CRM BULLETIN

Volume: 7 No. 1 Cultural Resources Management • A National Park Service Technical Bulletin April 1984

National Park Service archeologist/diver taking measurements, U.S.S. Arizona, forward section.

HOW THE PARK SERVICE MANAGES ITS ARCHEOLOGICAL RESOURCES

Douglas H. Scovill

The tools which support Park Service archeology are many and varied. They range from paper documents like the historic structures reports to resources inventory, the "bread and butter" of the profession. Some are new. Others have received a new twist to make them applicable to the specific resource management problems that archeologists and cultural anthropologists face today. This issue of the CRM BULLETIN explores a few of these tools.

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U.S.S. ARIZONA: A Cultural Resources Management Success Story

Gary T. Cummins

Nearly forty-two years after the sinking of the U.S.S. Arizona, the National Park Service began its underwater assessment survey. Within the first few hours of that survey, Navy Explosives Ordinance Disposal (EOD) divers removed four live, five-inch naval artillery shells from the deck of the battleship, virtually beneath the feet of the visiting public.

The episode illustrated how little we actually knew about the ARIZONA. When we first opened the park in October 1980, we assumed that a complete body of data existed, that everyone agreed on the causes of the ARIZONA's sinking, the extent of battle and salvage damage, the amount of settlement, and her current condition. And, of course, we assumed that all ammunition had long been removed from the ship. It took the survey to prove how faulty our assumptions were.

One of the newer units of the Park Service, the Arizona Memorial, consists of eleven acres located within the Pearl Harbor Naval Base on Oahu, 15 miles west of Honolulu. It includes a large, new visitor center, with theaters, museum, and ad-

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Leading the list is "Parkman," the new computer graphics program for cultural resources management. Developed by the Division of Cultural Research in conjunction with the Division of Special Programs, Santa Fe, the program allows for the organization of complex archeological data and makes it available to managers in usable form. Jim Judge examines this important contribution.

The inventory process is represented by a number of Service projects. Mark Lynott reviews work underway at Ozark National Scenic Riverways; Thomas Thiessen, the Knife River Indian Villages archeological inventory; and Bruce Anderson, the project at Wupatki National Monument, the data from which has been incorporated into Parkman.

The importance of historic structures reports to archeology is explored by Joan Mathien. In the case of Kin Nahasbas, the Anasazi site, the necessity for an historic structures report and the absence of archeological data with which to complete the report created the joint demand on management and archeology. Randy Biallas' article on the historic structure reporting process provides a good overview of this significant tool.

Sometimes the very structure of an archeological center can determine the effectiveness with which it handles fieldwork. The Midwest Archeological Center is a case in point. Pursuing an innovative biregional approach, it serves the archeological needs of both the Rocky Mountain and Midwest Regions, without the necessity of administrative duplication. Randy Pope, Lorraine Mintzmyer and F.A. Calabrese report on this successful approach.

The applications of remote sensing technology to archeology have focused frequently on the southwestern and Western U.S. As Stephen Potter successfully demonstrates, however, this tool has significant Eastern U.S. applications. With a small sum of money and a lot of careful planning, the cultural resource manager can obtain useful information overlooked by on-the-ground field survey techniques.

Although the archeological resources of certain Park Service areas have been known for decades, others have remained unexplored and are only now receiving their just attention. Bryan Harry offers a thoughtful examination of Pacific parks' archeology. His area practices a uniquely challenging blend of archeology and cultural anthropology. Throughout the islands, ancient worship sites continue to enjoy the veneration of present-day Hawaiians. As the author explains, "here is archeology with a cultural constituency," where sensitivity to native populations becomes as essential as the more technical approaches to site preservation.

In the Pacific parks as elsewhere in the Service, rock art has drawn significant attention as a preservation issue. How we protect this fragile evidence of past cultures is being researched at major institutions like the University of California. One of the first steps taken through the NPS Rock Art Task Force has been the development of a research bibliography,

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ministrative areas. However, the primary resources are the U.S.S. Arizona Memorial, and the battleship. Completed in 1962, the memorial is a gleaming white, reenforced concrete structure—184 feet long, 36 feet wide, and 21 feet high—erected directly over the hulk of the Arizona, a 31,000-ton, 608-feet long battleship, launched in 1915.

Until the Japanese attack on Pearl Harbor, December 7, 1941, the Arizona saw nearly 25 years of peaceful service. Then at 8:20 a.m., an 800 kilogram, armor-piercing bomb struck the forward deck and exploded deep in her hold. This set off a terrific explosion among her ammunition and aviation gasoline supplies. The ship sank in less than nine minutes, killing over 1,100 crew members. The Navy removed most of her superstructure and salvaged most of her guns and turrets, as well as other equipment and machinery. Salvagers left some 1,102 crew members entombed within her hulk. The Navy constructed a temporary platform over the battleship in 1950. Work on the current memorial started in 1961. Following its completion, the Navy began transporting visitors to the memorial on a regular schedule. By the mid-1970s, visitation increased to 500,000 a year. The Navy's ability to cope with the crowds reached its maximum, and negotiations with the NPS, plus pressure from veterans and civic organizations, eventually led to NPS responsibility for the memorial. Presently, more than 1.2 million persons world-wide visit annually.

Crockery and utensils — galley area, U.S.S. Arizona.

The new NPS property began operating immediately to handle the growing numbers of visitors. With nearly 4,000 visitors on our first day and over a million our first year, we never had the luxury of a "developmental stage" of visitation. Instead, we stressed building an efficient or-

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A BIREGIONAL ARCHEOLOGICAL CENTER: How It Works

Randall Pope, Lorraine Mintzmyer and F. A. Calabrese

Since the end of World War II when the National Park Service began sponsoring major archeological projects, each region developed different ways to meet their archeological assistance needs. Some obtained a staff position to assist in contracting for archeological services; others developed archeological centers. The Midwest Archeological Center in Lincoln, Nebraska emerged out of the Smithsonian Institution's Missouri Basin Project office in 1969. Until then, the service primarily assisted other agencies with funds and personnel salvaging archeological information from dam and reservoir areas.

Then in 1974, the Center received its first base funding for work with parks and the salvage program responsibilities shifted to the newly established Interagency Archeological Services offices in Denver and Atlanta. At about the same time, the boundaries representing the revised Midwest and the new Rocky Mountain regions were established. The regional directors decided that the Midwest Archeological Center would serve both. Since then, the Center has developed an organizational structure designed solely to assist these regions in the management of their archeological resources.

This primary mission is accomplished in a number of ways. The Center staff participates in the review of planning, programming, and management documents. They provide advice about needed archeological work prior to new construction and provide program development assistance to park managers gathering basic inventory data or initiating interpretation programs.

Given an identified need for archeological work in conjunction with development, management or interpretive needs, the staff designs, implements, and then reports on the needed archeological investigation. Determining who provides archeological services—the Center or a contractor—is done in consultation with the regions; though given the shifting design and construction priorities, it is often easier and more cost effective to accomplish projects in-house. On a day's notice, Center personnel provide archeological on-site monitoring in conjunction with construction and other earth-disturbing activities impacting historic or prehistoric remains. Occasionally, larger projects are done as joint University-Center endeavors. These accomplish Service objectives while maintaining a high level of professionalism with limited funds and personnel.

In addition, Center staff participate in team planning efforts and the preparation of environmental assessments and management plans, as well as other general planning documents. They also facilitate the planning and programming of future archeological needs for management and interpretation. They maintain the basic cultural sites inventory information for park archeological resources, and update the archeological base maps as well as other basic resource inventory data. They curate collections and records of past archeological investigations, and maintain the files and library information pertaining to both regions' archeological resources.

These activities are carried out by the four divisions: the Rocky Mountain and Midwest Region Divisions, the Developmental Archeology Division, and the Administrative Division. The two parallel divisions for the Midwest and Rocky Mountain Regions provide the planning, programming and review assistance outlined above. They are the major contacts with the regional offices and park staffs. Dr. Mark Lynott heads the Midwest Regional Division, Dr. Douglas Scott the Rocky Mountain Region Division.

The Developmental Archeology Division, headed by Robert Nickel, conducts research on magnetic and resistivity surveying, and other geophysical exploration techniques. Nickel's division adapts computer hardware and software to archeological problems and programs, to the archeological laboratory and the curation of collections.

The Division of Administration Contract and Support Services, headed by Thomas Thiessen, provides administrative and contracting services, as well as clerical support. It maintains the staff research library and obtains the illustrations needed for archeological publications.

The Midwest Archeological Center is the only unit in the Service that routinely

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Positive crop mark of site 44 NB 29 is visible as a dark concentration of winter wheat in the narrow strip of field adjacent to a grass runway.

LOW BUDGET AND LOW ALTITUDES: Aerial Photography And Archeological Survey In Tidewater Virginia

Stephen R. Potter, Ph.D.

In 1976, an archeological and ethnohistorical study began in a locale corresponding to the territory of an early seventeenth century Virginia Algonquian chiefdom—the Chicacoan (Potter 1982). The territory of the Chicacoan extended between the Potomac and Rappahannock Rivers on a peninsula referred to as the Northern Neck of Tidewater Virginia.

The purpose was to develop an aerial settlement pattern model of late prehistoric and early historic aboriginal occupations. Using ethnohistorical and environmental data, several hypotheses pertaining to village size and location were postulated for archeological testing. Although the study concerned late prehistoric and historic aboriginal settlement patterning, all archeological manifestations dating to

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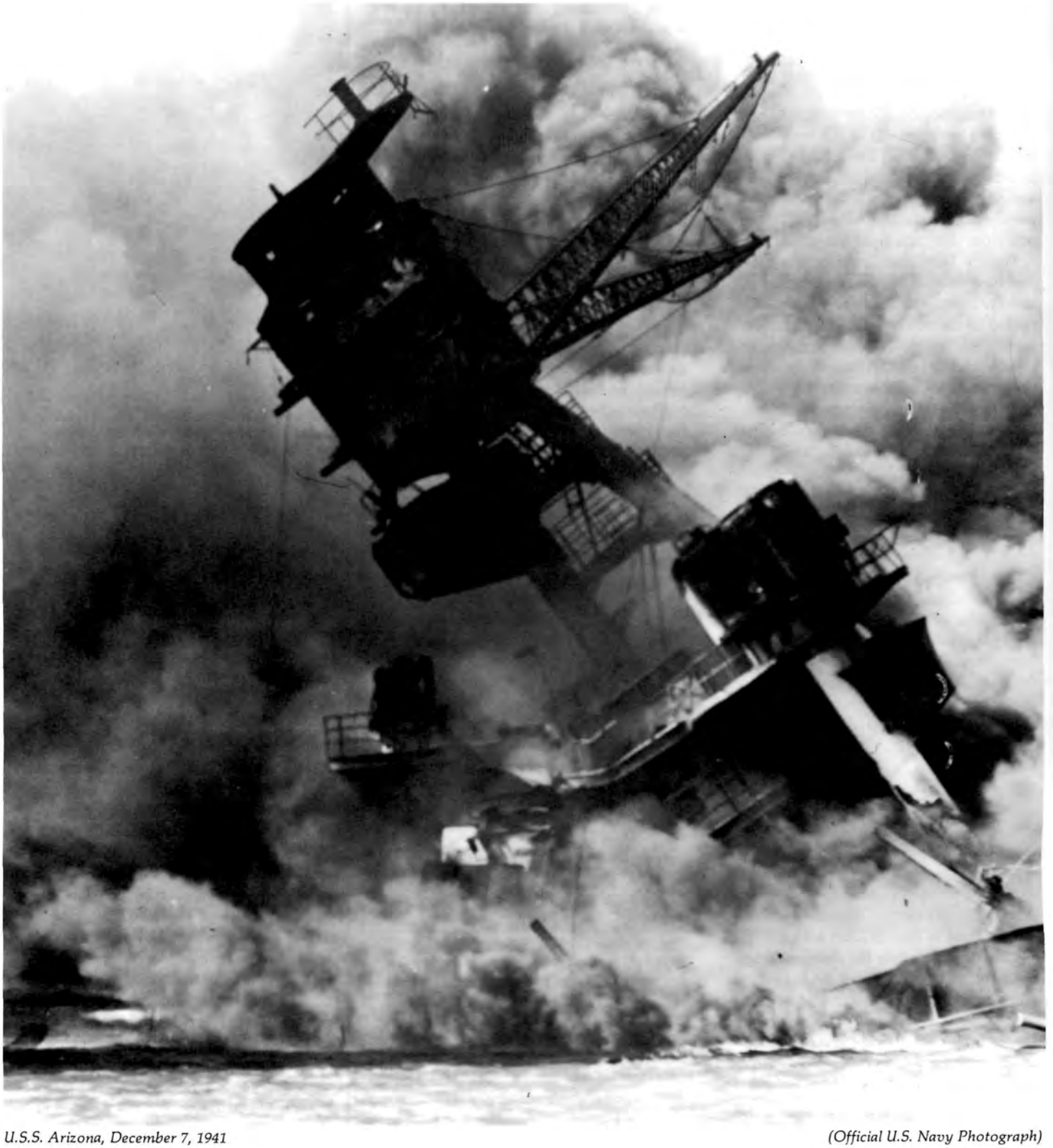
ganization, developing competent staff, programming a realistic budget, and providing a solid interpretive program. It was not long, however, before we saw how shallow our knowledge was of the park's primary resource, the U.S.S. Arizona.

