sites. Pothunters are vandals, but so are people who destroy archeological sites without seeking either objects or information, such as people who efface pictographs with spray-paint.
PART II

A. GEOGRAPHY

The arid lands of southeastern California generally are regarded as being divided into two parts: the Mohave (or High) Desert and the Colorado (or Low) Desert. This bifurcation to some extent reflects drainage patterns, the Mohave River being an important drainage system for the High Desert, while the streams of the Low Desert flow into the Colorado River or directly into the Gulf of California. In the main, however, the differences are elevational and topographic. The Mohave Desert, while it includes low-lying playas, is mainly an area of mountains and broad alluvial valleys, with elevations ranging from 2000 feet to well over 5000 feet. The Colorado Desert is lower, including the playa-lands and low mountain ranges along the Colorado River (averaging about 3000 feet elevation at their crests) and the Salton Basin, with elevations well below sea level (cf. Jaeger 1965:3-4). Both deserts constitute Munz and Keck's Southern Desert biotic province (Munz and Keck 1959:11).

The boundary between two such vaguely defined entities as the Mohave and Colorado deserts naturally is itself somewhat ambiguous, but Joshua Tree National Monument is generally regarded as straddling it (see Map 1). Immediately to the north, the Morongo or Twentynine Palms Valley is a typical Mohave Desert alluvial plain, with several playas. The Pinto and Coxcomb mountains reach elevations in excess of 4000 feet, while at the west end of the Monument the Little San Bernardinos exceed 5000 feet in elevation and contain plant species typical of the coastal chaparral bordering the Mohave Desert farther to the west (DOI 1973:14). The southwest face of the Little San Bernardinos drops sharply into the Salton Basin. Pinto Basin lies immediately south of the Pintos and Coxcombs at elevations of less than 2000 feet, bounded on the south by the 3300 feet high Eagle Mountains. The basin drains southeast into the playa-lands of Chuckawalla Valley.

In general, the Monument consists of the Pinto Basin and the arid mountains that surround it, the Little San Bernardino Mountains along the southwest border and a highland jumble of mountains, rocky hills and valleys (Pinto Mountains, Lost Horse Valley, Queen Valley, Wonderland of Rocks, etc.) in the northwest corner. The highlands are composed largely of complex granitics--Mesozoic intrusives, including quartz monzonite, ganodiorite and gabbro. Metamorphics of Paleozoic and Precambrian age, especially Precambrian Pinto Gneiss, also occur in the highlands, along with some rhyolites and basalts (DOI 1973:11). Substantial recent seismic activity (cf. DOI 1973:11) has resulted in considerable folding and rearrangement of drainage patterns (cf. Scharf in Campbell and Campbell 1935:13-15). The lowlands include alluvial fans and alluvium-filled basins built up from the erosion of the highlands. During the earlier Pleistocene, a lake apparently existed in the Pinto
Map 1: Location of Joshua Tree National Monument.
Basin (Scharf in Campbell and Campbell 1935:14-15; Jefferson 1973), but subsequent seismic activity drained it and established an erosion-deposition regime that has buried the lacustrine sediments, except where they are exposed along Pinto Wash.

In terms of prehistoric human occupation of the Monument, several aspects of the local geology may be important. First, the landforms and soils produced by erosion and deposition control the distribution of plant communities, which will be discussed below. Second, water tends to be available at springs and oases along fault lines (cf. Bean 1972:33) and in natural basins and naturally dammed portions of drainages, which also are artificially dammed to form "tanks." Third, aeolian erosion of the uplands and rock outcrops in the valleys has produced literally thousands of holes, niches, wind-caves and large rock shelters, offering living space, storage opportunities and places for artistic expression. Finally, some local rocks were useful for tool-making, including granites for millstone production, and rhyodacites, quartzes and miscellaneous metamorphics for the production of flaked stone tools and weapons.
B. FLORA AND FAUNA

Munz and Keck (1959) provide an organized presentation of plant communities and vegetation types for the Southern Desert Province. The Environmental Impact Statement on the Monument's Wilderness Plan (DOI 1973) gives a concise summary of floral and faunal distributions within the Monument itself and Bean (1972) discusses the environmental zones used ethnographically by the Cahuilla in a manner applicable to the Monument. These sources can be combined to obtain a picture of the distribution of key plant and animal resources within the Monument at the present time.

The Pinto Basin and its surrounding fans and hills are characterized by a Creosote Bush Scrub community (Munz and Keck 1959:13-14; DOI 1973:13). Creosote Bush (Larrea spp.) is the most widely represented major plant, although various cacti, yuccas, mesquite and other flora also occur. The periodic washes of the area support a modest riparian association of mesquite (Prosopis spp.), Desert Willow (Chilopsis spp.), Smoke Tree (Parosela spinosa) and Paloverde (Cercidium floridum).

Above about 2500 feet elevation, a Joshua Tree Woodland begins, dominated by Joshua Tree (Yucca brevifolia), but also containing Nolina parryae and some juniper. The Joshua Tree Woodlands are concentrated toward the west end of the Monument and are interspersed with Shadscale Scrub, a community in which saltbush (Atriplex spp.) is dominant. Joshua Tree Woodland becomes very sparse as one moves east across the Monument.

At elevations above 4000 feet, especially in the Little San Bernardinos, a Juniper Woodland appears. Juniper (Juniperus spp.) is dominant here, but Pinon (Pinus monophylla) also occurs, along with some small oaks (Munz and Keck indicate Quercus turbinella), various yuccas and nolina.

Large game animals today are restricted to the higher elevations, generally in the Juniper Woodland. Both Mule Deer (Odocoileus hemionus) and Bighorn Sheep (Ovis canadensis) are found here, though the Bighorn ranges down into somewhat lower elevations (DOI 1973:16). In the Creosote Bush Scrub and in much of the Joshua Tree Woodland and Shadscale Scrub communities, mammals of importance in aboriginal diets today are limited to rabbits (Lepis californicus and Sylvilagus audubonii) and to rodents, such as wood rats (Neotoma spp.). It is possible that pronghorn (Antilocapra americana) ranged through some of these areas in aboriginal times.

Riparian associations, occurring throughout the Monument, are most dramatically represented at the oases and tanks. Here fan palm (Washingtonia filifera) occurs, reaching the northernmost point in its range at Twentynine Palms. Along with the woody riparian species common to the washes throughout the area, the oases and tanks also support various tuber and root producing plants important in the aboriginal diet, such as Desert Lilly (Hesperocallis undulata) and tule potato (Sagittaria latifolia). Attenuated representatives of the Coastal Chaparral community also occur in a few locations, notably at Covington Flat and above Pinyon Wells. Sages (Salvia spp.) and other economically important seed producers might occur in such locations.
C. HUMAN ENVIRONMENTS

The Monument experiences the considerable extremes of temperature and weather typical of desert areas. Air temperatures range from well below freezing to well above 100°F. Ground temperatures are higher (DOI 1973:12), but the biting winter wind introduces a chill factor that often creates the impression of exceedingly low temperatures, especially in the highlands. The higher altitudes receive snow annually, in varying amounts. During the summer the lowlands of Pinto Basin experience extreme heat during the day, while the higher western areas are more temperate and subject to cooling breezes.

The climate can be assumed to have broadly controlled the distribution of human populations at the Monument in prehistoric times, just as it does today. During the winter, the lowland eastern portions of the Monument would be occupiable, while the western highlands would be very cold, windy and often blanketed in snow. During most of the year, however, Pinto Basin would have been distinctly inhospitable, not only because of its discomforts, but also because, as shown in Figure 1, it offered little in the way of food. During these times, however, the Joshua Tree Woodlands and Juniper Woodlands to the west and southwest would experience relatively mild weather and offer a variety of plant and animal foods.

These general human environments extend outside the Monument in several directions, with exceptions. The Juniper Woodlands of the Little San Bernardinos continue a short distance to the southeast. To the northwest they expand along the San Bernardinos proper, interfingerling with oak woodlands and Upper Sonoran forests as the mountains get higher and more complex. The Joshua Tree Woodland and Shadscale Scrub also extend to the northwest, spreading out across the valleys and alluvial fans of the high desert. The creosote bush scrub of Pinto Basin recurs in the low valleys (e.g. Palen, Chuckwalla, Ward, Cadiz) to the south, east and north, with the difference that most of these valleys contain playa lakes. These playas normally support only sparse alkali flat vegetation, but they may hold ephemeral lakes during the winter, providing some attraction to wildfowl, which could be exploited. Pinto Basin lacks a playa, though there is a very small one in Pleasant Valley immediately to the west.

To the west-southwest the Joshua Tree environments terminate sharply, almost at the Monument boundary, where the Little San Bernardino escarpment drops into the Coachella Valley. Although the Coachella has many environmental features in common with the Monument (palm oases, for example), it offers substantially greater potential for human settlement. Its proximity to the high (10,000') San Jacinto Range yields relatively high stream flows in its western canyons, as well as a broad range of food resources available for exploitation (cf. Bean 1972:23-35). Although it shares Pinto Basin's relatively temperate winter weather, summers in the canyons and large oases are not unbearable and food continues to be available. For much of the period of human life on the California Desert, the Coachella Valley has contained Lake Cahuilla or LaConte, which will be discussed below.
Figure 1: Significant plant and animal resources available in Joshua Tree National Monument and when procured.
D. ENVIRONMENTAL CHANGE

The desert environment is dynamic and sensitive to temperature and climatic change. Studies of playa lakes, relict plant distributions and woodrat middens have provided a basis for projecting some gross changes in the California Desert Environment during the past 30,000 years. Summarizing the work of Smith (1968), Ore and Warren (1971), Blackwelder and Ellsworth (1936), Martin (1964), Wells and Jorgenson (1964), Wells and Berger (1967) and his own research in Lucerne Valley, T. Jackson King (in Mortland 1974, with revisions by personal communication 1975) suggests the following periods:

Period 1: Cool, moist climate ca. 30,000 to 28,000 B.P.
Period 2: Arid, warm climate ca. 28,500 B.P.
Period 3: Cool, moist climate ca. 28,500 to 16,500 B.P.
Period 4: Warm, dry climate 16,500 to 14,500 B.P.
Period 5: Cool, moist climate 14,500 to 7,500 B.P., turning warmer and dryer toward end of period.
Period 6: Hot, arid climate 7,500 to 5,500 B.P.
Period 7: Warm, moist climate 5,500 to 3,000 B.P. (uncertain).
Period 8: Warm, dry climate 3,000 to 1,000 B.P. (uncertain).
Period 9: Hot, arid climate 1,000 B.P. to the present.

King subsequently has developed further documentation for the Pleistocene-early Holocene portions of this sequence (King, T.H. 1975), but he indicates that the sequence as presented here probably is safe (personal communication 1975).

Jefferson (personal communication 1974) warns that King's terminology should be taken only in a relative sense: "cool and moist" relative to today's weather in the California Desert does not mean sparkling rivers and stands of giant sequoias. It could mean distributions of plant communities substantially different from those which characterize the area today. King's sequence suggests that the present climate has been established for only about 1,000 years. For the bulk of the period of known human habitation in the Monument the climate would be at least somewhat milder and moister than it is today. This would result in different distributions of economically important plants, but specifications of these distributions would require further study. Although one might expect a larger Juniper Woodland, more extensive riparian communities and Joshua Tree Woodlands at lower elevations, such distributions are the complex functions of more variables than simple temperature and climatic change and they require specific documentation.
Bettinger (1974:110-112) has summarized the works of Adam (1967), Curry (1971), LaMarche and Mooney (1967) and Gale (1914) to suggest a different climatic sequence for the California Desert during the last 10,000 years. Bettinger sees cool-wet periods at 7000-6000 B.P., 2600-2000 B.P. and 600-100 B.P., with warm-dry periods at 8500-7000 B.P., 5300-3500 B.P. and 1400-600 B.P. Bettinger's and King's sequences are contrasted in Table 1.

There apparently is a substantial lack of agreement about what the climate or the natural vegetation in southeastern California has done during the last 10,000 years, but it is certain that it has been variable. Although one cannot make specific retrodictions about the premodern environment at Joshua Tree National Monument, it would be entirely erroneous to treat the natural environment as an unchanging quantity in the man-land relationship.

Not only has the desert environment changed on a large scale during the past millenia, it also experiences short-term cyclic variation. Shepard, for example, has postulated a wet-dry cycle with wet periods peaking around the 20th year of each century and dry periods peaking in the 70th (Shepard 1965:9-10; see also Bean 1972:30). The desert environment also experiences stochastic changes; not only may weather conditions be unpredictable from year to year and violent in their extremes, but the active tectonics of the area have potentially significant effects. Bean, for example, cites instances in which earthquakes in the area have changed the course of streams and closed or opened springs (Bean 1972:33).

The most dramatic, documented local environmental change to occur in relatively recent times was the disappearance of Lake Cahuilla (Lake LaConte or the Blake Sea). This huge freshwater sea filled parts of the Coachella and Imperial valleys (see Map 2), receiving inflow from the Colorado River. About 500 years ago this flow was halted and the lake rather abruptly dried up (Wilke and Lawton 1975). The social concomitants of this desiccation will be discussed below.
Map 2: Geographic and research areas discussed in the text.
Table 1: Comparisons of Climatic Sequences for the California Desert, Suggested by T.J. King (1974 and 1975) and R. Bettinger (1974)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>King</th>
<th>Bettinger</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 B.P. to Present</td>
<td>Hot-Arid</td>
<td>Cool-Wet</td>
</tr>
<tr>
<td>1000 B.P. to 500 B.P.</td>
<td>Hot-Arid</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>1500 B.P. to 1000 B.P.</td>
<td>Warm-Dry</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>2000 B.P. to 1500 B.P.</td>
<td>Warm-Dry</td>
<td>No data</td>
</tr>
<tr>
<td>2500 B.P. to 2000 B.P.</td>
<td>Warm-Dry</td>
<td>Cool-Wet</td>
</tr>
<tr>
<td>3000 B.P. to 2500 B.P.</td>
<td>Warm-Dry</td>
<td>No data</td>
</tr>
<tr>
<td>3500 B.P. to 3000 B.P.</td>
<td>Warm-Moist</td>
<td>No data</td>
</tr>
<tr>
<td>4000 B.P. to 3500 B.P.</td>
<td>Warm-Moist</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>4500 B.P. to 4000 B.P.</td>
<td>Warm-Moist</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>5000 B.P. to 4500 B.P.</td>
<td>Warm-Moist</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>5500 B.P. to 5000 B.P.</td>
<td>Warm-Moist</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>6000 B.P. to 5500 B.P.</td>
<td>Hot-Arid</td>
<td>No data</td>
</tr>
<tr>
<td>6500 B.P. to 6000 B.P.</td>
<td>Hot-Arid</td>
<td>Cool-Wet</td>
</tr>
<tr>
<td>7000 B.P. to 6500 B.P.</td>
<td>Hot-Arid</td>
<td>Cool-Wet</td>
</tr>
<tr>
<td>7500 B.P. to 7000 B.P.</td>
<td>Hot-Arid</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>8000 B.P. to 7500 B.P.</td>
<td>Cool-Moist</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>8500 B.P. to 8000 B.P.</td>
<td>Cool-Moist</td>
<td>Warm-Dry</td>
</tr>
<tr>
<td>9000 B.P. to 8500 B.P.</td>
<td>Cool-Moist</td>
<td>No data</td>
</tr>
<tr>
<td>9500 B.P. to 9000 B.P.</td>
<td>Cool-Moist</td>
<td>No data</td>
</tr>
<tr>
<td>10000 B.P. to 9500 B.P.</td>
<td>Cool-Moist</td>
<td>No data</td>
</tr>
</tbody>
</table>

* Evidence of neoglacial advance after Curry (1971)
Boundaries between California Indian groups tend to be rather hazy and those in the desert are less certain than most. At the time of initial white occupation of the state, however, the vicinity of Joshua Tree National Monument seems to have been used by three groups: Chemehuevi, Serrano and Cahuilla. Kroeber (1925) and subsequent writers (e.g. Heizer 1966; Bean 1972) map the Serrano-Chemehuevi boundary as a line running nearly arrow-straight about 10° off true north-south through the Monument, an unlikely construction. The Cahuilla/Serrano and Cahuilla/Chemehuevi boundaries appear to have hugged the crest of the Little San Bernardino in the Monument vicinity, but whether a Serrano/Chemehuevi boundary was recognized as any kind of distinct entity is a matter for conjecture and for archeological investigation (see Map 3).

All three groups were members of the Uto-Aztekan language family. The spread of Uto-Aztekan across California, the Southwest and the Great Basin, and as a separate bloc through Mexico and Central America, is a source of continuing anthropological and linguistic interest. As early as 1925 Kroeber recognized that the Shoshoneans (i.e. the Uto-Aztekans north of Mexico, except for some Piman groups) "appear as if raying in a semicircular fan from a point in south-central California, on or near the Kern River" (Kroeber 1925:577). He regarded this as a spurious vision, however, insisting that:

"We must rather look upon the focus as the region where con­densation has been greatest, the tract where newcomers gradually agglomerated, not the hive from which the whole body swarmed" (Kroeber 1925:577).

Lamb (1958), on the other hand, sees the "focus" around the Kern River as a "hive" and, on glottochronological grounds, has Shoshonean speakers spreading out across the Great Basin from California around 900 B.P., with the overall Uto-Aztekan family developing over 5000 years or so from a focus around the Arizona/Sonora border. Goss (1968) also argues in favor of this reconstruction and Madsen (1975) has summarized archeological evidence in support of the same position.

The question of Shoshonean movements is of considerable interest in California archeology, as the movement of Shoshoneans must have affected (especially if they were "agglomerating") and/or reflected (especially if they were "swarming") social events in the southern Sierra Nevada, San Joaquin Valley and California deserts. Whatever the direction and time of dispersal or condensation, however, one result was the location of three Uto-Aztekan groups in proximity to Joshua Tree National Monument.

Of the three, the Chemehuevi are the least well represented in the ethnographic literature. The actual relationship of the Chemehuevi to the Monument area is somewhat obscure and their time depth in the vicinity may be quite shallow. The Chemehuevi are mentioned in several general works (e.g. Kroeber 1925:593-600; Drucker 1937) and are summarized concisely in a popular brochure (Miller and Miller 1967), but a comprehensive memory ethnography awaits publication (Laird n.d.). Even Laird's
Map 3: Ethnic "boundaries": distribution of ethnographic groups (after Bean 1972).
work, the product of decades of residence among the Chemehuevi, reflects their culture on the Colorado River, not in the high desert. It contains little information on the Monument itself (Lawton personal communication 1974). Aboriginally, the Chemehuevi evidently were occupants of the high desert, closely related, if not identical, to the Southern Paiute (cf. Euler 1966; Heizer 1966). Their prehistoric territory has not been established with any certainty, but shortly before the historic period they apparently were occupants of the east half of the Mojave Desert west of the Colorado River and of a portion of the Colorado Desert between the river and the Coachella Valley (Kroeber 1925:594; Miller and Miller 1967:4). They began to settle in agricultural communities on the river, allegedly as the guests of the Mohave and Yuma after the latter drove out the Halchidoma and Kohuana, only after Garces' trip through the area in 1776 (cf. Kroeber 1925).

The Serrano and Cahuilla have been more fully reported in the ethnographic literature, the former by Kroeber (1925:611-20), Strong (1929), Benedict (1924) and Johnston (1965), and the latter by Barrows (1900), Hooper (1920), Strong (1929), Patencio (1943), Bean (1960, 1972), Bean and Lawton (1967), Bean and Saubel (1961, 1963), Lawton and Bean (1968) and Wilke and Lawton (1974), among others.

Territories: As noted above, territorial boundaries should not be considered hard-and-fact entities among California Indians, although some boundaries certainly were recognized, marked and defended. Boundaries circumscribed areas of resource exploitation reserved by particular groups, however, and it was control of resources rather than border transgressions per se that constituted a regular cause for conflict (cf. Bean 1972:131). The extent to which boundaries between groups are fixed and recognized and the institutions involved in their transgression constitute fruitful subjects for anthropological inquiry as reflectors of intragroup organization and values and of intergroup relations. The variability that may exist in the recognition of boundaries by different groups is masked by our own propensity for drawing lines between people on maps. The lines drawn on Map 3, which follow those of Kroeber (1925) and Bean (1972), should be taken only as heuristic devices.

The Cahuilla centered in the Salton Basin, probably as a function of their former residence on the shores of Lake Cahuilla (cf. Wilke and Lawton 1972; Jefferson 1972). They used the west slope of the Little San Bernardino Mountains and may have worked over the crest into the western part of the Monument, but there is no ethnographic record of permanent occupation there (Wilke personal communication 1974). Their territory extended ambiguously to the east from the Coachella across the Oroopia Mountains and may have taken in the southern portion of the Monument. Again, no villages are recorded, but the Romero expedition of 1823-24 reported "wells" at several locations between the Coachella Valley and Palen Dry Lake (Bean and Mason 1962). The Cahuilla in the Coachella dug deep, walk-in wells on the valley floor, but it is not known whether the Romero party had reference to this sort of facility or to modified (or even unmodified) springs.
The Serrano demonstrably occupied the San Bernardino Mountains and Little Morongo Valley and extended their use of the high desert an uncertain distance to the east along the Pinto Mountains. They occupied a village (Marah) at Twentynine Palms, though in historic times, at least, there also were Chemehuevi living there (cf. Strong 1929; Johnston 1965). The Serrano appear to be the most likely prime users of the northwestern part of the Monument. The Chemehuevi presumably used the east portion of the Monument, including Pinto Basin, the eastern Pinto Mountains and the Coxcomb Mountains, though no Chemehuevi occupation sites are recorded as such in the vicinity.

Economy: All three groups essentially were hunters and gatherers, though the Chemehuevi practiced agriculture once they settled on the Colorado and there is mounting evidence for precontact agriculture among the Cahuilla (cf. Lawton and Bean 1968; Wilke and Lawton 1974; Wilke, King & Hammond 1974). If such agriculture did exist among the Cahuilla, however, it probably did so only after the desiccation of Lake Cahuilla (Wilke & Lawton 1974).

The ethnobotany of the Cahuilla has been extensively reported (Barrows 1900; Bean and Saubell 1961, 1963, 1972) and there is no point in detailing it again here. Bean (1972) and Wilke (1975) present concise summary statements about both plants and animals, which should be applicable to the Serrano, as well as to the Cahuilla, insofar as the pertinent plant communities are duplicated in both areas. Figure 1 is derived from Bean's summary, presenting those food sources indicated by Bean as fairly significant in the diet and which also occur today in the Monument, as well as diagramming the seasonal availability of foods derived from those resources. It should not be taken as a straightforward indicator of the optimal seasons for occupation in the Monument, as it does not take into account variations in quantity or nutritional value within or among resource types. Combined with the rather severe winter weather conditions in the Monument highlands, however, these data do suggest that winter would have been a relatively unlikely season for use of the Monument by ethnographic groups for anything but hunting.

