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Prehistoric Archeological Resources in the Maryland Coastal Zone

A Management Overview

Steve Wilke and Gail Thompson

Maryland Natural Resources
Coastal Zone Administration

Prepared for and funded by the Maryland Department of Natural Resources
and Coastal Zone Administration under a Coastal Zone Management
Program Development Grant from the National Oceanic and Atmospheric Administration

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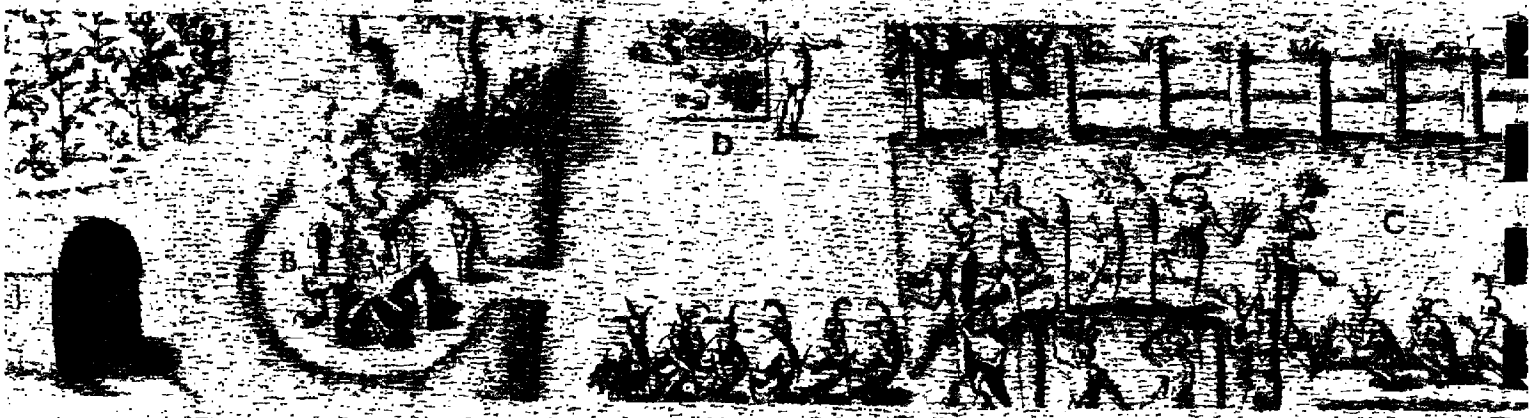
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Energy + Coastal Zone Administration.

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Seattle, Washington
August 1977

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PREFACE

This report represents an initial and significant step toward the understanding and management of the archeological resources of the Coastal Zone of Maryland. The dynamic environmental and cultural changes which transpired during the 12,000 year span of human occupation have produced a varied and complex archeological record. Prolonged environmental and cultural stresses constantly erode this non-renewable data base. Interim and long-term management goals are presented in this report to assist concerned individuals and agencies in interpreting and preserving this archeological record, yet effective formulation and implementation of the many recommendations requires the cooperation of individuals concerned with different aspects of natural and cultural preservation.

The Maryland Historical Trust (MHT) and the Division of Archeology of the Maryland Geological Survey (DOA) are the agencies primarily responsible for the development and implementation of the management objectives recommended in this report. During the two-year period between the writing and the publication of this manuscript, the MHT and the DOA implemented several of the management goals presented in Chapter 6. These include five baseline studies, research on the development of a state management plan, assessment of the effect of shoreline erosion on sites, examination of local collections, and establishment of a cultural resource management position at DOA.

The interpretation and management of archeological resources requires three major steps: assessment of the data base, formulation of a management and research plan, and implementation of such a plan. The

current data base of 3,500 sites varies in both the type of sites and data represented. Baseline studies are essential for the interpretation of a representative sample of the total range of sites within different regions of the state.

The Maryland Historical Trust supports baseline surveys with funding received from the Heritage Conservation and Recreation Service grant-in-aid program. The MHT and DOA funded the Kent County baseline survey (Wilke and Thompson 1977). This survey revealed many relationships between prehistoric sites and environmental factors in the Coastal Plain. The MHT and DOA also funded a baseline survey of the rapidly developing shoreline of the South River. This survey revealed numerous prehistoric sites which escaped the affects of urban development. Other joint projects include a systematic survey of serpentine deposits in the Piedmont province and a three-year survey of the archeological resources of the Monocacy River valley. A similar baseline study in the Hagerstown valley is funded by a matching grant between the MHT and the Thunderbird Research Corporation. These land-based surveys are providing controlled data on the archeological resources in different environments in Maryland. The surveys are of immediate value in clarifying and predicting the diversity, nature and distribution of archeological resources.

