ARCHEOLOGICAL ASSESSMENT OF CARLSBAD CAVERNS NATIONAL PARK

BY C. BRITT BOUSMAN

ARCHAEOLOGY RESEARCH PROGRAM
SOUTHERN METHODIST UNIVERSITY
AN ARCHAEOLOGICAL ASSESSMENT

OF CARLSBAD CAVERNS

NATIONAL PARK

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INTRODUCTION

In April, 1973 the Archaeology Research Program at Southern Methodist University undertook five projects to conduct literature and field survey assessments of the archaeological resources at five National Parks and Monuments. This report describes the results of an archaeological assessment of Carlsbad Caverns National Park.

The objectives of this project were to synthesize the known literature on the prehistoric occupation at Carlsbad, define the major deficiencies in the literature, and discuss what might be done to correct these deficiencies. The objectives were accomplished by the following methods:

1. Compiling a thorough bibliography of all published reports concerned with the archaeology of the study area;
2. Spending one week in the field locating and evaluating sites;
3. Reviewing all literature dealing with Carlsbad and abstracting each work;
4. Identifying topic areas which are instrumental toward understanding the cultural systems of all prehistoric inhabitants;
5. Recommending how these deficiencies can be corrected;
6. Preparing a synthesis of the known archaeology at the study area.

The final purpose of this report is that it serves as a tool which will allow the National Park Service to estimate the nature and intensity of a research project which would provide a detailed, comprehensive knowledge of the prehistoric occupation at Carlsbad Caverns National Park. This research project would not require total completion by one institution; in fact, the quality of information would be higher if various qualified institutions contributed to the total project. This type of project requires that an overall research design be compiled before field work is started and that an overseeing institution, namely the National Park Service, contract with other institutions to solve various problems which have been explicitly defined in the research design.
THE ENVIRONMENT

Carlsbad Caverns National Park is located in south-eastern New Mexico in the Guadalupe Mountains. The mountains form a prominent escarpment above the neighboring areas and are the remains of an immense salt water reef. This reef has been dissected by numerous deep, narrow canyons and an extensive network of caves (Fig. 2). West of the Guadalupe Mountains are large internally draining basins and playas, and east of the mountains are low foothills which gradually slope to the Pecos River. East of the Pecos is a sand dune zone which terminates at the western boundary of the Llano Estacado. To the north the Guadalupe Mountains merge into foothills; the Delaware Mountains are to the south. Three life zones are represented in the park and a great diversity of flora and fauna exists today.

The Lower Sonoran Zone is found on both sides of the Pecos River up to approximately 4,000 feet m.s.l. The flora found in this zone include creosote, mesquite, ocotilla, all-thorn, blue thorn, desert willow, three-leaved barberry, agave, green sumac, varnish bush, buckeye, sotol, thick-leaved yucca, narrow-leaved yucca, grasses, and many forms of cacti. Fauna include buffalo, pronghorn, badger, jackrabbits, cotton-tail rabbits, ground squirrels, cave mice, wood rats, kangaroo rats, pocket mice, pocket gophers, skunks, bobcats, coyotes, foxes, and various types of bats. Birds present include road runners, wood peckers, night hawks, king birds, ravens, orioles, wrens, sparrows, mockingbirds, owls, falcons, and flycatchers (Table 1).

The Upper Sonoran Zone extends from 4,000 to 7,000 feet and encompasses a large amount of the Guadalupe Mountains. The flora of this zone is dominated by juniper. Other associations include pine, oak, madrone, mulberry, hackberry, apache plum, cat claw, service berry, star leaf, silk tassel bush, syringa bush, sotol, yucca, and agave. The fauna of this zone include mountain sheep, white-tailed deer, turkey, white-footed mice, squirrels, wood rats, gray fox, bobcats, elk, quail, larks, ravens, jays, sparrows, tanagers, and poor-wills.

The Transition Zone is found above the Upper Sonoran Zone (7,000 to 9,500 feet). The Transition Zone receives
Table 1. Flora and Fauna in the Lower Sonoran Zone.

**Flora**
- Cresote (*Sancobatus vermiculatus*)
- Mesquite (*Prosopis glandulosa*)
- Ocotilla (*Fouquieria splendens*)
- Allthorn (*Koeberlinia spinosa*)
- Bluethorn (*Zizyphus lycioides*)
- Desert Willow (*Chilopis linearis*)
- Three-leaved Barberry (*Berberis trifoliolata*)
- Green Sumac (*Schmaltzia virens*)
- Buckeye (*Ungnadia speciosa*)
- Varnish Bush (*Flourensia cernicia*)
- Agave (*Agave lechuguilla*)
- Agave (*Agave wislizeni*)
- Sotol (*Dasylirion lecophyllum*)
- Yucca (*Yucca radiosa*)
- Yucca (*Yucca macrocarpa*)
- Grass (*Sporobolus airoides*)
- Grass (*Schizachyrium neomexicanum*)
- Cactus (*Opuntia filipendula*)
- Cactus (*Mamillaria grahami*)

**Fauna**
- Jackrabbit (*Lepus californicus texianus*)
- Cotton-tail Rabbit (*Sylvilagus auduboni minor*)
- Ground Squirrel (*Citellus mexicanus parvidens*)
- Cave Mouse (*Peromyscus leucopus tornillo*)
- Wood Rat (*Neotoma micropus canescens*)
- Kangaroo Rat (*Dipodonup merriami*)
- Pocket Mouse (*Perognathus hispidus paradoxus*)
- Pocket Gopher (*Thomomys lachiguilla*)
- Skunk (*Mephitis mesomelas varians*)
- Skunk (*Spilogale leucoparia*)
- Pronghorn Antelope (*Antilocapra americana americana*)
- Buffalo (*Bison bison bison*)
- Bat (*Tadarida mexicana mexicana*)
- Bat (*Corynorhirus macrotis pallescens*)
- Bat (*Myotis incautus*)
- Badger (*Taxidea berlandieri*)
- Raccoon (*Procyon lotor mexicanus*)
- Bobcat (*Lynx rufus uinta*)
- Coyote (*Canis latrans texensis*)
- Fox (*Larocyon cinereoargentus scottii*)
Road Runner (*Geococcyx californianus*)
Woodpecker (*Centurus uropygialis*)
Nighthawk (*Chordeiles acutipennis texensis*)
Kingbird (*Tyrannus rociferans*)
Raven (*Corvus cryptoleucus*)
Oriole (*Icterus parisorum*)
Wren (*Heledytes brunneccapillus couesi*)
Owl (*Aluco pratincola*)
Sparrow (*Amphispiza bileneate deserticola*)
Falcon (*Falco fusco caerulescens*)
Mockingbird (*Mimus polyglottos leucopterus*)
Flycatcher (*Pyrocephalus rubinus mexicanus*)
Table 2. Flora and Fauna in the Upper Sonoran Zone.