The aboriginal economy was not totally dependent on the procurement of local resources, however. Bean (1973:69, 123-5) has shown how a ceremonial-exchange network based on inter-sib moiety obligations served to equalize the distribution of food in an unstable environment. Strong's (1929:12-15) discussion of inter-sib ("clan") interaction among the Serrano suggests that the same system was operative. This movement of foodstuffs through mutual involvement in ritual congregations went beyond the boundaries of each group. White (1974) has discussed interaction networks that united the tribes of Southern California and Arizona into broad, though discontinuous, east-west bands of confederation for intracconfederation economic cooperation, as well as for inter-confederation hostilities. The distribution and composition of these confederations in California, as indicated by White, are shown on Map 4, which also traces the major recorded trails along which trade was carried out. Note that the Cahuilla and Serrano are members of one alliance, while the
Map 4: Aboriginal alliances (derived from White 1974), with trails (after Bean 1972; Johnston and Johnston 1957).

- White's "Alliance A"
- White's "Alliance B"
Chemehuevi are a part of its competitor. These alliances should not be considered to have been in a state of constant warfare or to have totally eschewed economic interaction with one another any more than the modern antagonistic alliances of eastern and western Europe should be so considered. When an alliance member found itself in trouble, however, be it economic difficulty or conflict with a group from outside the alliance, it could seek assistance from other members of the confederation.

**Settlement Organization:** Certain rules about Cahuilla and Serrano social organization, which either can be observed or inferred to have had an influence on the organization of people and facilities on the ground, have been recorded. Naturally, the extent to which these rules actually influenced the organization of settlements and territory depends on the extent to which they were obeyed. Since, as Bean (1972) has shown, the recorded rules of marriage and interaction can be seen as having distinct survival value by facilitating the transfer of food between groups in time of scarcity, we can suppose that they were fairly regularly observed. In any event, rules or norms would constitute one factor influencing settlement organization, with environmental and historical factors providing other influences.

The Cahuilla and Serrano are recorded as being organized into landholding sibs, which segmented into landholding lineages (Bean 1972:75; Strong 1929:11-15). Cahuilla and Serrano society was bifurcated into economic moieties, each with ritual obligations to the other. Hence, one had to marry into the opposite moiety and out of one's own lineage and sib. And, among the Cahuilla at least, one was not supposed to marry anyone in the opposing lineage with whom a genealogical relationship could be traced within five generations (Bean 1972:91). Residence was at least nominally patrilocal. Such rules would result in the widespread distribution of females and the establishment of a broad circle of inter-sib relationships (Bean 1972:90-92).

An idealized diagram of Cahuilla-Serrano settlement organization, change and interaction is given in Figure 2. Here two adjacent canyons have been occupied by "parent" lineages (presumably "daughter" lineages from some other location), one representing the Wildcat Moiety and the other the Coyote. Each segments periodically, each new daughter lineage establishing a new village in the vicinity and maintaining political ties with the parent. Parent and daughter lineages now constitute a sib. The members of each sib recognize reciprocal ritual/economic obligations to members of the moiety represented by the other sib. They also exchange women with one another, as well as with other sibs of the appropriate moieties within the boundaries imposed by the five-generation rule.

Lineage villages were occupied year-round by the Cahuilla and Serrano. In addition to its village site, each lineage would own various cache sites, grinding stations and so on. Gathering areas within the larger sib territory were used by the lineages of the sib (Bean 1972:75). The sib territory typically included a cross-section of life zones with a variety of food resources, a canyon being a classic example.
SIB OF THE COYOTE MOIETY  SIB OF THE WILDCAT MOIETY

Sib-territory boundary

Village segmentation

Marriage and ceremonial interaction

Canyon wall, i.e. natural boundary

Figure 2: Idealized Cahuilla and Serrano village segmentation and interaction.
Strong (1929:7, 11) records the presence of two Serrano "clans" (a term probably equivalent to sibs as used here and, in some cases, by Bean; lineages in others) near Twentynine Palms, apparently in adjacent villages. The tamianutcem were of the Wildcat moiety, while the adjacent mamaitum were of the Coyote.

The settlement organization of the Chemehuevi is difficult to characterize, partly because of the scant attention given them by ethnographers, partly because most Chemehuevi informants have been from groups settled along the Colorado River, rather than on the high desert, and partly because their lifeway on the desert necessarily provided a good many settlement options. Laird (n.d.) indicates that they were rather loosely organized politically and that they practiced a seasonal round much like that generally ascribed to Shoshonean groups in the Great Basin proper (e.g. Steward 1938). This pattern involved a winter village, in which several families would come together during the least productive season. They then would disperse in the spring to shift from camp to camp as single families or in small groups, exploiting the changing resources of the area until fall. Even the winter camps allegedly held together only for a month or two and were not necessarily returned to annually (Laird n.d., quoted in Barker and Schlanger 1974:16). Movements are said to have taken place within generally recognized boundaries, however. Each lineage is said to have worked within a hunting-gathering range, which constituted either a crest-to-crest transect across a valley or a block including both sides of a mountain range. Hunting rights were passed down through the lineage via songs describing the landmarks of the inherited area (Laird n.d. quoted in Mortland 1974:34).

There is no published record of Chemehuevi institutions paralleling the ritual interaction systems of the Cahuilla and Serrano. It appears that the Chemehuevi themselves moved around to meet changes in resource distribution, rather than moving foodstuffs. White (1974) records them as members of one of the California-Arizona alliances, but their role in the operation of the alliance is not clear and may have been nominal. Their vaguely defined territory actually appears to separate the territories of the Cahuilla and Halchidoma, members of the opposing confederation, but this does not seem to have interfered with the operation of that alliance's systems of interaction. The time depth represented by Chemehuevi occupation in the eastern Colorado Desert is unknown.

Mortland's paper quotes Laird as saying that hunting territory songs were passed down "from father to son and from maternal grandfather to grandson. . ." (Mortland 1974:34). Assuming patrilineality, receipt of songs and hence hunting rights from both father's and mother's lineages might be an adaptive device to provide wide options for family movement and for game exploitation in an uncertain environment. On the other hand, songs and rights could be received from father and from mother's father and still be derived from the prerogatives of a single lineage if prescriptive matrilateral cross-cousin marriage was practiced. This practice would tend to result in small, independent bands of intermarrying
kinspeople, which might be very efficient for the nomadic exploitation of high desert resources. The two contrastive forms of organization probably would result in quite different patterns of interaction and in somewhat different distributions of people and their facilities on the ground. Either form of organization would contrast sharply with the organization of the Serrano and Cahuilla.

Population: Kroeber gives population figures for the three groups as follows:

- Cahuilla . . . . . . . . . . . . . . . . . . . . . . . . . . 2500 (Kroeber 1925:692)
- Serrano . . . . . . . . . . . . . . . . . . . . . . . . . . 1500 (Kroeber 1925:617)
- Chemehuevi . . . . . . . . . . . . . . . . . . . . . . . . . 800 (Kroeber 1925:595)

Kroeber's figures for California populations are notoriously low, however (cf. Cook 1955), and most scholars find that doubling his estimates results in figures closer to the cumulative totals of recorded village populations (cf. Hicks 1961; Bean 1972:76). Thus, as a working estimate, figures of 5000 for the Cahuilla, 3000 for the Serrano and 1600 for the Chemehuevi can be used.

To the west of the Monument, then, and probably using its western half to some extent, were ethnographic groups with fairly large, dense populations, living in permanent villages linked by ritual, marriage and economic ties. The eastern part of the Monument, on the other hand, was in use by small groups of hunters and foragers with a low population density and, probably, a highly independent, nomadic lifeway. Reflections of these different patterns of organization can be expected in the archaeological variance from and changes in ethnographically recorded norms.
F. ARCHEOLOGICAL RESEARCH IN THE CALIFORNIA DESERT

To consider fully the archeological research projects carried out in the California Desert would require volumes. Some highlights of the history of archeology in the area have been discussed in the literature, particularly by Meighan (1961) and by Warren (1973). Bettinger (1971) has provided a concise synopsis and critique of the philosophical positions that he considers typical of desert temporal taxonomists. To understand the context in which the study of Joshua Tree National Monument prehistory has developed, however, we need something a little different from the precise analysis of Bettinger or the chronicles of Meighan and Warren. We need some explication of the intellectual trends reflected in California Desert archeological research.

Lacking a systematic, quantifiable framework for analysis, I think intuitively that six general foci of research interest can be identified among California Desert archeologists. I will consider them in chronological order.

Salvage or Preservation: Aside from a general curiosity about what was out there, the first archeologists on the California Desert were impelled by a motivation to preserve things. To an extent, this applies to the ethnographic "archeologists," such as Harrington, Strong and Steward, who collected archeological data in the course of their salvage-ethnographic fieldwork. Definitively archeological fieldworkers, such as the Campbells, also were explicit about the urgency of preservation in the face of massive attacks by desert-roaming Los Angelenos who were, in those days, really pot-hunters (Campbell 1931). The salvage ethic, then as now, called for the massive and eclectic recording and collection of anything available. Preserving data was the important thing; using such data for research was secondary. Harrington, for example, collected "extensive and rich" data on Serrano ethnography and (if operating true to form) archeology, but these data remain "virtually untapped" (Bean 1972:xxii) in the Smithsonian Institution because Harrington simply piled up notes, rather than attempting to organize and publish them. The Campbells were of somewhat the same philosophical set and any archeologist who has worked in truly emergency conditions can be entirely sympathetic. One need only look at Campbell's 1931 photographs of cache after cache of complete ceramic vessels in shelters behind spirit sticks to understand the panic she must have felt as the roads from Los Angeles, which she and her husband were helping to see built (Campbell 1961), crept inexorably closer, bringing with them their crowds of lumpen.

After the first shock had passed--after the main ethnographic informants were gone and the most obvious sites had been looted--the vigilance of the salvagers was relaxed. The Campbells moved on in search of Early Man, Steward began the development of Cultural Ecology, Strong went to work for the WPA and Harrington moved on in search of livelier informants. During the latter '30s and the war years, little preservation activity seems to have been carried out in the desert. The lack of work during World War II, incidentally, will be a recurring theme; this probably resulted in part from the fact that most archeologists were engaged in
soldiering or its support and partly from the fact that much of the desert was occupied by Gen. George Patton and his training command in preparation for the North African invasion. Much of the California Desert was a distinctly unsafe place to be and snoopers presumably were not encouraged. Patton's activities, of course, resulted in unknown, but doubtlessly extensive, archeological damage.

After the war, wandering in the desert again became a popular pastime and residence there increased. Public interest, coupled with the need to protect some archeological data from the misdirected results of that interest, resulted in the development of archeological museums and societies. The Archaeological Survey Association of Southern California (ASA) was founded in an attempt to keep track of prehistoric sites in the area. The ASA subsequently segmented with the creation of Archaeological Research Associates (ARA), an organization which attempted a somewhat less "popular" approach to archeological site recording and salvage. Dr. Gerald Smith, who had seen a nascent archeological museum at the University of Redlands disappear during his wartime absence from the area, began the development of the San Bernardino County Museum as a permanent repository for the material and data of county prehistory and history and directed surveys and excavations along the Mohave River and elsewhere (cf. Smith 1963). Dr. William Wallace, arriving from graduate school at Berkeley to teach at the University of Southern California, was involved first with ASA and later with ARA in survey and salvage activities (cf. Wallace 1958, Wallace & Taylor 1958, 1960a, 1960b). Wallace's students, notably George Kritzman and Roger Desautels, continued his work after Wallace's interest shifted elsewhere.

By the late 1960s a good deal of miscellaneous site survey and excavation was going on in the desert under the impetus of data preservation. Such activities ranged from a rather half-hearted attempt by the University of California, Los Angeles, to assess the archeological impact of the Mohave Forks Reservoir (all the archeological sites there were lost) to a meticulous survey of the El Paso Mountains by Alex Apostolides, then art editor for the Los Angeles Free Press. The implementation of new environmental and cultural resource laws in the early 1970s resulted in an explosion of activity, including large numbers of surveys for purposes of environmental statement preparation (eg. King, Jefferson & Gardner 1972, 1973; Mortland 1974; Barker & Schlanger 1974), attempts at archeological general planning (Desautels 1970; CDAC 1971; Weide 1973) and the formation of a cooperative group of concerned institutions and organization, the California Desert Archaeological Committee. Growth, essentially undirected, is continuing within the salvage and preservation focus.

Construction of Culture-History: Malcolm Rogers appeared on the California Desert shortly before the Campbells and stayed longer, but his work always was directed toward the same general goal: understanding the sequence of cultural developments in the area through the interpretation of change sequences in artifact forms, following models similar to those then being developed (during the 1920s and '30s) in the Southwest. Rogers in 1929 published "Report of an Archaeological Reconnaissance in the Mohave Sink
Region" (Rogers 1929). Ten years later he issued a paper containing the first overall culture-historical sequence for the entire desert (Rogers 1939), in which he took substantial exception to the claims of Campbell and others of great antiquity for both the Lake Mohave and the Pinto Basin complexes. The next two decades (which included the World War II hiatus) were characterized by disagreements with the far end of Rogers' sequence by M.R. Harrington and others (cf. Harrington 1957, 1961), who periodically were confused by Rogers' healthy willingness to change his mind when confronted with new data (cf. Ezell 1961). One gets the impression that the contestants on the desert were talking past one another; those concerned with Early Man were displeased because Rogers would not give his sequence the time depth needed to accommodate their dates, while Rogers was concerned with getting his sequence straight (cf. Rogers 1966:27). Rogers' modifications thus constituted shifts of name and order within a general temporal range. By the late 1950s he still was not convinced that his San Dieguito I was older than about 5000 years (Rogers 1958, 1966:37; Hayden personal communication 1974).

By 1961 William Wallace had done substantial survey and excavation in the desert and had taken his turn at sequence construction. His sequence had greater depth than Rogers' and left an opening for earlier horizons, though he was succinctly critical of the Early Man enthusiasts (Wallace 1962a). Wallace's chronology has been in use as a standard referent for the area since its presentation. Shortly after Wallace's publication there was a brief burst of sequence-promulgation in the eastern desert in connection with attempts (discussed below) to trace California-Southwest relationships. J.T. Davis (1962) produced a short sequence for the post-800 A.D. period at Rustler's Rockshelter, and Donnan (1964) presented an extended sequence, largely derived from Davis, Wallace and Rogers, for the Providence Mountains as a whole. Simultaneously, Lanning's (1963) report of Riddell's excavations at Rose Spring in the northern Mohave Desert provided new perspectives on change sequences which theretofore had been defined largely on the basis of surface assemblages or single component sites. Radiocarbon assays subsequently firmed up significant portions of Lanning's sequence (Clewlow, Heizer & Berger 1970) and its applicability to other parts of the Great Basin was indicated (Clewlow 1967). Bettinger in 1971 discussed the concepts behind type fossil-based sequence building on the desert and concluded that such concepts are not applicable to current systemic approaches to culture theory. At the same time, he succinctly summarized the historical utility of normative sequence construction:

"Essentially, the use of type fossils within a normative framework provided the results for which its proponents hoped. It introduced order (and sometimes reason) to an otherwise chaotic body of data.

"Individuals who argue that such a view of culture does not reflect the realities of cultural process miss the point--because its proponents never maintained what it did!" (Bettinger 1971:190)
Bettinger went on to collaborate with R.E. Taylor in the construction of a sequence rigorously limited to assertions about change in projectile point forms, asserting simply that different classes of projectile points succeed one another in the prehistory of the desert and leaving the cultural meaning of this succession to be ascertained by further research (Bettinger & Taylor 1975). The Bettinger-Taylor sequence is depicted in comparison with all other major post-C14 desert sequences in Table 2.

The Search for Early Man: Seeking Pleistocene Man on the California Desert is a little like looking on 10th Street for a dime lost on 4th because the light is better; there is no reason to think that the desert was a particularly happy place to be during the Ice Age or its immediate aftermath, though it was a good deal damper and cooler than it is now. Seekers after Early Man are attracted to the desert because his traces--or things that look like his traces--are scattered all over the surface, locked in desert pavement rather than being buried under sediment or inundated on the continental shelves. The Early Man seeker pays a price, however: the deflation and devegetation that has laid artifact assemblages open to view also has destroyed the stratified deposits that could provide sure dating and contextual associations. As a result, the history of Early Man studies on the desert is one of constant wrangling over age assignments and contexts, usually with very little hard and agreed-upon data.

The quest for Early Man on the California Desert was initiated in part by Malcolm Rogers, with his definition of the enigmatic "Malpais" industry, and in part by the Campbells, with their discovery of the Pinto industry. The Campbells, spurred on by the enthusiasm of C.A. Amsden and others at the Southwest Museum, moved on to locate and describe the Lake Mohave "culture." During the war, the Southwest Museum under M.R. Harrington shifted its attention to safer regions (cf. Harrington 1949), but in the '50s the search began again apace with work at the Stahl Site at Little Lake (Harrington 1957) and at Tule Springs (Harrington 1961). Clements and Clements (1953) reported Early Man in Death Valley, but Wallace (1962) commented that "there is nothing to show that they (the artifacts) are purposefully made products." Discoveries by Ritner Sayles and Ruth D. Simpson at the Calico Site on Manix Dry Lake (Simpson 1958) have produced claims for the presence of Early Man that have had greater longevity. Wallace pronounced the crude material found on the surface of the Calico fan to be "'quarry blanks,' rejectage of manufacture and unfinished tools rather than . . . an ancient and crude industry." Simpson, sponsored by the San Bernardino County Museum and supported by the National Geographic Society and the Leakey Foundation, has not been dissuaded and has for years conducted what must be one of North America's most meticulous excavations in an attempt to show that the "tools," unfinished or not, lie in stratigraphic contexts indicative of great antiquity (cf. Leakey et al 1972). The results, however, are as yet ambiguous (cf. Haynes 1973).

The 1960s saw the arrival on the Desert of E.L. Davis who brought an ecological approach to the study of Early Man from her training at UCLA and from her comprehensive ethnographic/archeological studies around Mono Lake (Davis 1964; 1968). Davis worked first at Panamint Valley and is
<table>
<thead>
<tr>
<th>TIME</th>
<th>NAMED PERIOD</th>
<th>Lanning 1963</th>
<th>Wallace 1962</th>
<th>Donnan 1964</th>
<th>Davis 1961</th>
</tr>
</thead>
<tbody>
<tr>
<td>ca. 1850</td>
<td>MARANA PERIOD</td>
<td>Desert Side-Notch Series</td>
<td>Cottonwood</td>
<td>PERIOD IV</td>
<td>SHOSHONEAN HORIZON</td>
</tr>
<tr>
<td>1500</td>
<td>Cottonwood Series</td>
<td></td>
<td></td>
<td>Prehistoric Yuman and Shoshonean</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>HAIWEE PERIOD</td>
<td>Rose Spring Series</td>
<td>LATE ROSE SPRING</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eastgate Series</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>NEWBURY PERIOD</td>
<td>Elko Series (includes &quot;Gypsum&quot;)</td>
<td>MIDDLE ROSE SPRING</td>
<td>PERIOD III</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Amargosan</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>LITTLE LAKE PERIOD</td>
<td>Little Lake Series</td>
<td>LITTLE LAKE</td>
<td></td>
<td>PERIOD II</td>
</tr>
<tr>
<td></td>
<td>Pinto Series</td>
<td></td>
<td></td>
<td></td>
<td>Pinto Basin</td>
</tr>
<tr>
<td>2500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td>LAKE MOHAVE PERIOD</td>
<td>Lake Mohave Series</td>
<td></td>
<td>LAKE MOHAVE-PLAYA</td>
<td>PERIOD I</td>
</tr>
<tr>
<td></td>
<td>Silver Lake Series</td>
<td></td>
<td></td>
<td></td>
<td>Lake Mohave</td>
</tr>
<tr>
<td>4500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Approximate concordance of chronological sequences (does not include pre-radiocarbon sequences, e.g., Rogers 1939).
currently excavating and surveying at China Lake. Her work thus far has resulted in the exposition of a "Western Lithic Co-Tradition," a widely distributed and rather variable technocomplex typified by an absence of milling tools and a presence of choppers, planes, core tools and macroflakes, plus rather amorphous points and knives. This is contrasted to, but is supposed to be contemporaneous with, the "Fluting Co-Tradition" (Clovis, Folsom, etc.) of the Plains and the East (Davis, Brett & Weide 1969). Her current studies, however, are producing "fluted" points in possible association with the remains of extinct fauna (Davis 1974, 1975).

C.N. Warren began his involvement with Early Man on the San Diego coast, with an interest in the San Dieguito Complex springing from his research at Batiquitos Lagoon (cf. Warren, True, and Eudey 1961). Warren's unpublished dissertation is a fascinating attempt to predict the adaptive strategies developed by hunter-gatherers in a changing environment and to test the predictions using data from the Batiquitos cultural sequence (Warren 1964). The immediate pertinence of his coastal work to the desert, however, is that he thus became interested in Rogers' San Dieguito culture, which led him into a concern about the morphologically similar Lake Mohave complex (Campbell 1937). Warren carefully has defined the San Dieguito Complex (Warren 1967), studied (and admired) Campbell's work at Lake Mohave (Warren 1970) and utilized interdisciplinary approaches to closely examine and essentially to confirm Campbell's assessment of the Lake Mohave site's age as being in excess of 10,000 years (Warren & DeCosta 1964; Ore & Warren 1971).

In the last few years other researchers have entered the Early Man field in the California Desert by providing detailed descriptive reports of putative Pleistocene or immediately post-Pleistocene sites. Notable among these are Begole (1973, 1974) in the Anza-Borrego area; the late Stuart Glennen (1974), who reported a highway salvage project near Baker which revealed a possibly early industry, and Jefferson (1973), who is reinvestigating the Pinto Basin site(s).

Relations With The Southwest: Attempts to tie southeastern California together with culture-historical developments in the Southwest have been sporadic, in spite of the interest inherent in the study of the relationship between two culture areas with disparate political systems and economic foci. Although Rogers worked on both sides of the Colorado River and early archeologists freely transgressed state boundaries, the systematic study of California-Southwestern relationships is largely a post-war phenomenon. Harner (1958) attempted to apply the Patayan sequence of the lower Colorado River to the eastern California Desert. J.T. David (1962) provided an interlocked sequence through his excavations at Rustler's Rockshelter in the Providence Mountains and Donnan (1964) discussed the chronology of the Providence Range on the basis of further excavations and extra-Providencial data. Ruby and Blackburn (1964) gathered data on Southwestern pottery in southern California. Ruby (1970) subsequently made an extended discussion of this distribution the topic of a Ph.D. dissertation. White (1974) has presented ethnohistorical data on confederations uniting social groups ranging from the California coast to the Gila River and beyond. Wilke and Lawton, in their study of pre-contact Cahuilla agriculture (1974), have considered traditional Cahuilla data on contact with Colorado River agriculturalists.
Cultural Ecology: The progenitor of cultural ecology, Julian Steward, was a product of the California and Nevada Deserts, but "ecological" archeology in southeastern California is a relatively recent phenomenon, dating roughly from the late '60s. The basis for the "ecological approach" in Southern California goes back to Malcolm Rogers and his non-related colleague, David Banks Rogers, as I have discussed elsewhere (King 1974), but organized ecological archeology on the desert began with the arrival of Emma Lou Davis and her study of the ethnography and prehistory of Mono Lake (Davis 1964). Shortly thereafter, Claude Warren began his detailed studies of man and water at Lake Mohave (Warren 1967, Ore & Warren 1971) and Makoto Kowta dealt with the distribution of the Southern coast "Millingstone Horizon" in the arid lands on the basis of environmental considerations (Kowta 1969). An ecological, materialist and explicitly deductive approach to understanding California Desert archeology has been espoused by the University of California, Riverside, through the work of Bettinger in Owens Valley (Bettinger and King 1971; Bettinger 1974), Wilke's research in the Coachella Valley (Wilke 1974; for a popular interpretation see Pepper 1972) and the Perris Reservoir Project near Riverside itself (O'Connell, Wilke, King & Mix 1973; O'Connell et al 1971). Hillbrand (1972) has presented a set of hypotheses concerning environmental and cultural change in the desert and the contract work of Mortland (1974) and her colleagues is implicitly ecological in emphasis (cf. the contribution of T.J. King) concerning environmental change.