Matching grant-in-aids are also provided by the MHT to study underwater archeology sites. The first underwater project studies the historic resources at Londontown in Anne Arundel County. The MHT, Calvert Marine Museum, and Nautical Archaelogical Associates, Inc., are funding a systematic survey of selected portions of the Patuxent

River. Submerged terrestrial sites, shipwrecks, and associated land sites are being examined to develop a predictive model of value in interpreting the submerged archeological sites in the Patuxent and throughout the state.

The MHT will continue to fund baseline surveys through the matching grant program. Such studies will provide the controlled data base essential for the formulation and implementation of research and management plans.

The MHT and DOA are also funding a cultural resource management position at the DOA. This position increases the DOA's ability to review construction projects received through the Department of Natural Resources review process, to determine the affects of erosion on sites, to study local collections, and to coordinate between the different agencies in the state. The Maryland Department of Transportation (DOT) has two archeologists working out of the DOA doing highway surveys and management of DOT projects. The DOT annual appropriation for archeological research equals that of the DOA and MHT. The DOT is also funding a MHT architectural and archeological assessment of sites on the DOT properties in the state. This survey is in compliance with the 1978 Board of Public Works regulations requiring an assessment of the architectural and archeological sites on all state property. By utilizing the matching funds provided by the MHT and by entering into contractual agreements with other agencies, the DOA annual budget now exceeds $100,000.

Implementation of the management goals advanced in this report will require increased archeological expertise throughout the state. One

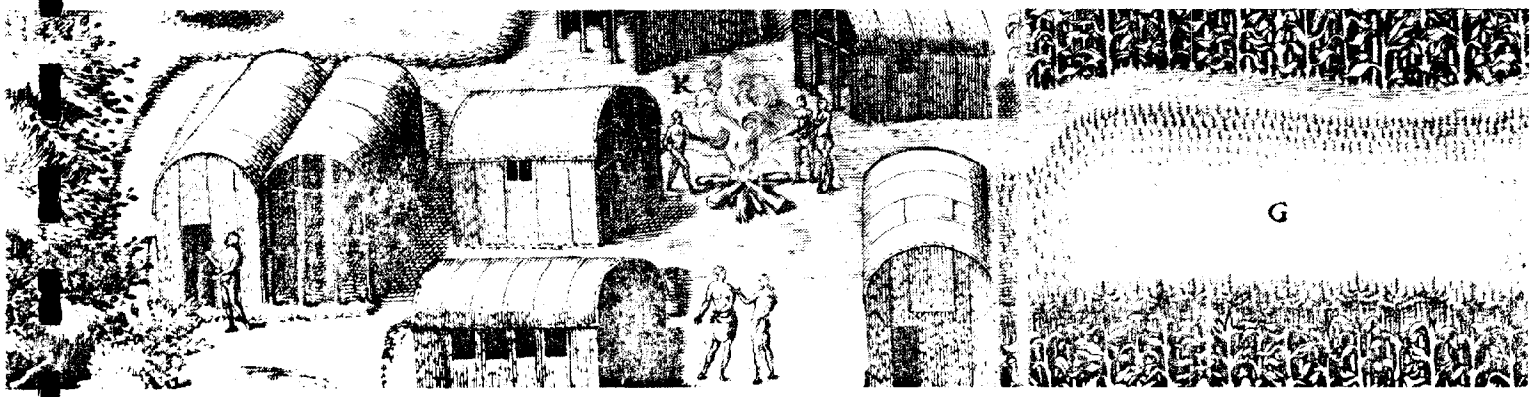
method of accomplishing this objective is through the establishment of regional centers. The MHT is contemplating the establishment of six regional centers located at educational institutions or government agencies which can provide the 50 percent match to qualify for the grant. Ultimately, each regional center will consist of at least one archeologist, architectural historian, and historian. Once operational, the regional centers will be able to implement many of the management goals set forth in this report.

