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SESSION: PREHISTORIC & HISTORIC CULTURAL RESOURCES
Chairman: Ms. Melanie Stright
Scribe: Ms. Anne Giesecke
Date: August 25, 1982

Presentation Title	Speaker/Affiliation
Session Summary	Ms. Melanie Stright MMS, Gulf of Mexico OCS Region
Prehistoric	
Management Strategy for Prehistoric Sites on the OCS	Ms. Melanie Stright, MMS Gulf of Mexico OCS Region
Marine Geologic Mapping	Mr. Henry Berryhill, USGS
Sedimentary Studies of Prehistoric Archaeological Sites	Dr. Sherwood Gagliano Coastal Environments Inc.
Core Sampling of a Holocene Marine Sedimentary Sequence and Underlying Neolithic Cultural Material off Franchthi Cave, Greece	Dr. John Gifford Dept. of Geography & Archaeometry University of Minnesota
The Quantitative Analysis of Soil Phosphate	Dr. William Woods Department of Anthropology Southern Illinois University
Historic	
Management Strategy for Historic Sites on the OCS	Ms. Melanie Stright, MMS Gulf of Mexico OCS Region
National Park Service: Management of Shipwreck Sites	Dr. Daniel Lanihan National Park Service
Cultural Resource Management Factors for the OCS	Mr. J. Barto Arnold III Texas Antiquities Committee Austin, TX
Spatial Magnetics of Shipwrecks	Mr. Alan Saltus Archaeological Consultant Prairieville, LA

SESSION SUMMARY

Ms. Melanie Stright
MMS, Gulf of Mexico OCS Region

The cultural resources session was subdivided into prehistoric and historic archaeology sessions.

The major questions addressed by the participants in the prehistoric archaeology session included:

1. Where will prehistoric sites occur on the OCS?

2. Under what conditions will sites be preserved?

3. In what circumstances are prehistoric archaeological data recoverable?

4. What technology is available for data retrieval?

5. What type of site data is recoverable without complete excavation?

As a result of the presentations and discussions in the prehistoric archaeology session, four study needs were identified:

1. synthesize existing high resolution shallow seismic data on the OCS to more precisely delineate high probability areas for the occurrence, preservation, and retrieval of prehistoric archaeological data in the Gulf of Mexico;

2. physically test relict landforms already identified through cultural resources surveys and evaluated as having a high probability for site occurrence, preservation, and data retrieval;

3. test the validity of geochemical test results from terrestrial sites on marine inundated sites; and

4. continue perfecting localized late Pleistocene/Holocene sea level curves for the northern Gulf of Mexico.

The historical archaeology session focused on management factors affecting preservation of known sites, and on the use of magnetometer data vs. side-scan data for identifying sites. Seven problems and study needs were identified:

1. Central storage locations are needed for remote sensing survey data so that these data will be accessible for future reference and analysis.

2. Peer review of contract archaeological reports is necessary to ensure the professional quality of the reports.

3. Federal agencies need more field-level archaeologists to handle the work load and to ensure quality control of the contract archaeology work.

4. Survey line spacing and tow fish height need to be regulated and tailored to the location of significant shipwrecks.

5. Federal legislation is needed to remove historic shipwrecks from consideration under admiralty salvage law and put them under antiquities legislation.

6. Groundtruthing of a selected sample of unidentified anomalies should be conducted.

7. Information should be compiled on horizontal and vertical distribution of wreck debris in sediments of varying thickness and composition, in order to determine what type of signatures, if any, should be expected on the various remote sensing instruments.

MANAGEMENT STRATEGY FOR PREHISTORIC SITES ON THE OCS

Ms. Melanie Stright
MMS, Gulf of Mexico OCS Region

As an introduction to the prehistoric session, Ms. Stright briefly outlined MMS's management strategy for prehistoric sites in the Gulf of Mexico. The 1977 cultural resources baseline study for the northern Gulf of Mexico proposed a series of management zones. These zones differ in the probability for occurrence of significant cultural resources on the OCS. According to existing sea level curves, the area of the shelf defined by zones 1 and 2 was subaerially exposed until approximately 12,000 B.P. As such, these two zones have potential for occurrence of prehistoric sites dating from 12,000 B.P. to 3,000 B.P. (depending on the position of the area on the shelf).