The relation of man to environment is a natural source of interest in southeastern California, where the environment is such an overwhelming and constant presence. Its recent specific application as a basis for research, however, reflects largely an attempt by younger archeologists in California to keep abreast of developments in modern archeology, as represented by such people as Louis Binford (cf. 1962), and, especially, Flannery (cf. 1968; 1971). Explicitly ecological, and hence materialist, approaches to the archeology of southeastern California reflect changes in the nature of archeology in North America and internationally. They also represent a narrowing of the field of study, a constriction of sorts in the kinds of questions it is appropriate for an archeologist to ask. This reduction of archeological theory to materialist theory is not purely a matter of fashion. It also represents an attempt by archeologists to deal with their data in a systematic fashion, positing and testing hypotheses that turn on economic variables because the operation of such variables is relatively simple and observable in the archeological record, especially as compared, for example, to psychological variables. If such hypotheses are not supported in the long run, archeology presumably will be able to open up to other intellectual currents in the social sciences and to seek other answers.

Rock Art: Possibly because it does not have a clear adaptive function, rock art has been dealt with in a somewhat spotty fashion in the California Desert. The desert is rich in petroglyphs and pictographs, but the application of research questions to their study has been limited.
Steward (1929) made an early study of rock art in the desert, defining several style areas on the basis of different methods of art production, such as pecking petroglyphs as opposed to painting pictographs, and the distribution of style elements. Fenenga (1949) updated and modified Steward's work and is quoted heavily by Johnston and Johnston in their unpublished work on Cahuilla rock art in the Monument vicinity. Grant, Baird & Pringle (1969) have published descriptions of California Desert rock art, while Charles LeMonk and Gordon Redfeldt have concentrated on the artistic replication of pictographs. Using different techniques, McCarthy has made accurate reproductions of petroglyphs. McCarthy currently is working with both petroglyphs and pictographs at the Monument. Heizer and Baumhoff (1962) published a survey of California and Nevada rock art as a preface to a discussion of the function of some petrography in the operation of hunting magic. Heizer's Archaeological Research Facility continued for many years to accumulate unsystematic survey data on rock art, leading to a recent summary publication by Heizer and Clewlow (1973). This work updates Steward once more and discusses time and space distributions of rock art elements and their possible functions. Most professional discussion of the Heizer/Clewlow effort has centered on ethical questions concerning their publication of rock art locations, but the validity of the premises it advances also is questionable because of the unsystematic nature of its data base. As an exploratory work, advancing questions for discussion, it has considerably utility, but the fact that California Desert rock art studies have not advanced beyond this point in the half-century since Steward was in the field is a reflection of the low level of organized archeological concern for the phenomenon.

Hedges (1973) has presented a very useful discussion of Southern California rock art. Although his summary provides a valuable basis for future work, it suffers from two typical flaws: first, its data base is similar to Heizer's and Clewlow's and, secondly, the conclusions, while often interesting, tend toward simple statements of relationship rather than toward exploration of what such relationships might mean in anthropological terms. He defines eight rock art styles and five style areas, as shown on Map 5. His definitions and proposed functions are given in Table 3. Map 6 shows the distribution of rock art by function. Supporting ethnographic data are cited by Hedges and partially supportive data are given by Joseph (1973) and by Minor (1973).

California Desert rock art stimulates many questions, some of which will be discussed below, but at the present time it is very difficult to sort out questions that spring from empirical styles and distributions of styles from those derived from sampling error. Aside from some local examples (eg. Joseph 1973), no study of California Desert rock art has been based on a systematic sample of rock art sites and there has tended to be little explicit consideration given by such studies to how (or which elements are observed, recorded or analyzed.

The preservation ethic that has characterized much of the history of desert archeology is well represented with respect to rock art. The work of LaMonk, McCarthy and their respective associates was motivated largely by the desire to preserve these fragile pieces of data. A vigorous
Map 5: Southern California rock art distributions (after Hedges 1973).
<table>
<thead>
<tr>
<th>Name</th>
<th>Definition</th>
<th>Interpretation</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern California Rectilinear Abstract</td>
<td>Painted chevrons, zigzags, straight lines, diamond chains, etc.</td>
<td>Ethnographic records of connection with girls' puberty ceremonies and Chingishnish religion</td>
<td>After 1770 AD</td>
</tr>
<tr>
<td>Rancho Bernardo Rectilinear Abstract</td>
<td>Elaborate, well-executed geometric designs, especially complex mazes, painted</td>
<td>No ethnographic data, but thought to be connected with spread of Chingishnish, possibly as post-mission revitalization movement. Possibly the work of a single artist</td>
<td>Mission Period</td>
</tr>
<tr>
<td>Peninsular Range Representational</td>
<td>Digitate anthropomorphs, sauromorphs, sunbursts, circles, grids, painted</td>
<td>Possibly associated with shamanistic preparation for dancing, boys' puberty rites</td>
<td>500 B.P. to historic times</td>
</tr>
<tr>
<td>Great Basin Abstract</td>
<td>Circular pecked elements, with curvilinears, wavy lines, dots, crosshatches, mazes</td>
<td>Uncertain, but may be associated with hunting activities</td>
<td>Possibly 5000 BC to historic times</td>
</tr>
<tr>
<td>Colorado Desert Representational</td>
<td>Pecked digitate anthropomorphs sometimes elaborated</td>
<td>Uncertain, but may be associated with hunting activities. Associated with trails</td>
<td>Ca. 850 AD to early prehistoric period</td>
</tr>
<tr>
<td>Great Basin Scratched</td>
<td>Lightly incised crosshatching, feather-like elements, parallel lines</td>
<td>Some appear designed to obliterate pecked designs. Some are associated with trail shrines</td>
<td>After 500 AD</td>
</tr>
<tr>
<td>Riverside Maze</td>
<td>Pecked maze designs, rectilinear elements, sunbursts, curvilinears, linear dot patterns</td>
<td>Generally situated near good lookout spots</td>
<td>No estimate</td>
</tr>
</tbody>
</table>
| Cupule | Pecked cups, sometimes with grooves | May be associated with boys' puberty ceremonies | Probably within last 500 years }
program of protection and public education recently has been launched by
the Rock Art subcommittee of the California Desert Archaeological Committee
under the direction of Ike Eastvold. Rock art sites are being located,
recorded, fenced, barricaded and otherwise protected against the increas­
ingly rapacious forays of collectors and vandals. Consistent with the
historical disinterest of professional archeologists in California Desert
rock art, Eastvold is receiving very little assistance from the archeo-
logical community and some active, if puzzling, opposition from particular
professionals.
The primary organized research now underway in the Monument vicinity is that of Philip J. Wilke of the University of California, Riverside, in the Coachella Valley. As noted earlier, the Coachella is the site of an extinct fresh-water sea, Lake Cahuilla (LaConte, Blake Sea). Lake Cahuilla formed a distinct shoreline at about 42 feet above sea level and extended from the neighborhood of Indio to a point south of the California/Mexico border; the present Salton Sea, formed by a breakthrough of the Colorado River in 1905-7, is a relatively small stand. Large numbers of prehistoric archeological sites, including village sites, house remains, cemeteries, fish traps and even latrines with preserved coprolites, exist around the Lake Cahuilla shoreline. The lake was sustained by inflow from the Colorado, which was interrupted about 500 years ago. Desiccation apparently occurred rapidly. Wilke's research is concerned with the response of the lakeshore residents—thought to be the ancestors of the Cahuilla—to this catastrophic environmental disintegration.

Much of Wilke's research, which is directed toward a Ph.D. dissertation, is not yet published, but he has engaged in extensive archeological surveys around the lake, mapped a large number of fish traps on recessional shorelines, excavated several sites and worked closely with avocational archeologists, particularly Douglas Fain of Indio, who have collected material eroding out of the Coachella Valley (cf. Wilke & Fain 1974). Ethnohistoric research also is an important part of Wilke's study. He and Harry Lawton have identified the desiccation of the lake in Cahuilla oral history and have found evidence of the adoption of agriculture as a response to the loss of lacustrine resources (Wilke and Lawton 1974). Wilke's work is integrated closely with programs of environmental management and salvage. A survey and excavation project at Tahquitz Canyon, sponsored by the Agua Caliente Tribe of Cahuilla in connection with nomination of the area to the National Register of Historic Places, provided information pertinent to Wilke's questions (Wilke, King and Hammond 1974). The Perris Reservoir Archaeological Project, sponsored by the California Department of Parks and Recreation of the Perris Penaplain west of the San Jacinto Mountains, resulted in a suggestion of population increase in this area at about the time of the Lake Cahuilla desiccation (O'Connell, Wilke, King & Mix 1973; O'Connell, Jefferson, Bettinger & Wilke 1971). A popular account of Wilke's studies has been provided by Pepper (1972). Wilke's study is of direct pertinence to the Monument, as the area east of the Little San Bernardino is part of the Lake Cahuilla hinterland and it can be expected that its use after the desiccation differed from its use when the lake was at its height.

Other studies in the immediate vicinity of the Monument have been directed essentially at management needs and have not yet produced ideas or information directly pertinent to the archeology of the Monument itself. Such studies include a survey of the Morongo-Yucca-Upper Coachella Valley aqueduct right-of-way, which runs down Little Morongo Valley (King 1971); a survey of American Telephone and Telegraph's Oklahoma City-Los Angeles "A" Coaxial Cable Route from Blyth to Corona, which passed just south of the Monument (King, Jefferson and Gardner 1973); a survey of the Coachella Valley Canal right-of-way just southwest of the Monument, and a survey of Southern California Edison Co.'s Kaiparowitz Transmission Line right-of-way, which runs just east, south and west of the Monument (Barker and Schlanger 1974).
PART III

A. RESEARCH WITHIN THE MONUMENT (See Appendix I for Details)

The earliest and, in some ways, most extensive archaeological fieldwork done within the current boundaries of the Monument was conducted prior to its creation. During the first quarter of the 20th century a small number of archaeological sites, mostly rock art sites, were recorded in the area by Julian Steward and W. Duncan Strong (Steward 1929). Since maps of the area were virtually nonexistent at the time, the sites they recorded can seldom be relocated today.

Elizabeth W. Crozer Campbell and her husband, William Campbell, began their work in the vicinity in 1929. William Campbell was a World War I veteran who had been injured by exposure to mustard gas. He and his wife moved to Twentynine Palms in order to build up his health and remained there for many years. The population of the area was small at the time, consisting mostly of miners, prospectors and (allegedly) moonshiners. The Campbells homesteaded and participated in the town's development (Campbell 1961). Both developed a deep interest in the desert and in the local Indians and they eventually became associated with the Southwest Museum in Highland Park, through which Mrs. Campbell obtained an Antiquities Act Permit to conduct archaeological surveys in the area. She collected data and materials from 31 "districts" in the Twentynine Palms region. Topographic maps were still unavailable, making the locations and boundaries of these districts difficult, sometimes impossible, to define, but at least 20 of them are within the boundaries of the Monument (See Table 4 and Base Map A). She and her husband conducted intensive research at the alleged Early Man sites along Pinto Wash (Campbell and Campbell 1935), but the purpose of most of their research in the Monument area appears to have been the salvage of late prehistoric cache sites that were in immediate danger of being vandalized (Campbell 1931). They established the Desert Branch of the Southwest Museum in their home and financially supported publication of reports on their research. As time went on, the Campbells became more and more engrossed in the search for Early Man on the desert and especially with sorting out relationships between man and the natural environment. As Claude Warren put it after reviewing Campbell's general strategy (Campbell 1936) and her approach to the archeology of Lake Mohave (Campbell et al 1937):

"Elizabeth W. Crozer Campbell had by 1936 outlined an environmental approach to the archeology of the California Deserts and had distinguished several artifact assemblages and presented a hypothesis regarding these assemblages and their environmental settings" (Warren 1970:7).

As their interests extended farther into the Great Basin the Campbells relocated to Lake Tahoe. It was there that William Campbell drowned in 1944 (Antevs 1945). Mrs. Campbell then moved to southern Arizona with portions of her collection, other portions remaining at the Southwest
Base Map A: E. W. C. Campbell collecting districts (see Table 4 for names of districts).
Table 4: E.W.C. Campbell Collecting Districts in the Vicinity of Joshua Tree National Monument

<table>
<thead>
<tr>
<th>District Name</th>
<th>In Monument?</th>
<th>If in Monument, Number on Base Map A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ames Dry Lake</td>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Anaconda Mine</td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>Ames Mountain</td>
<td>No</td>
<td>Not Located</td>
</tr>
<tr>
<td>Big Rock Canyon</td>
<td>Probably</td>
<td>Not Located</td>
</tr>
<tr>
<td>Bristol Dry Lake</td>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Bullion Pass</td>
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</tr>
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<td>Eagle Mountain (Pinto Wash)</td>
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<td>Gold Hill</td>
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Table 4 (continued)

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<th>If in Monument, Number on Base Map A</th>
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<td></td>
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<tr>
<td>White Tanks</td>
<td>Yes</td>
<td>20 (uncertain loc.)</td>
</tr>
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<td>Willow Holes</td>
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Museum. Disagreements with early administrators of Joshua Tree National Monument apparently resulted in an unwillingness on Mrs. Campbell's part to return her collection to the federal government and she had some differences of opinion with the Southwest Museum (Schumacher personal communication 1975). By 1967, however, she had returned to the Twenty-nine Palms area and, with the cooperation of then Superintendent Super- naugh, she turned over to the Monument a large portion of the collection, 20 volumes of field notes and catalogs (some duplicating others) and drawers of as yet unsorted maps and miscellaneous notes. A large quantity of heavy stone material from the area had been transferred to the Monument in 1963 from the Southwest Museum (Schumacher n.d.), but other material remained at the museum. Mrs. Campbell worked until her death in 1973 with Mr. and Mrs. John Kelly and Monument personnel to recatalog and sort the collection (Schumacher personal communication 1975; Kelly and Kelly personal communication 1974). After her death, an unquantified, but allegedly large, number of photographs and notebooks are said to have been removed from her house and discarded (Cheryl Erickson personal communication 1975). It is not known whether any archeological notes or photos were among the discarded material.

Until the data known to be extant—the notebooks, maps and loose notes at the Monument and whatever exists at the Southwest Museum—are fully reassembled and studied, it will be impossible to make much good use of the Campbell collection. The published record of her work is inadequate for systematic analysis, though it does post interesting and useful questions. The collection remains the largest assembly of artifacts from the Monument vicinity and there appears to be enough information in the notebooks and on the maps filed at the Monument Visitor's Center to justify hope that the collection's constituents can be reassigned provenience.

Curiously, two one-time professional anthropologists and archeologists lived in the Twentynine Palms area during about the same period the Campbells lived there, but there is no substantial record of their involvement in local research. W. Egbert Schenk and his wife, Sara, were students of A.L. Kroeber at the University of California during the early years of the century. Sara conducted ethnographic research (Schenk and Gifford 1952) and Egbert undertook substantial archeological fieldwork (Schenk and Dawson 1929; Figgord and Schenk 1926). The Schenks did not remain full-time in anthropology, but they eventually retired from private enterprise to reside at Twentynine Palms. According to former Monument Superintendent Samuel King (n.d.), Egbert Schenk collaborated with him on a published paper concerning the Monument, but the article does not mention Schenk or list him as a co-author. He did correspond with the botanist Philip Munz regarding a hybrid oak growing at Live Oak Tank (Fact File n.d.). He also argued with the National Park Service about the proper name for Ivanpah Tank (National Archives n.d.) and published a review of Campbell and Campbell's "The Pinto Basin Site" in American Anthropologist (Schenk 1936). In 1931, Gifford said that Schenk was preparing a paper on the Kamia, indicating that his anthropological expertise was being applied to Southern California groups (Gifford 1931), but this paper was not published and the whereabouts of the manuscript, if
it exists, are unknown. There are rumors that the Schenks interviewed local old-timers in the Monument vicinity, but there are no notes on file at the Monument or at the local library that can be associated with the Schenks, nor is there any record of their having produced any. They are not mentioned by Campbell. The Schenks moved to Carmel, California, shortly before their deaths in the 1960s (Fact File n.d.). Inquiries are being made in the area in the hope of finding any notes or manuscripts that may exist.

In 1973, while conducting research in the Southern Santa Clara Valley (King and Hickman 1973), Hickman and I purchased several old issues of the University of California Publications in American Archaeology and Anthropology, with labels indicating that they were from Egbert Schenk's personal library. In one was a carbon copy of a letter to Luther Cressman discussing taxonomic problems. These issues were purchased at Poole's Antique Store in San Juan Bautista, about 35 miles from Carmel. Inquiries are being made through Ms. Mary Poole, the owner of the store, as to the possible existence of unpublished material. Wilke (personal communication 1975) reports contacting the Schenk's daughter, Mrs. Kimi Spear, through the Pacific Grove Museum. Mrs. Spear indicates that the Schenks did leave unpublished material, about which she is now making inquiries. Albert Elsasser of the Lowie Museum of Anthropology at the University of California, Berkeley, reports that no unpublished Schenk material from Southern California has found its way back to the Schenk's alma mater.

Egbert and Sara Schenk, in short, provide an intriguing but frustrating element in the history of archeological research in the Monument vicinity. It is hard to believe that, with their background and training, they would not have collected ethnographic or archeological data and worked it up into an organized form. Such data would be quite useful in light of the paucity of solid information on local archeology or ethnographic groups, but it has thus far eluded recapture and may no longer exist, if it ever did. It also is curious that the Schenks, although they know about the Campbells and must have been in contact with them about community affairs, apparently did not collaborate in the latter's archeological endeavors. If and when the Schenks' unpublished documents turn up, some answers to this puzzle may be forthcoming.

Archeological work within its boundaries came to a virtual halt with the establishment of the Monument. We do not know whether this cessation involved deliberate Monument policy, perhaps reflecting the Monument's peculiar status as a creature of the Antiquities Act, designed to protect non-cultural phenomena, or a simple redirection of interest by the Campbells and their Southwest Museum colleagues (cf. Campbell 1936), creating a local research void.

In the 1950s, however, research began again through the efforts of Mr. and Mrs. Francis Johnston of Banning. Like the Campbells, the Johnstons are avocational historians and prehistorians who have taken it upon themselves to record the rapidly vanishing archeological resources of the California Desert. Much of their attention has been focused on San Gorgonio Pass (cf. Johnston 1969) and on the desert to the east. Their research in the Monument has emphasized the study of aboriginal trail systems (Johnston & Johnston 1957) and of rock art (Johnston & Johnston n.d.). They also have collected miscellaneous first-hand and
second-hand archeological site reports, whenever possible. Their main contribution to date, other than the collection of data that otherwise would be lost, has been to reconstruct something of the trail system that linked the California coast and the Colorado River (see Map 4). In an unpublished paper, Johnston and Johnston discuss the distribution of rock art styles in and around the Monument. They are concerned primarily with the relationships between boundaries of rock art style distributions and prehistoric social boundaries. The Johnstons' interest in this kind of research continues and they are cooperating with McCarthy in his work within the Monument. The National Park Service in 1957 initiated a program of contract archeology at Joshua Tree National Monument that resulted in the systematic survey of about 2.5% of the area (Base Map B). The purpose of the work is not entirely clear from any documents available to us, but there apparently was recognition that the archeological resources of the Monument should be better understood and that they should somehow be protected from vandalism. Both purposes seem to have been served by initiating a program of contract research. The institution chosen to do the research was the University of Southern California. The archeologist responsible was Dr. William Wallace. Wallace had received his training at the University of California, Berkeley, and was the first fully professional archeologist to turn his attention to the Monument area. He had been involved in desert research for some time prior to undertaking the Joshua Tree research and had worked with the Archaeological Survey Association of Southern California before founding Archeological Research Associates, a professional/avocational group equipped to do contract work.

Wallace first directed his attention to the Squaw Tank area, where prehistoric sites were known to occur and to be undergoing vandalism. He conducted an intensive survey of approximately a 10 square mile area and excavated one site. Workmanlike reports were prepared on both projects, the first co-authored with Edith Taylor (Wallace & Taylor 1959, 1960a), the second with Roger Desautels (Wallace & Desautels 1959, 1960). The Squak Tank projects were the first in the Monument in which substantial attention was paid to reporting field methods and techniques. In general, they set a high standard of technical competence. The sites recorded during the survey appeared to be of late-prehistoric to early historic vintage. The one excavated site was assigned to the same time range, despite an unexpected encounter with a deep buried stratus on the edge of the midden toward the end of the dig. Wallace and his co-authors concluded that they were dealing with the remains of seasonal campsites used by Serrano Indian bands. No more specific or inclusive conclusions were attempted or reached.

Wallace then shifted his operations to the vicinity of Sheep Pass, between Queen and Lost Horse Valleys. The reason for the work is not clear. Wallace said the pass appeared to be a natural route of travel between the Little San Bernardino Range and the Twentynine Palms Desert area, but he does not say what he wanted to find out about this route. His reports on the Sheep Pass survey are much less explicit about methodology than are those on Squaw Tank, but the conclusions are about the same: the sites recorded represent the activities of small, mobile bands of hunters-gatherers during the late prehistoric period (Wallace 1962b, 1964).
Base Map B: Systematic surveys, excavated sites, minor surveys and other minor inspections within Joshua Tree National Monument. Key to numbered areas: (1) KEYS RANCH--Jefferson 7/73 evaluation, Anderson 11/73 visit; (2) OASIS OF MARAH--Jefferson 7/73 evaluation, Jefferson 7/73 flood control clearance, Jefferson 7/73 visitor center addition clearance, Anderson 11/73 well clearance; (3) SOUTH ENTRANCE COMPLEX--Jefferson 7/73; (4) INDIAN COVE COMFORT STATION--Jefferson 7/73; (5) WEST ENTRANCE COMPLEX--Jefferson 7/73; (6) COTTONWOOD SPRING DUMP STATION--Jefferson 7/73; (7) INTERSECTION RTS. 2 & 3--Jefferson 7/73; (8) SANITARY DUMP STATION--Jefferson 7/73; (9) NORTH ENTRANCE COMPLEX--Jefferson 7/73; (10) PINTO BASIN ROAD SEGMENT--Ladd 11/70 (location uncertain); (11) WHITE TANK/BELLE CAMPGROUND VICINITY--Anderson 11/73; (12) 49 PALM'S OASIS--Anderson 11/73.
Although Sheep Pass was the last work done by Wallace in the Monument, his associates, Kritzman and Desautels, representing Archaeological Research Associates, continued their relationship with the Monument through a contract survey of Indian Cove, where a new public-use facility was planned. The contract, however, covered only the area of actual construction. Feeling that the indirect impact of the facility needed to be dealt with, Kritzman and Desautels extended their survey across the floor of the cove on a volunteer basis. They did not go substantially into the surrounding rocky hills and spurs. Two clusters of sites were found. Kirtzman's (1967) report provides the by now rather familiar conclusion: the sites were occupied by late-prehistoric nomadic hunters-gatherers.