While much has been accomplished in the past two years, a majority of the goals and objectives advanced in this report remain unfulfilled. The archeologists of the Council for Maryland Archeology are currently discussing the development of a state plan for Maryland. However, implementation of such a plan will require years of increased communication with the public and private section and, ultimately, increased state appropriations. The MHT review of federal and state projects through the A-95 Clearinghouse has given increased emphasis to archeological resources but some agencies are slow or reluctant to comply with existing laws. Major accomplishments can be made simply by working with existing county, state and federal programs as discussed in the report. The success of the interim and long-term recommendations of this report will depend upon the ability of archeologists to assist private citizens and government employees in complying with the existing laws and in incorporating known resources into the planning and education process. Each recipient of this report is urged to study the sections of the report relevant to his area, interest, or agency. This report provides the basic framework from which all concerned individuals can build toward

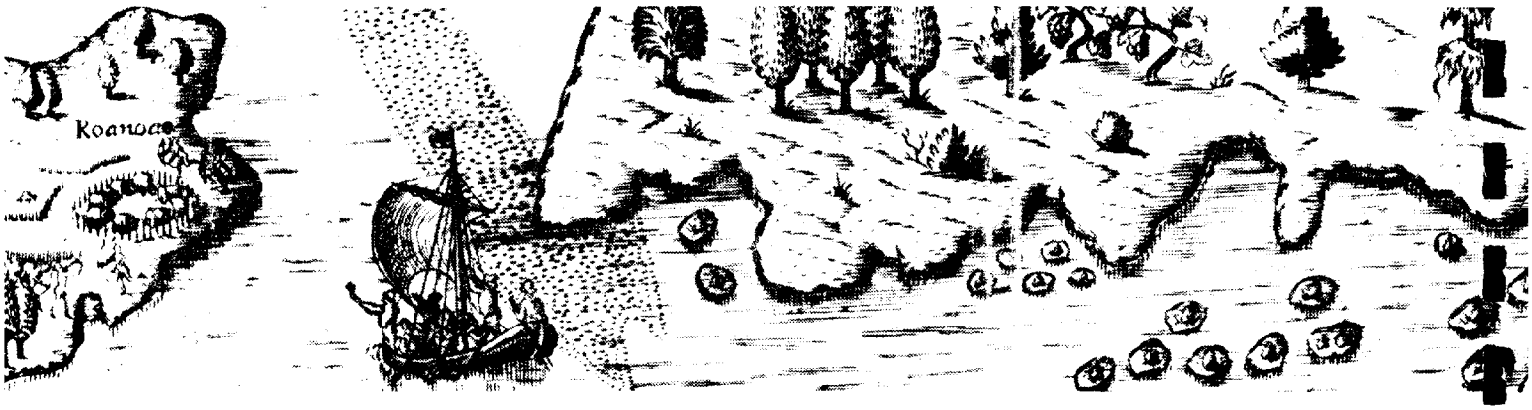
the common goal of interpreting and preserving our inherited past.

Wayne Clark
Staff Archeologist
Maryland Historical Trust
June, 1979

Chapter 1



Introduction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Chapter 1

Introduction

Eastern North America has abundant prehistoric remains, particularly along the coastline. A variety of rich resources attracted early peoples -- just as the coast now attracts modern populations. Sadly, modern land development practices in the coastal zone are rapidly disturbing and destroying prehistoric remains which are both irreplaceable and nonrenewable, resulting in an incalculable loss of our cultural and aesthetic heritage as well as a loss of scientific information (Dunnell ms.).

What are Prehistoric Resources?

Prehistoric resources are archeological remains which are composed of objects or modifications to the soil that owe some aspect of their form and/or location to human activities before recorded history. These remains, usually called artifacts, rest as individual objects on or in the soil, in groups, or in modified areas such as shell deposits.

Prehistoric remains result from early Native American life in Maryland. Historic remains result from the time of European exploration and settlement, left either by the Europeans or by the native groups they contacted. Thus, the remains of the last Native American cultures -- those that disintegrated as a result of European contact -- are termed historic here because some information on them is recorded as part of Maryland's earliest written history.