High resolution shallow seismic profilers are the primary instruments used in locating relict landforms with a high probability for associated prehistoric sites on the OCS. Remote sensing surveys conducted on OCS leases have recorded numerous examples of such relict landforms; however, virtually no further investigation of these landforms has been conducted. Therefore, no prehistoric sites have been identified on the OCS as a result of remote sensing surveys.

MARINE GEOLOGIC MAPPING

Mr. Henry Berryhill
MMS Office of Marine Geology, Corpus Christi, TX

Henry Berryhill reported results from regional habitat mapping studies funded through the BLM studies program. Possible archaeological applications of the results were also addressed.

Original high resolution seismic data were collected on three-mile and four-mile grids across large portions of the central and western Gulf of Mexico. From these data a series of interpretive maps was constructed. The most useful maps from this series are those showing post-Wisconsin sedimentation patterns and the paleogeography of the continental shelf during former periods of low sea stand.

These interpretive maps provide a regional geologic framework which serves as an interpretive base for data collected during cultural resource surveys. This regional framework allows data interpretation to go beyond a statement that a relict landform occurs within a survey area, to an assessment of its archaeological potential in terms of its general age, the type of system to which it belongs, and the geologic processes which formed and modified it.

The maps of post-Wisconsin sedimentation patterns, for example, help identify the depth below the seafloor of the late Wisconsin erosional surface and help identify the depth of sediments which would have to be penetrated to test for archaeological sites in association with this surface. The situation should never be oversimplified, however, by categorically excluding all post-Wisconsin (Holocene) sediments as "archaeologically sterile." In some circumstances, such as short reversals in sea transgression and deltas prograded to a level of subaerial exposure, surfaces inhabitable by prehistoric man may occur within the Holocene sequence. Likewise, maps of early and late Wisconsin fluvial systems help in interpretation of the general age of such features observed in the cultural resources survey data. From this information, it can be determined whether these features fall within the time frame of human occupation of the area.

Mr. Berryhill indicated that erosion has probably destroyed most prehistoric archaeological sites across the Gulf, and that thick accumulations of Holocene muds would probably preclude the discovery and evaluation of sites over some portions of the Gulf, particularly off of south and central Texas.

From the audience, Dr. Gagliano pointed out that although erosion is evident at the late Wisconsin surface, site preservation would be excellent in areas which subsided or were covered by sediment prior to transgression. Site materials may also be incorporated into the sedimentary sequences and preserved in point bar deposits, natural levee deposits, back-barrier lagoons, or channel fill material.

SEDIMENTARY STUDIES OF PREHISTORIC ARCHAEOLOGICAL SITES

Dr. Sherwood Gagliano
Coastal Environments, Inc., Baton Rouge, LA

Dr. Gagliano reported the results of his recent study for the National Park Service. Although numerous examples of relict landforms having a high probability for associated prehistoric archaelogical sites have been identified on the OCS, the resolution and line spacing of data currently being collected do not permit identification of actual sites on the records. The limited physical testing of these landforms has generally been unsuccessful in identifying sites. This failure is attributed to the extremely low probability of recovering artifactual material in a core-sized sample, and to the lack of established parameters defining cultural deposits with which to compare the soil matrices of the physical samples taken.

Based on the assumption that cultural processes, like natural processes, influence the physical and chemical makeup of sediments, this study was designed to develop procedures and criteria for distinguishing cultural deposits from natural deposits using core-sized samples.

Box cores were taken from 15 selected onshore prehistoric sites. Off-site control samples were also obtained. The sampled sites from Mississippi, Louisiana, and Texas represented eight different coastal landform types and conformed to the following criteria:

1. site is associated with a relict landform type identifiable on the shelf;

2. site is commonly associated with that type of landform; and

3. site occurs in a location which may be preserved on the OCS.

These samples were subjected to four levels of analysis from the least complex to the most complex:

<u>Level 1</u>: lithology and minor sedimentary structures;

<u>Level 2</u>: point count and grain size analysis;

<u>Level 3</u>: geochemical analysis; and

<u>Level 4</u>: evaluation of all data.

The findings of this study indicate that systematic analysis of core-type sediment samples provides a basis for distinguishing cultural deposits with a high degree of certainty. In addition, study results suggest that there is a high probability of being able to positively identify a cultural deposit as such prior to the need for geochemical

analysis (Level 3). Further, the study results indicate that 1) the statistical reliability of the 10 to 20 sized fraction analysis (Level 2) in yielding positive site identification may preclude the necessity for the smaller sized fractions in most cases; 2) grain size analysis is the least useful in sites where the soil matrix has a large proportion of greater-than-sand-size particles; and 3) bone or bone and charred material consistently separate site from non-site samples.