Flora

Juniper (*Juniperus monosperma*)
Pine (*Pinus edulis*)
Oak (*Quercus grisea*)
Madrone (*Arbutus arizonica*)
Mulberry (*Monus microphylla*)
Hackberry (*Celtis reticulata*)
Apache Plume (*Fallugia paradoxa*)
Cat Claw (*Mimosa biuncifera*)
Service Berry (*Amilanchier bakeri*)
Star Leaf (*Choysia dumosa*)
Silk-tassel Bush (*Garrya wrighti*)
Syringa Bush (*Philadelphus microphyllus*)
Sotol (*Dasylirion leiophyllum*)
Yucca (*Yucca macrocarpa*)
Yucca (*Yucca radiosa*)
Agave (*Agave lechuquilla*)
Agave (*Agave wislizeni*)

Fauna

Mountain Sheep (*Ovis canadensis texiana*)
White-tail Deer (*Odocoileus virginianus macrourus*)
Fox (*Larocyon cinereoargentus scottii*)
Bobcat (*Lynx rufus uinta*)
Wood Rat (*Neotoma micropus canescens*)
Peccary (*Tayassu angulatum sonoriense*)
Squirrel (*Citellus mexicanus parvidens*)
Quail (*Callipepla squamata*)
Owl (*Otus asiocineraceus*)
Poor-will (*Phalaenoptilus nuttalli nuttalli*)
Lark (*Olocoris alpestris occidentalis*)
Jay (*Aphelocoma woodhousei*)
Tanager (*Piranga rubra cooperi*)
Sparrow (*Amphispiza bileneata deserticola*)
Raven (*Corvus cryptoleucus*)
Table 3. Flora and Fauna in the Transition Zone.

Flora

Spruce (Pseudotsuga mucronata)
Pine (Pinus scopulorum)
Oak (Quercus gunnisoni)
Maple (Acer neomexicanum)
Gooseberry (Grossularia leptantha)
Rose (Rosa fendleri)
Elderberry (Sambusus neomexicanus)
Grass (Stipa saribneri)
Grass (Muhlenbergia comata)

Fauna

Chipmunk (Eutamias cinereicollis)
Mice (Microtus mexicanus guadalupensis)
Wolf (Canis mexicanus)
Black Bear (Ursus americanus ambliceps)
White-tail Deer (Odocoileus virginianus macrourus)
Mule Deer (Odocoileus hemionus canus)
Elk (Cervus canadensis merriami)
Mountain Lion (Felis cougar aztecs)
Turkey (Meleagris gallopano merriami)
Pigeon (Columba fasciata fasciata)
Hawk (Accipiter cooperi)
Owl (Otus flammeolus flammeolus)
Woodpecker (Asyndesmus lewisi)
Hummingbird (Cyanolaemus demenciae)
Robin (Planesticus migratorius propinquis)
Blue Bird (Sialia mexicana banridi)
more moisture than either the Lower or Upper Sonoran Zones and the ecosystem is considerably different. The flora and fauna present are spruce, pine, maple, oak, grasses, rose, gooseberry, elderberry, chipmunk, mice, wolf, black bear, white-tail deer, mule deer, elk, mountain lion, turkey, pigeon, hawk, owl, woodpecker, hummingbird, robin, and blue bird. (Table 3).

The Lower and Upper Sonoran Zones are a desert-like ecosystem, very dry and hot with an abundance of cacti and succulents. In contrast, the Transition Zone is moist and cool with forest and open grassy meadows. The Guadalupe Mountains offer a highly varied set of flora and fauna which was utilized by the aboriginal inhabitants. The environment of the Guadalupes has changed since termination of the Pleistocene and the immigration of man, but a detailed environmental study documenting these changes has not been published.

The geologic history of the area is both interesting and complex. The oldest deposits in the area are Precambrian in age and are completely buried. Above the Precambrian deposits are Ordovician sandstones and dolomites. Then come Silurian dolomites, Devonian shales, and a cherty limestone dating to the Mississippian Period. During the Pennsylvanian age the deposits were affected by tectonic movements and there is a thrust-fault zone northwest of the park dating to this time period. The basin which includes the area adjacent to the Guadalupe Mountains on the south, west, and east began to sink between the Pennsylvanian and Permian Periods. During the Permian Period the major deposits seen today at the park were formed. Limestones, shales, sandstones, and breccias were deposited. The major deposit of this period was a great barrier reef, the Captian Reef, which forms the escarpment and most of the Guadalupe Mountains. Between the Permian and Cretaceous Periods there was no sea in the area and a period of erosion and drainage systems existed. The only deposits of the Cretaceous Period are a few fossils found in sinkholes and possibly some sandstone dikes and sinkfills. Between the Cretaceous and Tertiary Periods the area began to uplift, with the major uplifting taking place in the Pliocene and Pleistocene. The present drainage system has formed since the uplifting; the cavern system also formed during this time span and was greatly affected by ancient drainage systems.
Fig. 2a. Typical Upper Sonoran Environment near Walnut Canyon. Notice the sotol and agave in the foreground.

Fig. 2b. Slaughter Canyon as viewed from New Cave. Painted Grotto is left of the area shown in the picture.
THE HISTORY OF ARCHAEOLOGICAL RESEARCH

The development of systematic archaeological research in the Carlsbad area to a great extent was linked to the development of Carlsbad Caverns National Park. Local individuals played an important part in supporting the study of the remains of the prehistoric inhabitants in the area. The most notable of the local amateurs were Carl B. Livingston and Bill Burnet.