Visitor curiosity first spurred our need to learn more about the battleship. We found ourselves unable to answer their questions. Though information existed from the battleship's construction to its sinking, details of the Navy's 1942 salvage operation remained hazy; and since 1943, virtually no new information had become available.

Survivors of the Arizona, as well as relatives, friends, and acquaintances of the crew, made it extremely important for the staff to be well informed about all aspects of the disaster. Failure would jeopardize Park Service credibility nationally, and park management credibility locally, par-



U.S.S. Arizona, December 7, 1941 *(Official U.S. Navy Photograph)*

ticularly in its relationship with the U.S. Navy.

Therefore, gathering sufficient information to support the interpretive program became an important management objective. We were unsure about the condition of the battleship. Was it in danger of collapse from corrosion? Could increased settlement affect the memorial structure? What was the source of the oil which continued to seep from the hulk? When we turned to the Navy authorities for answers, we found they knew little more than we.

The deficiencies in our knowledge could be divided into two categories: historical and resource management. We set about designing a research program to provide us with information on both. We suspected, however, that a hands-on, underwater examination of the battleship would be required. Research at the National Archives narrowed the recent history gaps. We then drew up a list of questions for which no documentation could be located. This formed the basis for a programming document (10-238) sent to Dan Lenihan, chief of the Submerged Cultural Resources Unit, Santa Fe. Soon, Dan and I worked out survey plans as well as a tentative timetable and estimated cost.

The next step was to obtain funding. Turning to our cooperating association, we requested $10,000 to fund an underwater survey of the battleship. The AMMA board of directors, which includes two survivors of the Pearl Harbor attack, granted us the needed funds. So we officially requested use of the Submerged Cultural Resources Unit from the Southwest Region. We explained that the international significance of the battleship mandated the trained eyes and judgment of a competent archeologist. Also, carrying out the job within Pearl Harbor, one of the U.S. Navy's major installations, required the blessings of the Navy for the survey. To accomplish this, we had to demonstrate the concrete, identifiable goals of a completely professional operation.

I presented a position paper explaining the need for the survey and including the timetable, the goals, and the resumes of survey team members to the staff of Rear Admiral Conrad J. Rorie, USN, the incoming Commander, Naval Base Pearl Harbor.

The proposed survey goal included the close examination of all submerged, exterior portions of the ship and sufficient measurements to produce a set of scaled, three-dimensional drawings. The survey would be carried out in two phases. Phase I would be an overall look at the vessel and mapping of a specific portion, plus some determination of the time, manpower, supplies, and funds required to completely map the ship and a close examination of the port hull for torpedo damage to settle a disagreement between survivors and official records as to a torpedo strike. The deck and hull would be examined for evidence of hits by other aerial bombs. Datum points on the hull of the Arizona and the pilings supporting the memorial would allow periodic measurements and identify further settlement or shifting of the hulk. The team would carefully examine two portions of the port hull for buckling or distortion from steel and concrete landings built in 1950, and pinpoint the persistent oil seepage as well as any remains of the ship or other historic debris on the harbor bottom. Phase II entailed total mapping of the ship.

Admiral Rorie approved the project, and loaned Navy divers to assist. He also added an additional research item—to locate an area on the harbor bottom close to the memorial where remains of the U.S.S. Arizona's deteriorated superstructure could be deposited, safe from souvenir hunters.

Finally, on September 13, after planning conferences with Navy divers and the early morning removal of the lethal five-inch artillery shells, the project began. Overall control rested on Dan Lenihan, assisted by team archeologist Larry Murphy, and Jerry Livingston, a scientific illustrator/diver pulling together myriad measurements, notes and videotapes taken during the seven days of operations. The divers from the Arizona Memorial and War in the Pacific NHP served as field crew, the underwater equivalent of archeological "shovel bums," attaching lines, recording measurements, setting datum points, and holding lights for the video camera.

Lenihan decided to map a small portion of the badly damaged forward section. The team set a center line of nylon cord from the bow aft, eventually all the way to the stern. They then set plastic clips at carefully measured predetermined intervals, and numbered the clips in consecutive order, measuring from each interval to features along the ship, such as gunwales, or turrets, then recording them with grease pencil on plastic easels.

Slowly, complicated by poor visibility, sections of the ship began to evolve on paper. Given silt levels in the Harbor which limited visibility to less than ten feet, the mapping project became similar to entering a strange room in the dark with pencil, paper, measuring tape and a flashlight, to make a scale drawing. Fortunately, more of the ship was mapped than anticipated due to assistance from the Navy's Mobile Dive and Salvage Unit One.

September 20, the first phase of the project came to an end. Over 200 hours of underwater time had been accumulated without mishap, a testimony to divemaster Dave McLean's careful management. A substantial amount of the ship had been mapped, with final drawings expected early in 1984.

We found the hull in generally good condition. The luxurient sealife covering virtually all exterior portions of the wreck seems to act as a barrier to salt water corrosion. No evidence of torpedo damage was found. However, the ship rests on the bottom with a slight list to port. Evidence of a torpedo hit in the lower section of the hull could be obscured by the ship resting directly on it. Holes were found in the main deck, some from battle damage, but most from the salvage operation. Datum points were set as well. The survey team sank steel pins in the hull and pilings, and located the oil seepage adjacent to the Number Three Main Battery mount. In examining the old 1950s landings attached to the port hull gunwales, no apparent distress to the ship's fabric seemed evident. Finally, we located a "sterile" area on the harbor bottom some 25 yards from the ship's last resting place where the remaining fragments of her superstructure could be safely deposited.

From the mapping work carried out, we now have a good idea of what the second phase of the operation will entail. The Arizona Memorial Museum Association has tentatively agreed to fund the undertaking, scheduled for twelve days in early October 1984. Plans include using the scale drawings to make a large scale model of the wreck for site interpretation.

Overall, the survey represents the best aspects of a successful cultural resources management oriented project. Excellent rapport and understanding developed between management and researchers. Hours spent in pre-project discussions resulted in research objectives tailored to yield the maximum amount of historic data as well as serve management needs. I believe the U.S.S. Arizona survey demonstrated close cooperation and involvement between research and management—from which the park is still reaping benefits. Indeed, the manager of a television station in Phoenix, Arizona, saw the ABC-TV report on the project, called the Memorial, and offered to help fund the second phase of the undertaking. With cooperation like this, the future looks bright.◎

The author is the Superintendent of the U.S.S. Arizona Memorial.

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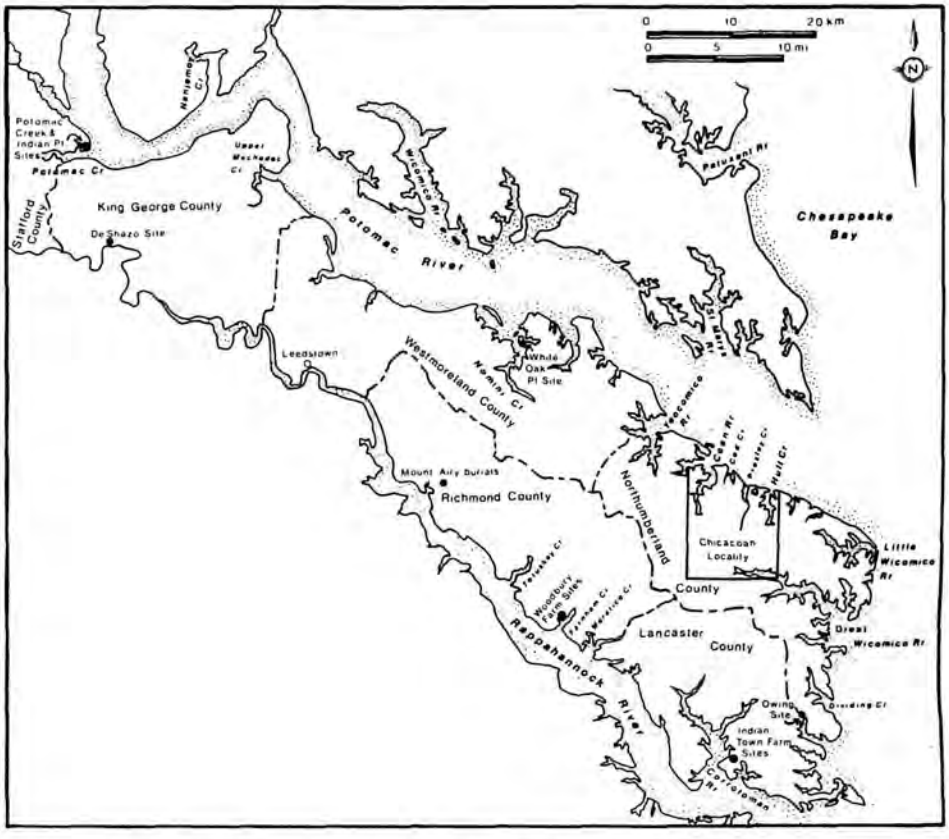
the mid-nineteenth century A.D. were to be recorded. Aerial photography and survey proved to be the best means to achieve this end.

I felt that such an approach would be successful because: 1) approximately 60% of the study area is in cropland; 2) the soils are mainly light colored sandy loams or silt loams (Elder et al. 1963: 13-21), which serves to enhance the soil discoloration of archeological middens; and 3) most of the topography consists of necklands, broad areas of level to gently sloping terraces along the Potomac River, or uplands composed of tableland dissected by streams. Such broad, flat expanses are usually tilled. Also, flat land makes it easier to discriminate the soil and crop marks of archeological sites from soil and crop marks of differential drainage.

Once everyone knew that I intended to use low altitude aerial photography, I encountered skepticism from those who think it impossible to employ this technique in the eastern woodlands. As Baker and Gummerman (1981:10) noted in their study of remote sensing applications in the Midwest, major portions of the eastern woodlands are not forested. This is obviously true of the Chicacoan locality and of the Chesapeake-Tidewater region, in general. Three other comments were heard frequently: 1) "if the archeological sites are so obvious from the air, they will be just as obvious from the ground"; 2) "in areas of previous collection by amateur archeologists or survey by professionals, all the major sites will be known"; and 3) "why bother with low altitude aerial photographs when the areas have already been photographed by the Soil Conservation Service or the state highway department." These tidbits of archeological scripture notwithstanding, I decided to plunge headlong into the folly of flight, photography and archeology in the eastern woodlands.

Aerial photograph of Coan Hall (44 NB 11), a seventeenth century anglo-american site. The archeological remains are visible as a series of dark soil marks in the cultivated field adjacent to a winter wheat crop.



Map showing the Chicacoan study area and its relationship to the Northern Neck of Tidewater Virginia.

Applications of Aerial Photography and Survey

From the beginning, I was faced with constraints on money and equipment. During the three years of 1976, 1978, and 1979, I had a total of $450 which I could apply toward aerial photography and survey. Nor did I have access to a diversity of camera equipment or belly mounts for vertical, aerial photography. Thus, it was my purpose to determine, by the most in-

expensive means possible, the optimum conditions for discovering and recording archeological sites through oblique angle aerial photography and survey.

Prior to each flight, we briefed the pilot as to what to look for, examined topographic maps of the area to be flown, discussed current land and weather conditions, and planned the flight path. We used several different light aircraft, mainly Cessnas. In order to increase the probability of spotting small archeological sites, we flew at low altitudes, usually between 500 and 1,000 feet (152 and 305 meters).

Once a suspected site was observed, the plane circled once to determine the best photographic angle, taking into consideration the altitude and the angle of the plane, the angle of the sun, the direction of cultivation, and the nature of the suspected archeological site. Both color and black-and-white photographs were taken, using a hand-held, 135 mm camera.

Archeological sites in the Northern Neck were detected primarily by differential crop growth or coloration and by variations in soil color. Positive crop marks appeared strongest in small grain crops, such as wheat, rye, or barley. For example, if a winter cover crop, such as wheat, grew over an archeological midden, the wheat would be denser, greener and thicker than in surrounding areas.