CORE SAMPLING OF A HOLOCENE MARINE SEDIMENTARY SEQUENCE AND UNDERLYING NEOLITHIC CULTURAL MATERIAL OFF FRANCHTHI CAVE, GREECE

Dr. John Gifford
University of Minnesota

Dr. Gifford reported the results of his work in Koiladha Bay off of Franchthi Cave, Greece during the 1981 field season.

A Neolithic settlement, the Paralia site, which lies downslope from Franchthi Cave on the shoreline of Koiladha Bay, was excavated by T.W. Jacobsen in 1973-1974. It was hypothesized that this Neolithic settlement extended farther downslope, beneath the waters of the bay, which formed during the post-glacial sea level rise. Records obtained with a 3.5 kHz acoustic profiler indicated that a river channel formerly cut through the present bay area, and that a wedge of Holocene sediment up to 5 m thick presently overlies the subaerially formed late Wisconsin surface with which the Neolithic site would be associated. To establish the presence or absence of this extension of the onshore Neolithic site, Dr. Gifford obtained two cores through the bay fill material, using a diver operated pulsing auger.

At the base of one core, 5.5 m below the present bay bottom, a stratum rich in mollusc shell fragments and subangular limestone pebbles was found to rest on a hard rock substrate. Thirty pottery shards were also recovered in the core from this stratum. Other materials recovered from this stratum through coarse fraction analysis included mud-building plaster, oxidized copper fragments, carbonized wheat grain, charred fish vertebrae, and a small burin. Dr. Gifford attempted to determine whether these cultural materials were downslope wash from the onshore Neolithic site, or were in situ materials from an underwater extension of the site.

Pot shards from the excavated portion of the onshore site which had been exposed to weathering and transport for only a few years were compared to the shards from the core sample. The marked angularity of the shards from the core in comparison to the shards from the onshore site indicates that the material from the core had been subjected to very little or no weathering and, therefore, was probably in situ.

Dr. Gifford's work has several important applications to the Gulf of Mexico. First, it establishes the presence of a preserved in situ cultural deposit in a bay fill situation. Second, the location of the site was predictable based on paleogeographic reconstruction and information provided by high resolution shallow seismic data. Third, the coring apparatus and methodology used are applicable in certain areas of the Gulf (depending on water depth and bottom sediment type). Fourth, the amount of site material and site information obtainable in a core-sized sample from a site buried by 5.5 m of sediment was demonstrated.

THE QUANTITATIVE ANALYSIS OF SOIL PHOSPHATE

Dr. William Woods
Southern Illinois University

Dr. Woods' paper detailed his work with geochemical analysis of soil samples in locating and evaluating terrestrial archaeological sites. This analysis is particularly useful in intrasite delineation or in locating sites with no surface expression. Although many soil components are evaluated, phosphate is one of the most useful indicators of cultural deposits because it is always present in high concentrations in areas utilized by humans, and because of its physical and chemical stability. Dr. Woods gave many examples of the success of geochemical analysis in delineating sites, distinguishing functional areas within a site, and determining site type. Experimental use of phosphate levels in estimating site population densities through time was also discussed.

The group discussed the possibility of using soil phosphate levels to locate buried sites on the OCS. Members of the group asked about the cost of obtaining soil samples. Dr. Woods indicated that the cost of lab analysis for a full battery of geochemical tests is only about $20 a sample, but the cost of collecting the samples offshore runs about $10 per foot, plus shiptime at about $6,000 per day. The question was then raised as to whether existing soil borings, collected by industry, could be used. Another question concerned the condition of the uppermost levels of deep soil borings, and whether sufficient stratigraphy would be preserved to permit archaeological analysis. The group agreed that these questions would have to be explored.

A second line of questioning was whether the results of the geochemical tests of terrestrial sites would apply to sites subjected to marine inundation. What would be the effect of the high phosphate levels of seawater on the use of phosphate levels as a site indicator? Dr. Woods stated that although the natural soil phosphate levels on the OCS may be high, they would result in a uniformly high background level from which even higher concentrations associated with cultural deposits could be distinguished.

Dr. Gagliano suggested that comparative core analysis be undertaken to determine the effects of saltwater inundation on the geochemical test results.