Livingston met Dr. Willis T. Lee in Carlsbad in 1924. Dr. Lee, representing the National Geographic Magazine, explored Carlsbad Caverns and Last Chance Canyon. Lee's articles in the National Geographic Magazine and Science in 1924 stimulated an interest in the Guadalupe Mountains and its archaeology. This interest was further motivated by Livingston, who contacted the University of Pennsylvania and Laboratory of Anthropology. A number of local people in the Carlsbad area had always been interested in the archaeology but never in recording or preserving the archaeological record.

Bill Burnet, a local amateur also had a profound effect on the gathering of archaeological and paleontological data for scientific purposes. Burnet, in the 1930's, became the Curator of the Archaeological and Historical Society of Carlsbad, New Mexico. In this position Burnet had correspondence with many important people in the fields of archaeology and paleontology.

The next expedition to work in the Carlsbad area was directed by Dr. Edgar B. Howard in 1930 under the auspices of the University of Pennsylvania Museum and the Philadelphia Academy of Natural Sciences. Howard excavated caves and midden circles at the Williams Ranch, Last Chance Canyon, Gilson Canyon, the upper reaches of Rocky Arroyo, and Anderson Canyon. Howard met Burnet in 1930 and they worked together in 1930, 1931, and 1932. Howard terminated his work in the area, but not his interest, for a project at Blackwater Draw.

In 1930 the Laboratory of Anthropology's expedition under the direction of H. P. Mera began field work. Mera was concerned with a wide range of archaeological remains and attempted to present them as an integrated unit. Survey and excavations were
begun in 1930 and concluded in 1932. Mary Y. Ayer in 1934 and 1935 excavated Williams Cave in the Guadalupe Mountains of Texas. Her work was supervised by Howard even though he continued to work at Blackwater Draw.

In 1936 Bill Burnet and C. T. R. Bohannan excavated sites in Carter's Cave, Boyd's Cave, Last Chance Canyon, Sitting Bull Canyon, Wilson Canyon, Robert's Canyon, Stone Canyon, and Park Canyon. The results were discussed in three separate manuscripts which have never been published, but are on file at the Carlsbad Public Library. Throughout the 1930's Burnet continued surveying and excavating sites, some of which were Shattuck Cave, South Fork Cave, McKittrick Canyon, Flea Cave, Three Forks Cave, and Burial Cave.

In 1938 the last archaeological project for many years in the Carlsbad region took place at Hermit's Cave. Dr. C. B. Schultz, representing the School of American Research, conducted paleontological investigations at Hermit's Cave, while Mr. Edwin N. Ferdon, Jr. of the Museum of New Mexico directed the archaeological investigations at the cave. The results of this investigation were not published till 1946, but the archaeological project represents the most organized and informative body of knowledge presented thus far.

Research was not resumed until the early 1950's, when Bill Balgemann and other interested amateurs began surveying and excavating various archaeological and paleontological sites in the vicinity of Carlsbad. In 1955 Dr. Schultz convinced Dr. W. C. Holden to come to Hermit's Cave and finish excavating the deposits at the cave. Dr. Holden has not yet published the results of this work. In 1959, National Park Service employees Spangle, Gordon, and Johnson conducted a survey of Carlsbad Caverns National Park and the report is on file at the Park Headquarters at Carlsbad. The National Park Service has been continually locating and recording sites since the initial survey in 1959. Also in the same year, Zorro Bradley tested a cave, site A-08, for the National Park Service.

Beginning in 1965 Mr. John Greer of the University of Texas began a study of midden circles in the Carlsbad area. Greer has published three reports on this subject, in 1965, 1966, and 1967. A synthesis of the archaeology in the Carlsbad area was written by Barney T. Burns in 1967 as a B.A. thesis.
at the University of Arizona. In 1970 Susan M. Riches concluded a M.A. thesis which reported on a six week survey and excavation project in the Guadalupe Mountains. This marks the end of archaeological research conducted in and adjacent to the Carlsbad Caverns National Park, an area which was studied intensively in the 1930's but for some unknown reason has been virtually ignored since.
Fig. 3a. Site A-59. The people are at a ring midden at the base of the reef escarpment at Slaughter Canyon. Notice the flat topography of the basin terminating at the escarpment.

Fig. 3b. Yucca Cave. The cave is located at the group of trees and large outcropping of rock.
Paleo-Indian Period - Burnet Cave exhibits the only recorded artifact which has been found in a reliable association with Pleistocene fauna in the Carlsbad area. A "Folsom-like" projectile point was found in a hearth 5 feet 7 inches below the surface of the cave, 4 feet below the Basket Maker level. Within this stratigraphic unit, which terminated on bedrock nearly 9 feet below the surface, were a few hearths plus bones of extinct bison, a musk ox, horse, camel, deer, and antelope. One of the hearths near bedrock was sampled in 1937 and dated by Libby in 1954. The date for the sample was 7432 ±300 years B.P. A site which may have possibly demonstrated a Paleo-Indian occupation was Hermit's Cave. A "hearth" was found in association with Pleistocene
fauna, but no artifacts were present. The remaining evidence of Paleo-Indian occupation is known from local collections. Characteristic Paleo-Indian artifacts are often found by collectors in the sand dune area east of the Pecos River. As to what man was doing during this period, inferences from sites in adjacent areas may be utilized. It appears that man was living in small bands, moving nomadically hunting a variety of animals including extinct Pleistocene megafauna, and gathering wild foods. This may or may not be true for the Guadalupe Mountain area.

Basket Maker-Archaic Period - This stage of occupation is known from a number of caves including Burnet Cave, Williams Cave, Goat Cave, Anderson Canyon Cave, Hermit's Cave, Wild Horse Cave, North Three Forks Cave, Burial Cave, and Cremation Cave. There are no radiocarbon dates for this period; stratigraphic information indicates that it occurs above the Paleo-Indian occupation and below an occupation zone containing pottery. Artifacts occurring within this zone include stone and fiber lined cists, baskets, nets, matting, cordage of fiber and hair, woven bags which are occasionally painted, 4 types of sandals, fiber and fur cloth, skin robes, sea shells, beads, braided hair, bone awls, atlatls, darts and foreshafts, bow and arrows, wooden projectile points, digging sticks, fire drills, grooved clubs, wood paddles, stone projectile
points, drills, scrapers, chopper-cores, both cremations and inhumations often found in baskets, metates, manos, leaf-shaped bifaces, hammerstones, drilled shell pendants, fiber cushions, decorated rib fragments, and a cradle board found with a buried child. The two Basket Maker levels in Hermit's Cave indicate a slight shift in the material culture. The ratio of sandal types changes and the bow and arrow appear in the upper Basket Maker level. There are also caves which were utilized for burials. Almost nothing is actually known as to how the society of the Basket Maker people actually functioned and was integrated. It appears that on the subsistence level there was an emphasis on the importance of gathering wild plant foods in comparison to hunting, but this may be a function of the excellent state of preservation of perishable artifacts in most caves. The Basket Maker occupation may be a local variant of an Archaic culture, but at the moment the lack of information restricts a correlation between the two.