Positive crop marks showed best when the soils began to warm in late winter or very early spring, ostensibly due to the higher organic content and moisture retention capability of the midden deposits compared to the surrounding natural sandy loams and silt loams (Limbrey 1975:328-330; Baker and Gummerman 1981:11). Depending on the severity of the winter, the moisture in the soil and the daily increase rate in air temperatures, March proved the most advantageous period to observe positive crop marks in winter cover crops. The best oblique angle photographs were taken during midmorning, when the angle of the sun was low and little or no distortion occurred from heat rising off the fields.

Soil marks provided the most obvious means of detecting sites in the Northern Neck. Best observed in cultivated fields, they appeared as gray-black stains against the lighter colored natural soils of the region. By paying close attention to the topography and subtle color differences, the gray-black color of middens can be discriminated from the dark brown color of moisture laden soils in poorly drained areas. Archeological soil marks show best photographed at an angle to the furrows.

Various archeological sites or features appeared as soil marks. One of the most striking examples was the site of the first permanent English settlement on the Virginia side of the Potomac River. The seventeenth century site of Coan Hall and its dependencies is visible as a number of gray-black stains. A long, linear feature can also be seen, which represents the remains of a road leading to the plantation complex. Another Anglo-American site, this one an eighteenth century structure, and its dependencies, is clearly visible as dark soil marks in a freshly cultivated field.

The results of the survey were very encouraging. Ninety-five percent of the sites located from the air and predicted to be historic Anglo-American sites were later confirmed as such. Large prehistoric or historic Indian sites greater than 2.5 acres (about 1 hectare), with dark earth or dense shell midden, were also detected with 90% chance of success. Intermediate prehistoric or historic Indian sites between 10,800 square feet (about 1,000 square meters) and 2.5 acres (1 hectare), with dark earth midden or dense shell midden, were spotted with about a 60% probability of being correct.

Conclusion

By way of concluding, let me offer a few rules of thumb regarding my experience with oblique angle, low altitude photography. First, archeological sites visible as soil marks are not always obvious from the ground. Even if they were, site detection from the air is faster, economical, and the observer obtains a better appreciation of the environmental setting. In one 20 minute flight over a portion of the Rappahannock River's north bank, nine suspected archeological sites were observed and all nine later confirmed. Just because amateurs have collected from an area or professionals have completed some surveys does not mean all the major sites have been recorded. And finally, while the Soil Conservation Service and the state highway department have aerial photographs available for inspection, they are of limited value because photographed at a less optimal time of year and at too high an altitude.

Indeed, the optimum seasons for spotting sites have proven to be late winter and early spring. Archeological sites usually appear as dense and/or very green areas of small grain crops, or as gray-black soil marks. However, aerial survey at altitudes higher than approximately 2,000 feet (612 meters) usually proves useless for spotting small, historic Anglo-American archeological sites.

I make no pretense that low altitude, oblique angle, aerial photography is an innovation. However, it certainly has not been used to its fullest potential. The technique is well suited to a Coastal Plain environment consisting of broad, flat necklands and interior plateaus covered by extensive agricultural fields. With continued systematic experimentation, low altitude, oblique angle, aerial photography can be adapted to a variety of physiographic settings. ◎

The author is Regional Archeologist, National Capital Region, and Research Associate, Department of Anthropology, Smithsonian Institution. His work with low altitude flights was presented at the Annual Meeting of the Society for American Archeology, April 17, 1982.

KNIFE RIVER INDIAN VILLAGES
A Useful Man

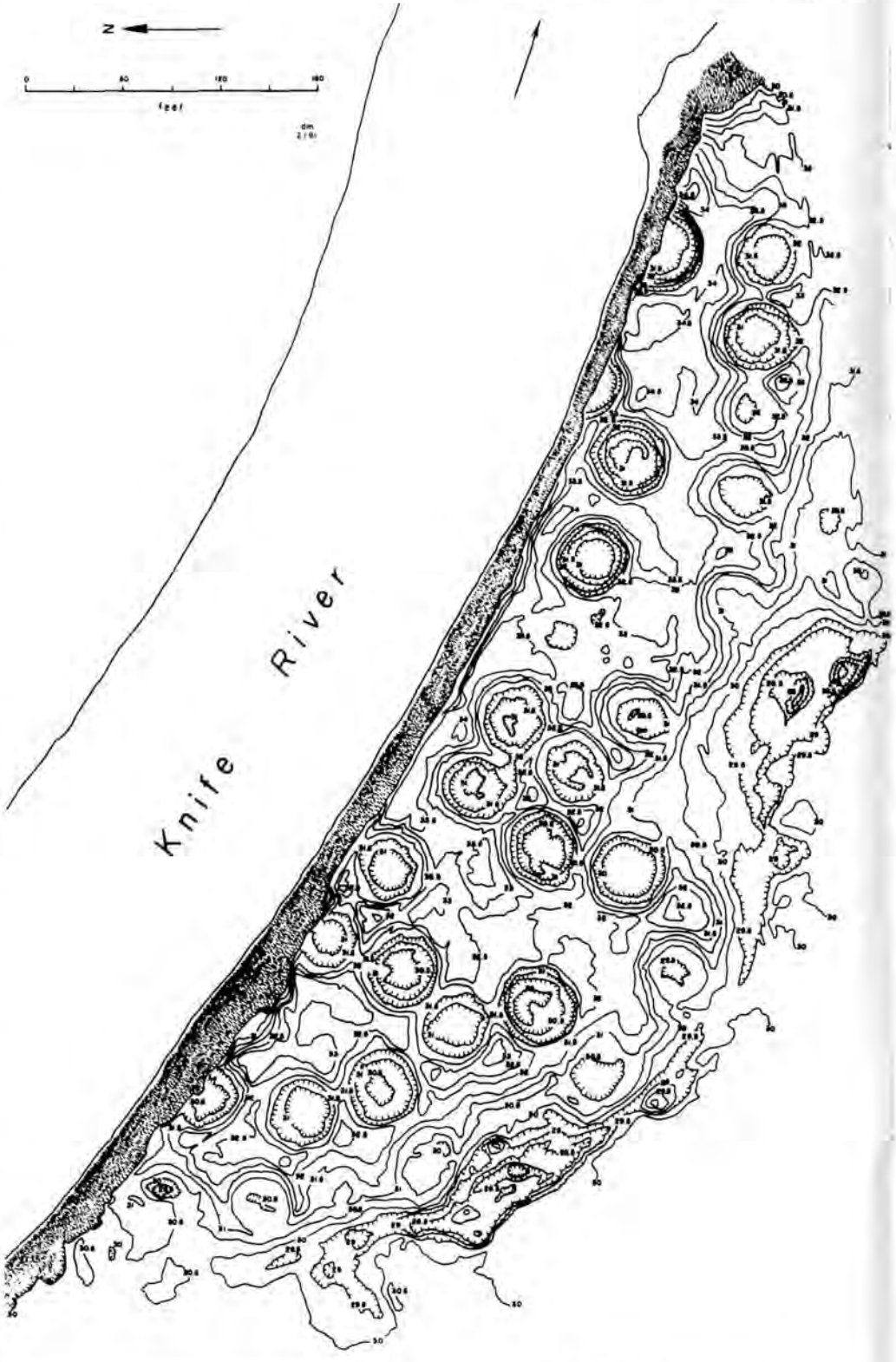
Thomas D.

One of the tasks facing each unit of the National Park System is the creation of a cultural resources inventory. Several forms of cultural resource inventories exist which partially achieve this purpose, i.e., the List of Classified Structures and the National Register of Historic Places. However, these do not provide a complete list of archeological properties because they either restrict themselves to above-ground resources or reflect incomplete knowledge of park resources. Few parks have comprehensive archeological resource inventories to assist management decisionmaking.

One notable exception is Knife River Indian Villages National Historic Site in North Dakota, which commemorates the traditional homeland of the Hidatsa and Mandan Indians. At its creation, only four archeological sites were known, three of them highly visible remains of earthlodge villages occupied in late prehistoric and early historic times. Travelers such as Lewis and Clark, John Evans, Manuel Lisa, and Prince Maximilian and the artist Karl Bodmer have left a wealth of written testimony about the inhabitants of these villages. Despite their exceptional state of preservation, none of the sites received much attention from archeologists prior to their acquisition by the Park Service.

During the past several years, an intensive archeological and ethnohistorical research program has focused on the park. Beginning in 1976 and continuing for each summer through 1981, archeologists from the University of North Dakota and the NPS Midwest Archeological Center conducted research to determine the park's archeological resources. The research would provide understanding of the regional prehistory and ethnohistory, using an interdisciplinary approach to test new archeological methods in the field and laboratory. A comprehensive research plan prepared by Dr. Stanley A. Ahler of the University of North Dakota outlined specific tasks tied to regional archeological research problems as well as to the specific cultural resource management needs of the park. This document provides a sound methodological and problem-oriented basis for the entire archeological program at Knife River.

Essentially, there are three primary facets to the overall research program, the first being a comprehensive inventory and



Contour map of the Sakakawea Village, produced photogrammetrically from aerial photographs. The contour interval is six inches.

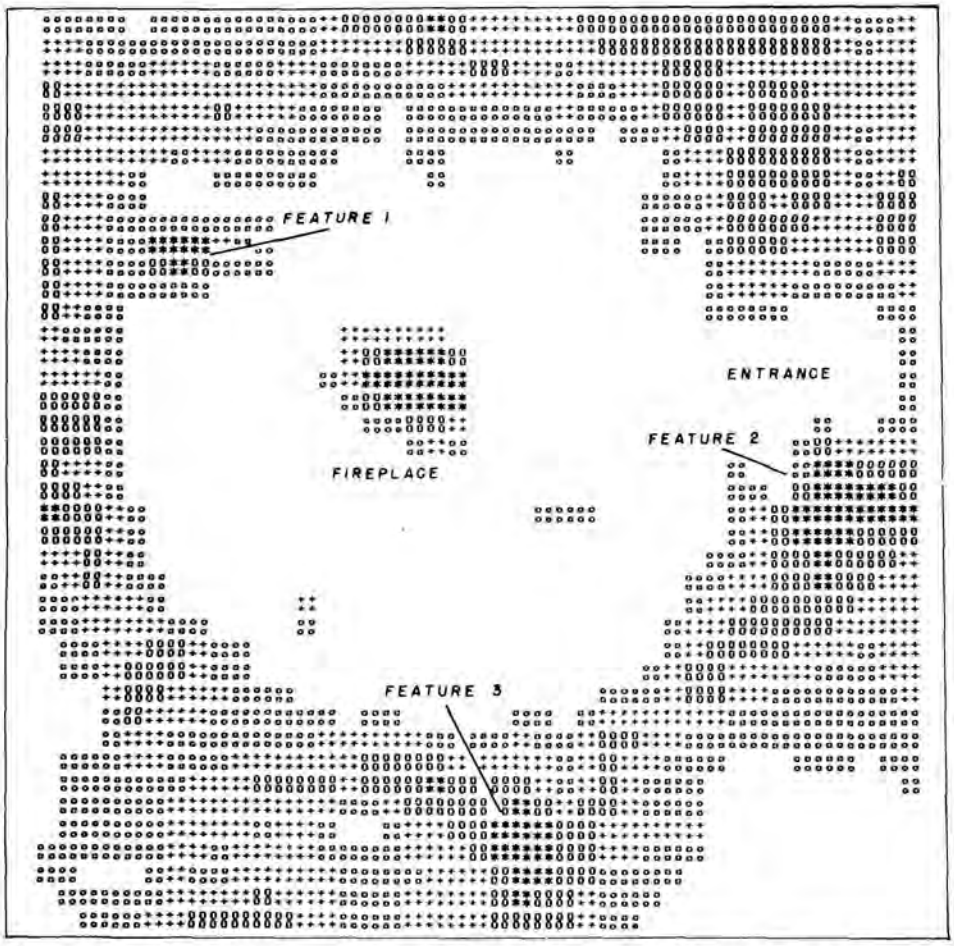
ARCHEOLOGICAL INVENTORY: agement Tool

Thiessen

evaluation of the archeological resources. We systematically examined the 1157 acres of fee land in the park, using a battery of different techniques including a power auger in timbered tracts, careful mapping of surface artifacts, and a point-quarter statistical sampling method to measure artifact density in formerly cultivated tracts. An aerial photo program provided base contour maps of the villages and the entire park. Aerial photographs, photogrammetrically-produced contour maps, a proton magnetometer survey, and historic documentation were also used to identify archeological sites.

The second major aspect of the program was a proton magnetometer survey of each of the three major village sites. Where the ground has been disturbed by digging and refilled with material different from the surrounding soil matrix, or where earth has been subjected to the effects of fire, deviations from the surrounding magnetic field can be mapped with proton magnetometers. Plotting and analysis of the collected magnetic measurements are presently underway; when completed, small-scale maps for each of the park's historic earthlodge villages will be invaluable for locating interpretive trails and signs and for designing future scientific excavations.