 Actually, nowhere in any of the reports by Wallace and his colleagues is any substantiating data cited for the recurring conclusion about occupation by small nomadic bands. That the sites were occupied during the late-prehistoric to protohistoric period is demonstrable; light projectile points and pottery, diagnostic of these periods, characterize all recorded sites with any substantial assemblages. It also is a safe assumption, of course, that the occupants were hunters-gatherers. Dealing with questions of population size and mobility, however, require kinds of analysis that have not been attempted anywhere in the Monument. My impression is that Wallace and his associates derived their conclusions in these regards not from the data but by extrapolation from what they took to be standard ethnographic expectations about arid lands nonagriculturalists (cf. Steward 1938).

Wallace does not record rock art sites at Squaw Tank and Kritzman makes the omission at Indian Cove. The Johnstons, however, have records of such sites at the former location (Johnston and Johnston personal communication 1974, 75) and McCarthy recently has recorded rock art in both areas (McCarthy personal communication 1974, 75). This leads me to conclude that a degree of unintentional bias may have influenced the observations of the ARA teams. This is a very important, and very understandable, problem in archeological fieldwork. The interplay between what is, or what exists in the real world, and what the archeologist sees is not simple; it is as likely to be affected by cultural and idiosyncratic factors as is any other kind of human perception. When I first came to the California Desert after years of work on the coast and in the Sierras, I could literally walk over potsherds all day without seeing them. Coming from a pottery-free area, I simply had not trained myself to notice them. A major village site on the Mohave River was lost to the construction of a Corps of Engineers dam because archeologists from UCLA, trained in coastal archeology, could not see it when they surveyed the area. But regional specificity in observational training is not the only factor involved in the generation of perceptual bias. A group of Forest Rangers who attended an archeological training course once commented to the author that they had great difficulty seeing archeological sites because they were on the ground, while the phenomena they were used to observing were up in the trees. Similarly, a person concerned with rock art will fix his eyes on surfaces, overhangs, crevices and crannies in the rock outcrops while trudging unknowingly over middens and sherd scatters; a midden person, on the other hand, will peer intently downward and let the rock art go by.
Some phenomena may not be recorded because they seem within the range of natural occurrence, while some may seem unworthy of "professional" notice. The latter possibility pertains in particular to rock art. Rock art has received rather bad press in the archeological community during the last decade or so, perhaps because of its too-frequent use in attempts to "document" visits by spacemen, Egyptians or Chinese to the North American continent and possibly because it seems terribly idiosyncratic and mentalistic at a time when fashion dictates that archeology must be technoenvironmental determinism if it is to be anything. Under such a cloud, rock art simply is not going to be observed if the archeologist has to choose between looking up into the rocks in search of vague pigmented meanderings and down into the ground where the tools and facilities of economic function and process lie clustered. Whatever the reason, a tendency not to observe rock art sites appears to have been present in the work of both Wallace and Kritzman.

At the conclusion of his report, Kritzman recommended excavations at several of the sites he had recorded. His recommendations were not explicitly justified by management considerations, although it certainly seems likely that the sites could be regarded as threatened by intensified public use of the area. His recommendations were based instead on an assumption that excavating the larger, apparently deeper sites in the area would contribute to an understanding of local culture-history. No action was taken.

About two years after the Indian Cove survey was completed, in the spring of 1968, the Monument contracted for a survey in the Barker Dam region. The University of California at Riverside was chosen to do the work, which was carried out under the immediate direction of Dennis O'Neil, then an advanced graduate student in the Department of Anthropology. O'Neil conducted an intensive survey and prepared a detailed report (O'Neil 1968). He was the first investigator at the Monument to deal systematically with rock art and his documentation of sites recorded by his team is exhaustive. He was not able to fully cover the area to be surveyed, however. Like Kritzman and, in general, Wallace, he limited himself to the flats and did not venture into the major rocky areas. As a result, he failed to record some kinds of sites, particularly rock art sites, which McCarthy now is discovering. O'Neil noted that his study was incomplete in this regard, but the casual reader, glancing at his map of surveyed areas, will be left with an impression of complete coverage.

In contrast to the reports of the Wallace teams, where the ways in which conclusions arise from data are seldom spelled out, O'Neil made an attempt to outline his thought processes in arriving at results from his work. He provides a simple qualitative comparison of Barker Dam with Sheep Pass, Indian Cove and Squaw Tank, concluding that all three areas are quite similar in the nature of their prehistoric resources but that some more intensive occupation is indicated at Barker Dam than in the other areas. He points to certain rock art forms in the Barker Dam area as possibly indicative of white-Indian acculturation (a suggestion now disputed by McCarthy). He assumes, with Wallace and Kritzman, that the area was occupied by Serrano bands, but points to the possibility of Paiute/Chemehuevi contact, as indicated by the presence of a few Owens Valley
Brown Ware sherds. He recommends excavation and further survey for purposes of culture-historical and cultural-ecological reconstruction, but these recommendations have not been followed.

After O'Neil's survey, the Monument's program of sporadic reconnaissance entered a period of quiescence that lasted, generally speaking, until 1973. The only archeological project that seems to have been undertaken at the Monument during the period was a rock art study initiated in about 1968-69 by Lynn Maners, then an undergraduate student at the University of California, Riverside (Kowta personal communication 1975). Maner's project apparently never got well underway, however, and produced no known results. This was a period, coincident with the Nixon administration, of limited funding for Park Service functions and of reorganization within the Service's national archeology programs. The functions and needs of the Monument also were being redefined, leading to the preparation of a General Plan and a Wilderness Proposal. Although the Wilderness Proposal won support, the 1972 draft General Plan met considerable criticism on archeological grounds and others (cf. Broadbent 1972, King 1972) and is now being re-drafted. Finally, this was the period during which the National Environmental Policy Act, Executive Order 11593 and other environmental and historic preservation statutes were passed or implemented. Archeological philosophies began to shift from an emphasis on exploitation to a focus on conservation and the archeological resources of National Parks came to be regarded not as safe and easy sites for excavation, but as "banked" sites that should and could be protected in perpetuity. While the National Park Service groped for a definition of its role in the shifting field of cultural resource management and while the Monument considered its function and future, fieldwork at Joshua Tree virtually ceased.

Leslie E. Wildesen, then a graduate student in anthropology at San Francisco State College and an employee in the National Park Service Regional Office in San Francisco, in 1969 prepared an "Archaeological Research Management Plan" for the Monument (Wildesen 1969). Such plans were, in a sense, the forerunners of overviews like this one, but seem to have been much more narrowly focused, much more restricted by arbitrary guidelines and much more directed to "interpretive" needs. Because of the technical overlap of Wildesen's work and mine, a detailed discussion of her plan will be presented in a separate section. In terms of the history of archeological research in the Monument, however, it is interesting to note at this point that of seven explicit recommendations offered by Wildesen for management, surveys, test excavations and other research, only one--cataloguing of the Campbell Collection--has been undertaken, and that with much less money than would be required to do it thoroughly (Schumacher n.d.). The only fieldwork that the Park Service seems to have sponsored subsequent to Wildesen's report and prior to 1973 was a one-day reconnaissance of a road segment in Pinto Basin, done by an in-house archeologist and resulting in a less than satisfactory report (Ladd 1970).

Sylvia M. Broadbent of the University of California, Riverside, although a specialist in Colombian prehistory, has for a number of years maintained an interest in the archeology of the California Desert and periodically has sought to interest students in doing new fieldwork to reevaluate Campbell and Campbell's 1935 research in the Pinto Basin. George T. Jefferson in
1972 initiated such fieldwork under an Antiquities Act Permit granted to Broadbent. Jefferson came to anthropology with an M.A. in geology and an emphasis in vertebrate paleontology. He had conducted his main research on the Pleistocene fauna of the Mannix Lake basin and had become interested in problems of early human adaptations to changing natural environments. It was natural for Jefferson to become interested in "the Pinto problem," the central feature of which has to do with the association of man-made objects with Pleistocene fauna. Although Pinto-like projectile points have been found widely in the Great Basin, the Southwest and California, nowhere has an association with Pleistocene fauna been discovered and most dated Pinto contexts are very much more recent (Clewlow 1967). The nature of the association at Pinto Basin was unclear. As noted earlier, the Campbells themselves were quite cautious about it. The possible association, then, remained undealt with in the literature and the actual dating of the complex remained subject to a great deal of uncertainty. Jefferson set out to ascertain the actual relationships between artifacts and extinct fauna and generally to clarify the ecological context of the human behavior represented by the assemblage.

Jefferson's work, which involves very careful surface plotting, test excavation and stratigraphic studies, is not yet complete. In his preliminary report (Jefferson 1972a) and in personal communication, however, he indicates that there thus far appears to be no association between fossil bone and tools, except that produced by deflation of the tool-bearing sands into the underlying fossil-bearing sediments.

As the National Park Service developed procedures for compliance with new federal environmental and historic preservation laws, it became necessary to provide "archeological clearances" prior to undertaking land-modifying projects. Jefferson and his associate, Michael Gardner, were called upon to provide 12 small surveys for clearance purposes at the Monument during 1973 (Jefferson 1973b). A further clearance inspection was provided by Keith Anderson of the NPS Western Archeological Center toward the end of that year (Anderson 1973; see Base Map B).

The most recent archeological activity at the Monument, other than the preparation of this overview, has been the employment of Daniel McCarthy to undertake a review of extant archeological data and a rock art survey. McCarthy is a self-trained specialist in rock art. He became involved in archeology through the San Bernardino County Museum's excavation of the alleged Early Man site near Calico, where he learned techniques for casting reproductions of artifacts. He and an associate applied these techniques to petroglyphs and were able to replicate the appearance of the originals with a high degree of accuracy. Their work has been displayed in a number of museums and galleries. McCarthy views it as an important means of preserving something of America's fast-disappearing art history. McCarthy was employed for several months at Anza-Borrego State Park, conducting a rock art survey, recording and replication project in association with William Deidel, Park Archeologist. He was "discovered" at Anza-Borrego by Homer Rouse, Monument Superintendent, and employed as a seasonal ranger with joint duties in law enforcement and archeology. Although his function remains somewhat unclear, McCarthy is doing a thorough and careful job of recording rock art, revisiting surveyed
areas and checking the accuracy of site records and the completeness of coverage. He also is attempting to locate sites, especially those of Steward (1929), whose provenience is unclear.

I suggested earlier that several general research approaches, or intellectual themes, could be identified in the work of California Desert archeologists during the past 50 years. Another way of organizing the archeologists of the desert is by chronological periods. This approach provides a good way of summarizing the history of archeological research within the Monument.

First we might refer to the "age of the ethnographer," from the turn of the century until the late 1920s, when field ethnographers in the tradition of Boas and Kroeber were salvaging memory-culture data from surviving Indian people in the California Desert and elsewhere. Interviews led to visiting old village sites, camps and ceremonial locations and these were recorded to the extent permitted by the available maps and data. Such recording activities were sporadic, however. The work of Steward and Strong (Steward 1929) is exemplary of such research.

During the 1930s and, to some extent, the 1940s, the "archeological explorer" came on the scene. Daring denizens of the desert wastes, the explorers might or might not have anthropological training, they might or might not be as careful as were the Campbells about reporting their findings and exercising reason in developing hypotheses and they usually were on the trail of Early Man. Adventure, toughness, courage and a feeling of personal involvement in the vastness of the desert and the magnitude of its ancient human presence were their characteristics. The data they have left--the Campbell collection being an excellent example--are often difficult to deal with, but one must stand in awe of what they endured in the conduct of what really was an adventure into the past. One must also recognize the important purpose they served as catalysts, demonstrating an unexpected time-depth for American prehistory and helping ask many of the culture-historical questions that have infused the discipline of archeology ever since.

After World War II, technicians took the stage. The massive archeological projects of the WPA and other pre-war federal recovery programs had resulted in significant technological and strategic advances and archeologists in California, particularly, were embued with a passion for data collection by virtue of being, almost to a person, students of Alfred L. Kroeber and Robert Lowie. This also was a period when theorizing could be distinctly maladaptive, particularly for archeologists, whose concern for economic processes might mean contact with theories then held in significant ill repute by powerful members of the government. Thus, there was a tendency to concentrate on fine-scale technical work in excavation and, to a less developed degree, in survey. William Wallace and his colleagues exemplify the tradition of this period, doing fine, highly controlled fieldwork, but leaving their reader with a number of unanswered questions about how the fieldwork was conceived, what its purposes were and how to judge its results.

The revolutionary changes in American archeology occasioned during the mid-60s by the development of "New Archeology" are reflected to some
extent in the work of O'Neil. Unlike Wallace and his colleagues, who when they proposed excavation seemed to do so entirely for culture-historical reasons, O'Neil suggests fieldwork in order to answer adaptive and social questions, as well. The methodological component of "New Archeology," emphasizing research designs that specify connections among problems, hypotheses, fieldwork and results, is exemplified by Jefferson's work.

Finally, the rise of the newest trend in American archeology, "Public Archeology" or "Conservation Archeology," is reflected in typically ambiguous fashion in the various clearance surveys and, possibly, in the present overview. In fact, the two entities rather nicely reflect polar opposite tendencies in the field of cultural resource management. Under current statutes it is clear that federal agencies must be sure that their activities will not necessarily damage archeological resources. One response to this requirement is to drop an archeologist on the site of every land-modifying project, an approach resulting in the archeological "clearance." Another view is that such project specific inspections are of uncertain value, both to science and to management, if conducted in a vacuum, and that archeological regional plans are necessary if cultural resources are to be dealt with intelligently. While an overview is not a general plan, it is a necessary component of one. It naturally is our hope that the next step--development of a plan--will be undertaken at Joshua Tree.
In 1969, as noted earlier, an attempt was made by Leslie E. Wildesen to develop a planning framework for Joshua Tree National Monument. Her "Archeological Research Management Plan" was prepared in accordance with a standard format developed by the Washington Office of the National Park Service (NPS n.d.; Anderson personal communication 1975). The function of the document in the planning process is not clear, and its standardized organization seems to be directed exclusively at rather shallow interpretive considerations.

After a brief statement about why the Monument was established, Wildesen presents a "Statement of Archeological Significance." She states that there are "two major periods of aboriginal occupation, separated by a hiatus of several millenia." The first of these is represented by Pinto Basin, which she assigns a "post-Pleistocene" date with an implication of antiquity, while hedging to the extent of commenting that "post-Pleistocene . . . could mean anything from 9000 B.C. to 2000 B.C." She asserts that the Pinto Basin site represents a big game hunting economy because of its many projectile points and choppers. She then points to a "later period," between 1000 A.D. and the present, presumably represented by the sites studied by Wallace and his colleagues. She says that these sites represent a different pattern of adaptation because of the presence of pottery and seed-grinding tools and asserts that the change from big game hunting Pinto people to later gathering societies "is the most significant feature of the archeological story within the Monument."

Aside from Wildesen's equation of archeology with prehistory, there remain several problems with her sketch of Monument prehistory and its significance. In the first place, the "several millenia" hiatus between the Pinto artifacts and the later assemblages was questionable at the time Wildesen wrote. It is even more doubtful in view of Jefferson's subsequent work. In the second place, Amsden describes 24 metates and 23 manos from the Pinto Basin Site (Amsden in Campbell & Campbell 1935:33), rather a respectable industry for a "big game hunting" assemblage. The mere presence of milling tools at Pinto Basin does not tell the whole story, of course, as the table below demonstrates:

<table>
<thead>
<tr>
<th>District or Site</th>
<th># Projectile Points</th>
<th># Milling Tools</th>
<th>Ratio PP/MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinto Basin*</td>
<td>173</td>
<td>47</td>
<td>7.3/2</td>
</tr>
<tr>
<td>Squaw Tank District (survey)**</td>
<td>6</td>
<td>140</td>
<td>2/46.6</td>
</tr>
<tr>
<td>Squaw Tank Excavation***</td>
<td>27</td>
<td>23</td>
<td>2.7/2.3</td>
</tr>
</tbody>
</table>

* After Amsden in Campbell & Campbell 1935  
** After Wallace and Taylor 1959  
*** After Wallace and Desautels 1959
At Pinto Basin in 1935 there were more than three times as many projectile points as milling tools, while at the late sites around Squaw Tank in 1959 there were 20 times more milling tools than projectile points. This, of course, was after over 20 years of surface collecting by pot-hunters, who would be more likely to carry away an illegal projectile point than an illicit metate. But in the excavated sample at Squaw Tank the numbers of projectile points and milling tools were approximately equal. Assuming that all the observations recorded in the preceding table are equivalent, Wildesen is right in saying that hunting is more heavily represented at Pinto Basin than at the later sites, but she is incorrect in implying that the Pinto Basin people were "hunters" and that the development of a gathering economy represents a dramatic adaptive shift.

Wildesen proceeds to the identification of a "Main Archeological Theme," presumably for interpretative purposes. This theme is trifurcated into an "Early Man Theme," represented by the Pinto Basin; a "Protohistoric Theme," represented by the later sites, and a "Contact Theme," concerning the Cahuilla, Chemehuevi and Serrano, their relationships, their trade activities and their relations with whites. Identified subsidiary themes are environmental adaptations, particularly an assumed Pinto adaptation to a "moist, Pleistocene environment," and a question regarding the ecological and archeological meaning of the assumed temporal hiatus between Pinto and later manifestations.

What purpose the identification of these themes is supposed to serve is unclear. The guidelines under which Wildesen's paper was prepared simply present the "theme" as a necessary empirical quality of the Park or Monument, to be described like a potsherd or a ruin (NPS n.d.).

The report next discusses "Archeological Resources of the Park" and presents a "Site Inventory." Three types of sites are identified: open shallow middens, rock shelter and cave sites and rock art sites. This taxonomy, while valid within its limitations, does not seem to me adequately to represent either the known or potential diversity of sites in the Monument, nor is it clear on what basis it is constructed. Wildesen next summarizes concisely the work of the Campbells and notes that subsequent sporadic surveys (unreferenced, but presumably those of Wallace, Kritzman and O'Neil) have revealed 69 more sites. No assessment of any of the surveys is attempted. Finally, Wildesen states that:

"Since only limited areas have been surveyed, no data on the total number of sites is available. On the basis of site density noted in the Twentynine Palms region, however, at least another 100 sites are estimated to be within Monument boundaries . . ." (Wildesen 1969:6-7).

This is a misleading statement. It is very difficult to determine how much of the Monument actually has been systematically inspected for archeological resources, but a crude estimate indicates that Wallace and Taylor, Kritzman and O'Neil have reported on surveys of little more than 2.5% of the surface area. Such a limited and non-representative sample provides no basis for reliable extrapolation. Wildesen, however, says that she is extrapolating not from the controlled data within the Monument (which
presumably would lead, mechanically, to an estimate of 2,760 sites, i.e. 40 X 69, but from data on the Twentynine Palms area. As far as we can tell, however, the only data on the Twentynine Palms area are those provided by Campbell, who never tells us what she defines as a "site;" how such a phenomenon is identified, bounded or separated from any other representative of the class; how she set about to locate them; where she found them, or what any given representative looks like. The only clue to Campbell's thinking that I can find is the map of the "Pinto Basin Site" in the 1935 report. This "site" is represented as including some 22 separate "concentrated camp areas," any one of which many archaeologists would define as a "site," plus 36 "scattered camp areas," any one of which might also be so defined. This is rather massive "lumping." If we assume that Campbell regularly lumped her phenomena in this way and if we then assume that the average archaeologist would split the concentration of about 58 activity loci at Pinto Wash into about half as many "sites," i.e. 30, and if we then take Wildesen's extrapolation from Campbell's data at face value and assume 100 Campbell "sites" in the Monument, we arrive at a figure of 3,000 sites as they would be recorded by a modern archaeologist, not too far from the figure extrapolated from the Wallace & Taylor/Kritzman/O'Neil results. This whole discussion obviously is nothing more than an exercise in number juggling. The fact is that there is no reliable basis for predicting the numbers or kinds of archeological sites to be found within the boundaries of Joshua Tree National Monument.

After a brief description of the Campbell Collection, then lately turned over to the Monument, Wildesen concisely and accurately summarizes previous and then-current research and turns to research and interpretive needs. Although the research called for is limited to prehistoric archeology and justified only in terms of imminent destruction and/or historical particularist interests, the recommendations themselves are reasonable and, in most cases, correspond closely with my own and with those offered by William Wallace in a letter to Wildesen shortly after her report was accepted (Wallace 1969). Both sets of recommendations are included herein as Appendix II.
Nature and Quality of Research: The Monument area has been subjected to sporadic archeological fieldwork for some 50 years. Surface survey has been the predominant fieldwork form, though Campbell excavated some rock-shelters, Wallace and Desautels excavated the Squaw Tank Site and Jefferson tested along Pinto Wash. As Base Maps A and B show clearly, most survey has been concentrated in the northwest-central part of the Monument. Not all of Campbell's districts can be located, boundaries cannot be assigned for any of them and the manner in which they were surveyed is not general knowledge. More recent, better documented surveys have covered only approximately 2.5% of the Monument's surface area. The results of all contract surveys during the 1950s and '60s contain evidence of inaccuracy and inadvertent bias.

Known Resources: Table 6 lists Monument area sites recorded at the Monument, at the University of California (Los Angeles and Riverside), at the Bureau of Land Management and at the San Bernardino County Museum as of November 1974. McCarthy's ongoing research has added to this list. Many of the records do not provide information adequate to locate or recognize the referent sites, but McCarthy has been attempting to field check and update them. From the extant data, several gross site-classes can be distinguished:

- **Non-ceramic open sites:** These are the Pinto Basin sites, scatters of stone tools, weapons and debris lying among deflating sand dunes, probably occupied 3000-4000 years ago. If sites of similar age and use occur under conditions of aggradation rather than degradation, they would probably look very different, possibly containing middens and structural remains, and they might be deeply buried.

- **Open sites containing ceramics:** These are the midden areas and ceramic/lithic concentrations known to occur on the fans and valley floors in the north-western highlands. Recorded examples tend to be associated with occupied shelters and rock art sites.

- **Occupied shelters:** These are exogene caves and overhangs with midden, ceramic fragments, fire-cracked rock, flakes and other debris representing habitation. They often are associated with rock art and sometimes contain bedrock mortars.

- **Cache sites:** These are crevices, small shelters or niches, which contain (or contained) pottery vessels and/or other stored artifacts. The vessels presumably contained seeds, water or other useful things. The mouths of the caches (if they have mouths) often are marked with "spirit sticks"--branches propped up in the entrance to provide ritual protection for the cache.