MANAGEMENT STRATEGY FOR HISTORIC SITES ON THE OCS

Ms. Melanie Stright
MMS, Gulf of Mexico OCS Region

As an introduction to the historic session, Ms. Stright briefly outlined MMS's management strategy for shipwrecks in the Gulf of Mexico.

The 1977 cultural resources baseline study for the northern Gulf of Mexico proposed a series of management zones having different probabilities for the occurrence of significant cultural resources on the OCS. Zone 1, closest to the shoreline, has a high probability for the occurrence of historic shipwrecks. Within this zone, MMS requires that a remote sensing survey be conducted at 150 m line spacing prior to development of a lease area, or as a condition of inter-lease pipeline permits.

The two principal instruments for shipwreck detection are the magnetometer and the side-scan sonar. At 150 m linespacing the magnetometer gives about 25 to 30% coverage of the seafloor which constitutes only a sampling survey. At this linespacing, however, side-scan sonar can cover well over 100% of the seafloor, with good resolution.

Conducting surveys at 150 m line spacing for the protection of historic shipwrecks is based on the premise that avoidance of all unidentified magnetic anomalies and side-scan contacts recorded within a survey area will result in the avoidance, and therefore the protection, of historically significant shipwrecks. This assumes either that all parts of a shipwreck are ferromagnetic and would be recorded by the magnetometer, or that all nonferromagnetic parts of a wreck would be evident on the side-scan records. Neither is necessarily the case.

In areas with a relatively hard bottom or in areas with only a thin veneer of unconsolidated sediments, it is probable that there would be some evidence on the side-scan sonar records of any shipwreck within the survey area. However, over large portions of the Gulf of Mexico, the thickness of unconsolidated sediments is sufficient to completely conceal debris from most pre-20th century wrecks of wooden or composite construction. The primary instrument for shipwreck detection in this case would be the magnetometer.

According to the results of studies conducted by the state underwater archaeologists for Texas and North Carolina, at 150 m linespacing it is possible to pass by an historically significant shipwreck with no indication whatsoever on the magnetometer record.

In addition to these survey limitations, Ms. Stright indicated that in areas where the magnetometer is the principal instrument for shipwreck detections, the 25 to 30% coverage does not allow any definitive statements concerning patterning of anomalies, or distinctions between modern debris and probable shipwrecks. These limitations result in recommendations for identification or avoidance of numerous anomaly locations. Ms. Stright concluded by stating that very little further investigation of unidentified anomalies is undertaken. Industry generally prefers to avoid the anomaly locations when developing their leases.

NATIONAL PARK SERVICE: MANAGEMENT OF SHIPWRECK SITES

Dr. Daniel Lanihan
Submerged Cultural Resources Unit, Santa Fe, NM

Dr. Lanihan discussed the management strategy for shipwreck sites in areas under National Park Service jurisdiction. Approximately 23 of the 45 submerged resource areas under Park Service jursidiction have potential for shipwrecks. These areas are actively inventoried by the Park Service. A key concept in the inventory of these resources is the identification of all unidentified anomalies recorded during the survey, with as little time lapse as possible. This provides immediate positive feedback into the system for the dollars spent.

The second major concept in the National Park Service's management of shipwreck sites is maximum data retrieval with minimum disturbance of the resource. This reflects both the emphasis on conservation of the resource and the third major management concept: interpretation of the resource for the public.

The smaller, well defined areas of National Park Service jurisdiction on the OCS make intensive survey techniques more practical. The fact that the Park Service also owns the resources within these well-defined areas makes protection of the resource possible.

Using the example of the Liberty ship, Dr. Lanihan stressed how rapidly we are losing our nation's maritime heritage and how important conservation and management of this resource is. During World War II, the Liberty ship was mass produced from identical plans. Today, only one unmodified example of the Liberty ship remains.

Even with the major differences in the management situations between the National Park Service and Minerals Management Service, Dr. Lanihan believes that the combined management of natural and cultural resources is an optimal and workable management strategy for both agencies.