The third important aspect of the Knife River research program entailed a reassessment of the voluminous historical literature pertaining to the park. Under the direction of Dr. W. Raymond Wood of the University of Missouri, contemporary documents describing the eighteenth and nineteenth century fur trade between the Mandan and Hidatsa, and traders from Canada have been surveyed for significance. A new understanding of the nature and frequency of this trade has emerged as a result. This has important implications for both the park's interpretive story and the interpretation of the archeological research results. In addition to this synthesis of the early fur trade at Knife River, other ethnohistorical research has uncovered significant information leading to a new interpretation of the 1837 spread of smallpox among the Missouri River tribes.



A computer-produced magnetic map of one of the earthlodges at the Sakakawea Village. The central fireplace and entryway extension are obvious. Features 1, 2, and 3 mark probably locations of storage pits.

The archeological sites on park fee lands have been identified and numbered, and, in most instances, a good deal of information made available about their archeological content and significance. Instead of the four archeological sites known at the park's authorization, the inventory of sites now stands at 55, many representing more than one period of past use or occupation. Consequently, the park's interpretative story appears far more complex than previously thought. In addition, the archeological inventory has offered practical advantages to park management, allowing the development of boundaries for National Register districts and also excluding those areas where archeological resources do not exist. The parkwide archeological survey has also located two contiguous archeological sites, subject to gradual deterioration from the temporary visitor's center/administrative building directly above. The need to relocate the headquarters complex elsewhere in the park has subsequently been recognized.

This and other management concerns (including proposed improvement to a country highway transversing the park) are all addressed in the recently completed cultural resources management plan—a plan made more useful through the research of the last several years. Because of this work, the park management at Knife River Indian Villages possesses sufficient knowledge of the resources to accurately define their cultural resource management problems, and resolve them. ◎

The author is an archeologist at the Midwest Archeological Center in Lincoln, Nebraska.

PAST PATTERNS OF HUMAN ADAPTATION: Ozark National Scenic Riverways

Mark J. Lynott

Located in the eastern Ozark region of southeast Missouri, the 180 miles of Ozark National Scenic Riverways contains giant springs, narrow valleys and beautiful rivers. Protection of cultural resources and interpretation of the rich cultural heritage of the eastern Ozarks are major components of NPS activities in the park. To determine the number, location, and significance of archeological sites and to study changes in past patterns of human adaptation, the Midwest Archeological Center began a multi-year study of the park's prehistoric and historic archeological resources in 1979. The study resulted in the discovery of numerous archeological sites and has illustrated the potential of these resources for scientific research and public interpretation.

A major thrust of the study involved reconstruction of past environmental conditions in the area surrounding the park. As part of this research, Dr. Roger Saucier (U.S. Army Corp of Engineers) is determining the geomorphological history of the Current River valley and the relationship of landforms to past patterns of human settlement. In association with Saucier's geomorphological work, Drs. Paul and Hazel Delcourt (University of Tennessee) have been conducting palynological studies of bog deposits. These studies have produced long pollen sequences which will permit reconstruction of past vegetation history and climatic changes for the past 30,000 to 70,000 years.

Within the emerging environmental and climatic reconstructions, the research program has attempted to identify the sequence of past cultures occupying the park. While test excavations and other traditional archeological activities have contributed, the study has also benefitted from the knowledge and data controlled by amateur archeologists and private artifact collectors in the area. This component of the study complies with the Archeological Resources Protection Act of 1979 which recommends professional archeologists work with amateur archeologists and private collectors to make better use of data for the interpretive benefit of the general public. Dr. James Price (southwest Missouri State University) has documented the artifacts in these private collections, using that information to reconstruct the spatial and temporal extent of prehistoric cultures in the Current River watershed. The study has shown continuous occupation from approximately 10,000 B.C. until 1300 A.D.

Among the many questions investigated by the study, the Early Missisippian settlement within the park has received considerable attention. Large civic-ceremonial sites with associated temple mounds in the major alluvial valleys exemplify the Mississippian culture. Mississippian sites in the park conform to a more dispersed settlement pattern. Testing has shown that many of them date two to three centuries earlier than major Mississippian towns like Cahokia near East St. Louis, Illinois. The discovery of Ozark participation in the early development of this culture has led to its reexamination.

Reconstruction of past adaptive patterns in the eastern Ozarks is highly dependent upon reconstruction of past dietary and subsistence patterns. Traditionally accomplished by analysis of food remains from archeological sites, the technique may be more or less accurate, depending on the types of food preserved. Chemical analysis of human skeletal remains provides an opportunity to collect data directly related to the foods ingested by specific individuals. Dr. Thomas Boutton (Baylor College of Medicine) has conducted a study of the stable carbon isotope content of human skeletal remains. His study provides information on corn consumption. After examining twenty human skeletal samples from southeast Missouri and northeast Arkansas dating from 2500 B.C. to 1880 A.D., Dr. Boutton found that corn became a significant part of the diet after 1100 A.D. His data suggests that a dependency on corn farming did not characterize the Early Mississippian populations, thus contradicting existing hypotheses linking the development of Mississippian culture to the adoption of corn agriculture.

Radiocarbon techniques applied to charcoal or other organic substances generally date prehistoric archeological occupations. The research program at Ozark National Scenic Riverways also utilizes thermoluminescence to date prehistoric ceramics. Thermoluminescence measures the energy trapped in the crystal structure of minerals like quartz, present as temper, or occurring naturally within ceramic clays. The thermoluminescent energy trapped in ceramics develops from exposure to radiation after firing a ceramic vessel. The annual dose rate of radiation to which a ceramic sample is exposed may be calculated from the soil matrix surrounding the sample in its archeological context. Once the dose rate is estimated, then the total thermoluminescence content of the sample may be used to calculate the age of the ceramic since its last firing.

Testing to determine the age and nature of sites like Old Eminence has also contributed extensively to the interpretation of life in historic times. Documented written and oral histories claim Civil War bushwackers burned the original county seat of Shannon County, Missouri. The site was rediscovered as part of the research study. Absence of domestic refuse indicates the county seat served a strictly political or civic function in 1861. The data collected from Old Eminence will be used in conjunction with that collected from farmsteads, mills, roads, etc. to reconstruct adaptive patterns on the eastern Ozarks frontier during the early nineteenth century.

These examples represent only a portion of the ongoing archeological investigations at Ozark National Scenic Riverways. The interdisciplinary study has produced exciting research data and essential management information. A motivated research team, incorporating local expertise, new methods and ideas, and a highly communicative interdisciplinary approach, has made the program a success. The study will continue through 1985 and will result in professional and popular publications interpreting the archeology in the park area. ◎

The author is an archeologist with the Midwest Archeological Center.

ARCHEOLOGICAL APPLICATION OF HISTORIC STRUCTURE REPORTS

Frances Joan Mathien

The cultural resources manager often tackles tough and unexpected problems, but the Park Service also provides the manager with some unexpected tools to accomplish the job. CRM policy provides for the documentation, evaluation, and preservation of historic and prehistoric cultural resources. One way to accomplish this is through a historic structure report (HSR), a document including all available information on a particular structure and its setting. Not only does the HSR provide anthropological/archeological, historical, and architectural/engineering findings, but also an evaluation of data and recommendations for treatment/possible use. the author responsible for such a report often uncovers critical information important to park management.

The HSR contains a record and analysis of all periods of construction, modification, source materials, building techniques, other evidence of use, cultural and social setting, and history. Therefore, conducting new studies prior to writing such a report sometimes becomes necessary. This situation arose in 1983 when Kin Nahasbas, an Anasazi site in Chaco Culture National Historical Park, was scheduled for stabilization and maintenance.

Initially, we obtained a history of archeological site work. Reginald G. Fisher We needed to know how much of the site had deteriorated since 1935, what stabilization had really occurred, and how the stabilized walls compared to original wall first conducted a survey as part of the School of American Research/University of New Mexico investigations from 1929-1937. In conjunction with his survey, several sites, including the great kiva at Kin Nahasbas (1935), were partially excavated by Dorothy Luhrs, a graduate student who produced the field report.

Between 1935 and 1983, the NPS conducted two additional surveys. The 1972 records indicate the presence of house rooms, trash, hogans, petroglyphs, etc., but none of the published reports emphasize these features. In fact, some of the publications studied the great kiva exclusively and termed it "isolated."

Reviewing these documents to obtain a history of Kin Nahasbas, we located none of the field notes, maps, and artifacts collected in 1935. Faced with little or no detailed information, we saw a need for accurate maps and detailed notes, not just on the great kiva, but the entire site. This meant archeological fieldwork. The Division of Cultural Research developed a research design addressing both managerial and archeological research questions.

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Biregional . . .

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provides archeological assistance to two regions. This biregional responsibility has proven to be a viable, efficient alternative to the single-region centers. The arrangement, however, offers both advantages and disadvantages.

Organizationally it can be difficult to work across regional boundaries. The Chief reports directly to the Region Director of the Midwest (host) Region, which programs base funding and personnel for the Center. The region also provides management, contracting, and equipment support for the Center's biregional work. However, the Center maintains close working relationships with the Rocky Mountain (non-host) Region, coordinating activity through the Associate Regional Director for Planning and Resources Preservation, the Chief of the Cultural Resource Division, and the Regional Archeologist. In addition, it maintains a continuous liaison with the Assistant Manager and branch chiefs of the Midwest/Rocky Mountain Team, Denver Service Center, to provide archeological assistance for DSC projects.

Occasionally the host region feels it provides services to the second region for which it goes unrecompensed. On the other hand, the non-host believes it lacks control over the Center's activities and finances. The programs must be balanced with the pragmatic needs of the regions and parks considered, to accomplish archeological programs within existing financial and personnel constraints.

Supervision of the archeological center from a host Regional Director's perspective must be based on his knowledge and trust of the Center Chief. In addition, the Center must follow appropriate channels for authority. The signatory authority for all archeological contracting, as well as personnel ceilings and actions is controlled by the host region. Review of project work plans and research designs as well as the review of the summary and final reports of the work involves both the host and non-host regions. Annual review of the Center Chief gives both Regional Directors an opportunity to evaluate how well the Center meets NPS objectives.

The success of the bi-regional archeological center can be measured by the quality of the data developed in specified time frames and whether it meets service and professional needs. Maintaining Park Service leadership in preservation and conservation archeology and the success of programmatic memoranda of agreements with the cultural resource community is dependent upon that output. But that leadership image must be real, based upon high standards for research and high quality in the management of our archeological resources. From the perspective of both the Midwest and Rocky Mountain Regions, the bi-regional concept, although faced with occasional problems, is a successful and economical method of accomplishing that objective. ◎

Randall Pope is Deputy Regional Director, Midwest Region. Lorraine Mintzmyer is Regional Director, Rocky Mountain Region. F. A. Calabrese is Chief, Midwest Archeological Center.

COVERING THE FIELD:
Rock Art In The National Park Service

Debra Berke

When prehistoric people first struck rock and made pictures, they left extraordinary records to their passing. Rock art refers to the intentional modification of non-portable stone by human beings. Pictographs (rock paintings) and petroglyphs (rock engravings) may be found in many national parks. At Amistad NRA in Texas, pictographs of animals, humans, and geometric designs were painted in prehistoric rock shelters. The largest concentration of petroglyphs in the State of Hawaii is within Hawaii Volcanoes NP. These petroglyphs range from gameboards and salt pans to contemporary designs of people on horses holding guns. A spiral petroglyph at Fajada Butte in Chaco Canyon NP has been identified as a solstice marker. the Park Service has a mandate to protect these echoes from the past. But much work remains to be done.

Two major repositories of rock art data, the University of California, Los Angeles Rock Art Archive, and the Centro Camuno Di Studi Prehistorici in Italy, contain a wealth of information. With so many rock art sites in National Park Service areas, we need to correctly interpret pictographs and petroglyphs for the visitor, using the most up-to-date research. We also need to be sensitive to the preservation needs of rock art. Information from the Rock Art Archive and the Centro Camuno Di Studi Prehistorici could be useful.

The NPS Rock Art Task Force, which initially met in 1981 to develop policies and guidelines, felt a bibliography of park-related references might be useful. I completed a literature search and indexed the references into park and geographic areas, as well as subject matter. The bibliography focuses on the description and interpretation of rock art on or near NPS sites. General references have been divided into: descriptive reports, information on management and preservation, and interpretation of rock art. The microfiche card included in this issue of the CRM BULLETIN contains the first draft of the bibliography. As you will see, a number of references discuss rock art resources in particular national park areas, many of them archeological site reports. The parks with reference material on rock art are as follows: Alibates Flint Quarries NM, Amistad NRA, Bandelier NM, Big Bend NP, Canyon de Chelly NM, Canyonlands NP, Capitol Reef NP, Carlsbad Caverns NP, Chaco Culture NHP, Death Valley NM, Dinosaur NM, El Morro NM, Glacier NP, Glen Canyon NRA, Golden Spike NHS, Golden Gate NRA, Grand Canyon NP, Gran Quivira NM, Quadalupe Mountains NP, Hawaii Volcanoes NP, Hovenweep NM, Joshua Tree NM, Lava Beds NM, Mesa Verde NP, Navajo NM, Pecos NM, Petrified Forest NP, Saguaro NM, Santa Monica Mountains NRA, Virgin Islands NP, Wupatki NM, Yellowstone NP, Yosemite NP, and Zion NP.