The Nature of Prehistoric Resources

Prehistoric resources have several characteristics, including that they are finite, fragile, unique, and systemic (Dincauze and Meyer 1975: 18-19). It is difficult to determine the number of prehistoric resources that once existed. This number would depend upon the scale at which the remains were conceived. Prehistoric artifacts are distributed across the landscape in varying densities, reflecting patterns of past land use. If we think of them as individual objects, they must number in the millions. However, if we think of them as groups of objects, they are much less numerous. Of course, there are certain kinds of resources, for example large, thick shell deposits in the Chesapeake Bay area, which may never have been very numerous and now are practically destroyed. Regardless of the scale at which we conceive prehistoric resources, they are finite. With continuing disturbance or destruction, the number decreases; none can be renewed because the cultures that created them have long since disappeared.

In addition to being finite, prehistoric resources are unique and systemic. Their uniqueness comes from the fact that they were deposited by particular past events that took place at specific times and places. But the events that created individual prehistoric resources were related to events taking place at other locations both before and after. Thus, prehistoric resources result from the subsistence and settlement patterns that past cultures developed in adapting to their natural environments.

The significance of prehistoric resources lies not merely in the objects themselves, but in their spatial relationships to each other and to the natural environment. For this reason, they must be considered extremely fragile. Because prehistoric artifacts rest on and in the soil, disturbing the soil destroys the evidence for prehistory -- either by destroying the remains themselves or by altering their locational relationships with each other and the natural environment.

Thus, most of the meaning and usefulness of prehistoric resources depends on preserving the integrity of their locations. To be of enduring value, they must be left intact and undisturbed before they are studied. To be of the greatest value to scientific research, prehistoric resources must be carefully collected and recorded. Only in context can they contribute significantly to our understanding of the past.

Why are Prehistoric Resources Important?

Prehistoric resources can provide important information about past human activities; they can tell us what life was once like on the North American continent. For the thousands of years before European contact brought recorded history, prehistoric resources are the only record. Thus, these remains are of incalculable value in understanding cultural evolution that resulted in permanently settled agricultural towns in many places.

Archeological remains contain information on both the documented and undocumented past. For example, archeological excavations have provided information on early American colonial life at Jamestown and Williamsburg. But documented history covers no more than a few hundred of the 10,000 years that people have lived in the Maryland coastal zone. By studying archeological remains, we can learn how people adapted to the environment, to its changes, and to each other as well as learning how the activities of prehistoric people may have affected their environment. Through studies of prehistoric remains we can also gain a time perspective on the cultural processes operating on all human populations. Most important, we can learn more about our place in cultural evolution and in the natural world. Thus, we can better understand the present and we may be able to predict some aspects of the future through our studies of the past. In the words of Adan Treganza, "the archeologist transforms remnants into contemporary meaning, bringing the past into focus with the present, giving perspective to man, time, and the natural world" (Moratto 1970:1).

Prehistoric resources provide the only avenue for studying the lifeways that existed before recorded history. Information about the past is important to the heritage of our society and to our identification.

Archeological studies can help biologists and geologists in understanding the environment. For example, we have learned that interference with natural forest succession did not begin with European settlement. Rather, this interference was present during Native American occupation (Day 1953; Elder 1965; Heizer 1955; Lewis and Schweger 1973; Maxwell 1910). Studies like these can show the interaction between prehistoric cultures and their environments. Data from archeological studies provides information relevant to the study of such diverse problems as the health of prehistoric populations and changes in landforms in the past. This environmental information can help us predict the future as well as aiding in the manipulation of the present environment. As one ecologist has concluded:

> ... an area which was wooded when first seen by white men was not necessarily primeval; ... an area for which there is no record of cutting is not necessarily virgin; ... a knowledge of local archeology and history should be part of the ecologist's equipment (Day 1953:343).

That prehistoric remains are an important public resource is reflected in the visitation figures for archeological parks. We go in great numbers to Mesa Verde, Colorado, and Cahokia, Illinois, to monuments such as Flint Ridge and the Newark Mounds in Ohio, and to countless museums throughout the United States. In addition, audio-visual programs about North America's prehistory consistently attract large audiences as do college courses in anthropology and prehistory.