Jornada Period - This period is characterized by the occurrence of pottery which in the most part is indicative of the Jornada Branch of the Mogollon. This period can be dated by pottery and radiocarbon between A.D. 900 and 1450. The types of sites found dating to this period include caves, ring middens, and open campsites. These sites may represent seasonal or specific
activity sites of the Jornada peoples or a people who have acquired pottery from the Jornada peoples. The caves which display pottery are Goats Cave, Wild Horse Cave, North Three Forks Cave, Hermit's Cave, and a few others. This occupation period was represented at Hermit's Cave by a large "habitation pit" with the edge outlined with uncut stones and a hearth containing pottery in the floor. A light scattering of pottery covered the remainder of the cave. Ring middens which are doughnut shaped structures of burned rock, ash, and occupational debris, are another type of site dateable to the Jornada Period. Ring middens are widely distributed over the entire park, and present a complicated problem concerning their function(s), age, and origin. The ring middens which have been dated by radiocarbon have yielded dates with a range from A.D. 840±60 to A.D. 1490±90, with one exception of 610±100 B.C. Does the latter date indicate that ring middens were being constructed during what is apparently the Basket Maker occupation and continued to be an aspect of the society in later periods, or is the date unreliable? The function(s) of ring middens have been suggested as either an oven or a specialized type of midden deposit. Other possibilities should certainly be considered. In Right Sandal Cave a ring midden utilized as an oven was found. The open campsites which are found in the foothills and dune area are very poorly studied,
and their inter- and intra-site patterning is not known. The artifact assemblage for this period is composed of sandals, bows and arrows, cordage, basketry, metates, manos, scrapers, leaf-shaped bifaces, mortars, and pottery including the types of El Paso Brown, El Paso Polychrome, Jornada Brown, Lincoln Black-on-Red, Three Rivers Red-on-Terracotta, Alma Brown, Chupadero Black-on-White, Ramos Polychrome, and Playas Red Incised. The evidence suggests that there was very little change in subsistence patterns from the Basket Maker to pottery levels. Small amounts of corn have been found at Pratt and Williams Caves, but agriculture does not appear to be a major subsistence technique. This conclusion may or may not be erroneous. The topographical situations of most sites which have been studied would not have allowed the practice of agriculture. An intensive investigation of suitable areas for agriculture might yield the evidence which is lacking to clear this point.

Apache Period - The evidence for aboriginal habitation in the Carlsbad area during this period is very scanty. There are historical accounts of raids made against the Apache Indians by the U.S. Cavalry and vice versa. One account notes that the cavalry raided a large Apache campsite at the mouth of a large canyon in the Guadalupe Mountains. The Apaches were hunting and processing mescal (probably agave and sotol) which the cavalry confiscated, amounting to
approximately 10 tons of contraband. The Spaniards, when first exploring the area, noted that Indians (presumably Apaches) were living in rancherias along the Pecos River. Other than the historic accounts, the remaining information consists of a few metal projectile points found scattered throughout the area. People have suggested that Painted Grotto is Apache in origin, but there are no definite data to support this claim.
Fig. 4a. Pictographs at Painted Grotto, a shelter in Slaughter Canyon.

Fig. 4b. Site A-59. Five ring middens were found in a stratified sequence at this site.
LIST OF RECORDED SITES

Legend:
A: Ring Midden
B: Rock Shelter
C: Cave
D: Pictographs
E: Midden
F: Mortar Holes
G: Campsite

Figure 1 shows the site locations within Carlsbad Caverns National Park.

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The major deficiency in the archaeological record at Carlsbad Caverns National Park is that a representative and reliable chronology is lacking. A majority of the research was conducted in the 1920's and 1930's, and the quality and sophistication of the archaeological record reflect the emphasis of the early work conducted in the Guadalupes. To gain a reliable view of the extinct cultural systems which existed in the Carlsbad area, an archaeological project of site surveying and excavating is required.

To develop a definite chronology a number of deep, stratified sites should be excavated. These sites should offer a continuous occupation sequence for a long period of time and display the entire range, or as wide a range as possible, of intra-site patterning. The discovery and selection of deep, stratified sites presents a problem and the most efficient way to select sites, in terms of time, energy, and information, would be to conduct a comprehensive systematic survey.

The survey should be concerned with locating not only deep stratified sites but also all the sites in Carlsbad Caverns National Park. A broad sample of sites in the general area should also be recorded and studied even though some of the sites may not be on National Park Service land. A total range of sites would allow the archaeologist to view the area and its sites in a comprehensive manner and as an integrated system. Only when each period or phase of a complete chronology is known in-depth and by its major facets can the chronology be reliable and representative of the actual situation. Various theoretical hypotheses should be formulated based on information discovered by the survey. Developing a chronology would be one of the problems but many others can and should be constructed. The hypotheses should be testable in the field and each site should be judged as to its own potential to answer various hypothetical problems.

The excavation project should attempt to answer the hypotheses established during the survey or any hypothesis pertinent to the area's prehistoric development. A realistic definition of the represented periods of occupation and a crystallization of a chronological scheme should be the re-
sults of the excavation project. These results will not mater­
ialize, or the quality of the final project will be poor, unless a detailed research design is prepared before and during the survey project. In other words, this project must be well or­ganized even though the institution conducting the research might change from survey to excavation, or from excavation to excavation.