CULTURAL RESOURCE MANAGEMENT FACTORS FOR THE OCS

J. Barto Arnold III
Texas Antiquities Committee
Austin, TX

Two significant government funded studies have appeared since the last Information Transfer Meeting, in 1981: "Sedimentary Studies of Prehistoric Archeological Sites" by Gagliano et al. (1982) and "An Assessment of Cultural Resource Surveys on the Outer Continental Shelf" by Ruppe (1982). These reports contain many suggested improvements which deserve support. Actual cultural resource management practices remain much the same, however. The recent reorganization of the Outer Continental Shelf (OCS) Offices under the Minerals Management Service represents an opportunity to make improvements in the management realm. A few suggestions regarding that topic are presented herein. Topics to be covered include line spacing, the relevance of the lack of side-scan sonar targets, archaeologists on federal agency staffs, archiving survey data, dissemination of reports, historic shipwreck management factors, and the need for ground truth studies.

Line spacing for the survey coverage on the OCS has been a perennial topic of discussion. It is now widely acknowledged that the 150 m line spacing used for years is not to be considered "complete" coverage, but only a sample relative to magnetometer data. An example comes from magnetometer data from a survey in Texas (Arnold 1979, 1980a, and In Press) from two tracks spaced at 100 m. The magnetometer data showed small anomalies on the order of 3 and 7 gammas. When these were ground truthed, over 1550 gammas were measured at the anomaly's center. The measurement of 1550 gammas was made at least 40 feet vertically above the target. This demonstrates the sampling nature of the 150 m line spacing. At 150 m this anomaly could have been missed altogether. The 300 m line spacing some propose would be a small sample indeed. Even so, a small, area-wide sample might be acceptable if a close-grained survey, on the order of 50 m line spacing, were performed in the more limited area where actual bottom disturbance is to take place. The matter of carefully controlling the distance of the magnetometer sensor from the bottom is of importance as well. A maximum of 30 feet for this distance would be ideal.

Apparently there are those who advocate the belief that if there is no side-scan sonar target then there is no wreck. The idea is that side-scan sonar survey tracks can be spaced much wider than magnetometer survey tracts and still obtain complete coverage. However, in ground truthing 47 significant anomalies in Texas waters, only six cases, or about 13%, showed any debris protruding above the bottom (Arnold 1976, 1977, 1978a, 1979, and In Press). Of course there would be no side-scan target if there is no debris standing proud of the sediments.

Returning to more mundane cultural resource management matters, let us consider the matter of qualified archaeologists on the staffs of the federal agencies involved in monitoring the OCS cultural resource program. It is absolutely essential that the number of archaeologists in the OCS offices and especially in the agency headquarters offices be increased. The few archaeologists currently employed in this capacity are greatly overworked and must often be loaned to other offices which have no archaeologist at all. One of the Minerals Management Service's new management guidelines calls for non-archaeologists to review data and reports resulting from the OCS cultural resource program. This can in no way be considered an adequate execution of the agency's responsibilities to protect cultural resources.

The archiving of the strip chart records or copies of those records is another area of concern. With each report on cultural resources to the MMS should come either the original data or a complete copy in some acceptable format. If these data are to be of use in the future for further study or synthesis, the data must be permanently archived in the same way that other archaeological collections are curated.

Regarding the archaeological reports generated by the OCS program, publication or other dissemination is a major problem. There has been some concern about the quality of many of these reports. This might be in part a self-correcting situation if MMS required that the reports be published. At an absolute minimum, copies should go to the National Technical Information Service, the relevant State Historic Preservation Office, State Archaeologist and/or State Marine Archaeologist, and perhaps the State Archives or a major state university library. In fact, an effort on the part of MMS to assemble microfilm or other copies of the backlog now on file and have them appropriately distributed should be a high priority and would correct a major deficiency in the program.

Historic shipwrecks present several management problems. The U.S. urgently needs a law asserting sovereign prerogative or ownership of historic shipwrecks in federally controlled waters (Arnold 1978b, 1982). This would remove such sites from the jurisdiction of admiralty salvage law, the law which has enabled commercial treasure hunters to pile up a dramatic string of court victories over the historic preservation interests of the state and federal government. Additionally, the compilation of a central historic wreck reference file complemented by a file of the anomalies already located through the OCS program would provide much needed management tools (Arnold 1980b).

Finally, ground truthing studies on anomalies located and simply avoided by industry during the OCS program should be a high priority. The MMS has a responsibility to find out what it is protecing. A sample of promising anomalies should be investigated and their causes identified.

The above represents a brief summary of a series of complex and convoluted factors related to the OCS cultural resource managment program. It is not an all inclusive list, but implementing these suggestions would significantly improve the situation.

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