The prehistoric resources of Maryland's coastal zone, particularly

Chesapeake Bay, provide an important natural laboratory for studying the interactions between changes in environment and prehistoric cultures through time. Here, people witnessed and had to contend with a series of environmental changes. Fifteen thousand years ago, the Chesapeake Bay area was the valley of the ancestral Susquehanna River. As the continental glaciers melted, the sea rose, moving the Atlantic coastal zone westward, consequently flooding the Susquehanna River to create the Chesapeake Bay estuary.

Continuing sea level rise and shoreline evolution have greatly altered coastal environments and natural resources. When the Europeans arrived, they found native people with agricultural economies occupying much of the area. These early explorers and settlers recorded some information about the native cultures they encountered but their information is incomplete. How did prehistoric adaptions change through time and what relationship did these changes have with ongoing environmental changes? Only Maryland's prehistoric resources can answer these questions.

The Chesapeake Bay area was the scene of interaction between late Native American cultures and European culture. These late Native American people represented an environmental adaptation resulting from thousands of years of cultural change. Interaction between the two cultures produced trade, cooperation, and war. Among other things, the settlers learned to use corn, tobacco, and seafood, all extremely important to Maryland's economy. Cultural interaction also involved famous figures in Maryland's early history, such as Captain John Smith.

Modern Maryland residents are directly related to the area's prehistoric cultures, simply by living in the same area. If the remains of prehistoric cultures are not preserved, these residents will lose a valuable cultural and aesthetic heritage. Most importantly, we will all lose a great deal of information about the cultural processes that operate in human societies.

Maryland's rich archeological remains have never been adequately studied. Nor have these resources been systematically tapped for information on prehistoric and early historic economic systems and cultural

relationships. The ever-quickening rate of modern shoreline development is removing forever potentially significant resources about which almost nothing is known. If the area's prehistoric resources were studied, Maryland could play a prominent role in the understanding of the prehistory of the eastern United States as well as providing data on prehistoric human behavior unique to its own setting.

Disturbance and Destruction of Prehistoric Resources

As soon as they were deposited, prehistoric resources began to be disturbed by natural and cultural processes. Wind and water erosion and sedimentation scattered and buried these remains. Activities by later cultures also altered the soil and the prehistoric remains found in it. Although this disturbance has proceeded constantly throughout most of the past, it has accelerated during the past 50 years. Increases in population and improvements in earthmoving technology can now quickly alter large areas of the landscape.

Coastal areas are noted for their rich natural resources brought together by the intersection of land and sea. These natural resources attracted prehistoric cultures in large numbers, resulting in the deposition of many prehistoric remains, especially when compared with the sparse prehistoric occupation and remains that often characterize inland areas. Because of its rich and diverse resources, the coast has had a unique influence on human populations and has been the scene of important cultural developments (Dunnell ms.).

In addition to its attraction to prehistoric cultures, the coastal zone also is the focus of many modern activities. Almost half of the country's labor force is employed in the coastal zone at present and as much as 80% of the country's population may live in this zone by the year 2000. Thus, there is a great overlap between the distributions of prehistoric resources and modern activities in the coastal zone.

When Captain John Smith left the Jamestown colony in 1612 to explore Chesapeake Bay and its tributaries, he met groups of native peoples all

along his route. Most of these groups had a long cultural history and may have been descended from people who occupied what is now the Chesapeake Bay area as long ago as 10,000 years or more. Since the early 1600's, as Euroamerican occupation and development of the Maryland coastal area has proceeded, the remains of Maryland's coastal prehistoric cultures have increasingly been disturbed by our modern land use. As development in the Maryland coastal zone continues, concern for its effects on natural resources has been expressed. But the effects of development are frequently more harmful to prehistoric resources than they are to natural resources because cultural resources are unique, extremely fragile, and nonrenewable.

Because we cannot estimate the total number of prehistoric resources that were deposited and because we also do not know how many have already been disturbed or destroyed, we cannot conclude how many of these resources may yet remain for possible preservation. According to one estimate, the state of Arkansas lost 25% of its prehistoric resources in the period between 1962 and 1972 (McGimsey 1972:3). Likewise, as few as 10% of the prehistoric resources located around the shore of San Francisco Bay may remain today (Moratto 1970:2).

Thus, as time passes, the resources as a whole diminish in quantity and increase in importance. The value of any given prehistoric site increases as the reservoir of similar sites available for preservation decreases. Prehistoric resources are being lost at an alarming rate in Maryland. Why? For several reasons: they are not readily apparent to an untrained observer; their importance is unknown and unappreciated; and their investigation may cause delays in construction and cost increases.