The question of public education of the non-renewable archaeological resources in the park is a two sided problem. Certainly the general public should be allowed to study the archaeology of the park as they now learn about the geology. The prehistoric inhabitants led a very unique and signifi­cant life, and the public's awareness of these qualities would serve to enhance and broaden their world view. The major problem with this line of reasoning is that various segments of the public destroy educational facilities and thus some means must be utilized to protect the non-renewable archaeological resources if an educational program is put into effect.

It has been suggested that a comprehensive, systematic site survey of Carlsbad Caverns National Park should be con­ducted. This implies that the entire Park be inspected for archaeological remains and that relevant data be recorded in a reasonable and systematic manner. It is also suggested that this survey should be concerned with preserving the non-re­newable archaeological resources of the Park. Conserving the resources can be managed by collecting data concerned with settlement patterns, cultural affiliations, site locations, evaluations of sites for further study, and by leaving arti­facts in place rather than disturbing a site's surface. Com­prehesive site survey forms should be completed and numerous black and white and color photographs should be taken of each site.

A thorough survey of the Park's approximately 60,000 acres will require a crew of 12 surveyors for three months. The budget should be flexible enough to allow for an under­estimation in time and/or money because of logistical prob­lems and other difficulties associated with limited access­ibility and rugged terrain.

Due to poor accessibility and rugged topography, a crew could most efficiently utilize both time and money by main-
taining camp and headquarters in the field. The crew of 12, divided into two groups with two teams per group could most efficiently survey the Park. Communication is essential between teams, and would be greatly facilitated by the use of walkie-talkies. Since artifacts will not be collected, site descriptions and evaluations will be the major source of archaeological data. The site descriptions should be written in a finished form while in the field.

After field work is concluded, two full-time research archaeologists and two full-time assistants will be needed to assimilate the data and prepare a report which describes the results of the project. It is estimated that this portion of the project will require three additional months since artifact analysis will not be necessary. An estimation of projected project costs is presented below and includes both field and lab work.

No estimate of time or money has been made concerning testing and/or excavation. These factors will be governed by the number and nature of the particular site or sites chosen for testing and excavation. The cost estimate for further site investigation should be included in the survey report.
### Proposed Budget

#### Salaries and Wages

**Off Campus**

- Principal Investigator (1)
  - 1 month @ $1,000.
  - $1,000.

- Research Archaeologist (2)
  - 3 months @ $650. each
  - 3,900.

- Student Assistants (10)
  - 3 months @ $2.50/hr.
  - 12,000.

**On Campus**

- Principal Investigator (1)
  - 1 month @ $1,000.
  - 1,000.

- Research Archaeologist (2)
  - 3 months @ $650. each
  - 3,900.

- Student Assistants (2)
  - 3 months @ $2.50/hr.
  - 2,400.

- Secretary (1)
  - 1,000 hours @ $2.75/hr.
  - 2,750.

**Total**

- $26,950.

#### Employee Benefits

- 1,255.

#### Supplies and Services

- 3,000.

#### Publication

- 3,500.

#### Travel and Per diem

- 12 individuals, 25 mandays/month for 3 months @ $18.
  - 16,200.

#### Vehicle Expenses

- 4 Blazers @ $15./day rental, plus 18¢/mile, estimated for 40,000 miles
  - 12,600.

#### Equipment

- 2 Cameras @ $250. each
  - 2,340.

- 4 Walkie-Talkies @ $125. each
- 5 Tents @ $100. each
- 2 Propane Refrigerators @ $420. each

**Total Direct Costs**

- $65,845.
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<td><strong>TOTAL PROJECT COST</strong></td>
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ABSTRACTS

This section contains a summation of each important report. Many of the manuscripts which are in the bibliography have not been abstracted because they were not deemed relevant or that work was inaccessible. The abstracts are ordered alphabetically by the author's last name, the reference is stated, and the abstraction follows below. The information contained in these works was utilized to draft the recommendations for further archaeological investigation.

Ayer, M. Y.

The author excavated four burials, and associated archaeological and faunal materials from Williams Cave. The burials were found in woven baskets or in hide bags. The archaeological material included scrapers, awls, bone beads, metates, manos, projectile points, digging sticks, shafts, foreshafts, painted sotol strips, drilled shell, pendants, balls of red, yellow, and purple paint, sandals, cordage, netting, matting, bags, and basketry. Reliable faunal and floral associations to the archaeological remains were corn, mesquite beans, piñon cones, prickly pear, sotol, seeds, bundles of grass, sheep, deer, and antelope. A percentage of the fauna which was not associated with the archaeological remains was extinct Pleistocene mega-fauna and other non-extinct forms which suggest a cooler climate at an earlier period than is represented by the archaeological remains.
Bradley, Z. A.
1959 Cave Site A-08, Carlsbad Caverns National Park. Unpublished manuscript on file with the National Park Service.

The author and others dug a test pit in site A-08 in 1959. At least two periods of occupation are reported for this cave. The upper or more recent occupation appears to have taken place during the Dona Ana or El Paso Phase of the Jornada Branch of the Mogollon Period. The lower or older period of occupation appears to be a "Desert Archaic" but due to the limited amount of information, no connections to specific sequences can be made, nor can any statements about the culture of the people be put forth.

Burnet, R. M. P.

Burnet's exploration of New Cave in Slaughter Canyon brought to light two deer skeletons, charred wood, and pottery which the author identifies as Pueblo III, but it resembles Chupadero Black-on-White and El Paso Brown or Jornada Brown.

Burnet, R. M. P. and C. T. R. Bohannan
1937 A Reconnaissance of the Guadalupe Mountains, New Mexico for the Pennsylvania University Museum. Unpublished manuscript on file with National Park Service.

The authors examined caves in Last Chance, Gilson, Wilson, Roberts, Dark, Stone, Lecheguilla, and Bean Canyons. Boyds Cave contained a ring midden with Chupadero Black-on-White, a bone awl, metates, and miscellaneous bone and shell associated with the midden. Last Chance Canyon contained a cave yielding two burials and pictographs. Lowes I exhibited faint traces of an occupation while Lowes II also contains evidence of a light occupation. Roberts Cave contained two occupation levels. Left Sandal Cave displayed two hearths, fiber, sandals, and oak, walnut, and juniper poles. Right Sandal Cave was tested and demonstrated a stratigraphy of rock, charcoal, then baked sotol, apparently an unopened ring midden. Near Right Sandal Cave was a cave containing three levels of occupation with basketry and a slab and fiber lined cist. Mudgetts Cave yielded a few flakes and two possible manos. Goat Cave contained a charcoal stratum but was very damp; thus, fibrous material would not be preserved.