Petroglyphs near Crack In Rock ruin, Wupatki National Monument.

Petroglyphs near Crack In Rock ruin, Wupatki National Monument.

Descriptive Reports

Archeological field studies make up most of the descriptive reports. However, the two major continent-wide surveys of rock art were not done by archeologists but by an art historian (Grant 1967) and a physician (Wellmann 1979). These descriptive reports include information on location and inventory of sites, the culture creating the art, classification of design elements, and geographic distribution of styles. Photographs and drawings are usually included. Some archeological studies attempt to date rock art either by dating associated artifact materials like habitation refuse; matching dated material like pottery; or determining period through time markers. (See V. Smith, for description of Big Bend pictographs representing European contact.)

The analysis of rock art produces some interesting information. Two archeologists obtained data on petroglyphs by experimentally producing rock art themselves (Bard and Busby 1974). James Keyser (1975) proposed that native peoples of the Northern Plains and the Great Basin were culturally related, based on a rock art motif found in both.

Managing and Preserving Rock Art

Many articles have been published on protection and treatment for rock art. (See articles by Berke 1981, Grant 1967, Meighan 1981, Schaafsma 1966.) These references emphasize that rock art sites are threatened by natural, biological, and manmade phenomena. Water and wind erode sites; vandals deface rock art.

Protective techniques to minimize damage have been developed, including diverting water off a petroglyph or controlling public access to sites. Conservators are developing techniques to treat damaged rock art, such as cleaning graffitti, as well as experimenting with treatments to strengthen the art. Because of the threats to the resource, researchers advocate complete documentation of all known sites to insure against loss of the record. Recording standards have been proposed by the American Committee to Advance the Study of Petroglyphs and Pictographs. Information on technical conservation treatments can be found in professional journals, museum publications, and conference notes.

Interpretation of Rock Art

The bibliography includes a number of exciting, recently published references that offer ideas on the multiple meanings of rock art. The interdisciplinary nature of the topic has been demonstrated by the archeologists, anthropologists, astrono-

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Petroglyphs near Crack In Rock ruin, Wupatki National Monument.

Petroglyphs near Puerco ruin, Petrified Forest National Monument.

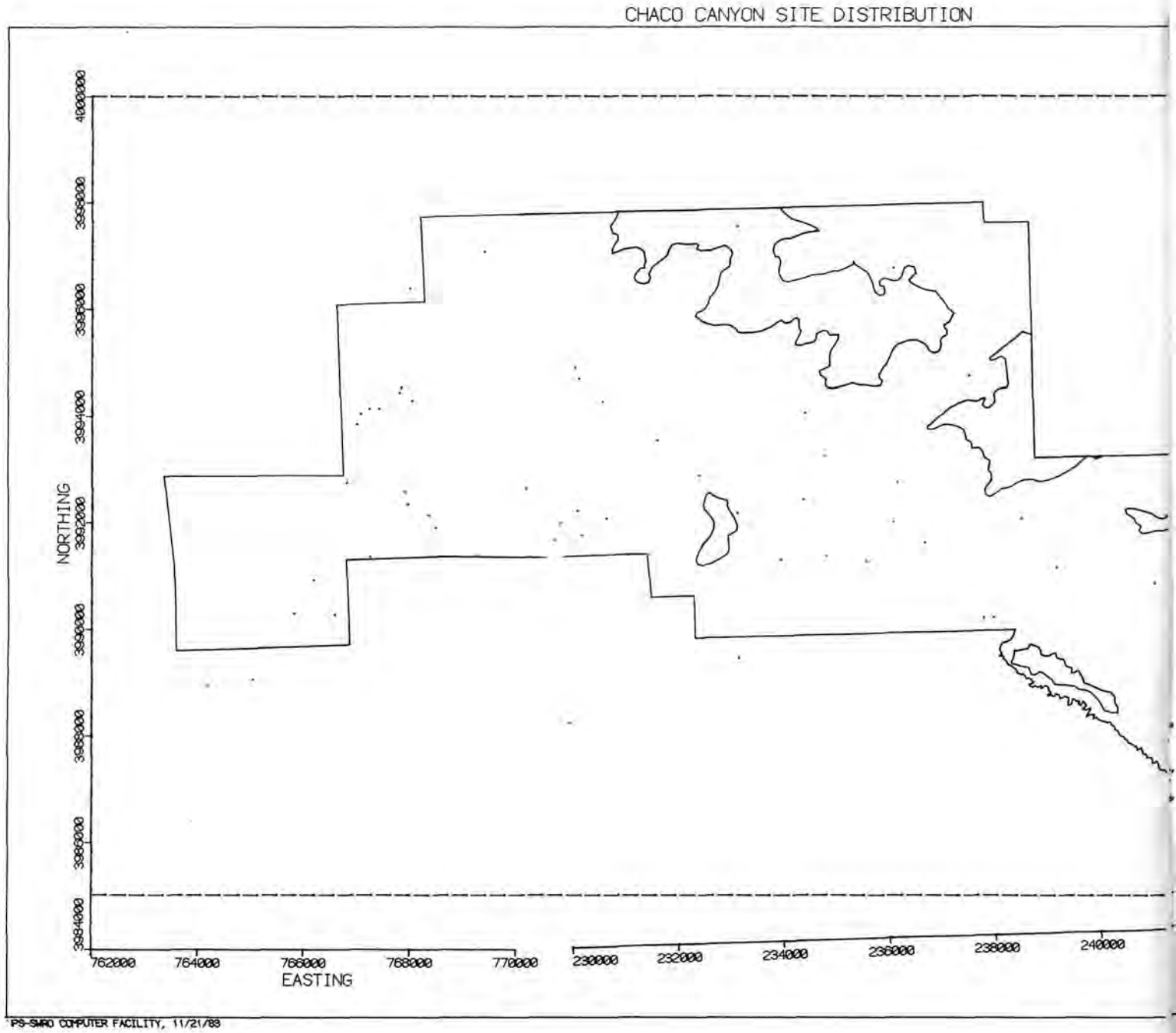
PARKMAN: A Computer Graphics Program for Cultural Resource Management

W. James Judge

Background

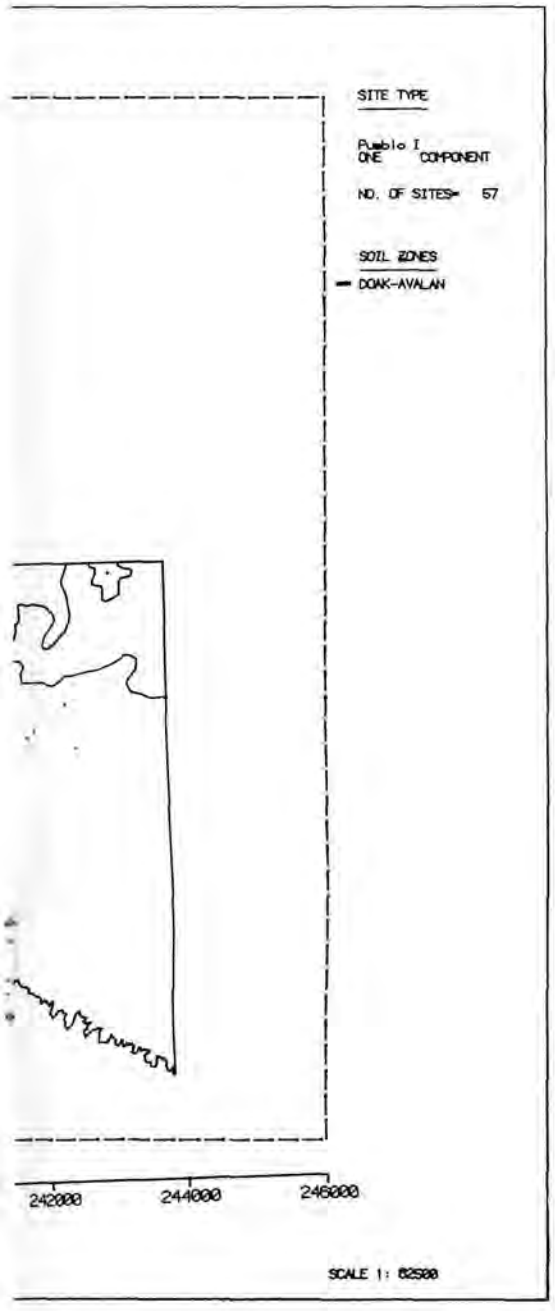
PARKMAN is an acronym for Park Management, an interactive computer program with full graphic capabilities developed by the Division of Cultural Research, in conjunction with the Division of Special Programs, Southwest Region. The program provides regional planners, cultural resource specialists, and park managers with computerized information sufficient to make refined and knowledgeable decisions governing the long- and short-term management of NPS cultural resources. Initially developed to manage the archeological resources of Chaco Culture NHP, the program is being modified to assist other national parks and handle a variety of cultural and natural resources.

To manage cultural resources effectively, site data and data on the natural environment must be readily available to



Computer printout illustrates how site density and environmental zones are related (in this case, Chaco Canyon).

accommodate long-range protection planning, scientific research, resource interpretation, and development planning. In parks with a complete cultural resources inventory, the volume of data is staggering. A computerized data base management system is the most efficient way to compile, process, and retrieve information in a format most useful to planners and managers. PARKMAN was developed specifically for such cultural resource management purposes and has the additional advantage of a refined graphics (plotting, mapping) capability.



Operation

PARKMAN, a user-oriented, user-interactive computer program, permits archeological sites and digitized maps or zones to be selected through combining a wide range of attributes (variables). Selected sites and zones can then be plotted, or only sites located within the zones. Further, the entire park area, or any segment of it, can be selected through positioning a cursor on the computer screen. For example, the user might want to select an area in the park impacted by heavy erosion, a common occurrence following intensive summer rainstorms in the Southwest. In addition to the erosional channel digitized with recent aerial photos, the computer will plot all sites in the chosen area or only those sites selected by time period, size, function, etc. by positioning the cursor on the screen, distance from any site to the channel can be calculated immediately, and site numbers and additional information can be displayed quickly. An almost endless variety of other management, research, and interpretive applications are available, as desired and defined by the user.

Equipment

PARKMAN currently runs on the NPS Data General Eclipse system in the Southwest Regional Office. A dedicated line to the Division of Cultural Research in Albuquerque links the main frame with a Tektronix 4052 graphics terminal and a Tektronix 4663 interactive plotter, at a baud rate of 9600. Tektronix terminals, a Versatec plotter, and a digitizer are also available in the Southwest Cultural Resource Center.

The Data Base

In developing the data base for PARKMAN, we computerized information on approximately 2400 archeological sites located during the Chaco Project surveys. The UTM coordinates of each site served as the basic locational index for the site record. Additional information included maps of boundaries, soil and vegetation zones, roads, stairways, cairns, historic structures, and main erosional drainages in the Canyon, digitized from 7.5 minute topo sheets or recent aerial photos. These have been incorporated into the PARKMAN file and are accessible for analytical purposes.

Applications

PARKMAN provides a variety of applications for park management, including preservation, interpretation, and research. This is possible through its ability to overlay environmental and/or management zones on site locations, and its ability to select virtually any combination of site type, size, and function for display and analysis.

As the program develops, we plan to add other management-significant variables, such as site visibility (e.g., standing wall heights, type of masonry, amount of rubble, etc.); artifact collections made; excavation or other research dates; location of site records and artifacts; stabilization history; preservation status; National Register status; site interpretation status; historic structures report; and archival documentation.

In addition to these variables, there will be a simple formula for determining site significance based on site redundancy within environmental zones (e.g., combination of landform, soils, vegetation) and classification by chronological and functional units. Sites can easily be ranked based on the relative frequencies of a given site type to all sites within the zone.

Predictive Modelling

Once natural, cultural, and administrative zones in a park area have been digitized and entered in the data base, it becomes relatively easy to develop the next feature we plan to add to PARKMAN, the capability of predictive modelling. This refers to the ability to estimate cultural resource frequencies within selected zones in unsurveyed park areas, based on knowledge of actual site locations gained from resource sampling surveys. Such ability will permit informed cultural resource management decisions prior to a complete site inventory. Though this approach cannot predict exact site locations, site densities within selected zones can be estimated. As information is gained through future archeological inventory, the accuracy of the estimates can be improved.