- **Rock art sites:** These include elaborate painted shelters with many elements, single elements or small numbers of elements painted in small protected areas; remnants of large exposed painted surfaces, and petroglyphs, including naturalistic, abstract and cupule elements.

- **Trails:** Where they survive, trails usually are faint linear impressions or clearings in the desert pavement or slight "shelves" along hillsides and canyon walls. Potsherds and other artifacts may occur along them and trail shrines, probably consisting of piles of rocks, might occur.
Table 6: Archeological Sites Recorded Within Joshua Tree National Monument as of November 1974.

Site Characteristic Code

Occ = Occupation, indicated by midden, etc.
Pinto = the Pinto Basin Sites
Q = Quarry: evidence of stone acquisition
Tr = Trail
Me = Bedrock metate
Rf = Rock feature (cairn, wall, etc.)
Sh = Rockshelter
BRM = Bedrock mortar
Gr = Grinding tools predominate
w/Hist = Historic materials present
RA = Rock Art

Recorder Code

S/S = Steward & Strong
C = Campbells
J = Johnstons
W = Wallace et al
K = Kritzman
O = O'Neil
Ch = Paul Chace
F = Jack Forbes
H = Arda Haenszel

(full names of infrequent recorders given)

Site Designator Code

R = Riverside County site in University of California System
S = San Bernardino County site in University of California System
SB = Site recorded in San Bernardino County Museum sequence
I = Site recorded by Indian Cove survey
B = Site recorded by Barker Dam survey

<table>
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<tr>
<th>Site</th>
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<td>RA</td>
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<td>RA</td>
</tr>
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<td>R26</td>
<td>S/S</td>
<td>RA/BRM</td>
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<td>S/S</td>
<td>RA</td>
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<td>S/S</td>
<td>RA</td>
</tr>
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<td>R29</td>
<td>S/S</td>
<td>RA/BRM/Occ</td>
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<td>S/S</td>
<td>RA/Occ</td>
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<td>Occ</td>
</tr>
<tr>
<td>R235</td>
<td>W</td>
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<td>Occ/Gr</td>
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<td>RA</td>
</tr>
<tr>
<td>R247</td>
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62
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<tr>
<td>I1</td>
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<td>I9</td>
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<td>B20</td>
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Grinding stations: Although bedrock mortars and metates usually are recorded within occupation sites, some appear to have been noted in isolation. Each of these site types contains an unknown amount of actual variability and there is no guarantee at all that the list given above is inclusive.

General Data and Questions: The level of archeological research conducted to date in the Monument can be characterized as generally inadequate as a basis for reliable generalizations about the numbers of sites present, the types of sites present or their levels or kinds of significance. On the basis of this research, however, we can say that we know (or think we know) some things about prehistory in the Monument vicinity. This partial knowledge can help us to ask further questions.

We know that man has been on the California Desert for a long time, but just how long he has been there is a matter for debate. At least 10,000 to 12,000 years of time depth is assured and two to three times that is probable.

We know that there has been a good deal of environmental change in the area. Particularly interesting, considering the time span apparently represented by the local archeology, is the fact that there have been substantial changes during the last few thousand years.

We know there is evidence for a population increase on the Desert about a millenium ago; at least the population of the Desert became much more visible archeologically at that time.

We know that in ethnographic times the Monument area was more or less a boundary region between the closely allied Cahuilla and Serrano, who were sedentary hunters-gatherers with the possibility of some horticulture, and the nomadic Chemehuevi. These groups were members of contrasting and mutually hostile alliance networks stretching from the Pacific Coast to the Gila River.

We know that the Cahuilla experienced a catastrophic environmental change (the desiccation of Lake LaConte) about 500 years ago.

We know there has been substantial demographic change on the desert, most dramatically represented by the dispersal, condensation or other movement of the Shoshonean language family.

These general pieces of knowledge suggest that some dynamic human events have occurred on the California Desert during the last few thousand years. There also are some things we can say about the archeological record within the Monument.

There is a preceramic cultural expression in Pinto Basin, the Pinto Complex, which probably is some 3000-4000 years old.

There are many sites apparently occupied after 1000 A.D., recorded not in Pinto Basin but in the western portion of the Monument. At one site (Squaw Tank), there is entirely ambiguous evidence of a pre-1000 component.

There appear to be some differences in the types of post-1000 sites in different portions of the Monument and in different topographic circumstances, but the extant data are so incomplete that any attempt to discuss these distributions would be adventurous, uninformative or both.
Some specific questions also have arisen as a result of the work thus far conducted within the Monument.

Campbell (1931) noted a difference between the distribution of painted ware and that of unpainted ware. The former, she said, when found in caches, almost always was found under rock falls in collapsed caves, while the latter usually was intact in caves that had not fallen. She suggested that the painted ware was earlier in time than the unpainted and that an earthquake had occurred between the time when the former was in use and the time when the latter became predominant. This is interesting, not only because it implies a temporal sequence not previously noted, but also because it implies a change in custom so intimately correlated in time with a geological event that some causality must be suspected. If we assume that when Campbell speaks of painted pottery she is talking about painted variants of Lower Colorado River Buff Ware (a number of which are known) and that her unpainted pottery is Tizon Brown Ware, her suggested relationship does not hold up against data from stratigraphic excavations, which thus far place Tizon Brown as the earlier of the two wares (cf. Davis 1962, Wallace and Taylor 1960b; Schroeder personal communication 1975; Euler personal communication 1975). Stratigraphic excavations monitor a different kind of depositional phenomenon than did Campbell's observations in caves, however, and the cited studies were in areas distant from the Monument. On the other hand, perhaps when Campbell distinguishes between painted and unpainted pottery she is talking about, say, two or more variants of Lower Colorado River Buff Ware and excluding Tizon Brown Ware from consideration. It also is possible that the intact and collapsed caves were in different parts of her study area and that they represented the cache sites of different social groups, or that they were different kinds of caves used for different purposes and that these distinctions were reflected in the types of pots placed there. Campbell's published work provides an inadequate base for assessment of these options, but such a base probably would emerge from a full and systematic study of her notes and collection.

A kind of ceramic variability that is documented quantitatively at the Monument is an east-to-west shift in the ratio of Tizon Brown Ware to Lower Colorado River Buff Ware. The table below presents the ratios for Squaw Tank, Sheep Pass, Indian Cove and Barker Dam, from which it is apparent that there is an almost perfect reversal of the ratio between the first two and last two tracts, with Tizon Brown Ware predominating in the Squaw Tank and Sheep Pass region and Lower Colorado River Buff Ware predominating at Indian Cove and Barker Dam.

Table 7

<table>
<thead>
<tr>
<th>District:</th>
<th>Squaw Tank</th>
<th>Sheep Pass</th>
<th>Barker Dam</th>
<th>Indian Cove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio TBW/LCRBW</td>
<td>1.7:1*</td>
<td>2.4:1</td>
<td>2:3***</td>
<td>1:1.3</td>
</tr>
<tr>
<td></td>
<td>(3.3:1)**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Wallace and Taylor's Buff, Red-on-Buff, Black-on-Buff
** Squaw Tank Excavation
*** O'Neil suggests that a more accurate ratio might be 1:3 since 132 of his 427 Tizon Brown Ware sherds came from a single pot.

65
O'Brian (1973) noted a similar reversal at Perris Reservoir, with three presumptive gathering-processing stations (Peppertree, Dead Dog and Oleander Tank) showing a predominance of Tizon Brown, while the single projected base camp (Charles Mott) had Lower Colorado River Buff as the main ceramic element. O'Brian proposed a functional explanation: Lower Colorado River Buff Ware was used primarily for storage vessels, expectable at a base camp, while Tizon Brown Ware was used for utility vessels, which would be taken along for day-to-day operations at the gathering-processing camps. The same situation may pertain at the Monument, but it might have further social ramifications. Tizon Brown Ware as the primary ceramic element might mark the sites of the mobile Chemehuevi (who, however, might have Lower Colorado River Buff vessels in food caches in the rocks (cf. Laird quoted in Barker and Schlanger 1974), while a preponderance of Lower Colorado River Buff sherds might mark the villages of the sedentary Serrano and Cahuilla.

The question of boundaries between social groups has been raised over and over again in the archeological reports on the Monument and the question is not unimportant. If we are to study extinct social groups in a comparative framework, it will be useful to tell them apart. As may the peculiar distribution of pottery types, so may rock art provide a clue to the location of boundaries. Johnston and Johnston (n.d.) dealt with this question, drawing on the earlier thinking of Steward and Fenenga. Mary O'Neil, who assisted in the recording of rock art at Barker Dam, has gone on to use petrography as a boundary indicator in Columbia, with good results (O'Neil 1973). McCarthy (personal communication 1974) has detected some regularity in the differential distribution of rock art elements in the Monument and Eastvold (personal communication 1974) says that while the rock art he has seen in the western part of the Monument resembles that of western Riverside County, the art of a site he is nominating to the National Register of Historic Places on the Twentynine Palms Marine Base is radically different, resembling more closely that associated with a known Chemehuevi site near Baker. The distribution of other "traits" might also be indicative of different territories. Clarke (1968) has shown how material items recorded by the University of California Culture Element Distribution study are differentially distributed within different tribal territories and True (1970) has proposed a Diegueno-Luiseno boundary based on differential ratios among projectile points. Boundaries among prehistoric groups appear to be determinable and there is every reason to think that they can be determined at Joshua Tree National Monument.

The presumed existence of a Serrano/Cahuilla/Chemehuevi boundary within the Monument provides the basis for studying the reasons for differences among these groups and the results of such differences. One can imagine the utility of flexible band membership or of matrilateral cross-cousin marriage among mobile gatherers and that of exogamous moieties and five-generation rules among sedentary foragers, but the reasons why the Chemehuevi were nomadic and the Serrano and Cahuilla sedentary are not entirely clear. Nor are the relationships among the groups obvious. For example, although they apparently observed quite different norms of kinship and political organization and belonged to different trans-California
confederations, the Chemehuevi and Serrano apparently lived together peacefully after contact and intermarried at Twentynine Palms (cf. Miller and Miller 1967). A detailed study of the boundary conditions existing between the groups in prehistoric times should make possible some observations on their long-term patterns of interaction.

Questions about the function of rock art have only barely emerged in the course of Joshua Tree research. Aside from their boundary marker function (or, at least, their possible differential distribution within different boundaries), they must have had functions within their producer societies which probably would be linked with other elements of social, political and ideational organization. It is interesting in this regard to plot Hedge's (1974) major styles in terms of their projected functions; Map 6 does so, with the addition of Joseph's (1973) interpretation of the Riverside Maze style and certain elements of the Southern California Rectilinear Abstract style as explicit markers of territory or possession. The immediately apparent feature of this distribution is that the functions predictable among complex nonegalitarian societies, such as associations with elaborate, socially integrative religious activities and with the marking of territories, are distributed toward the west and the coast, while those predictable among mobile, egalitarian social groups, such as marking landmarks and travel routes and the pursuit of individual power, range toward the east and southeast. Both blocs meet in the Monument.

A final question that emerges easily from the information thus far obtained about the prehistory of the Monument has to do with the apparent population explosion around 1000 A.D., reflected in the large numbers of late prehistoric occupation sites in the western highlands. Jefferson (1971) has considered two alternative dynamics for this increase in visible population, with reference to the Perris penaplain. On the one hand, he posits "budding" of subpopulations into the Southern California interior from sedentary centers of population on the coast and along the coastal rivers. On the other hand, he points to the desiccation of Lake Cahuilla as the occasion for large-scale population dispersals. Although both propositions are viable possibilities, I am not confident that either could account for the entire spread of human populations across the California Desert and the Great Basin after about 1000 A.D. A simulation study would be interesting, if one could derive sensible figures from which to simulate, but other hypotheses also would be useful to test. I am intrigued by the paleoclimatic data summarized earlier by Bettinger and T.J. King. Referring back to Table 1, note that Bettinger projects a warm-dry period between 1400 and 600 years B.P., the time-period of the California Desert population increase and the projected Uto-Aztekan expansion (Madsen 1975). This period rather abruptly follows a cool-wet period, which corresponds closely to the time range of Central California's "Middle Horizon" (cf. Ragir 1972 for C14 determinations). It is generally felt that intensive use of acorns as a food source began early in this period (cf. Fredrickson 1974, King 1974b), which contributed to the inception of village sedentism and population increase (King 1973, 1974c). If this population increase was occurring during a time when the Sierra Nevada was heavily wooded with neoglacial coniferous forest, which provides scant food sources for a gathering economy, one would expect
population overages to be budded into the desert, which under such conditions would be somewhat more productive than it is today. Such budding might result in some substantial populations in favored parts of southeastern California by about 1500 B.P. Given a rapid warming/drying trend, we would expect such populations to face substantial subsistence stress. Unable to displace the more numerous people of the coast or the Southwest, such populations might find it most adaptive to reorganize into smaller, more mobile units and to spread out rapidly over the potential resource area. Evidence of such reorganization might be present in the Monument, depending on the extent to which climatic change has had a substantial effect on the local environment.

In this section I have briefly summarized the tangible results of 50 years of research in and around Joshua Tree National Monument, including lands surveyed, sites recorded and the quality of data recorded about them, and I have speculated in general about some intangible questions and questions and puzzles arising from this research. The questions I have discussed are particularistic ones, dealing with the reasons for and ramifications of particular phenomena observed or thought to have been observed among the Monument's prehistoric remains. To evaluate the significance of the Monument's prehistory in terms of long-range scientific research, it is necessary to go somewhat further and to attempt to consider the very general anthropological questions which might be addressed. This attempt will be the subject of the final part of this volume.
PART IV

A: FUTURE RESEARCH IN MONUMENT PREHISTORY

The previous sections have outlined past research in and around Joshua Tree National Monument. By and large, this research has been done by individual scholars and their immediate associates, each team concerned with a small range of rather direct culture-historical questions, such as "what is the cultural sequence?" or "did people live around this or that lakeshore over 10,000 years ago?" These questions were not unreasonable and they were and are answerable by individual scholars working with minimal funds. But they do not take us very far toward an understanding of human behavior.

To really use archeological resources as bodies of anthropological data requires a more organized, thoughtful and responsible approach to them than has been characteristic in the past. By virtue of their existence within a National Monument, the prehistoric resources of Joshua Tree National Monument are relatively safe from destruction. They should not be expended, except in the pursuit of significant research questions, and any such pursuit should be well thought out and adequately supported.

Organized, regional programs of archeological research, with explicit theoretical bases and long-range plans, are relatively new phenomena on the desert. The most self-conscious such program is that of the Southwestern Archaeological Research Group (SARG) in the arid lands to the east of California (Gummerman 1971). Smaller projects, still linked to individual scholars but regional in scope and with definite research designs, are Bettinger's Owens Valley Project (Bettinger 1974) and Wilke's work in the Coachella Valley (Wilke 1974).

It is not the purpose of this section to detail specific hypotheses or to develop explicit and complete research designs, these being the proper responsibility of those who might wish to conduct field research at the Monument or in its environs. It is the purpose of this section briefly to point at some general questions that might be worth addressing in the Monument vicinity. I certainly do not expect to exhaust the list of potentially useful questions here. I can only discuss those issues which have occurred to me in the course of preparing this overview. Nor would I assert that all the questions I put forth are practically addressable. They are merely questions worth thinking about with the Monument in mind. As distinguished from the questions advanced in the last section, which were based on regularities and irregularities observed in the local archeological record, the research topics identified below are much more general, derived from general ideas about environments, societies and the desert as genre.

What brings people to occupy deserts? Are deserts occupied, as we tacitly assume, only when more fruitful places are not available? Or are there some attractions that bring societies or individuals to select deserts for occupation? Are some people or societies preadapted to life in deserts and, if so, how? Like those that follow, this is a cross-cultural question,
but one can seek locally to answer the question of why people occupied the California Desert. On previous pages I have projected reasons for the 1000 B.P. population increase predicated on the assumption that people would not occupy the desert unless they were pushed into it and/or unless it was not a desert at the time. This is an economic assumption—that people prefer to live where there is plenty to eat, not where there is very little—and it is so obviously true that its discussion seems foolish. It is so obviously true, however, that it may lack a certain explanatory power. Given, say, two populations living side-by-side on the California coast, with equal resources, equal power, equal numbers, increasing in size and stretching their resource bases, which will go to the desert? The basic assumption does not permit a prediction; it forces us instead to question our data about the equality of the populations. Our data may be wrong, of course, but it is also possible that there are other factors at work.

Warren's (1964) dissertation research suggests that the population with the adaptive strategy most like that appropriate to desert life would be the one to go: shellfish gatherers rather than fisherman would go, as one can gather things in the desert, but one cannot take mesquite beans with a hook and line. It seems reasonable to think that there might be other, less obvious preselective factors at work. Differential forms of political organization might be of considerable importance; for example, a group with a highly centralized authority system might be unlikely to move into the desert because the dispersal necessary to find food would weaken the power structure.

Without belaboring the issue, I suggest that asking why the California Desert was occupied and why some populations spread into it while others did not would be worthwhile. Such research would require defining proposed causes, ascertaining how they would affect the archeological record and seeking evidence for their operation in the culture-histories of the desert and its hinterlands.

How do desert people conceptualize space? The relationship between environment and the way people conceptualize and organize their surroundings are becoming increasingly pertinent objects of anthropological inquiry. The study of proxemics arose from a recognition that intercultural conflicts, on an individual level at least, often spring from the fact that different cultures see and use space differently (Hall 1959). The extent to which a population's environment may influence its perceptions of space in predictable ways remains unclear, but addressing the problem certainly seems relevant in the California Desert, where space is an important factor. Hypotheses can be drawn from the theoretical proxemic literature (Hall 1959, 1966, 1971; Watson 1972) and tested against archeological data. The uses of land and the internal organization of settlements should provide clues to the spatial concepts of the population.

The organization of rock art should be even more informative. Rock art probably is the most useful available data source on spatial, organizational and communication concepts, but its analysis toward such ends has only begun. Martineau (1973), for example, treats rock art as communication and analyzes it according to the technical principles of crypt-analysis. Most rock art specialists regard Martineau as overenthusiastic
and feel that his assertion of a virtually continent-wide unified "lan-
guage" expressed in rock art is overblown. Be this as it may, the idea
of treating rock art as symboling and analyzing it as a linguistic form
is worthy of more detailed study.

What are the reasons for and the effects of small group size and mobility?
This is a classic anthropological question and it is still open to con-
siderable discussion (cf. Steward 1955, Less 1968, etc). There apparently
were both sedentary and mobile hunter-gatherers at the Monument, organized
according to rather different principles as discussed earlier. We do not
really know why they were sedentary in two cases and mobile in the third
and we cannot specify the connections between their degrees of mobility
and their forms or organization. Productive studies could focus on the
internal organization of settlements as reflectors of social organization
and on how settlement organization changes through time and space. One
might begin by deriving hypotheses from a very general body of theory,
such as General Systems Theory, predicting, for example, that the organi-
zation of social groups, as reflected in their settlements, will vary
with access to sources of energy (eg. foot), but will be controlled by
the way that energy pulses through the system (eg. the scheduling of food
availability). One could then identify energy sources and define the ways
in which energy from such sources would be distributed as a basis for
making predictions about the kinds of organization that should be manifest
in the archeological record. Where variations from the predictions became
apparent upon investigation, one could then seek other principles.

What are the effects of "marginal" living? Desert life is dangerous and
desert dwellers lived close to the edge of poverty much of the time. A
season's failure in an important crop like mesquite could have serious
consequences and repeated failure could be fatal. Yet with the environ-
mental change that apparently has occurred on the desert during the last
5000 years, serious stress conditions must have occurred regularly. The
effects of the marginal existence resulting from this insecurity are
predictable. In general, we can expect small, mobile groups, an emphasis
in economics, territoriality and kinship organization on mechanisms
permitting efficient adjustments of population to resources and value
systems stressing individual initiative. In less general terms, however,
different kinds of stress should produce different kinds of socioeconomic
adaptation. Moreover, the specific form of adaptation selected by a
particular group may not be solely a function of the form of the operative
stress; it may also reflect historical preselective factors within the
population itself. Dealing with the differential effects of marginal life
will be complex. Temporal and spatial variability in environmental con-
ditions must be defined, as must the various social responses to variability
experienced by different groups. Methods of defining relationships between
groups must be developed in order to determine under what conditions inter-
group cooperation may increase or decrease. Precise ways of determining how
people were distributed over the landscape must be devised, so that changes
in the distribution of personnel in the face of environmental stress can
be identified.
These are very elemental sorts of questions about the nature of human social systems and about human behavior. They are questions that I believe could be dealt with on the California Desert. They are questions to which the prehistoric resources of Joshua Tree National Monument, being in all probability among the best preserved such resources on the desert, are very pertinent. One cannot even begin to think practically about how the resources of the Monument might be so used, however, until certain kinds of basic data are available.
Pragmatically, it is not possible, on the basis of what has been done at the Monument, to say what sorts of research might be undertaken. Substantial data are available on only four small districts, comprising about 2.5% of the total Monument area, and even for those districts the available data are incomplete and ambiguous. Although the formulation of general questions is important before fieldwork begins, the generation of much more precise research problems would be premature in the absence of more comprehensive basic data. In short, as both Wallace and Wildesen have pointed out, a systematic and comprehensive archeological survey is needed before the research value of the Monument can be effectively assessed. Several models exist for archeological surveys in the California Desert and these apply in varying ways to the archeological needs of the Monument.

The Reese River/Owens Valley Model: Thomas (1969, 1973) and Bettinger (1974) have utilized comparable methods in defining settlement patterns in the Reese River Valley of central Nevada and in Owens Valley, California. In each case, broad environmental zones were used as sampling strata and survey tracts were selected at random for intensive inspection within each stratum. This method provides a well-dispersed sample, reflective of modern environmental conditions, but it does not control for environmental change, which might be crucial in the Monument.

The BLM Model: Margaret L. Weide (1973) has prepared a proposed archeological survey element for the Bureau of Land Management's California Desert Study. Weide's approach basically is similar to those of Bettinger and Thomas, but it is applied to a number of large survey areas scattered over the 11,000,000 acres managed by the BLM in the desert and is closely tied to the bureau's program of environmental inventory through remote sensing.

The Coachella Valley Model: P. J. Wilke's work in the Coachella Valley is proceeding under much different circumstances. Wilke is faced with extensive agricultural and urban disruption of the natural landscape and archeological resources. His survey covers 100% of the area applicable to his research questions, insofar as this is possible. His sample is designed to provide the fullest possible record of the Lake Cahuilla shoreline, its recessional beaches and the archeological sites associated with them, as well as of sites that might represent non-lakeshore adaptations to both the presence and absence of the lake, but it is "stratified" largely by the conditions imposed by modern land-use.
C: RECOMMENDATIONS

Over the long run, a 100% intensive archeological reconnaissance of the entire Monument should be conducted. Such a survey repeatedly has been recommended (Wildesen 1969, Wallace 1969), but without specific plans. It also is mandated by law in order for the Monument to identify all sites which might qualify for the National Register of Historic Places (Executive Order 11593). Such a survey will be very expensive, however. It is difficult to imagine what the basis might have been for Wildesen's (1969) estimate of $37,000 for a survey of the Monument. The figure bears no relationship to the costs experienced by archeologists conducting systematic surveys for management purposes anywhere in the nation.