A synthesis of all systematic field work (published and unpublished) conducted in the Carlsbad area is presented. Burns discusses early man, Basket Maker, Pueblo, and Apache-Comanche occupations in the area. Evidence of early man occupation has been acquired from Burnet Cave, Hermit's Cave, and scattered surface finds by the local people. The people of this period appear to be hunters and the faunal assemblages indicate an environment similar to the Canadian zone. Burnet Cave produced a radiocarbon date of 7432±300 B.P. The artifacts for the Basket Maker period indicate a people who hunted and gathered for a subsistence. An amazing amount of perishable materials have been found in the Carlsbad area which date to this period. The dates for the Basket Maker Period are not known, only that Basket Maker falls between early man or Paleo-Indian and the Pueblo Periods. The Pueblo Period, which begins at approximately A.D. 900, is characterized by the occurrence of pottery. The bow and arrow appear earlier in the Basket Maker period. No sites which date to this period have been studied, thus no statements can be made of the culture of the people. The Apache-Comanche occupation began at least by 1582 when Apaches were sighted by Antonio de Espejo. In 1590 Castano de Sosa reported Indians, probably Apaches, living in rancherias along the Pecos River. Apaches in later historic times were discovered by military patrols camped in the mouths of large canyons in the southern Guadalupes. The Apaches were gathering mescal and sotol, and up to 10 tons were found in one camp. Comanches moved into the area for raiding and warfare as the Comanches and Apaches were constantly fighting. The Apache-Comanche period was terminated in the area by the annihilation or removal of all Indians by the United States Military.

The author concludes his study by suggesting certain actions be taken to increase the archaeological knowledge of the area. Included are surveying and excavation recommendations of specific areas and sites within the region.
The author discovered three and possibly four levels of prehistoric occupation in the stratigraphic levels of the cave. The lowest level is characterized by a rock fill with a Pleistocene faunal assemblage. Well within the level Ferndon found a hearth but no direct cultural indicators in association. The first assured cultural level was laid above the Pleistocene deposit and was characterized by square-toed sandals, fiber cordage, river cobbles, leaf-shaped chert bifaces, a grooved club, and a bark and grass lined cist. The second cultural level contained almost all of the types of artifacts as the first cultural level, plus two new types of sandals, woven mats, coiled baskets, fiber netting, skin cordage, a digging stick, manos, metates, projectile points, scrapers, a fire kit, arrow shafts, foreshafts, a dart foreshaft, a drill, a bone awl, a shell pendant, and two types of lined cists (stone, and grass and bark). The third cultural level witnessed a change in the artifact assemblage. Two types of sandals, darts, and cists were discontinued from use. Two new types of sandals, a new type of scraper, and pottery came into use. The pottery has been dated to approximately A.D. 1250 to 1300, and is comprised of Chupadero Black-on-White, Lincoln Black-on-Red, and an unidentified culinary ware. In the northeast section of the cave is a pit excavated through the second cultural layer and stopping in the Pleistocene rock fill layer. A hearth was found in the bottom of the pit with Lincoln Black-on-Red pottery in the ash deposit. A stone wall was located on the southeast side of the pit, and slabs of rock roughed an outline of the pit on the southwest, west, and northwest sides of the sloping pit walls.

The archaeological evidence indicates that a similar subsistence strategy existed through all three cultural periods, with stylistic changes in the artifactual assemblages through time. The people seemingly lived by hunting and gathering.
Gebhardt, David

Gebhardt concludes that the design motifs present at Painted Grotto resemble other motifs at the mouth of the Pecos River, at numerous Basket Maker sites throughout the Southwest, and with pictographs found in Baja California. The author feels that part of the paintings at Painted Grotto date to the Archaic Period, not the Apache Period.

Greer, J. W.
1966 Preliminary Archeological Explorations at Carlsbad Caverns National Park, New Mexico. Unpublished manuscript. Department of Anthropology, University of Texas.

Greer proposes a typology for midden circles and mescal pits. A midden circle is a donut shaped accumulation of fire-cracked rock, and a mescal pit is similar to a midden circle except for a subsurface pit in the center of the burned rock accumulation. The author states that there are three basic types of midden circles and two types of mescal pits. The first type of midden circle is composed of two subtypes: a) is circular, 40 to 55 feet in diameter, and 2.5 to 5 feet high; b) is circular, 30 to 40 feet in diameter, .5 to 3.5 feet high, and with ash, bone, shell, and chipped stone dispersed in the burned rock. The Type II midden circle is elongated, 30 to 40 feet through the long axis and situated in front of a rock shelter or on a terrace against a cliff. The Type III midden circle is semi-circular, in front of or in the mouth of a shelter, and with some of the characteristics of Type Ia. The mescal pits are divided into two groups: Type I reflects the characteristics of a Type I midden circle with the addition of a subsurface pit dug in the depressed central portion of the structure. The Type II mescal pit is semi-circular, 2.5 feet high, 25 to 35 feet long and a pit has been dug adjoining the concave boundary.

Greer discusses 27 sites which display a range from 1-15 midden circles at a site. The breakdown of types is: 10 Type Ia midden circles; 44 Type Ib midden circles; 2 Type III midden circles; and 1 Type II mescal pit. There is also stratigraphic evidence to suggest that the Type Ib midden circle was used at
an earlier period of time than the Type Ia midden circle.

Greer states that the midden circles and mescal pits are temporary and probably seasonal sites. He is not sure if the range of the people who constructed them is restricted to the Guadalupe Mountains or if it extends to other areas.

Greer, J. W.

The author proposes that the term "ring midden" be used when the structure of burned rock cannot be assigned to either a mescal pit or midden circle. The assignment of the burned rock structure can only be done after excavation has taken place.

Greer, J. W.

Excavations at the Pow Wow Site exhibited four ring middens, numerous hearths, and artifact concentrations. Two radiocarbon dates (A.D. 990±80, A.D. 840±60) and pottery indicated an occupation during the Jornada Period. Greer suggests that the people who occupied the site may have been composed of small groups who hunted and gathered in the mountains a large amount of the time, but had relations with agricultural pottery producing peoples in the area.