Future predictive modelling applications will include the capability for selecting alternative locations for planned park development projects and ranking them on the basis of predicted low site density. Backcountry patrols also can be routed to areas of predicted high site density to check for vandalism. For areas susceptible to fire, the computer can estimate site density from coordinates, thus permitting a rapid decision as to whether an archeologist should accompany fire crews.

Although comprehensive site inventory is the long-term goal for cultural parks and for cultural (historic) zones within parks, refined density estimates of cultural resources, based on techniques of sample

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THROUGH ANCIENT EYES:
Ethno-Historic Research In The New Alaska National Parklands

G. Ray Bane

The Alaska National Interest Lands Conservation Act of 1980 established four new park units above the Arctic Circle. These totaled over sixteen million acres of intact and unaltered arctic and subarctic ecosystems. These units contain important cultural resources—archeological remains dating back in excess of 8,000 years as well as present day examples of long established native cultures, who rely on the land for basic subsistence needs.

The Kuuvangmiit, a group of Inupiaq Eskimos living along the upper Kobuk River in Northwestern Alaska, historically have used lands within three of the new park units. Until the late 1930's and early 1940's, these people maintained a traditional semi-nomadic lifestyle, ranging over ten thousand square miles. Now residing in three permanent villages, the Kuuvangmiit still rely on hunting, fishing, and gathering. But as elders pass from the scene, accumulated cultural traditions, skills, and history are irretrievably lost. In response to this situation, the Northwest Alaska Native Association (NANA) has initiated programs designed to document and utilize traditional cultural information. An Elders' Conference has been formed to provide advice and guidance for the younger generation.

The National Park Service is also interested in recovering and documenting cultural information, particularly that which pertains to the new parklands in Alaska. In order to intelligently manage subsistence activities, a historical perspective on human uses of wild resources is particularly important. The rapidly dwindling number of Alaska Native elders born near the turn of the century can provide present and future generations with an appreciation for man's ingenious ability to adapt to and thrive in a sparse, demanding environment.

One of the most knowledgeable and respected elders in the NANA region is Joe Sun, a Kuuvangmiit Eskimo born at the turn of the century. Joe served as a primary informant for a subsistence study of the Kobuk River Eskimos from 1974 to 1975. During the fall of 1982, a follow-up project was initiated with funding from the Alaska Humanities Forum and in-kind contributions from NANA and the National Park Service. The first phase of the project produced a record of Joe's life, with detailed information on use areas, methods of travel, travel routes, resource concentrations, established campsites, place names, sites of historic and spiritual significance, etc.

The second phase began at a base camp at the headwater of the Noatak River. From there, extensive aerial surveys were made of the northern subsistence territory used by Joe Sun and other Kuuvangmiit hunters prior to the late 1940's. For seven days, the field party flew over the vastness of the west central Brooks Range while Joe pinpointed and named old camping sites, resource concentrations, travel routes, environmental hazards, burial sites, sites of battles between Eskimos and Indians of "long ago," and sites for raft building to travel mountain streams. What appeared as a wilderness untouched by man became, through Joe Sun, a cultural landscape rich in history, spiritual values, economic importance, and implications to the development of the Inupiaq worldview. This information was recorded on topographical maps, in notebooks, and on tape.

During seven days of intensive fieldwork, the research party flew roughly 2200 miles. Approximately 130 new place names were recorded, along with a considerable store of environmental and historic information. The first draft of this report should be ready for review early in 1984. Publication may be possible by midsummer, with further information available on the project at that time.

Thanks to Joe Sun's desire to share the traditions and environmental knowledge of his people, we obtained a clearer picture of the dynamics of a subsistence lifestyle as well as the rich cultural blanket that rests gently on the land. Perhaps most importantly, the research party had the rare opportunity to see the natural world through the eyes of an ancient people. From this perspective, it would seem that the lure of natural areas to modern man transcends mere esthetic values. Wilderness has so influenced hunting and gathering cultures that perhaps modern man returns to it as to his first and truest home. ◎

The author is cultural resource manager for Gates of the Arctic National Park, and Preserve and Northwest Alaska Park areas.

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survey and predictive modelling of ecological zones, may be enough to manage cultural resources in natural park areas where site densities are low or where visitor or natural impacts are minimal. Refinement of this approach appears to have considerable potential for park managers and regional staff. It should help them to plan and implement resources management and park development more efficiently and at considerable cost savings.

Currently, data gathered during an ongoing survey at Wupatki National Monument is being entered into a PARKMAN program similar to the Chaco program. The Division intends to use PARKMAN during its future studies at Bandelier, NM also. In the meantime, we are writing a "universal," more generic PARKMAN program to allow park managers to modify several variable labels and adapt the program to specific areas. The generic PARKMAN will handle natural resource as well as cultural resource data, and should function as an effective management tool when it is completely operational in FY-1985. ◎

The author is the chief of the Division of Cultural Research. Requests for additional information may be addressed to this division, Southwest Region, FTS 474-3780.

THE PRESERVATION OF RESEARCH MATERIALS

Anthony Crosby

In the years ahead, the Park Service will be facing a significant problem involving the preservation of research materials. Too often, irreplaceable and nonreproducible research information has been lost. The need and directive to preserve such material is found on page eight, Chapter V of the "Management Policy (1974)."

> Field notes and collections of artifacts and structural features retrieved in the conduct of research in archeology and historic architecture, or during restoration projects, shall be preserved for the benefit of future investigators and as an aid to continued preservation.

How we accomplish this directive is another question with a complex solution.

Preservation professionals undertake the actual collection of field notes and other written materials, and frequently they seem to feel that all important information can be found in their reports. Why preserve material on completed projects where follow-up action has been taken? "I put everything of importance in the report" is not an atypical comment. One professional may have developed a detailed system for recording conditions and retaining the written materials afterwards; another may be less systematic and record field notes on anything from recording tape to field books to notes on the back of a napkin. But too often they fail to realize that even poor notes can be extremely important to future researchers, if the alternatives are no notes at all.

In addition to the notes of staff researchers, valuable field research often comes from a contractor's report or construction drawings. While this material logically belongs to the government, the data rarely ends up in a location or condition where it can be used again.

Other valuable information can be found in the notations and comments associated with contracts. Field notes produced in conjunction with construction contracts at the Denver Service Center become a part of that particular contract file. However, such files are scheduled for destruction six years after the contract ends (NPS-19, Appendix B, D22-15). Only when an individual recognizes their value, removes them from the contract files, and stores them elsewhere, are they preserved. Unfortunately NPS-19, 1978, revised 1979, the Records Management Guidelines, addresses the storage of many finished documents but remains silent on the storage of field notes. NPS-28 does require that archeological field notes be incorporated into the accession system of the National Catalog, thus keeping notes in association with artifacts; and architectural research can be treated as archival material and handled by the National Catalog system. But even so, such action is often not taken.

Just what is the actual size of the problem? How many research materials are collected from projects of various complexities? The following offer a few examples.

- Archeological work at Harpers Ferry, both a salvage and a research project, aimed at gathering information on several nonextant architectural features. It required one field season and produced approximately 100 boxes of artifacts as well as 5 feet of field notes, recorded in a standardized 8½×11 format, with some oversized drawings and plans.

- An archeological investigation at Sitka, Alaska, oriented to locating nonextant structures, resulted in 20 boxes of artifacts and approximately 2 feet of field notes.

- The preservation project at Tumacacori National Monument produced 6 feet of written material, consisting of 9 field books, rolled charts and graphs (some up to 4" in diameter), tables and charts (8½×11 format), and notes on irregularly sized sheets, as well as full and half size drawings and prints, cassette recording tapes, video recording cassettes, topographic maps and irregularly sized drawings. Photographic coverage included original black and white prints mounted on mat boards (for photogrametric purposes), other variously sized back and white prints, color prints, color xerox copies, both color and black and white negatives, several models, approximately 3,000 color transparencies, and unpublished research reports. An architectural investigation oriented to a full restoration of a large complex building or series of buildings could produce even more research materials and of a more varied nature.

- A rather large historical project, the Historical Resource Study for Golden Gate National Recreation Area, resulted in approximately 2,000 maps and building plans, 8 feet of 5×8 research cards, 10 feet of manuscript material and 1,500 photographs. A smaller Historical Resource Study for Fort Lapwai at Nez Perce National Historical Park resulted in 100 photographs, 150 slides, one foot of manuscript material, and 2 feet of 5×8 research notes.

The research materials in both archeological and architectural investigations can probably be related to the amount of field work and laboratory work involved. Hence, an estimation could be made and funds set aside to preserve the research materials they produce.

The quantity of materials needing preservation is extensive, and they arrive in any shape or form—cassette tapes, video cassette tapes, individual sheets of paper, maps, plans, photographs, and slides, field books, and specifically designed forms, magnetic cards and tapes, mass computer data storage tapes and disks generated during the compilation and analysis of field data. An architect may produce more oversized materials than an historian and an archeologist, but all face the problem of providing for the preservation of materials in tremendously varied formats with various life expectancies.

A few researchers feel that all pertinent information should be included in reports and anything left over be destroyed. However, most seem to think their materials should be saved and returned to the park of origin. This seems to be a proper first step. However, the necessity for adequate storage facilities at the park poses a problem of great proportions. Indeed, some professionals feel that sending materials to the park only postpones the problem and that if we have been entrusted with the preservation of the research, then we must take a more active role. Indeed, some professionals choose not to send materials to the park since they have little confidence in park preservation facilities. This is obvious to even the casual observer when boxes of research materials from past projects stack up under tables and in corners of a professional's office.

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Rock Art . . .

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mers, art historians, psychologists, and historians interested in the subject, Among some of the plausible explanations referenced are hunting magic, clan symbols, astronomical significance, mental experiences, and commemorating events. Examples of prehistoric astronomical recording include a supernova in 1054 recorded by Native Americans throughout the Southwest, and possible Navajo planetaria made in the ceilings of rock shelters.

Dr. Heizer and Dr. Baumhoff (1962) suggest hunting magic as an explanation for much of the Great Basin petroglyphs (Nevada and Eastern California). Great Basin designs tend toward abstract geometrick shapes with occasional groups of sheep, deer, or human figures. They are located near game trails and in narrow draws leading to water. It is known from Great Basin ethnology that shamans often directed the hunt, thus supporting the pictures as part of a ritual to increase the supply of game.

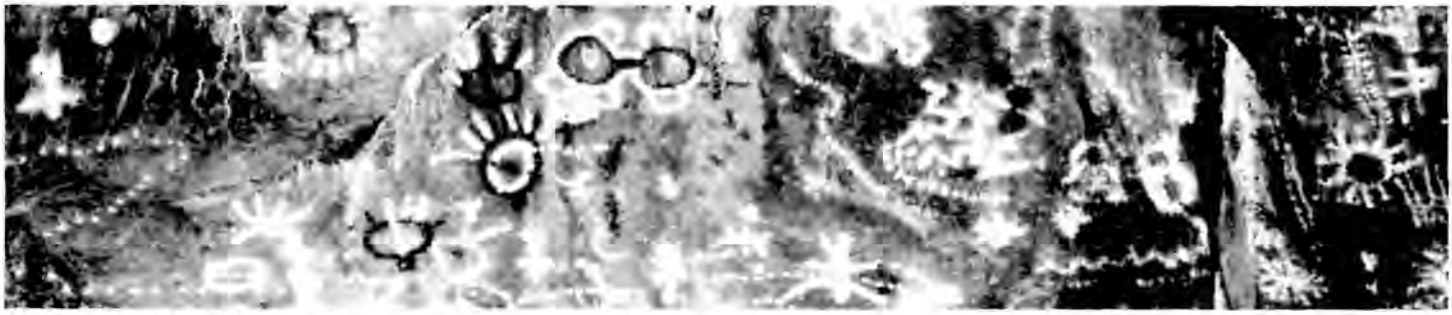
Other scholars suggest that rock art may be stimulated by drug or phosphene-generated (non-drug related) images universal in human populations. An example may be the colorful work of the Santa Barbara Chumash, known to ingest the Datura plant which induces visions. (See articles by Hudson and Underhay 1978, Blackburn 1977, Meighan 1981).

The references described above show that rock art research is vibrant and interdisciplinary. In order to make this information more available to parks, we are distributing the microfiched bibliography in draft. Additional references and comments are being solicited from the field to refine and complete the bibliography. These should be sent by July 30, 1984 to Chief Anthropologist, National Park Service, (434), Department of Interior, Washington, D.C. 20240. ATTN: Debra Berke.

Once all the comments and additions are received, the bibliography will be reissued as a final product. Using this collective NPS effort, we will be able to develop a comprehensive bibliography of sources relevant to NPS sites. ◎

The author is Staff Curator (Museum Management), WASO.