Access to information about the past can be viewed as a basic human right. This right should not be abridged unless it is through an overriding concern for the public well-being. Once destroyed, prehistoric remains cannot be regenerated; the cultures that these remains represent are forever lost. Finally, these remains are tangible evidence of the long ancestral history of today's Native American population. Care and respect equal to that given early colonial grave sites should be given the remains of Native Americans who interacted directly with early colonists.

The Present Study

Increasingly, legislation has recognized the need to conserve prehistoric resources at all levels of government. This concern is reflected in the Coastal Zone Management Act of 1972 (P.L. 92-583) that authorizes grants to coastal states to aid in developing management programs for land and water resources of the coastal zone. The act specifically requires that full consideration be given to "ecological, cultural, historic and esthetic values as well as to needs for economic development."

To include prehistoric resources in coastal zone management planning, information on their nature, distribution, and condition, as well as information on the nature, location, and intensity of current and predictable stress upon them, is essential. However, comparatively little systematic study has been undertaken in the coastal zone of Maryland. The result is an almost complete lack of information.

The present study was designed to provide an overview of the current status of prehistoric resources in the Maryland zone. It's objectives were to undertake a program of archival research, fieldwork, and data analysis to:

- assemble information on the nature and magnitude of prehistoric resources,
- test the feasibility of formulating a predictive model for the environmental distribution of coastal prehistoric resources based on limited fieldwork,
- assemble information on past, present, and predicted sources of disturbance or destruction to prehistoric resources,
- assemble information on present programs for conserving prehistoric resources, evaluate their effectiveness, and to suggest a management strategy for conserving Maryland's coastal prehistoric resources.

The present study was restricted to the Maryland Chesapeake Bay area with supplementary field work limited to the areas indicated in Fig. 1-1.

The remainder of this report is presented in five chapters and three appendices. Chapter Two summarizes information on the environment of the Maryland coastal zone, emphasizing its changes during the time that prehistoric occupation is likely to have taken place and the implications these changes have had for prehistoric activities and the subsequent pre-