Greer, J. W.

Greer reports that 18 radiocarbon dates are known for ring middens. The range is from 610±100 B.C. to A.D. 1490±90, with a mean of A.D. 1144±96. Seventeen of the dates fall between A.D. 840±60 and A.D. 1490±90. It is possible that the 610±100 B.C. is unreliable.
Howard, E. B.

Howard discusses the first season's field work in southeastern New Mexico. On the west and south portions of the Guadalupe Mountains, Howard inspected caves in Little Dog Canyon and on the Williams Ranch. A cave on Williams Ranch contained fragmentary pieces of cordage and a ring midden. Another cave on Williams Ranch which Howard excavated contained netting, basketry, cordage, a cord bag, sandals, a foreshaft, bone awls, chipped bifaces, corn, pottery, and human and deer bones. After terminating excavations on Williams Ranch, Howard concentrated on the eastern slope of the Guadalupe Mountains. At this point in time he met Bill Burnet of Carlsbad. Howard and Burnet explored caves in Anderson, Pine, Last Chance, and Three Forks Canyons. At a cave in Anderson Canyon they found two occupational zones with sandals, cordage, basketry, matting, and a foreshaft. Pine Canyon caves were inspected, but not excavated because Mera had expressed an interest in Pine Canyon. In Last Chance Canyon and its tributary canyons the caves produced little more than a few pictographs. In Three Forks Canyon Howard and Burnet dug a cave named in honor of Burnet. The artifactual material found in Burnet Cave included cordage, basketry, sandals, foreshafts, bone awls, various wooden objects including a wooden wedge, and bones of bison, horse, antelope, and California condor.

Howard, E. B.

Howard describes field work conducted at Burnet Cave west of Carlsbad. Within the cave the excavators found baskets, sandals, burials, bone awls, spear foreshafts, coiled twine, twine bags, hearths, and a Paleo-Indian projectile point (probably Clovis). A large amount of faunal remains were present and many were of extinct varieties. The animals represented were an extinct antelope, two species of extinct bison, an extinct musk-ox, an extinct camel, an extinct California condor, wild turkey, red fox, ringtailed cat, prairie dog, pack rat, kangaroo rat, field mouse, whitefooted mouse, pocket mouse,
squirrel, pocket gopher, jackrabbit, cotton-tail rabbit, and turtle. Howard states that the Paleo-Indian projectile point and a few hearths were in association with the extinct fauna at a depth of 5 feet 7 inches. The remaining material composes a Basket Maker occupation and was found in the upper two to three feet of deposit.

Lee, W. T.

The author discusses burials found in the entrance of Carlsbad Caverns. The burials were found in baskets on shelves in the walls of the caverns.

Lehmer, D. J.

Lehmer defines the Jornada Branch of the Mogollon and its various phases based on a survey of the Las Cruces district and lower Tularosa Basin, and excavations at Los Tunes, La Cueva, the Bradfield site, and two sites near Alamogordo. The Jornada area is pear shaped, and extends from Carrizozo, New Mexico in the north to below Villa Ahumada, Mexico in the south, and 75 miles west and 150 miles east of El Paso, Texas. The Guadalupe Mountains are on the eastern boundary of the Jornada area.

The proposed sequence suggested by the author begins with the Hueco Phase, a Cochise-like non-ceramic stage characterized by a gathering society with limited hunting and in later years marginal agriculture. Basketry, matting, woven sandals, atlatls, dart projectile points, leaf-shaped bifaces, and a strong emphasis on grinding tools comprise the basic artifact assemblage of the Hueco Phase. After this the Jornada area is split by the occurrence of two slightly different trends in cultural development. The Mesilla Phase in the southern two-thirds and the Capitan Phase in the northern third of the Jornada Area emerge from the Hueco Phase at approximately A.D. 900 and continue until A.D. 1100. The Capitan Phase is poorly documented, but the Mesilla Phase is known from surface collections from many sites, and excavations at Los Tunes. The Mesilla Phase is characterized by rectangular and circular
pit houses, hearths within the pit houses, storage pits with undercut sides, sherd discs, clay pipes, triangular projectile points, bone awls, chipped stone and ground sherd scrapers, manos, metates, pestles, and mortars. El Paso Brown pottery dominates the occurring pottery types with El Paso Polychrome, Mimbres Bold Face, Mimbres Classic, Mimbres Corrugated, San Francisco Red, and Alma Plain also occurring. The latter 5 pottery types are considered intrusives from neighboring areas. Lehmer believes that cultural influence came indirectly from the northern Anasazi area and from the southwestern New Mexico Mogollon area via the San Marcial Phase to stimulate the occurrence of the Mesilla Phase.