Photos by J.P. Schafer



Pictograph panel, Fern Cave.

Preservation of Research Materials . . .

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There are reasons for this attitude. During the 1950s, a directive ordered parks to destroy records, many of which included research files. At Whitman Mission, materials which later proved invaluable to an historian survived only because one person assumed responsibility for their preservation. Optimally, original research materials, not convenient copies, should be stored and cared for by and at the park of origin, or become part of an effective archival system. But what do we do while waiting for the optimum situation to become a reality?

One historic architect keeps all field notes, sketches, and photo in three-ring binders, then transfers them to the park when the project ends. However, even conveniently sized binders have a non-permanent look. One possible further step may be to bind these same materials in hardbound covers. The Western Archeological Center used to bind their reports on ruins stabilization projects. One can find them in red cloth covers with gold lettering taking their place on a park's library book shelves rather than the "working" shelf. I am convinced that those reports will be better preserved simply because they look more important and more permanent.

Another more pragmatic solution might tie the research material to another document with a more permanent status. Field notes for an historic structures report might be included as an appendix in the HSR, though no doubt expanding the length of the document and functioning most effectively on relatively small projects. With large projects, size reduction might be required to enable field notes to be included. One microfisch card contains approximately 55 separate pages; 1,000 pages of research material can be reproduced on 19 microfisch cards, at a cost of $2.25 each for the originals and 25 cents each for the duplicates. I plan to include microfisch originals of research notes as an integral part of an HSR in the near future. And what about permanency? Its life expectancy has conservatively been placed at 30 years.

Granted, some type of backup system may be desired also. Then, the originals or their copies could provide such a system, with recopying on a cyclic basis of perhaps every 50 years. Videodisc technology may offer another effective means of preserving data.

Given the extensive nature of present research materials, we may have exceeded our capabilities to effectively record and store all the backlogged information. However, if a system is devised now, the effort required for each subsequent project may be more manageable. Nevertheless, the optimum preservation approach will still require a significant commitment by Park Service management. ◎

The author is an Historical Architect, Denver Service Center.

The Associate Director, Cultural Resources invites comments on this subject to determine the scope of the problem. Please address all responses to: CRM BULLETIN, 18th & C St. NW, Washington, D.C. 20240.

Observations on CRM BULLETIN issues are welcomed in the form of *Letters to the Editor*. Please address all responses to: CRM BULLETIN, 18th & C St. NW, Washington, D.C. 20240.

Archeological Application . . .

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fabric. Three major research goals were outlined: 1) define and record architectural features of the great kiva prior to stabilization (required for the HSR); 2) define and analyze the great kiva as part of the larger site; and 3) define and analyze the site as part of the larger community.

The archeological site of Kin Nahasbas consists of an Anasazi pitstructure (beneath a great kiva), house blocks, and trash, a great kiva (or large, round "ceremonial" chamber), petroglyphs, and several Navajo hogans and small village sites. Part of an important prehistoric community inhabited by ancestors of today's Pueblo Indians, it represented one of over 75 Chaco Anasazi communities linked by a road network. The apparent sophistication of this ancient civilization makes it important to gain accurate, complete data on the communities in the system, as well as detailed information on individual sites.

Analysis of the data from Kin Nahasbas is still underway, but the information to date has increased our knowledge of site history, during Anasazi occupation and in more recent times. Evidence shows the earliest occupation of Kin Nahasbas during the early 900s. A pitstructure (previously unknown), roomblock, and trash from this period suggest that the earliest occupation coincided with the earliest rooms at Una Vida, the larger town site in this community. The building of a great kiva over the pitstructure and additional roomblocks during the 1000s may correlate with the growth of Una Vida and shed light on the importance of this strategically located community. Major reconstruction efforts at the great kiva, as well as remodeling of several features, suggest occupation for over two centuries during the florescence of the Chaco Anasazi. The data being analyzed from Kin Nahasbas will significantly expand management knowledge of the site, and, with the completion of the HSR, assist management decisionmaking.

In summary, HSRs provide management with a valuable source of thoroughly documented cultural research information. At its most useful, the HSR emerges from a research design encompassing the needs of both the archeologist and the manager. In this way, Park Service efforts not only protect a particular site or area, but add to the reservoir of knowledge concerning our cultural heritage in its broadest context. ◎

The author is an archeologist with the Division of Cultural Research, Albuquerque, NM.

Evolution Of Historic Structure Reports

Randall J. Biallas, A.I.A.

Background

In 1935, following the Moore House restoration at Colonial National Historical Park, Charles E. Peterson prepared a report entitled *The Physical History of the Moore House, 1930-1934*. This report initiated the Historic Structure Report (HSR) concept. To record documentary and physical research concerning the evolution of a structure, its condition before physical work, and finally the physical work itself established a National Park Service precedent. It underscored the importance of documenting such projects for future researchers.

Although the Service prepared many HSRs in the decades following 1935, it was not until 1957 that the Director of the Park Service sent a memorandum to field offices concerning the "Historic Buildings Report Form." This established a Servicewide organizational structure for preparing the HSR. To assure some professional standard of quality and administrative order through a diverse, decentralized organization, a Servicewide organizational structure and approval process became necessary. Then in 1971, a Historic Structure Preservation Guide (HSPG) for maintaining historic structures was required and an organizational structure imposed with issuance of the *Activities Standards*.

The public is little aware of the HSR's role in Park Service preservation programs. This is also true of the Historic Structure Preservation Guide. The purpose of this article is not to present a detailed administrative history of these documents, but simply to trace their evolution and structural development for the preservation community.

Director's Memorandum of February 12, 1957, "Historic Buildings Report Form;" Associate Director's Memorandum of October 24, 1958, "Historic Structure Reports;" Inventory with Classification and Work Code for Historic Buildings and Structures . . . 1960; and Historic and Prehistoric Structures Handbook, 1963.

The 1935 Moore House report was prepared after completion of the project. However, beginning in 1956, Field Order 11-56 required that a "Survey Report" outlining the history, condition, and proposed work on a historic structure be prepared and approved by park management before the physical work began. This resulted in the evolution of a rather complicated HSR approval process and organizational structure as outlined in the Director's memorandum of February 12, 1957, the Associate Director's memorandum of October 24, 1958, the Inventory with Classification and Work Code for Historic Buildings and Structures, and the Historic and Prehistoric Structures Handbook.

The Director's 1957 memorandum was the first Servicewide management document outlining a multidisciplinary approach to the HSR. The organizational structure included an Administrative Data Section, Historical Data Section, Architectural Data Section, Archeological Data Section, Landscape Data Section, and a Furnishing and Exhibits Data Section. The Associate Director's 1958 memorandum was the first document to use the term "Historic Structure Report."

Activities Standards, 1971

The organizational structure of HSRs changed in 1971 with the issuance of the Activities Standards. Only an Administrative Section, Historical Data Section, Archeological Data Section, and an Architectural Data Section were required. The physical work was to be recorded in a new report called a Historic Structure Preservation Guide which also contained information regarding the maintenance of the structure.

Historic Preservation Fund, Grants Management Manual, 1979

In 1979, the Heritage Conservation and Recreation Service issued the Historic Preservation Fund, Grants Management Manual. This document included an organizational structure for HSRs prepared under the Historic Preservation Fund based upon the Activities Standards. This organizational structure is still current.

Cultural Resources Management Guideline (NPS-28), 1980, 1981

With the issuance of Release No.1 of NPS-28, the organizational structure of a historic structure report changed to include only three sections: an Administrative Data Section, a Physical History and Analysis Section, and an Appendix. Release No. 2 continued this practice. The Guideline, in contrast to the Activities Standards, integrated the three professional discipline sections into one Physical History and Analysis Section. This change encouraged a multidisciplinary working relationship leading to integrated recommendations to park management. The Guideline also helped to standardize certain sections of an HSPG to enable computerization and encourage the development of a Servicewide preservation maintenance financial plan.

Future Evolution

Currently under development is a computerized inspection schedule with an inspection instructions system called the Preservation Maintenance Information System (PMI), to become part of the HSPG system. This is a cooperative effort by the North Atlantic Region's Historic Preservation Center and the Washington Office's Historic Architecture Division. During 1983, work began on the computerization of preservation instructions and material specifications. From Charles Peterson's precedent setting report, the HSR and HSPG concept has expanded to fill a crucial role in NPS management.

The author is Assistant Chief Historical Architect with the Park Historic Architecture Division, WASO.

POTHUNTING DETERRENTS AT PETRIFIED FOREST

In April of 1983, a routine patrol discovered one 3' by 2½' deep test hole at a small pueblo near the southeast boundary of Petrified Forest National Park. Patrols were increased. Again in August of 1983, six more test holes were discovered. At that time, we began ranger surveillance of the site, based on known methods of operation by two suspects. We requested and were granted an NPS Law and Order Account to fund our activities and were able to purchase and install at the site a sophisticated, state-of-the-art detection device. As the weather turned sour, we withdrew our physical surveillance but left the detection device in place and activated for the winter. We plan to resume surveillance when the "pothunters" come out in the spring.

In preparation for this case, we have had the site surveyed by an archeologist from the Western Archeological Center in Tucson. We also have contacted the Assistant U.S. Attorney to determine exactly what she needs as evidence and suspect apprehension.

Finally, the U.S. Forest Service generously loaned night vision goggles and exchanged intelligence. Since 1982, we also have been involved in a cooperative agreement with BLM and the State of Arizona for mutual funding of aerial surveillance flights over the archeological sites on state, BLM, and Petrified Forest lands. Along with the flights, we have issued numerous press releases and received television coverage from the ABC affiliate in Phoenix. We feel the deterrent value of this effort is important.

—Chris L. Andress
Chief Ranger

Pothunter's footprints, now cast in plaster for future comparisons and held in evidence.

FORT RALEIGH RESEARCH PROJECT

The 1983 Fort Raleigh research project used data collected from proton magnetometry and electromagnetic induction studies to identify possible remains of the 1587 English settlement for archeological testing. The upcoming celebration of the site's 400th anniversary makes the identification of archeological resources an important management goal. Therefore, six areas were examined through limited archeological testing. Early analysis indicates limited amounts of cultural debris dating to the proper historical period.

—David G. Orr
MARO

Excavations at RS-1, Fort Raleigh NHS.

WUPATKI NATIONAL MONUMENT ARCHEOLOGICAL INVENTORY

The third field phase of a six-year archeological survey at Wupatki National Monument has just been completed. We have completed the fieldwork for 13,160 acres (ca. 37.5% of the monument), and recorded a total of 1,022 archeological sites.

To date, most of the prehistoric archeological materials observed from the survey show a mixing of cultures—Kayenta Anasazi, Sinagua, Winslow Anasazi, and Cohonia. The historic materials include Navajo, Hopi, and early ranching and mining interests in the Wupatki area. Several agricultural areas and water control features have been located which include field markers, rock alignments, terrace systems, small field structures, check dams, and reservoirs. Several lithic resource areas and stone quarry areas have also been located and recorded.

Computerizing the survey information will allow the study, manipulation, and handling of a tremendous volume of information. Future survey data will help evaluate current ideas about the region, update and reevaluate previous research, and lead us toward more positive approaches to better understanding the area.

—Bruce A. Anderson
Supervisory Archeologist

MITIGATION UNCOVERS NEW DATA

Historical archeology at urban sites generally impacts areas which have undergone disturbance from historic and contemporary occupants. Nevertheless, information is still obtained which can be checked for accuracy against the historic record. At the Adam's Birthplace National Historic Site, a considerable amount of data evolved during the mitigation of drainage ditches around both Adams' structures. Present archeological knowledge about the size and location of the milk room throws into question the sequence of construction, as well as sketches of the time. Excavations at the Paul Revere House, Boston National Historical Park, uncovered mid-eighteenth century artifacts in an undisturbed context below a cobblestone surface near the rear door of the house.

In addition, the Mid-Atlantic Region Archeology Division recently completed a large water line mitigation project at Fort McHenry. Major discoveries included the foundation of the 1813 sally port traverse, the late 18th century scarp wall, the bombardment period bridge piers and drawbridge abutments, and elements of the pre-1840s sally port brick paving. In addition, a broad-based stratigraphic investigation was completed for a large part of the FOMC reservation and existing utility installations. The mitigation work allowed archeologists to survey and monitor the resources of a previously unsurveyed area. The information uncovered necessitated changing the direction of the pipeline in order to avoid endangered resources.