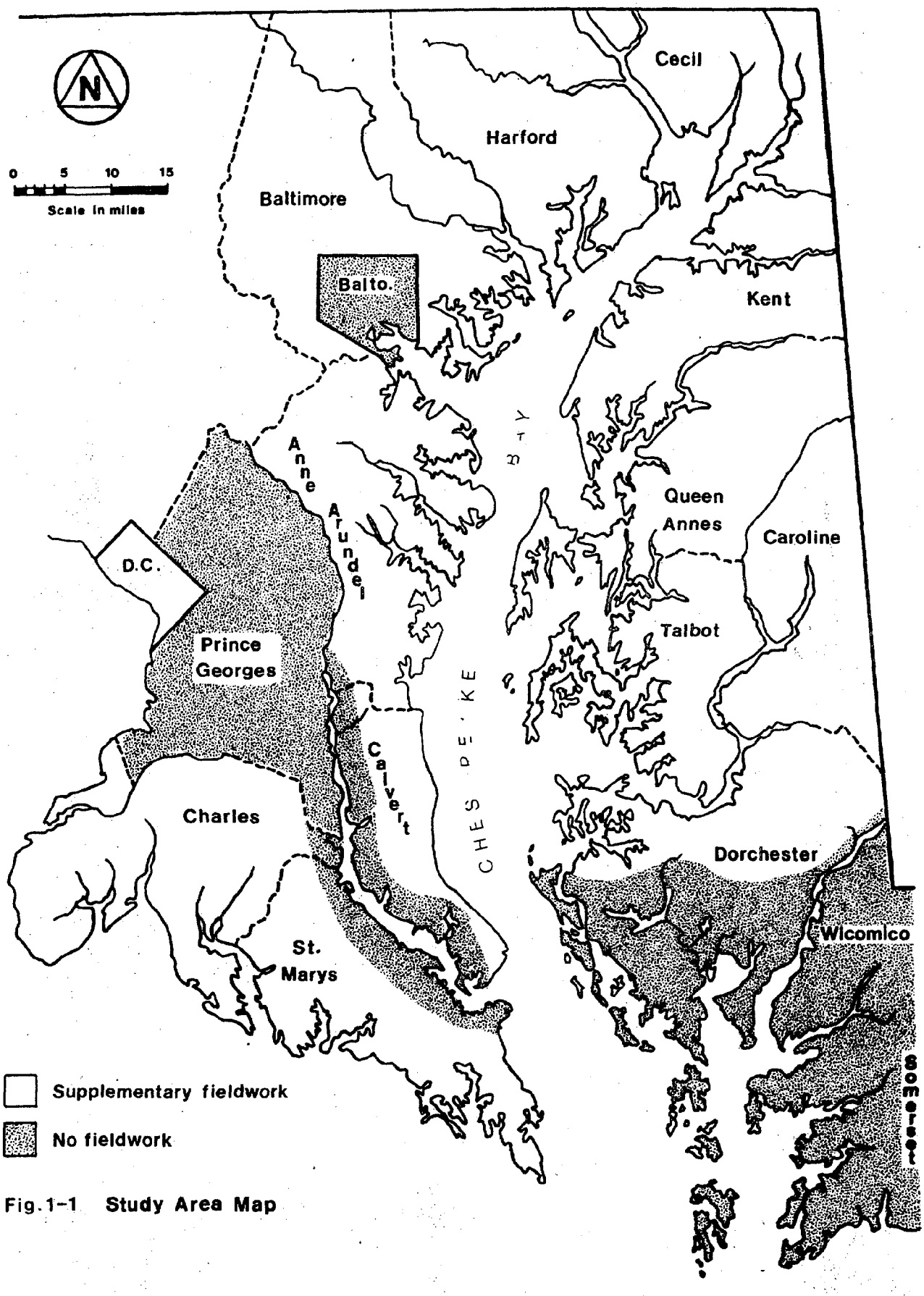

Fig.1-1 Study Area Map

servation of prehistoric remains.

Chapter Three summarizes what is known of prehistoric occupation of the area and considers what ages and activities might be expected. Historic accounts of native groups at the time of European exploration are also discussed.

Chapter Four presents the methods and results of fieldwork conducted to supplement existing information on the prehistoric resources of the Maryland coastal zone. It estimates the number of prehistoric resources that might be expected in each of the study area counties in addition to considering the feasibility of formulating a predictive model of the environmental distribution of prehistoric resources in the area.

Chapter Five summarizes the past, present, and predictable natural processes and land uses that disturb or destroy prehistoric resources.

Chapter Six reviews current conservation programs and suggests a strategy for the improved management of coastal zone prehistoric resources.

Appendix A provides summary data on tracts examined by the survey and statistical analyses, Appendix B provides the texts of legislation dealing with prehistoric resources, and Appendix C lists sources of information on Maryland's coastal zone prehistoric resources.

Major Study Findings

Assembling information on the natural environment, prehistory, and ethnohistory of the Maryland coastal zone reveals three facts about the prehistoric resources that could be expected: they should be abundant, following from the rich natural environment and long period of occupation; they should be diverse in nature and distribution, following from seasonal variation in natural resources and environmental changes resulting from sea level rise as well as changes in prehistoric activities and populations; and the prehistoric record will be difficult to interpret and will require an understanding of local geomorphic history, following from the loss of many remains through erosion and inundation.

Although little is known about Maryland's prehistoric resources and few projects are now being undertaken to remedy this lack of understanding, the information available suggests that the prehistoric record does reflect the above expectations. A survey undertaken as part of this study inspected approximately 440 miles of shoreline, locating 777 previously unreported prehistoric sites which enable the prediction of a minimum of 6,500 sites for portions of the study area shoreline.

A predictive model of coastal prehistoric site distribution could not be formulated from the presence-absence site data collected by the field survey. Statistical analyses of these data did suggest that sites are not uniformly distributed according to the environmental sampling units chosen for the study; sites may be randomly distributed. More meaningful patterns of distribution, allowing the formulation of a predictive model, might result if information on the age and activities represented in the remains were obtained.

Prehistoric resources are predicted to occur throughout the study area. Almost half of the total number are in Anne Arundel, St. Marys, and Talbot counties. The distribution of these resources does not rule out continuing development nor does it encourage development without a better understanding of the area's prehistory on which to base resource management decisions.