In order to keep costs within reason and to address crucial management problems while beginning to obtain a useful sample of the Monument's prehistoric resources, I suggest a strategy that constitutes a sort of hybrid between the Reese River/Owens Valley/BLM approach and that utilized by Wilke. The Monument is crisscrossed by roads and trails. These roads are used, with and without authorization, by off-road vehicle drivers, hikers and equestrians and provide egress to certain areas for unauthorized campers. Some of these recreational users are pothunters and their depredations must account for a substantial percentage of the damage now being done to archeological resources within the Monument boundaries. Thus, the lands immediately adjacent to roads and trails must constitute, for management and resource protection purposes, the most important areas to survey. At the same time, since roads and trails are so widespread, these areas must constitute a fairly representative sample of the Monument's environmental zones. Finally, since they are relatively easy to get to, archeological survey there should be less expensive than the survey of sample tracts derived without reference to modern cultural features.

A rational approach to the archeological survey of the Monument, then, would be to begin with an intensive study of all land surfaces lying along roads and trails, both used and abandoned. This survey should be tied into the BLM's Desert Study remote sensing program. Aerial photos of the Monument should be obtained and used (a) to identify roads, including those long abandoned, and (b) to identify topographic features and environmental zones to be sampled. Any geographic areas or landscape types that consistently are not sampled by following roads and trails should be sampled specially. Special attention should be given to the high, rocky areas, which essentially have been ignored by archeologists since Campbell's day and which probably are regularly entered by intrepid visitors.

If properly planned, a survey of about 20% of the Monument's land surface should be obtainable along roads and trails, with a fair representation of all landscape types. Such a sample should be adequate to permit predictions about the overall distribution of prehistoric resources in the Monument and to develop some supportable projections of the relative significance of different kinds of sites (cf. King and Hickman 1973). Such a sample survey should not be terribly costly, though I have no way of estimating actual costs without a detailed study of the road and trail network.
Planning is terrifically important in making such a sample survey useful. Several lessons can be drawn from the past history of archeological survey in the Monument and applied to the proposed study:

(1) Survey directors and teams should be carefully recruited and organized to minimize bias in observations. An attempt should be made to recruit workers who are both acknowledgeable and interested in all the kinds of phenomena likely to occur, including rock art. All survey parties should be instructed carefully in observation and recording methods. Explicit criteria should be developed for establishing site and locus boundaries.

(2) Frequent consultation with a geologist or geographer experienced in the evolution of desert landforms should be available to every survey team. In the planning of the project, a concerted effort should be made to predict the possible distributions of extinct plant communities, given different climatic circumstances, and the sample should be designed to give representative coverage of possible extinct environmental zones. During the project, a definite effort should be made to record relict plant communities and to sample rat middens and other sources of paleoclimatic data to provide a basis for paleoenvironmental reconstruction, to serve as a basis for future sampling. An organized attempt should also be made to predict, identify and sample areas where sites might have become buried.

(3) The difficulties of accurately locating oneself or a discovered site in the Monument's topography should be explicitly recognized and planned for. All survey parties should be equipped with detailed aerial photographs and with adequate surveying instruments and should be instructed in their use. In some terrain, such as the Wonderland of Rocks, aerial monitoring will probably be necessary to insure coverage and accurate locations.

Previous researchers in the Monument should be involved to the fullest extent possible in any study undertaken. The general acquaintance with the area and the specific expertise of people like Wallace, Kritzman, Desautels, O'Neil, Jefferson and McCarthy should be utilized. The methods developed by McCarthy for recording rock art should be used for this category of phenomena.

Once the initial road and trail survey is done, resulting in a sample sufficiently representative to permit predictions about the overall distribution and nature of the Monument's archeological resources, subsequent surveys can be aimed at testing the predictions. Such surveys probably can be done at a more leisurely pace, as the initial survey will have covered the prime management problem areas.

The Monument has problems other than the need for a physical survey of its land, however. First among these is the care and exploitation of the Campbell collections. The Monument administration is doing all that is possible within its limited budget to protect and properly manage this collection, which itself should qualify for the National Register of Historic Places (as an 'object'), but it is still neither safe nor useable. The collection is subject to theft and fire and it is stored in such cramped quarters that it simply cannot be used. The National Park Service either should provide proper quarters for this collection or give it up to
an institution that will. A collection of notes, maps and artifacts that cannot be spread out, compared, moved around and studied is not a functional collection and one that is destroyed or carried away piecemeal is good for nothing. The Campbell collection needs a good storage location, a full-time curator and space in which it can be examined. These should be provided concurrently with the recommended survey, so that the collection can be used to provide additional data needed by the survey. Campbell's sites often are located with reference to cultural landmarks that have disappeared, so experienced land surveyors should be employed in interpreting the notes and locating sites on the ground. Attempts also should be made now to locate survivors of Campbell's field crews, to interview them and to obtain their advice and information.

Other ethnographic, ethnohistorical and archeological data pertinent to the Monument should be acquired and studied, though this is less urgent than is the survey itself and the study of the Campbell collection. Research among the J.P. Harrington notes at the Smithsonian Institution might well turn up information on the Monument and efforts should be continued to locate anything the Schencks may have written about the area. Living people in the area might have information on Indian uses of the Monument. Attempts at obtaining a representative oral history have been initiated by Don Black and Cheryl Erickson at the Twentynine Palms Library and should be continued.

Excavation, which is always destructive, should be kept to a minimum, but it appears that some salvage work urgently is needed. Kritzman identified sites at Indian Cove that he thought were endangered and these have not been excavated. O'Neil identified sites at Barker Dam that were eroding away, but they have not been excavated. Wildesen recommended that excavations be undertaken at Stirrup Tank, as it is "particularly vulnerable to pothunters," as soon as possible, but nothing has been done. The remarkable pattern of soliciting recommendations for salvage excavation and then ignoring them should be ended. Salvage, of course, should not be carried out unless it is really necessary; but where it is necessary, it should be done immediately and done well.
In this overview I have attempted briefly to characterize the natural environment of Joshua Tree National Monument, to examine the kinds of research that have been done on prehistoric archeology at the Monument and in its vicinity, to discuss what the possible value of the Monument's prehistory might be to social science in general and to suggest what must be done if a sufficient basis is to be developed for planning useful research in the area. What has been done about prehistoric research or preservation at the Monument is, in a word, minimal, but it is very likely that something similar could be said for almost every other federal land unit in the state (cf. Moratto and Riley 1974). The solution to the problem lies in thoughtful planning and adequate budgeting in the context of other national programs and priorities. An overview is not a general plan for archeological research. Still less is it a general plan for the management of archeological resources, but the development and implementation of such a plan clearly is the next stop needed to properly care for the prehistoric resources of Joshua Tree National Monument.
APPENDIX I
SUMMARIES OF PAST RESEARCH

Principal Investigator: Elizabeth W. Crozer Campbell.
Sponsor Institution: Southwest Museum.
Project Title: None given.

Location: The work reported by Campbell was done within about 25 miles of Twentynine Palms, in both the Twentynine Palms Valley and in the Monument. Precise locations of survey districts and sites are not reported and are described only vaguely in the notes thus far studied by Mr. and Mrs. J. Kelly at the Monument. It probably will be possible to retrieve much of this information once all the Campbell notes and maps have been studied systematically. Thirtyone districts were inspected by Campbell and her colleagues, 20 of which appear to lie within or very near the Monument boundaries (Table 4; Base Map A).

Purpose: Campbell, her husband and their Southwest Museum colleagues appear to have been motivated primarily by the need to preserve what could be preserved from the vandals then beginning to pillage the area (Campbell 1931:24). Beyond this concern, an interest in simply understanding the "Indian story" of the area frequently is expressed.

Techniques: Hard data on techniques are lacking and in the absence of locations or boundaries for the districts (topographic maps being unavailable at the time of the work) one could not say that any area had been "fully surveyed" by Campbell, even if she had provided information on methods. The following quotes may be useful, however:

"As all of the country studied is desert in character, the finding of traces archeological has been simplified to locating all water holes, tanks and springs, and then searching in one or two-mile circles about them . . .
"Thus we have divided the country surrounding the water holes, etc. into 'districts' and for use in description we have named them all." (p. 21).

"At intervals all through our desert the brush covered hills and valleys break out into giant boulders of yellowish granite forming whole mountains of jumbo masses . . . A group of these giants across the desert is sufficient lure to draw us many miles and to keep us searching for hours or even days." (p. 30).
"We have located... (camp sites)... in mesquite groves... around dry lake-bed shores... in the mouths of canyons... in valleys and on plateaus, some near water holes, some amazingly distant. ...These camps we have been forced to hurry by with only a glance for anything we might find on the surface. ..." (p. 39).

"Selecting our pile of rocks, we all climb out. Off come our coats and each one arms himself with trowel, hoe and respirator, and a few sugar sacks 'to put things in.' We all tell each other which pile we will search and then off we go.

"Usually for an hour or so there is quiet, the only sound being a hoe ringing against the rocks, or the scraping of metal in digging out some niche or cave. Then comes a piercing whistle... and we all whistle in reply and come in haste to see what has been found." (p. 41).

Thus it appears that "districts" were keyed on watersources, that rock outcrops were concentrated on, that caves and shelters were attended to at the expense of open sites and that outcrops showing promise of containing caves were scoured rather carefully. Areas to be surveyed were located from maps, from the accounts of older residents or by accident (p. 21). Apparently the higher, more rugged portions of the area were concentrated on, as the following quote and many passing references indicate:

"Frequently the choice (of cache sites) was on or near a ridge where there would not be sufficient watershed for storm waters to accumulate. Few used caves have been found where the entrance was visible from the valley below or the plain beyond; but rather those caves of whose existence one cannot be aware until one is right on them. Here in dry dusty seclusion, resting on their 'nests' and accompanied by the 'spirit sticks,' we find our most valued treasures" (p. 39).

Summary of Results: Campbell reports finding over 300 sites. She discusses two major classes: shelters used for storage and sometimes occupation and open "camp sites" used for occupation. Her emphasis is on shelters, however, as it was there that the cached objects she felt were in greatest jeopardy occurred. Her report essentially is descriptive (though non-quantative), but she presents data pertaining to several questions that have continued to be of local archeological concern:

Use by ethnographic groups: "Francisco Patencio tells us the Oasis at Twentynine Palms was mostly Serrano" (p. 88).

"There certainly appears to be Cahuilla influence in this district, at least in the southern part... First of all, the pottery found in the southern part of the territory is typically that described by Kroeber... as Cahuilla in style... Dr. Kroeber also shows a figure of a Cahuilla seed beater which, were it a drawing of ours, could not resemble them more... We have found two of the large storage
baskets described by Dr. Kroeber as Cahuilla type...Our arrow straighteners show more resemblance to the picture of a Cahuilla straightener in Dr. Kroeber's book than any other kind..." (p. 89).

Cultural sequence: "As for the pottery, it is difficult to determine which type might be the older. One thing we have very definitely noticed, however, is that there must have been an earthquake of such severity that whole caves crashed in, while in others tons of granite fell from the ceilings. In no case have we found plain, undecorated ware beneath rock masses dislodged in this upheaval. Always it is painted sherds that appear beneath the great masses of rock. In fact, the only whole decorated ollas and bowls have come from such 'solid' caves that there was no chance of any loose matter coming down..." (p. 90).

Settlement and subsistence: "As for the population, it must have been governed by the water supply...there was certainly a sufficient crop of mesquite beans to feed an army of Indians irrespective of any other vegetation to say nothing of game, so probably the extent of the lack of water determined very largely the amount of population the country could support" (p. 89).

Evaluation: A full evaluation of Campbell's work will have to await a systematic study of all her notes, maps and collections housed at the Monument and at the Southwest Museum. Nothing can be located on the ground on the basis of the published record. Although it is almost certain, judging from a brief perusal of the currently available notes and maps, that things really are not so bad as the published record indicates, Campbell's work will, in the end, qualify as a series of reconnaissances, at best. Campbell's contribution was great, however, not only because she salvaged information that would otherwise have been lost, but also because she made observations and asked questions that still have pertinence. Her comment that the plants of the desert could support "an army of Indians" (p. 89) is worth considering as an alternate to the assumption frequently encountered in the more recent literature that the area could support only "a sparse and scattered population" (Wallace 1964:92). Similarly, her observation that painted wares were found regularly under rockfalls and unpainted ones never so, leading to the conclusion that a serious earthquake was somehow involved in the culture history of the area, is worthy of more sustained treatment than it has received (see Section IIIB). Finally, it is interesting to note that the Campbells apparently had a propensity for scrambling around in exactly the places that have not been investigated by any subsequent archeologist except McCarthy: the high, rocky ridges and massive outcrops. Thus, Campbell provides virtually the only data available on one major segment of the prehistoric record of Joshua Tree National Monument.

Collections: The bulk of the Twentynine Palms area collection is housed at the Monument, to which it was donated by Mrs. Campbell. It is being curated and cared for by Mr. and Mrs. J. Kelly and by Monument personnel. The Kellys have re-catalogued all the material; the new catalogue number appearing in the upper right-hand corner of each note page and notes have been added about the distribution of each catalogue entry between the Monument and the Southwest Museum. Significant portions of the collection, particularly material from the various dry lakes, still are at the Southwest Museum.

Notes: Twenty volumes of basic notes and catalogues are on file at the Monument, along with a large number of maps, plans and miscellaneous papers, most of the latter unsorted due to lack of work space. Some notes may still be at the Southwest Museum.
Principal Investigator: Elizabeth W. Crozer Campbell.

Sponsor Institution: Southwest Museum/California Institute of Technology.

Dates of Fieldwork: Between 1931 and 1935; exact dates unstated.

Location: West end of Pinto Basin, along Pinto Wash. About six linear miles of the wash are shown with archeological loci ("concentrated camp areas") marked on Campbell & Campbell's Plate 3. Survey appears to have been concentrated along the edges of the broad old streambed along which the wash flows.

Purpose: Prospectors reported presence of fossil bones and artifacts in spatial association. The possibility that this association represented an "Early Man" site stimulated the Campbells and their colleagues to undertake the fieldwork.

Techniques: A geological and paleontological inspection of the area was conducted by staff members of the California Institute of Technology. The Campbells prepared a careful sketch map of the wash and its archeological concentrations, using a transit to determine elevations and a tape for distances. Artifacts and bones were collected from the surface of the sites, utilizing unspecified search techniques. Some minor subsurface testing apparently was done in some cases. Artifact locations were noted with enough precision to permit quasi-quantification of relative distributions (cf. Campbell & Campbell p. 29).

Summary of Results: Scharf, in his geological section of the paper (Scharf in Campbell & Campbell, pp. 11-20), proposes the existence of a large shallow lake in the vicinity during the Pleistocene. A period of mountain building ended the existence of this lake, but a broad sloughy river was established within the outer banks of Pinto Wash, making these banks into places suitable for human habitation. A decrease in precipitation then desiccated the "Pinto River" and caused the area's depopulation. Scharf estimates the habitation phase to have occurred either before or after the end of the Wisconsin glaciation, depending on the interpretation given his word "below" as a designator of the occupation's age relative to the Wisconsin (p. 20, next-to-last line). He places the end of the Wisconsin between 15,000 and 20,000 years B.P.

The Campbells cautiously note that there is no demonstrable association between tools and fossil bones along Pinto Wash (p. 24), but quote Southwest Museum authorities to the effect that that some of the bones have been modified by man. They map an extensive series of flake/bone/artifact concentration, sometimes with rock clusters that appear to be hearths and are characterized by an apparently non-random (but quantified) distribution of tool types (cf. p. 28-29). They suggest that the archeological manifestation is of considerable age, basing their assertion on (a) the lack of late material, such as pottery; (b) extreme weathering, decomposition and/or sandblasting of most specimens; (c) the disappearance of all charcoal; (d) the (then) unusual character of the assemblage; (e) Scharf's geological reconstruction, and (f) the extreme unhabitability of the area today.
C.A. Amsden describes the assemblage, which includes metates, manos, pestles, hammerstones, choppers, keeled scrapers, retouched flakes, knives and projectile points, including the now-famous Pinto Points. The bases for taxonomic classification are not specified. Dimensions and materials are recorded and comparisons are offered with selected assemblages in the New and Old Worlds. He concludes: (a) that the ground stone tools are made of local stone, but that the flaked stone material was imported; (b) that the site has relationships with groups to the north, but that it represents a very rare archeological manifestation, and that (c) the assemblage is related in some unspecified way to Aurignacian and Solutrean industries in Europe and/or Asia. As a result he concluded that the Pinto manifestation can be roughly assigned an age of 10,000 years, which he says fits with the geological evidence.

Evaluation: It may be possible to evaluate the effectiveness of the Campbells' field strategy when and if the full notes and maps are reassembled and studied, particularly with the comparative data provided by Jefferson (1973: see below). No such evaluation can be made on the basis of the published record. I am not in a position to evaluate the geological worth of Scharf's study, but from a layman's point of view it does not seem to differ, in general, from that given by Jefferson (1973). Scharf appears to assume, however, that the desiccation of the region had to be concomitant of the end of the Wisconsin glaciation, which would make the "Pinto River" a stream of terminal Pleistocene date. Jefferson makes no such assertion and there is evidence for a good deal of climatic fluctuation on the California Desert during the last few thousand years. The Campbells are careful in their conclusions, essentially saying that the site seems to be old. Amsden leaps oceans and continents to "date" the assemblage on the basis of alleged morphological similarities to Old World collections. This approach to analysis was more justifiable in 1939 than it was when applied to the Calico Site in the 1960s (cf. Leakey et al 1972) only because of the paucity of archeological method and pertinent comparative data available at that time. It is not a rational means of relative age determination.

The Southwest Museum was at that time embarking on a quest for Early Man in the Southwestern deserts, a quest that sometimes was characterized by a good deal of wish-fulfillment. In the absence of better evidence than exists for the antiquity of the Pinto Basin assemblage and in the face of mounting evidence that the assemblage falls into the ca. 2,000-4,000 year range, the conclusions of the Pinto Basin Site report appear to be of the same character. It is interesting to note that the Campbells, who were "amateurs," were a good deal more responsible and cautious in their conclusions than was the museum professional provided to guide them.


Collections: The bulk of the Pinto Basin Collection, some 907 items, is at the Southwest Museum (Catalogue card series 498G: Kelly personal communication 1974), though a type-collection is housed at the Monument.

Notes: Catalogues of the collection are on file at the Monument, along with some notes. Some notes presumably are at the Southwest Museum, while some may have been discarded (Erickson, personal communication 1974).
Principal Investigators: Francis and Patricia Johnston.

Sponsor Institution: None.

Project Title: None.

Dates of Fieldwork: 1950s and 1960s.

Location: The general Monument vicinity, mostly the western and southern parts.

Purpose: The Johnstons were and are dedicated to recording archeological resources for posterity, especially those in danger of destruction. They have special interests in rock art and in trails.

Techniques and Intensity: Most often the Johnstons documented sites reported to them by others and walked out aboriginal trails, recording both the trails themselves and other types of sites along them. Standard (UCLA) archeological site survey forms were filled out, notes and photos were taken and rock art was sketched. Systematic ground coverage was not attempted.

Summary of Results: The Johnstons reconstruct and describe a major system of trails running from the Colorado River north of Blythe, westerly to the Coachella Valley and San Gorgonio Pass. Rock cairns, sherd scatters, rock rings, campsites and other features are associated. Often the trail corridor is marked by several parallel trails. The trail system approaches the Monument from the southeast, below the Eagle Mountains, and comes in at Cottonwood Spring. It runs westerly to Pinkham Well and out into the Coachella near Indio. A branch trail is reported running northerly from the Thousand Palms area to Stubby Spring and on to Twentynine Palms. Harner, in an appendix to the Johnston's 1957 report, attempts to date the trail on the basis of pottery analysis, but with ambiguous results. In an unpublished manuscript on the rock art of the Cahuilla area, Johnston and Johnston attempt to define style boundaries and to relate them to ethnic boundaries using Steward's (1929) taxonomy of styles as modified by Fenenga (1949). The Johnstons see a shift along both the western and eastern boundaries of Cahuilla territory (the latter in and around the Monument) from pure "Area I" style elements (Fenenga's terminology) to mixed sites, containing "Area I" and "Area III" elements. They present data on possible rock art functions, in rites of passage and other ceremonies, and as way-markers. They provide an interesting quote from Patencio (1943), referring to both the function and the age of local rock art:

"They were for the benefit of the Indians of early times. In those days there were no trails . . . no ways marked at all. But after, things were different. There were good Indian trails over the mountains and valleys everywhere. Then it was that the meaning of the sign marks was forgotten. People no longer depended upon them for the way and water."

85
Johnston and Johnston suggest several kinds of needed further work pertinent to Joshua the Monument. They stress the need for further survey around Hayfield Dry Lake just south of the Monument for comparison with the rock art of other, better known regions. They suggest further work on the "blending" of element types along the borders of Cahuilla territory. They recommend further work on the eastern and northern Cahuilla boundaries to define just where these boundaries are and how they relate to rock art element distributions. These boundaries lie partly within the Monument. Finally, they point out the need for a better understanding of the relationships between rock art and other kinds of archeological phenomena.

Evaluations: The Johnstons have provided a valuable service by documenting the fragile trail complexes, most of which have since vanished. They also have been on the spot to record rock art sites and other phenomena that would otherwise have gone unrecorded. Their work does not provide a systematic and complete record of the archeology of any part of the Monument, but it was not meant to. Both of their reports are preliminary and point the way to useful kinds of future research.


Collections: Johnston and Johnston (personal communication 1975) indicate that most of their material was sent to the University of California, Berkeley (Archaeological Research Facility); one bowl from the Thousand Palms Trail went on loan to the Palm Springs Desert Museum and some material is at Malki Museum.

Notes: Notes and extensive files of slides are in the possession of the investigators. Site record sheets and other data have been filed with the University of California (Berkeley, Los Angeles and Riverside), the San Bernardino County Museum, the Bureau of Land Management and the Monument. McCarthy currently is reorganizing much of this data.
Principal Investigators: William J. Wallace and Edith Taylor.

Sponsor Institution: University of Southern California (NPS contract).

Project Title: Deep Tank-Squaw Tank Archeological Survey.

Dates of Fieldwork: Periodically between 11/9/57 and 2/6/59.

Location: "An area roughly 2 miles wide and 5 miles long, commencing at a point 3.3 miles south of the Squaw Tank turnoff (from the paved highway) and extending to a rocky point beyond Squaw Tank" (Wallace & Taylor 1959:5). See Base Map B. The survey covers approximately 10 square miles (6,400 acres).

Purpose of Survey: The purpose is not explicitly stated in the report, but one gets the impression that (a) a management problem (severe ongoing vandalism) was being addressed and that (b) the NPS and the investigators shared a general desire to document the locations and nature of archeological resources.