—David G. Orr
MARO

SHIPWRECK PRESERVATION v. SUNKEN TREASURE

In 500 hours of underwater work, Southeast Region project archeologists and volunteers made controlled surface collections and mapped and probed 1620 square meters of the Legare Anchorage Shipwreck Site. A 1.5% sample of the site's central portion was excavated, yielding information pertinent to the ship's preservation and the destruction caused by treasure salvors. Artifacts collected from the ship included three pewter plates, three British bayonetts, distinctive French ceramic ware, and two English cutlasses in scabbards. Analysis of the data, the salvor's collection, and research conducted in Canada, Great Britain, and the United States has identified the ship as the *HMS Fowey*, a 44-gun fifth rate vessel which sank in 1748 due to pilot's error. Litigation regarding salvage rights on the site was decided in favor of the United States in late July. Because the ship lies embedded within Biscayne National Park and within U.S. territorial waters, Judge Atkins declared ownership by the NPS. The decision gives added protection to the other 45 shipwrecks in the park and extends to submerged resources throughout the country.

Further underwater investigations occurred at Fort Jefferson National Monument to determine the nature and significance of two 17th century Spanish shipwrecks. Twenty-five thousand square meters were subjected to intensive visual survey, with twenty-seven one meter square excavation units completed. The main site has been tentatively identified as *Nuestra Senora del Rosario*, a galleon of the 1622 Spanish plate fleet, the second as a patche from Havana which sank during salvage operations on the *Rosario*.

—David G. Orr
MARO

Probing

How The Park Service Manages . . . *continued from page 2*

photographed on the enclosed microfiche card. Field archeologists are being encouraged to survey the list, update it, and return their comments to Debra Berke so that the bibliography can be completed.

Research efforts of a different kind are represented by Ray Bane and Gary Cummins. Ray Bane's efforts produced a useful body of ethnographic data recorded laboriously over seven weeks of fieldwork. Cummins' efforts, in conjunction with the Submerged Cultural Resoruces Team, headed by Dan Lenihan, dramatically increased Service knowledge of the U.S.S. Arizona and its current condition.

Finally, Anthony Crosby tackles the question of how to preserve research notes and associated materials. Since the 1970s, NPS policy has been that field research notes, field catalogs, and remote sensing data be included as a part of the collections. Whether this is the case in practice is of interest to us, and your comments are solicited.

It is hoped that this issue and the previous issue of the CRM BULLETIN will serve as a useful overview of Park Service archeology. The cooperative effort among management, archeology, and cultural anthropology serves an increasingly important role in the continued preservation of our cultural resources.

Douglas Scovill is Chief Anthropologist, WASO.

MANAGING PACIFIC PARKS ARCHEOLOGY: Or Park Staffs Need To Include Archeologists

Bryan Harry

Pacific parks have no awesome Keet Seel or Cliff Palace. And, new managers—superintendents, interpreters, rangers, maintenance chiefs—on occasion don't know of the archeological resources for which they are responsible. Early on my first job in Hawaii I poked around the flank of Kilauea, saw red lava erupt, glimpsed endangered honeycreepers, puzzled the identification of several dozen rare plants—but was frankly confused by Hawaii Volcanoes National Park's huge historic district designation commemorating an archeology which didn't seem to exist. Luckily, an old-time local marked a tiny, precise location on some stereo photo pairs and suggested I take a look.

Sometime later I did, and after discovering the remote 2'×3' "puka" or hole in a smooth flow of lava, contemplated dropping down into the uninviting blackness. Dropping along some ledges into the subterranean cavern wasn't as difficult as I imagined, given the long "lava tube" hidden from above. As my eyes adjusted, dozens, then hundreds, and then many hundreds of intricate petroglyphs emerged from the darkness. The figures of people, dancers, birds, shapes and patterns extended from below the dirt floor to across the ceiling and the length of the tube, apparently beyond where recent roof collapse sealed off the rest of it. A few gourds, carefully broken in half, rested on the floor collecting condensation water drips from some wet ceiling locations, perhaps a Hawaiian's water catchment system in this waterless landscape. No Cliff Palaces indeed!

Hawaiian archeology is deceptive and too few managers ever get the friendly steer to find and be turned on by a tiny sample of the island's archeology—an entirely different archeology than a mainlander is used to. Perhaps the greatest distinction between Keet Seel and the lava tube is that here, living people still coexist with these artifacts, still believe in the same mythology and revere the same gods as did the makers of these ruins. In the islands, ancient archeology is hard to separate from history, anthropology, sociology, and the modern cultural beliefs of these ruin-maker's descendents.

Take the tale of the "footprints." As the legend goes, a young Kamehameha, a rising warrior, attempted to consolidate the kingdoms under one—his own. His chief rival, a cousin named Keoua, encamped between battles for island supremacy near Kilauea Caldera (home of the Volcano Goddess, Pele). Only twice in all of history had Kilauea erupted with Mount St. Helen's velocity. This instance, Keoua's men and camp followers were engulfed in poison gas, hot ash, and rocks. Some 400 died instantly. The survivors fled. Keoua's threat to the young Kamehameha ended without another spear ever being raised. Obviously, even the gods supported Kamehameha.

Modern day Hawaiians re-enact a ceremonial function of Kamehameha's time at the Puukohola Heiau.

Now, in the Kau Desert of Hawaii Volcanoes National Park, shifting sand dunes regularly uncover barefoot prints—made by running men embossed in the layer of rain soaked ash that fell in the explosion of 1790; Kamehameha's war temple of piled cobblestones (where Keoua surrendered to be killed) rests precariously on a hill in Puukohola Heiau National Historical Site. These ruins are relics of very significant Hawaiian history.

Perhaps it's rare in the NPS that genuine descendents—family—live beside the significant archeological sites of their culture, and that the sites are still ceremonially used to celebrate ancient events. Regularly, the ethnic/cultural descendents celebrate at the archeological places in the Pacific parks. Here, every move a park makes to stabilize, preserve, or restore a significant structure has a host of modern Hawaiians questioning, disagreeing—or perhaps expressing honest concern—over the correct way to do it. Here is archeology with a cultural constituency.

Under such circumstances, a manager may be tempted to waffle and wait, but that is not enough. Many ruins are like Puukohola—of round lava boulders piled in simple dry wall construction. It has an active thoroughfare nearby and every vehicle shakes the structure, tumbling rocks. Exotic pest shrubs and trees very recently introduced to the islands grow from ruins, crumbling the rockwork. At Kalaupapa, feral goats, pigs, and cattle hasten widespread erosion of ruins by trampling. Unstabilized, these ruins disintegrate quickly. What, then, must a manager in Hawaii do with archeology?

- An obvious start is to have extensive knowledge and some empathy for the subject. Yet, most of us are not professional archeologists and can rely on neither education nor training.
- So, check park master plans and resource basic inventory maps to learn the archeological resources of one's park (though far more area goes uninventoried than studied).
- Rely on Region or the Western Archeological Center (though they tend to concentrate their research on needs closer to home rather than on the Pacific).
- Realistically, each Pacific park with significant archeological resources needs a competent archeologist, for it's utterly unrealistic to manage a resource that the manager doesn't know about.

Hawaii Volcanoes, Puukohola, Puuhonua, Kalaupapa, Kaloko-Honokohau, Haleakala, and War in the Pacific parks contain fine archeological resources. However, with limited FTEs and dollar base, we have two field archeologists instead, operating out of the Honolulu Area Office and serving the management staffs of all these parks. Their tasks are basically:

- Keep park managers aware of resources under their care. Help be their conscience, their resource monitoring, their expertise in facing responsibility to care for the resource.
- Supervise the stabilization of important sites.
- Continue systematically to inventory and document archeological sites in the parks. (No rational preservation plan can be developed without some perception of the resource.)
- Deal directly with, or help the manager deal with, people who wish to use sites in their ceremonies, so as to find ways that neither abuse the sites nor degrade the cultures represented. Use of sites in ways that belittle or defy the old traditions is regarded as a breach of trust by those of us who are caretakers of the sites. Professional archeologists often can tie together or interpret the contemporary legends, myths, and beliefs with actual physical evidence at the site.
- Assure that Cultural Resource Management Plans are competently written and based upon current knowledge.
- Assure that archeological resources needs are represented in individual park's 10-237 and 10-238 program priority setting exercises.

Unless the park manager is an archeologist, only a talented archeologist on the manager's staff can assure an adequate resource preservation job. Ed Ladd and Gary Somers, our two archeologists, cover the nine parks of the Pacific. Their tasks could keep a much larger crew busy, but these two provide yet another integral service. They oversee all on-site day labor and construction activities which could harm archeological sites. At Pacific parks, an archeologist (as well as an ecologist) looks at all local maintenance jobs before and as they are happening. Some are quick, drastic, emergency construction operations. Hawaii Volcanoes National Park maintenance crew rebuilds park roads immediately after volcano eruptions. Since most eruptions are in a "Historic District," all the bulldozer work potentially threatens archeological sites. Invariably, an archeologist on the job helps locate the new road alignment.

Even so, neither park operations nor visitor use threatens archeological resources most. The widespread harm comes from the islands' dynamic geology. As I write these words, a local radio broadcasts that a 6.7 earthquake has jarred the Big Island (Hawaii). Archeologist Ed Ladd, working on archeological inventory maps at Kalaupapa National Historical Park, just called to find out if anyone knew whether there were rock collapses at the Puukohola Heiau ruins.

Earthquakes of 6.0 or 7.0 occur every few years, with many 4.0 to 5.0 quakes annually. The result to structures of unmortared, piled, round rocks is obvious. Many quakes result from massive earth slippage along the seward flanks of Mauna Loa and Kilauea. The sea edges of Hawaii Volcanoes and Puuhonua parks, with their concentration of archeological ruins, visably slip into the sea with each quake.

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The extensive Puuloa petroglyph field lies vulnerable to both erosion by hiker's feet and obliteration by Kilauea's molten lava.

ANNOUNCEMENTS

Summer School Opportunity

The West Dean Summer School at West Dean College, Chichester, England, brings together experts and students, July 27 to August 3, to consider the problems of conserving the built environment. 1984 is Heritage year in Britain and the theme of this year's Summer School is the conservation of historic houses, great and small. The program covers the principles and philosophy of conservation, and the contribution of research, survey and documentation. There will be lectures and discussions on traditional building materials and construction and on repair and remedial works. Further information and application forms can be obtained from: Gary Scott (American Convenor), 23 Q Street, N.W., Washington, D.C. 20001 Closing date for final applications will be May 31, 1984.

APT 1984

The Association for Preservation Technology will be holding its 1984 Annual Conference in Toronto, Canada, from September 19 to 23, 1984. The conference seeks to address the issue of "Principles in Practice" by stimulating awareness of the technological consequences of philosophical stances in architectural conservation. Those interested in making a presentation within this framework, please contact Herb Stovel, Programme Director, 77 Bloor Street West (2nd Floor), Toronto, Ontario, Canada, M7A 2R9 (416/965-5727).

Announcement

In 1981 a research project was initiated to provide data on the packaging and labelling of nineteenth and early twentieth century consumer and trade goods. The information gathered will be used to enhance the representation of such goods at Parks Canada national historic parks and sites. The data will also provide guidelines to archeological and material culture researchers in the identification and classification of artifacts. The first study in this project covers British North American barrel specifications, 1758-1867. Research Bulletin No. 208, Bulk Packaging in British North America, 1758-1867: A Guide to the Identification and Reproduction of Barrels can be ordered through Parks Canada.

Managing Pacific Parks. . .

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More noticeable are the drastic lava flows inundating the historic district. In the 1970s alone, an entire area five miles wide by twelve miles long vanished under new lava flows. Thus, a Pacific parks manager has a unique responsibility to assure that sites are inventoried and evaluated for further research needs before lost forever to natural geological processes.

I'm a manager, typical of many who manage incredibly interesting archeological park areas but who know nothing of archeology. This lack of knowledge doesn't lessen our responsibility to those resources, but merely points out that we need the best professional help at our elbows.

There's an exceptionally fine petroglyph field with a nature trail at Puuloa in Hawaii Volcanoes National Park. A decade ago we proposed to build a raised trail on boardwalks to confine visitors solely to the trail and to stop foot erosion on the rock etchings. Finally last year, it was funded, but a huge outcry from local Hawaiians threatened to stop the job in its tracks. The superintendent, rangers, and maintenance people explained the purpose to no avail. Finally, Ed Ladd went to the Hawaiian community and gently explained the archeology, the erosion, the concern, the proposed structure. Only then did the people endorse the idea. The trail is now built and works well. Archeologists here get involved in more than mapping and excavations; and managers don't survive without their talented help.

The author is Director, Pacific Area.

CRM BULLETIN

April 1984

Published quarterly by the Associate Director, Cultural Resources, in the interest of promoting and maintaining high standards in the management of those cultural resources entrusted to the National Park Service's care by the American people.

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Cultural Resources, Washington, D.C.

Volume 7: No. 1

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Cultural Resources
National Park Service
U.S. Department of Interior
Washington, D.C. 20240

Postage and Fees Paid
U.S. Department of the Interior
INT 417