The next phase has been designated as the Three Rivers Phase in the north and the Dona Ana Phase in the south. The Dona Ana Phase has been dated from A.D. 1100-1200, and is basically known from surface indications and also from test excavations at La Cueva. La Cueva demonstrated a stratigraphic relationship of Mesilla Phase overlaid by a Dona Ana occupation. The Dona Ana Phase is considered a transitional period intermediate between the Mesilla and the later El Paso Phase. The basic composition of the Mesilla Phase persists with the addition of contiguous-roomed adobe pueblos, increase in the importance of El Paso Polychrome pottery, and the introduction of Chupadero Black-on-White, Three Rivers Red-on-Terracotta, and St. Johns Polychrome, the latter three being intrusive pottery types to the Dona Ana Phase. Lehmer states that new relationships implied by the new intrusive pottery types stimulated a transition from the Mesilla Phase to the Dona Ana Phase. The Three Rivers Phase of the north appears to be a regional variant of the Dona Ana Phase, with surface adobe pueblos, pit houses, and Three Rivers Red-on-Terracotta being manufactured locally. The following phases are the El Paso Phase in the south and the San Andres Phase in the north. The San Andres Phase is discussed with little detail, but Lehmer describes the phase as exhibiting adobe pueblos which are usually situated around plazas. El Paso Polychrome is the dominate native pottery type with Three Rivers Red-on-Terracotta, Lincoln Black-on-Red, and a smudge ware also occurring. Chupadero Black-on-White, Gila Polychrome, Ramos Polychrome, Playas Red Incised, Agua Fria Glaza-on-Red, Arenal Glaze Polychrome, St. Johns Polychrome, and Heshotauthla Glaze Polychrome occur as intrusive pottery types. The El Paso Phase has been dated from A.D. 1200-1400, and the San Andres appears to date
to the same time period. The El Paso Phase is known from numerous but sporadic excavations in Texas and New Mexico and various surface collections, but more specifically from the excavations at the Bradfield site and the two Alamogordo sites discussed in Lehmer's report. The El Paso Phase is distinguished by the same general artifact assemblage as the Dona Ana Phase except for a few additions and shifts in popularity of particular traits. Pit houses of any type are discontinued and surface adobe pueblos arranged adjacent to plazas or in long tiers are utilized exclusively as an architectural form. Fire pits and straight sided storage pits are found within the rectangular roomed pueblos. A shift in emphasis toward trough metates over basin metates is noted. The appearance of grooved abrasion stones (arrow shaft smoothers?), both chipped and ground stone axes, palettes, copper bells, and stone animal effigies also characterize the El Paso Phase. The only pottery being produced locally is El Paso Polychrome. Chupadero Black-on-White, Lincoln Black-on-Red, Three Rivers Red-on-Terracotta, and a smudge ware are the most common intrusive pottery types. Also occurring are Gila Polychrome, Ramos Polychrome, Playas Red Incised, Agua Fria Glaze-on-Red, Arenal Glaze Polychrome, St. Johns Polychrome, Heshotauthla Glaze Polychrome, Babicora, Mimbres Black-on-White, Walnut Black-on-White, Tucson Polychrome, Madiera Black-on-Red, and Galisteo Black-on-White. Lehmer believes that the El Paso Phase is a "crystallization" of cultural trends which first appeared during the Dona Ana Phase. It should be stated that the author suggests that each phase is a direct outgrowth of the preceding phase and the distinctions between phases are the effects of various influences introduced from peoples in adjacent areas.


Mera suggests the usage of the term midden circle instead of mescal pit. He states that these types of structures represent a specialized type of refuse heap instead of an oven for cooking mescal and they do not contain pits.
Mera, H. P.


The conclusion of two seasons field work in the Guadalupe Mountains and adjacent areas is presented. A reconnaissance and excavation of 13 sites were conducted. The author grouped the sites into three basic types: campsites, midden circles, and caves. Campsites were located between the Pecos River and the western boundary of the Llano Estacado, usually in a dune area or adjacent to a playa. Campsites may range up to several acres in size and display hearths, a plain brown ware (possibly Jornada Brown), Chupadero Black-on-White, El Paso Polychrome, Three Rivers Red-on-Terracotta, manos, metates, projectile points, drills, chipped stone scrapers, and limestone choppers. Burials are found adjacent to campsites, usually scattered due to dune action.

Midden circles are circular, donut-shaped structures consisting of burned rock. Three basic types were distinguished: round, oval, and semi-circular in the mouths of caves. All three types appear to have the same function and date to the same general time span. The artifacts associated with midden circles are a plain brown ware, Chupadero Black-on-White, El Paso Polychrome, El Paso Brown, Three Rivers Red-on-Terracotta, an incised ware, Rio Grande Glaze Ware, bedrock mortars, projectile points, scrapers, bifaces, and drills. Mera suggests that the midden circles represent a site occupied on a seasonal basis which may be part of a system that includes the campsites and caves. No definite proof is presented for this hypothesis.

Mera excavated ten caves, eight of which were used for habitation, and two of which were used for burial purposes exclusively. The burials were either cremations stored in baskets or inhumations covered with mats with few offerings. The caves utilized for habitation indicated a temporary occupation with two possible periods of occupation, even though stratigraphic controls were poor. The artifacts associated with caves are a plain brown ware, Chupadero Black-on-White, El Paso Polychrome, stone projectile points, scrapers, bifaces, choppers, wood paddles, grooved clubs, fire drills, digging
sticks, wood projectile points and foreshafts, bows and arrows, atlatls, fur cloth, fiber fabric, skin robes, bone awls, sandals, nets, and vegetable fibers and hair cordage. Katherine Bartlett's "skeletal material" section concludes that although the material culture is basically the same for all burials, the burials represent a physically mixed group. Mera justifies this by concluding two separate cultural horizons had habitated the area.

Murray, Keith F.

The author estimates a drop in life zones of approximately 3500 feet in the Guadalupe Mountains during the period indicated by the faunal assemblages at Burnet Cave. Murray believes this era was the post-Wisconsin Altithermal period. During this period it is suggested that the Canadian zone extended down to about 4500 feet, and pine forest on the lower slopes of the Guadalupe Mountains. In the Pecos Valley a short grass prairie existed and between the short grass prairie and the pine forest a piñon-juniper woodland was situated.

Riches, S. M.

The author discusses the findings of a six week survey in the Carlsbad area. Six sites were tested. Four basic types of sites were noted: open campsites, midden circles, midden circle-rock shelters, and non-pottery caves. A model is hypothesized that the non-pottery caves were utilized at an earlier time period than the other three types of sites (campsites, midden circles, midden circle-rock shelters). The latter sites represent sites occupied on a seasonal basis by the same indigenous population.
Schroeder, A. H.
1965 Pratt Cave Studies, Guadalupe Mountains, Texas. Unpublished manuscript prepared for the National Park Service.

Schroeder and others excavated Pratt Cave in McKittrick Canyon. An Apache and pre-Apache occupation is suggested to have occurred. The archaeological material included digging sticks, a dart shaft, wood slabs, lechegilla leaf needle, basketry, matings, fiber bags, rope, corn, chili seeds, hide, horsehair cordage, cotton cordage, fiber cordage, quills, bone beads, burins, shell pendants, and two bifaces.

Spangle, P. F., G. J. Gordon and J. B. Johnson

The authors report the findings of 56 prehistoric sites. Four types of sites were found (cooking pits, rock shelters, caves, and pictographs), but one site may comprise two types, i.e. a rock shelter with pictographs. Cooking pit sites numbered 37, rock shelters were 10, caves totaled 4, and 9 pictograph sites were found. The authors conclude that the prehistoric inhabitants were an extension of the Pecos River Cave Dweller Culture, but later were related with the Dona Ana Phase of the Mogollon Culture.
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