Techniques and Intensity of Survey: This appears to have been an intensive survey. At least 27 person-days were spent on 10 square miles, for an average of .37 square miles, or 237 acres, per person-day. Although crew size varied, a two-person team appears to have been the norm. All major rock outcrops and most minor ones were inspected in detail. Open areas between such outcrops were "also inspected, but less intensively." Some unspecified areas were obscured by erosion and/or deposition. Test units 5' X 5' were dug at five sites (JT-10, 11, 12, 15 and 17). The units were dug by trowel in 6" levels and all soil was passed through ⅛" mesh screen. Several sites were raked to reveal the surface and rat nests were searched. Surface collections were made, but methods of surface collection are not specified.

Summary of Results: Twenty-three prehistoric sites were recorded. All were found among or adjacent to boulder outcrops and most had rock-shelters. The density and mean size of the sites were greatest close to Deep Tank and Squaw Tank. Most sites were small and apparently superficial. Larger, deeper sites generally were found to have been vandalized to some extent. The authors allude to the small amount and limited variety of cultural material recorded, without, however, specifying a comparative context for this observation. They suggest that the sites represent seasonal habitation by Serrano, and possibly by Cahuilla, groups. The time span represented by the sites is estimated at from 200-300 B.P. to historic times.

Evaluation: The strategy and techniques employed should have been adequate to identify any prehistoric sites lying on the valley floor, especially around rock outcrops. It would not have resulted in the recording of sites in the uninspected massive rock areas or of some kinds of valley floor sites that might lie away from rock outcrops. Partially obscured by deposition, they might well have escaped detection.
Non-Indian historic sites were not recorded, if they exist. The fact that no rock art sites were recorded is peculiar not only in view of their frequency elsewhere in the Monument, but also because both the Johnston and McCarthy have documented their presence at Squaw Tank (Johnston and Johnston personal communication 1975; McCarthy 1975). An unintentional selection for the perception of middens and other occupation indicators at the expense of rock art might be indicated here. This selection, if it was operative, might extend to the non-observation of cache sites and of other non-occupation loci as well. This possible bias problem is discussed in detail in the text of this overview. I do not feel that the survey should be regarded as reliable without further checking for selective perception.

The report lacks clear data on exactly how a "site" was defined, i.e., on the observational criteria for "siteness." There is a lack of precision in the definition of site boundaries. Information is lacking on how each site was searched for artifacts and features and on how surface collections were made.

There is nothing to quarrel with in Wallace's and Taylor's conclusions as such, especially considering that they were working with little in the way of a comparative framework. I do feel, however, that the potential of Deep Tank-Squaw Tank's prehistoric resources is inadequately impressed upon the reader when the sites simply are subsumed under the rubric "Serrano" and "late prehistoric." The dearth of apparent earlier components is worthy of considerable discussion and projection of hypotheses. The designation of the sites as Serrano is simply an extrapolation from the ethnographic record, with neither an archeological manifestation nor a projection of how it might be manifested.

Wallace's and Taylor's work was a pioneer effort, setting basic standards for future survey methods. It provided baseline data on the distribution of important material cultural elements and still stands as the major example of systematically gathered data on late prehistoric sites in the Monument east of Sheep Pass.

As noted above, the Deep Tank-Squaw Tank survey area needs rechecking to correct for possible inadvertent bias. The less accessible topography in the vicinity has been inadequately surveyed. As with all the surveyed districts, restudy will be necessary to assure comparability of observations, since neither the Wallace-Taylor team nor anyone else has defined what is meant by a "site," a "midden" or the various artifact classes.

Although Wallace and Taylor note the presence of historic artifacts on some sites, historic archeology is dealt with only in a peripheral way. The district apparently was used during the mining period, but a systematic, planned historic archeological survey would be necessary to define the nature of this or other historic use.


Collections: Unknown.

Notes: Unknown.
Principal Investigator: William J. Wallace (Roger Desautels & George Kritzman, field directors).

Sponsor Institution: University of Southern California (NPS contract).

Project Title: Squaw Tank (JT-1) Site Excavation (Contract 14 10 434 111).

Dates of Fieldwork: 11/7 - 11/9/58.

Location: "... at the base of a huge, rounded quartz monzonite boulder about one hundred feet north of the tank" ... "a small man-made reservoir at the western tip of the Hexie Mountains in the central part of Joshua Tree National Monument" (Wallace and Desautels 1959:3). See Base Map B.

Site Description: This is a large habitation site with two rockshelters. The occupation deposit is loose, coarse dark sand with rockfall, charcoal and artifacts. It is about 60' wide N-S, 100' long E-W. The deposit has been badly disturbed by vandals.

Purpose and Strategy of Excavation: Although "the work was done as part of a project of archeological research ... by the Department of Anthropology, University of Southern California," "the excavation was made because the site ... was being constantly vandalized" (Wallace & Desautels 1959:1). No other statement of purpose or strategy is given. The excavation probably was done with general reconstruction of cultural-history and environmental exploitation in mind and with the idea of (a) getting a sample before the site was destroyed by vandalism, while (b) making it less attractive to vandals by removing material of interest to collectors.

Sampling Procedures: Approximately 15.5% of the observed occupation deposit was excavated. Excavation was concentrated in one of the shelters, with a trench running out to the south, presumably to get a stratigraphic cross section of the midden. Three other 5' X 5' units were excavated discontinuously from the main shelter area excavation and trench. Sample location selection presumably was intuitive within the constraints imposed by the grid system and the desire to clear vandalized areas.

Excavation Procedures and Techniques: A datum point and a 5' grid system were employed for horizontal control. Units were excavated in 6" levels by trowel, with all soil passed through ¼" screen. All artifacts and ecofacts thus observed were recovered. This was relatively standard field methodology in California during the 1950s, though rather more exacting than that employed by some excavators. The general excavation format typically was employed regardless of specific problem or purpose.

Summary of Results: Two rock-cluster hearths, 1,209 aboriginal artifacts (1,128 of which are sherds), 57 non-aboriginal artifacts, 572 mammal bones (99 identifiable), 159 bird bones, 56 reptile bones and a few,
probably intrusive, seeds were recovered. The midden, for the most part, lacked visible stratigraphy and averaged 36" deep, lying on a quartz monozite slab. In one unspecified unit, however, "on the outer fringe of the midden," a sterile stratus was encountered at 18". At 30" dark soil appeared again and continued through 42", where excavation apparently was discontinued. Only one blade fragment was found beneath the sterile zone. The contents of the unit above the sterile zone are not specified.

Artifacts are described in terms of observed and material attributes. The reasons for choosing particular attributes for description are not stated. Only in the case of pottery is there any attempt to relate to established classes (from Colton 1939 and Schroeder 1952). Functional type names (knife, awl, etc.) are employed with no indication of the criteria used in definition. Mammal bones are identified to species level. Vertical distribution of artifacts is presented, but the horizontal is not. Distribution of bones is not presented. Seeds were found only in the top 6" and are thought to be intrusive.

The information recorded is used in comparison with the Deep Tank-Squaw Tank survey data to suggest that surface sampling tends to be biased by (a) the greater visibility of buff than of brown sherds and (b) selective artifact pickup by collectors and campers. The information also leads the authors to conclude (a) that the site was occupied seasonally by small bands, whose members gathered seeds and hunted; (b) that this use probably occurred primarily between about 1500 and 1900 A.D., with the terminal occupation marked by glass, cartridges and other manufactured material possibly used by post-contact Indians, and (c) that the site most likely was used by the Serrano.

Evaluation: Excavation techniques were highly controlled and exacting for the period. The excavation strategy employed was typical of the time prior to the widespread realization of the utility of dispersed and/or statistical sampling. The strategy also reflects the investigators' primary interest in culture-historical sequence building. The excavation did not provide a sample that might be expected to reveal activity area differentiation or horizontal stratification, but it did provide one cross-section of the midden area. Unfortunately, it was not really effective for culture-historical purposes either, as vertical stratification was revealed too late in the excavation to be pursued, given the time already committed to the trench. Although quite a substantial sample of the midden area was obtained, therefore, it does not appear that the sample was sufficient to provide an understanding of either the site's culture-history or of the activities it represents. In addition, of course, it can hardly be guaranteed that the midden area sampled represented the whole occupation or use area that could have been productively explored; only off-midden sampling would address this possibility.

The authors' conclusions are not especially arguable, but they do not really proceed from the data. I see nothing in the data to support the assumption that the site was occupied seasonally or by small groups or by Serranos or Cahuillas. The data indicate that the site was occupied during the specified period, after 1000 A.D., but the presence of the deep stratum generated the possibility, at least, that it also was occupied earlier. The data fully supported the authors' contention that primary reliance on seed-gathering and hunting is indicated.
The primary contributions of the Squaw Tank excavation, as I see it, lie in (a) illustrating that a bias factor appears to exist in local surface sherd collections, requiring sample excavation to correct, and indicating the direction of that bias, and (b) indicating that local sites have respectable depth and vertical stratigraphy, suggesting the potential for productive study of prehistoric change using traditional stratigraphic methods.


Collections: Unknown.

Notes: Unknown.
Principal Investigator: William J. Wallace.

Sponsor Institution: University of Southern California/Archaeological Research Associates (NPS contract).

Project Title: Sheep Pass Archeological Survey.


Location: Generally, the survey was conducted in the Sheep Pass area, including parts of Queen Valley and Lost Horse Valley, but the boundaries are not specified. See Base Map B.

Purpose: The overall USC/ARA project is described as having two objectives:

"...to compile, through field surveys, accurate information regarding the archeological assets of the 870-square-mile (JTNM) region...(and)...to supply additional information on the manner of living of the prehistoric peoples who once resided within the present limits of the Monument" (Wallace n.d.:1-2).

Sheep Pass itself was selected for survey because:

"With a predominantly east-west orientation, the pass appeared to be a likely route of travel for peoples coming and going from the lower desert in the vicinity of Twentynine Palms into higher elevations of the Little San Bernardino Mountains to the west" (Wallace n.d.:2).

Techniques: Usually a meticulous technician who reports his methods well, Wallace is surprisingly vague about techniques in this case. He says that the country was walked over, with attention centered on the larger rock piles; that sites were searched carefully when found; that large artifacts were left in situ (small ones, presumably, were collected), and that limited test digging was done in one rock shelter to determine depth of deposit. Rat middens also were searched for cultural material. No information is provided on the acreage covered, the boundaries of the area or the size of the crew, so that no estimate can be given of survey intensity. We can assume that the methods used here were similar to those employed at Deep Tank-Squaw Tank, but we have no way of documenting this assumption. Given the several ambiguities involved, this study is best considered a reconnaissance.

Summary of Results: Sixteen archeological sites were recorded: eight were occupied rockshelters and eight were open sites. All presumably are prehistoric. "Nearby prospector's camps" are mentioned in passing (n.d. 11), but are not described or located. The prehistoric sites are thought to be warm season camps, as they are exposed to winter winds. Sherds comprised 76% of the collection, with Tizon Brown Ware predominating over Lower Colorado River Buff Ware, the latter subdivided into Topoc Buff and Topoc Red-on-Buff. Bedrock mortars and metates, pestles and manos also
were recovered, along with a small number of flaked stone points and tools and a very small quantity of bone and shell artifacts. Two spirit stick clusters and two small petroglyph sites were recorded. Two small stone structures were found, one probably built by a miner and the other probably by an aboriginal. The sites are attributed to small, mobile, hunter-gatherer bands using the area after 1000 A.D., but probably not extending substantially into the contact period.

**Evaluation:** Compared with other reports by Wallace and his colleagues, this one is disappointingly incomplete in its presentation of data. The effectiveness of the strategy or, for that matter, the nature of the strategy itself cannot be determined from the written record. The study's reliability, therefore, cannot be appraised objectively. The conclusions reached are vague and are not fully connected with the data. McCarthy has commented that the relative dearth of rock art recorded around Sheep Pass is surprising and that Wallace's observations should be checked (personal communication 1974).

The Sheep Pass survey provides a useful piece of comparative data, but it must be used with caution until an intensive, controlled field survey is conducted to validate or modify Wallace's presentation.


Collections: Unknown.

Notes: Unknown.
Principal Investigator: George Kritzman.

Sponsor Institution: None stated. This apparently was a personal contract with Kritzman (NPS Contract No. 940-137).

Project Title: Archeological Reconnaissance, Indian Cove Area.

Dates of Fieldwork: The primary construction impact area was surveyed 10/1-2/65. The remainder of the area was surveyed 2/27, 3/6, 4/17, 11/26-27 and 12/11/66.

Location: It covered Indian Cove, south of San Bernardino Base Line, to the foot of rocky slopes, an area of about four square miles (2,560 acres). See Base Map B.

Purpose: To satisfy management requirements; a new campground was planned. The original survey covered the construction area. The expanded survey covered the entire cove at no cost to the government, as Kritzman feared possible indirect impacts. No archeological rationale is stated.

Survey Techniques and Intensity: The area proposed for actual construction and immediate public use was surveyed intensively. A less intensive reconnaissance was conducted on the surrounding flatlands. The rocky hills were not substantially inspected. Survey techniques are described as follows:

"The flat terrain was examined by forming a skirmish line with individuals separated by a distance of 25 to 50 feet. If an area exhibited even the slightest indication of having been occupied, it was closely scrutinized by several searchers, criss-crossing the area several times. If enough evidence was accumulated to merit calling the location a 'site,' it was photographed and properly recorded" (p. 15).

In rock outcrops:

"Every crevice must be entered and examined, and a simple boulder concentration contains hundreds of openings, which from a distance appear as likely living quarters" (p. 15).

The main difference between the intensity of coverage in the primary impact area and in the surrounding vicinity presumably lay in the enthusiasm with which the rocks were inspected. What constituted "enough evidence... to merit calling the location a 'site'" is not specified. I conclude from the general discussion that a "site" is any location where there is apparently culturally discolored soil and/or more than one artifact. Information was recorded on standard ARA forms (derived from those of U.C. Berkeley) and location, size, description, proximity to water, local plants and artifacts regularly were recorded.
Surface artifacts were collected. No data are given on collecting methods, but I get the impression of complete surface pickup. No excavation was done. The field crew varied in size from one to eight; 26 person-days were spent in the field, giving a coverage rate of .15 square mile, or about 100 acres, per person-day. E.W.C. Campbell's notes and other data and material from the area on file at the Monument also were checked.

Summary of Results: Ten prehistoric sites were found. Though historic mining activities in the vicinity are alluded to (p. 15), no historic sites were recorded, except for a small historic reservoir noted at site JTNM-IC-2. Based on artifact types, especially projectile points, the sites are assigned to Wallace's (1962:177) "Period IV - Shoshonean & Yuman," post-1000 A.D. Essential similarities to Sheep Pass and Deep Tank-Squaw Tank are noted. It is inferred that the sites were occupied sporadically by small groups engaged primarily in seed gathering. The recorded sites are concentrated in two locations: one just north of Sneakeye Spring and one about 3/4 mile northwest of the same spring. Sites recorded outside these clusters tend to be isolated bedrock milling features. Detailed descriptions are provided for all artifact classes, especially pottery. The author concludes that the area was not occupied for long, that it was utilized by nomadic seed-gatherers, that hunting did not form an important part of the economy (because of the lack of bones on the sites) and that certain sites should be tested for culture-historic purposes.

Evaluation: Kritzman's methods should have been effective for identifying most kinds of prehistoric sites on the floor of the cove, though the definition of "site," as usual, presents some ambiguities. Like Wallace and Taylor, however, Kritzman missed rock art sites that McCarthy has now recorded. McCarthy also has found at least one occupation site missed by the ARA team. The boundaries of Kritzman's overall study area are hazy, making the real extent of coverage unclear. The surrounding hills, of course, were not searched at all. We cannot assume that Indian Cove has been fully surveyed.

The author's conclusions are modest. First, although Kritzman illustrates the qualitative similarity of Indian Cove to Sheep Pass and Deep Tank-Squaw Tank, a possibly important quantitative difference--the reversal of the ratios of Tizon Brown Ware to Lower Colorado River Buff Ware--is missed. This reversal, which becomes more evident at Barker Dam, is discussed in section IIIC of this overview. Secondly, there is nothing in Kritzman's data to show clearly that the area was occupied sporadically by nomadic gatherers; these simply are unsupported extrapolations from the ethnographic record. The evidence for small group size is shaky at best. Presumably, Kritzman's reasoning rests on the small size of the individual sites, but these could seemingly be loci of a single major occupation area as easily as they could be the camps of specific groups. The evidence, as usual, does support the conclusion that hunting and gathering were basic to the economy, but the proposition that
hunting was of scant importance because few bones appear on the surface of the site seems highly questionable in the absence of excavation to prove the representativeness of the surface sample.


Collections: Unknown.
Notes: Unknown.
Principal Investigator: Dennis O'Neil.

Sponsor Institution: University of California, Riverside.

Project Title: Barker Dam Archeological Reconnaissance.


Location: Barker Dam vicinity, 9 miles SW of Twentynine Palms, at the edge of Wonderland of Rocks. See Base Map B.

Purpose: The management purpose of the reconnaissance was to record sites endangered by vandalism. No archeological rationale is given in the report.

Techniques and Intensity of Survey: The survey was restricted largely to the flat lands by time constraints. O'Neil specifically notes that sites undoubtedly do occur in the rocks, however. Techniques are not specified in the report. In personal communication, O'Neil indicated that team members were spaced 25' to 50' apart and that they covered all flat areas in detail. Thus, intensive survey was performed on the flat land, with only cursory inspection of the upper rocks. Fortyfive person-days were spent in the field, covering an estimated 2,000,000 square meters of flat land, or about 44,400 square meters (a little over 10 acres) per person-day. E.W.C. Campbell's notes and local collections also were inspected.

Summary of Results: Twenty prehistoric sites were recorded. Ten of these have middens, while others are concentrations of surface material, grinding sticks and/or rock art. The site concentration increases with proximity to the drainage blocked by Barker Dam, as does the density of single leaf pinyon pine, while the proportion of hunting tools to seed grinding tools decreases concurrently. Considerable attention is given to rock art: 11 petrographic element types and 27 subtypes are identified, as are nine unique forms. Their distributions are plotted. The recorded rock art sites generally are easily accessible from the valley floor and are not hidden. Their good preservation and the presence of some anthropomorphic pecked figures with skirts are taken to indicate a fairly recent date, though O'Neil clearly recognizes the difficulties inherent in assigning dates to rock art.

With respect to artifacts, general similarity to Indian Cove, Sheep Pass and Deep Tank-Squaw Tank is recognized; the Barker Dam area, however, seems to have been somewhat more intensively occupied than the other districts. All the artifacts recorded suggest occupation after about 1000 A.D., with the "acculturated" rock art elements possibly indicating occupation during post-contact times. Occupation by Serrano groups is projected, with possible Paiute/Chemehuevi contact indicated by a small number of Owens Valley Brown Ware sherds.

O'Neil recommends excavation of several sites, coupled with further survey, to assist in "(1) the identification of possible seasonal variations in activities, (2) a more complete reconstruction of the culture complex and its regional differences and (3) the identification of manifestations of earlier cultural horizons."
Evaluation: The strategy and techniques used by O'Neill appear to have been adequate for identification of most prehistoric sites on the flatter portions of the surveyed district. As O'Neill himself points out, the methods employed were not adequate to identify hidden sites in the upper rocks. McCarthy, in his current rock art survey, has located such sites in the Barker Dam vicinity.

O'Neill's conclusions from his data are modest and, for the most part, beyond criticism. There are some matters that require clarification, however.

(1) As did Kritzman (1967), when comparing his assemblage with those from other surveyed districts, O'Neill fails to note that the ratio of Tizon Brown Ware to Lower Colorado River Buff Ware at Deep Tank-Squaw Tank and at Sheep Pass is almost perfectly reversed at Indian Cove and at Barker Dam. This variability is discussed in Section IIIC of this overview.

(2) The most complex rock art panel recorded by O'Neill is at his site BD-8. He comments that the petroglyphs here have been "painted... by vandals" (O'Neill, site records). Actually, the situation is more complex. The overhang in which the panel occurs is known locally as "Disney Cave" and the painting was done by a film crew in the 1920s in connection with a movie featuring Hollywood Indians (McCarthy personal communication 1974). McCarthy has examined the panel in detail and feels that while some of the petroglyph elements that have been painted over undoubtedly are genuine, others are very suspect; he thinks it quite possible that the filmmakers first tried to use the genuine petroglyphs, then added petroglyph elements to heighten the effect. Finally, when the set still fell short of appropriate cinematic composition, the crew added the manifestly phony paintings. Having examined the panel with McCarthy, I am in agreement that his projected sequence is plausible. I feel that until further data become available, those elements recorded solely at BD-8 should not be taken as assuredly aboriginal.

(3) McCarthy also comments (personal communication 1974, '75) that while skirted pictographs occur on the desert with some frequency, he doubts the genuineness of the skirted petroglyphs taken by O'Neill to suggest postcontact Indian petrography. A great deal of subjectivity is involved here, but the figures appear too freshly pecked, too regular and too isolated from other elements to be genuine. Again, the question cannot be resolved without further data, but it should be recognized as a question.

These criticisms are not meant to detract from O'Neill's work, which is a major contribution to the archeology of the area. O'Neill's data are the most detailed available; he has reported on an archeological complex that appears to represent a major settlement locus, one which may be even more distinct from other districts in the Monument than he thought; he has provided the first detailed description of Joshua Tree rock art, and he has explicitly identified problem areas for future research.

The most obvious deficiency in our knowledge of the Barker Dam area lies in the lack of data on the higher, rocky areas. More broadly, as is the case in the other surveyed districts, Barker Dam cannot be
discussed in a really comparative framework because of the dearth of information on surrounding areas. The lack of excavation, despite O'Neil's recommendations and the fact that sites are being impacted by man and erosion, leaves us essentially without temporal control or a sample of either artifact assemblages or ecofacts adequate to reconstruct the prehistoric environment and its uses. Finally, there has been no systematic attention paid to historic resources in the Baker Dam area.


Collections: At Joshua Tree National Monument.

Notes: Copies of most notes are with the report, the originals at UCR.
Principal Investigator: E.J. Ladd.

Sponsor Institution: National Park Service.

Project Title: Archeological Survey, Pinto Basin Road Second Section.

Dates of Fieldwork: November 15, 1970.

Location: Pinto Basin Road Second Section. No map reference or boundaries are given.

Purpose of Survey: Presumably to satisfy management needs. One assumes the road was to be modified and that this was an attempt to identify archeological sites subject to damage.

Techniques and Intensity: The report is unspecific. Ladd, an archeologist from Hawaii, and Roman Dott, chief of maintenance for the Monument, made a "walk-through survey." Two person-days apparently were expended.

Summary of Results: "No significant archeological remains are within the proposed right-of-way" (Ladd 1970; underscore, mine). Don Black, however, reports that at least one artifact was recovered (Black, personal communication 1975).

Evaluation: As far as is known, this study meets no responsible criteria for an adequate survey. The boundaries of the area are inadequately specified, techniques are not specified, the personnel employed are not known to understand the archeology of the area and there is no indication of pre-field research to acquaint themselves with that archeology. The results of the survey are inadequately presented. We are not told what was found and what was not; we simply are told that there are no "significant" remains, with no criteria given for judging significance.


Collections: One chopper reported (Black, personal communication 1975); left in situ?
Principal Investigator: Sylvia Broadbent, George Jefferson (Broadbent holds Antiquities Act Permit; Jefferson is in charge of fieldwork and analysis).

Sponsor Institution: University of California, Riverside.

Project Title: Pinto Basin Project.

Dates of Fieldwork: 1972 to the present.

Note: Jefferson's research still is in progress. The following summary is based on his undated (ca. 1972) Progress Report and on personal communication.

Location: Pinto Wash area, eastern Pinto Basin. See Base Map B.

Site Location: Three sites (4-Riv-520, 521 and 522) have been selected for intensive examination. Riv-520 is a ca. 10,000 square meter non-random distribution of bone fragments and artifacts (mostly lithic debitage on an undulating surface north of Pinto Wash, with deflated exposures of old lacustrine sediments and a surface gravelly sand deposit of fluviatile and aeolian origin. Riv-521 is a nearby dense deposit of bone and debitage, apparently weathering out of a surface sand dune and accumulating on the lacustrine sediment surface. Riv-522 is ¼ mile south of Pinto Wash, and is a sparse bone and artifact scatter in eroded exposures of fluviatile sand overlying lacustrine sediment along the edge of a low bluff.

Purpose and Strategy of Excavation: The study was undertaken to clarify the age and paleoecological context of the Campbells' (1935) "Pinto Basin Site," of which Riv-520-522 form a part. The geology, vertebrate paleontology and geomorphology of the vicinity is being studied and the contextual relationships among artifacts (including debitage), recent faunal remains and the remains of extinct fauna are being plotted.

Sampling Procedure: Only Riv-520 thus far has been fully sampled. A grid system with 10-meter sample units was imposed over the site and all bone fragments within 10 cm. of a diagonal line through each unit were counted, providing a 3% maximally dispersed sample of bone fragments. A similar procedure was used for artifacts on a random 30% of the sample units in two quadrants of the site and on much higher percentages of units in the other two quadrants. Five 1 X 2 meter subsurface units then were excavated in sample units that showed typical high, moderate and low bone and artifact counts to see if surface correlations between bone and artifact counts would hold up at depth. Excavation was by 10 cm. levels, with all material passed through 1/8" screen. Subsequent to preparation of the Progress Report, line transects were inspected and units excavated at Riv-521; the resulting data have been analyzed and a report is in preparation. Surface survey also was conducted for about 1.5 miles down the wash to the narrows, with negative results.
Summary of Results: All bones recovered from Riv-520 have been identified. Artifacts and debitage await analysis, but they are not directly pertinent to the study.

Jefferson's preliminary conclusions are that:

(A) There is a striking correlation between the spatial distributions of artifacts/debitage and "midden" bone (broken, splintered and, sometimes, burned bone).

(B) "Midden" bone represents recent species (mostly rabbits, lizards, some Bighorn Sheep and elk), all of which occupy Joshua Tree National Monument today or have done so recently. Eighty percent of the species presently occupy Pinto Basin. A very minor increase in effective precipitation would be sufficient to alter the ranges of all represented species to bring them into the Pinto Wash catchment.

(C) "Midden" bone and artifacts/debitage occur primarily on the surface. Even when they occur at depth they show signs of wind abrasion. They also occur in surficial fluvial/aolian sediments, except when they are on the surface of exposures of the underlying lacustrine sediments.

(D) Extinct, late Pleistocene Rancholabrean fauna occur in the lacustrine deposits underlying the fluvial/aolian gravelly sands and are separated from them by an erosional disconformity. Fossil bone and "midden" bone are visually distinct.

(E) The "midden" bone, artifacts and debitage are brought into contact with the fossil bone via processes of erosion and deflation.

(F) The observed distribution of "midden" bone, artifacts and debitage results from the deflation of surface occupation sites.

(G) It appears, then, that the lacustrine sediments were formed during the Pleistocene, possibly as much as 250,000 years ago, and that during that time the remains of Rancholabrean fauna were deposited. Subsequently, dune sand was deposited along Pinto Wash and the wash banks were occupied by human beings. The dunes have since moved and deflated, destroying much of the occupational deposit and, in some cases, bringing cultural materials and "midden" bone into spatial contact with Pleistocene faunal remains.

(H) Further work is necessary to statistically support (or refute) these contentions and, possibly, to demonstrate the actual age and environmental context of the Pinto archeological materials. Jefferson intends further work south of the wash at Riv-522 and suggests that the washes along the north side of the Eagle Mountains should be surveyed. At this time, however, there is no support for the idea that the physical association of Pinto cultural remains with Pleistocene fauna along Pinto Wash indicates a Pleistocene age for the Pinto Complex. A date of 3000-4000 years B.P., consistent with those assigned to Pinto-like material elsewhere in the West (eg. Late Rose Spring; Lanning 1961), would be acceptable for the archeological sites studied to date at Pinto Basin.

(I) Pinto Basin provides a fine cross section of different environments. The potential exists there for studying adaptive change in time depth.

Evaluation: Jefferson's work has been the most carefully controlled and most explicitly problem-oriented yet conducted in the Monument. It already has contributed significantly to our ability to deal with the
area's prehistory by tentatively resolving the quandry generated by the apparent association of "Pinto Man" with Pleistocene fauna. One can hope for the speedy conclusion of the study and full presentation of the data.


Collections: Collections are housed at U.C. Riverside; artifacts/debitage and midden bone with the Archaeological Research Unit, pleistocene faunal remains with the Geology Department.

Field Notes: Copies are on file at U.C. Riverside, Department of Anthropology, and with Jefferson at the Los Angeles County Museum.
Principal Investigator: George Jefferson.

Sponsor Institution: University of California, Riverside, Archaeological Research Unit.

Titles: Twelve small archeological clearance surveys: Keys Ranch, Oasis of Marah, Oasis Flood Control, Equipment Storage Building, South Entrance Complex, Indian Cove Comfort Station, West Entrance Complex, Cottonwood Spring Sanitary Station, Intersection Rts. 2 and 3, Sanitary Dump Station, North Entrance Complex and the Visitor Center Addition.


Locations: These were small, scattered projects in all parts of the Monument. See Base Map B.

Purpose: The surveys were conducted for purely managerial purposes, to ascertain whether planned construction projects might impact archeological sites.

Techniques and Intensity of Survey: Intensive, 100% ground survey was conducted, except in areas covered by heavy plant growth. No subsurface testing was undertaken. Three and one-eighth person-days were spent on complete coverage of the specified project locations, the largest of which (Keys Ranch) covers 7 acres.

Summary of Results: Prehistoric sites are described briefly at Keys Ranch and at the Oasis of Marah and management recommendations are offered. Isolated artifact finds are reported at the South Entrance Complex, Cottonwood Springs Sanitary Dump Station and Visitor Center Addition locations, but these are not regarded as of significant archeological value because of their lack of association with other material.

Evaluation: More detailed maps would be useful at Keys Ranch and at the Oasis of Marah and I understand that these are forthcoming. Historic archeological resources are all but ignored, an especially serious shortcoming at Keys Ranch and at the Oasis of Marah. In general, these reports are workmanlike in quality and presumably met their management objectives, but they are of scant research value. Much more documentary and on-the-ground work is needed at Keys Ranch and at the Oasis of Marah if these sites are to be well described, especially for purposes of historic archeology.


Collections: None.
Principal Investigator: Keith Anderson.

Sponsor Institution: National Park Service.

Title of Project: Various minor clearances.


Locations: Oasis of Marah area, Keys Ranch, area between Belle and White Tank Campgrounds, Fortynine Palms Oasis. See Base Map B.

Purpose of Survey: These inspections were conducted for management purposes, in order to place wells in archeologically insensitive portions of the Oasis of Marah, to clear the sites of minor construction and generally to evaluate the potential of specific locations.

Techniques and Intensity of Survey: An intensive survey (3½ hours for ca. 16 acres) was conducted on parts of the Oasis of Marah. The other inspections would be classed as reconnaissances. Anderson walked the areas in the company of Monument staff.

Summary of Results: Anderson generally confirms Jefferson's findings at the Oasis of Marah and at Keys Ranch, but emphasizes the historical archeological value of the latter to a greater extent than did Jefferson. Anderson found the portions of the Oasis of Marah that he surveyed intensively to be heavily disturbed. He reports small concentrations of sherds between Belle and White Tank campgrounds. He reports little potential for and no evidence of occupation in the area reconnoitered at Fortynine Palms Oasis. He provides management recommendations.

Evaluation: For its purposes, this appears to have been a well-done study. What was done and what was observed are adequately reported. Both historic and prehistoric archeological localities were located on a base map, but only prehistoric phenomena are discussed in the report. At Keys Ranch an emphasis is placed on the site's value as "a resource of historic artifacts" (underscore mine); the importance of context to the archeological study of recent cultural phenomena seems to go unrecognized. This seems consistent with the Monument's focus on Keys Ranch as an interpretive location, but is prejudicial to the site's research value.

Records: Report: Trip Report, Joshua Tree National Monument, 11/26-27/73. Anderson to Supervisor, Division of Archeological Programs, Western Archeological Center, Tucson,

Collections: Apparently none.
Principal Investigator: Daniel McCarthy.

Sponsor Institution: National Park Service.

Project Title: None.

Dates of Fieldwork: 9/74 to present.

Location: Throughout Monument.

Purpose of Survey: McCarthy has been employed as a seasonal ranger to document rock art sites within the Monument and, seemingly, to engage in general archeological management activities. The overall scope of his mission is somewhat ill-defined. He does not regard himself as qualified to undertake systematic and complete archeological studies, but he is a highly competent student of rock art and it is on this that he is concentrating.

Techniques and Intensity of Research: McCarthy has been compiling background data on the overall archeological resources of the Monument, organizing data on hand and attempting to better document known rock art sites. He also has undertaken some intensive survey on small locations in the Barker Dam vicinity to ascertain what was missed by the O'Neil survey and he is planning a reconnaissance in search of sites reported by Steward and other investigators in the high country of the northern Monument. He is not conducting full and complete archeological surveys; he is organizing and systematizing much of the information already on hand and enhancing the data base on rock art.

Summary of Results: As of early 1975, McCarthy had added 18 new rock art sites to the Monument files, added data to the records of 25 sites already on file, documented nine sites in the Barker Dam vicinity missed by the O'Neil survey and begun to locate sites missed by Wallace, Taylor and Kritzman. He has questioned O'Neil's assumptions about BD-8 and about the "acculturated" rock art at Barker Dam, and has undertaken fresh surveys in the southern and northwestern parts of the Monument. He has compiled data from the San Bernardino County Museum, Bureau of Land Management and various campuses of the University of California to provide the Monument with a reasonably comprehensive file on known archeological resources.

Evaluation: McCarthy is performing a valuable service to the Monument by straightening out, adding to and enhancing the existing records of rock art. He probably is one of the best qualified persons to develop a well-organized system for the recording and preservation of rock art. It is important to recognize, however, as he does, that he is not in a position, in terms either of training or of manpower, to take care of all of the Monument's archeological needs. He is a responsible archeologist and is doing his best to record and protect the Monument's non-rock art prehistory, but he is not a complete archeologist and should not be treated as one by the Monument.
Records: McCarthy is compiling a well-organized file of data on rock art and other resources and has developed a systematic method for photographic recording of rock art that will result in an extensive photographic record at the Monument.
William Wallace's 1969 Recommendations (letter to Leslie Wildesen, dated October 27, 1969): "Receipt of your letter regarding the Archeological Research Management Plan for Death Valley National Monument reminded me of the earlier one on Joshua Tree, which went unanswered. Though considerable time has elapsed since we did our last fieldwork in Joshua Tree, I do have several thoughts on the Monument's archeological needs.

"1. Much more survey work should be done, for only a minute portion of the Monument has been intensively surveyed since the Campbell's pioneer work. The effort should be directed toward spaced areal coverage of the Monument, as well as a sampling of different environmental settings.

"2. Great difficulty was experienced in establishing a chronological sequence. Numerous campsites attributable to the recent Indians were located in the districts surveyed by our field parties, but nothing was discovered which could be definitely attributed to earlier populations. Perhaps a wide-range search should be made to find localities likely to produce earlier remains. Old water courses like the one in Pinto Basin would be a good bet.

"3. Controlled excavations should be carried out in selected rock-shelters. If archeological deposits of sufficient depth are encountered, clues to cultural change may be detected. There may be a few surface sites with enough accumulation of living debris to be worthy of exploration.

"4. The Campbell collection should be reanalyzed. A separation of materials by individual sites might produce interesting results in regards to cultural differences and/or periods of occupation.

"At the moment neither I nor any of my associates have definite plans to pursue work in Joshua Tree National Monument or its environs. This doesn't mean that we are no longer interested in the area. We certainly would like to see more work done and would be willing to participate in any archeological program."
Leslie Wildesen's 1969 Recommendations: Extensive further research is necessary within the Monument not only for archeological-interpretive purposes, but also because vandalism and natural forces rapidly are obliterating many of the fragile desert sites. Vandalism is both unintentional, brought about by dune buggies and motorcycles driving unknowingly across open desert middens, and intentional, in the classic "pothunter" sense: rockshelters and middens are robbed of artifacts, and petroglyph and pictograph sites either are defaced or, worse, large chunks of rock are cut and carted off. In the Desautels study of adjoining BLM lands, he discovered that target shooters had even defaced signs erected for the purpose of "protecting" sites.

Natural forces of wind and rain wreak havoc with desert sites. Wind can remove all the midden from an open site, scour a petroglyph and, in combinations with the sun, cause sandstone objects (for example, metates) to disintegrate. Water, in the form of flash floods, can sweep through a rockshelter, carrying its contents off into oblivion. Altogether, the forces of erosion are a powerful factor in determining the presence or absence of aboriginal sites in the desert.

For these reasons alone further research is urgently necessary in Joshua Tree and can be divided into the following categories:

A. Site Survey, Identification and Description.

There has been no extensive survey of the Monument. Most surveys hitherto have been concerned with restricted areas and were conducted in response to imminent construction plans or excessive, localized vandalism problems. The areas so far surveyed are: the Barker Dam region (O'Neil 1968); the Sheep Pass District (Wallace 1964); The Twentynine Palms region (Campbell 1931); the Indian Cove area (Kritzman 1967), and the Deep Tank-Squaw Tank region (Wallace and Taylor 1959). The single excavation occurred at site JT-1 at Squaw Tank and has been reported (Wallace and Desautels 1959).

There has been no resurvey of the Pinto Basin since the Campbell's work in the early 1930s and site identification urgently is needed for comparison with other Early Man sites in the Southern California Desert. The Twentynine Palms region also needs resurvey and publication for comparative purposes. Petroglyph and pictograph surveys are needed. Steward (1929) found over 30,000 separate sites in the desert area in only a brief survey: a comprehensive survey should reveal many more. As rock outcroppings are numerous in Joshua Tree, one can expect petrographic sites in abundance. Such outcroppings should be examined for aboriginal use as grinding sites or shelters and study should be made of the various uses of different kinds of stone. Maps, site record forms, photographs and other material (such as records of surface collections) should be examined and correlated and a full listing obtained of extant sites. Future surveys should concentrate on the whole of the Monument, with regard to heavily used public areas, in order to elucidate the relationship between Pinto Basin and the later sites. The Parker Dam and Conejo Well vicinities are two such heavily used areas and should be further surveyed and tested at the earliest possible date. Dr. Makoto Kowta, formerly of the University of California at Riverside, has suggested that "the apparent absence
of older materials in the areas surveyed" outside of Pinto Basin should
be investigated. He reasons that a survey starting with Pinto Basin and
working west across the Monument might resolve this discontinuity. Such
a survey might also provide data on shifts in ecological adaptation through
time (Kowta 1969).

B. Research for Interpretive Purposes.

As noted above, only one site has been excavated at Joshua Tree.
Even with a single excavation, however, certain differences obtain between
expectations deriving from surveys and actual results of excavation. For
example, more projectile points were found below surface than during
surveys and a slight difference in pottery type percentages was noted
at JT-1 (Wallace and Desautels 1959). Both of these differences may be
wholly or in part due to vandalism, but they may also reflect significant
later-site differences and further investigations should be made.

Research is necessary into the nature of aboriginally exploited natural
resources. For example, there is some indication that the source of raw
materials for certain kinds of stone implements was geographically distant
from the sites at which the implements were found. Research needs include
location of these sources and investigation of possible trade relations,
quarrying activities, trails, intervening campsites and the like.

Research on settlement pattern, adaptation to micro-environments
and ethnogeology is necessary to the full interpretation of aboriginal
culture patterns at Joshua Tree.

For example, during their survey of the Twentynine Palms region the
Campbells noticed that sites did not occur in close proximity to water
sources, but about a mile distant, though none occurred further than about
1\(\frac{1}{2}\) to 2 miles from a water source. On the basis of this data they postu­
lated that (1) distance from water was regulated by the fact that water
needed to be hauled by hand, (2) a campsite too close to water sources
would tend to scare away any animals gathered at the watering place and
(3) sites found further than 2 miles from extant sources of water might
serve as a clue to climatic change in the interval since their occupation.
Implications of these suggestions should be investigated in areas surveyed,
in conjunction with a paleoecological study to determine possible environ­
mental changes.

White settlers also utilized the Monument's resources. Mines, ranches
and dwellings dating from the late 19th century still exist and should be
located, possibly excavated, keeping differential exploitation patterns
in mind.

Museum displays and exhibits along trails and near campgrounds should
be designed to illustrate the varieties of desert habitat for humans, as
well as for other animals; historical sequences of culture change should
reflect the changing ecology, as well as indicating the varying uses of
the same resources under Indian and white exploitation. Nature talks
easily can be expanded to include ethnobotany or other aspects of
aboriginal culture.
C. Construction Oriented.

One road construction is planned for FY 1976, including a realignment of a section of the roadbed between White Tank and Cholla Cactus Garden. Because this area has not been surveyed for archeological sites, it is suggested that at least that portion of the road which is to be realigned be surveyed immediately; other sections, which improvement of the road will make more accessible to the public (hence the vandal and the pothunter), also should be surveyed and plans must be made to adequately protect or excavate any worthwhile sites in immediate danger. Since the proposed road improvement follows the floor of a canyon, there potentially are petroglyphs or pictograph sites, as well as rockshelters, along its path. These should be recorded in full and protected from vandals, if possible.

No other major construction is planned for the next three years, but it should be stressed that even water pipelines, electrical facility towers and the like can and often do disturb aboriginal sites; areas where such "small scale" construction is planned should be investigated as thoroughly as larger areas.

Public access to sites should be a consideration in planning construction. Easy access encourages vandalism; as Desautels points out in his BLM study, if one is forced to walk some distance to view an archeological site, one's "respect increases with every step." It is suggested, therefore, that salvage operations be conducted within a radius of at least \( \frac{1}{2} \) mile from the nearest public access and a radius of 1 mile from all major public areas (campsites, etc.).

D. Research Relating to Park Collections and Documentary Materials.

Mrs. Marion Riggs catalogued the bulk of the existing Monument collection in March 1967. Now the vast (over 150,000-specimen) Campbell collection has been turned over to the Monument and it will take at least six months and $6,000 to catalogue it. This work should be done immediately, while Mrs. Campbell still can be of assistance. Collections housed at other institutions (including the portion of the Campbell collection at the Southwest Museum) need study; emphasis should be on coordinating these collections and on making the data contained within them available for interpretive purposes. Smaller collections, if any, outside the Monument should be located, studied and photographed for cross reference.

In addition, Monument personnel should be made more familiar with the process of recording archeological sites, including petrographic sites, so that a complete and up-to-date file of site records can be maintained at the Monument. Photographs or rubbings of petrographic sites also should be placed on file and each site should be located on an archeological base map, as well as on U.S.G.S. maps.

Historic sites should be surveyed and mapped and the collections catalogued. Indians and Caucasians used the land differently; these differences will show up on an archeological base map as differences in settlement pattern, resource utilization (mines, etc.), shelter type and the like. As always, such knowledge cannot become available until there is adequate survey data for the areas in question.
E. Research Relating to Past Research Activities Which are Incomplete.

Because only a few limited surveys and a single excavation have been conducted, most past research activities are incomplete. Complete site reconnaissance is critical, both for interpretive purposes and for potential salvage. Adequate catalogues of collections do not exist, a full concordance of site records does not exist and excavation in sites recommended by both Kritzman and O'Neil has not been conducted. Although considerable ethnographic research has been conducted in Southern California, sufficient problem-oriented research has not been done to answer these basic problems pertaining to the Joshua Tree area: the exact boundaries of the various Indian groups have not been defined; trade relations, while assumed to exist, have not been described; and there are no extensive ethnobotanies, except for the Cahuilla. This kind of ethnographic research should not be thought of as "supplementary" to an understanding of prehistoric materials.

In summary, much work needs to be done before Joshua Tree can be said to be "understood" archeologically. The following projects should be carried out as soon as possible:

1. Catalogue the Campbell Collection (cost: $6,000).
2. Test excavation at Stirrup Tank Site, which is particularly vulnerable to pothunters.
3. Survey the proposed road construction between White Tank and Cholla Cactus Garden.
4. Further survey and preliminary testing in the heavily-used Parker Dam and Conejo Well area.
5. A complete archeological survey of the Monument (cost: $37,000; RSP-JOTR-A-35).
6. Prepare an up-to-date archeological base map.
7. Undertake a comparative study of other Southern California Desert Collections.
APPENDIX III

COMMENTS ON NATIONAL REGISTER ELIGIBILITY

Joshua Tree National Monument has not yet instituted a program to comply with Executive Order 11593 by identifying and nominating historic and prehistoric properties to the National Register of Historic Places. Although some historic properties have been nominated ad hoc, without systematic survey or evaluation, no prehistoric properties have been nominated.

Every prehistoric known site now within Monument boundaries qualifies for the National Register by virtue of containing information important to archeology. Very probably, every unrecorded site within the Monument also qualifies. On the basis of a systematic survey, it probably would be possible to eliminate some sites from consideration by determining the data they contain is unimportant because of redundancy, lack of integrity or some other factor. Lacking such a survey, however, no such judgments are possible; the present fragmented data base does not provide a proper judgmental framework.

I do not recommend nominating any prehistoric sites to the National Register at this time, not because they do not qualify, but because there simply is no point in making nominations on the basis of such insufficient data as are available. In the absence of a comprehensive archeological general plan for the Monument, however, all prehistoric sites, including those not recorded and any that may yet be discovered, should be regarded as potentially eligible for the Register.
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Antevs, E.

Barker, J.P. and S.H. Schlanger

Barrows, D.P.

Bean, L.J.


Bean, L.J. and T.F. King, Eds.

Bean, L.J. and H. Lawton

Bean, L.J. and W.H. Mason

Bean, L.J. and K.S. Saubel


Begole, R.S.


Benedict, R.

Bettinger, R.


Bettinger, R.L. and T.F. King

Bettinger, R.L. and R.E. Taylor

Binford, L.R.

Blackwelder, E. and E.W. Ellsworth

Broadbent, S.

Campbell, E.W.C.

1961  The desert was home. Westernlore Press, Los Angeles.

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Clements, T. & L. Clements  

Clewlow, C.W. Jr.  
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