The density of shell sites was found to increase downstream along the Bay and its tributaries in relation to the upstream and upper bay limit of shell occurrence. Nonshell sites show an inverse distribution although this may result from their being masked by shell sites. Former shorelines were found to contain as many prehistoric resources as present shorelines and prehistoric resources appear to be equally numerous on both the Eastern and Western shores.

Although individual cases of disturbance to prehistoric resources frequently are small in scale, cumulatively these disturbances have great effects. While few prehistoric resources may be completely destroyed each year, almost none escapes some form of disturbance. Depending on overlap between the distribution of particular kinds of prehistoric resources and modern development, some kinds of resources may

already be destroyed while others may be largely intact.

Erosion, inundation, agricultural, and a variety of development activities disturb prehistoric resources. While nineteenth century shell quarrying and modern relic collecting have specifically exploited prehistoric resources, most disturbance has not been intentional, resulting instead from an ignorance of the nature, location, and importance of these resources. Further, the lack of a conservation program for these resources has hindered the use of alternatives to mitigate disturbance.

Most land in the study area is owned privately. The disturbance to prehistoric resources from agricultural and construction activities goes on continuously and randomly, usually not subject to any central planning process.

For convenience, the counties bordering Chesapeake Bay can be divided into four categories based on the major sources of disturbance to prehistoric resources. Urban and industrial development is severely disturbing resources of the upper Western Shore; in addition to agricultural activities, suburban development is increasingly disturbing resources of the lower Western Shore; localized development and agricultural activities disturb resources of the upper Eastern Shore; and erosion and inundation are the primary sources of disturbance to resources of the lower Eastern Shore.

The significance of the prehistoric resources that are currently being disturbed and destroyed cannot be determined with the information that is now available on Maryland's coastal prehistory. This situation severely limits the alternatives for mitigation. Because so little is known, archeologists are forced to recommend that most threatened resources be scientifically excavated. If a framework were available to interpret the region's prehistory, other mitigation alternatives, less expensive and less comsuming of the resources, could be implemented.

While efforts are being made to conserve prehistoric resources in the study area, to date they have been ineffective, partly resulting

from the lack of a centrally administered management strategy. In addition, no education program exists to aid resource conservation.

Two state agencies deal with prehistoric resources, the Division of Archeology and the Maryland Historical Trust. The Division of Archeology is designated by legislation to conserve prehistoric resources but does not receive adequate staff or funding to carry out its duties. Previously concerned almost exclusively with historic resources, the Maryland Historical Trust has added a staff archeologist. This agency receives Federal funds for surveys to locate significant prehistoric sites and for developing a state historic preservation plan. The division of duties, expertise, and funding between these two agencies may cause difficulties in coordinating conservation efforts.

Four sources of information frequently are used by developers and planners to judge the potential for disturbance to recognized prehistoric resources: the National Register of Historic Places, the Maryland Landmarks List, the Maryland Inventory of Historic Sites, and the Division of Archeology files. None of these records was compiled for resource management as none represents a cross-section of prehistoric sites by age, function, and environmental setting. They do not indicate the relative abundance of kinds of prehistoric resources or locations where they are not found.

Several mechanisms are available that could be used for prehistoric resource conservation from the state and Federal levels, including sources of funds, programs for acquiring sites or areas, and laws requiring resource assessment or inventories, among others. Effective conservation of prehistoric resources, however, will require aggressive use of these mechanisms guided by a conservation plan.

Major Recommendations

Because development is increasing and the reservoir of prehistoric resources is decreasing, conservation is essential. For effective prehistoric resource conservation, it is recommended that a centrally administered strategy be used to guide the development and implementation of a conservation plan, the interim use of existing state and Federal mechanisms, and the development of an education program.

A conservation plan would provide mechanisms for regulating the disturbance and destruction of prehistoric resources as well as assuring the preservation of a representative sample. Formulation of this plan by archeologists and planners will require baseline studies of prehistoric resources so that an interpretive framework can supply the understanding of the area's prehistory now lacking. Through the plan optimal mitigation procedures can be selected depending upon the significance of the resources involved and the nature of specific developments. The plan also could be used to guide changes in legislation, rules, and regulations to assure that prehistoric resources are adequately considered in environmental impact statements, permits to alter land use, and government acquisition of lands.

Because development and implementation of a conservation plan will require several years, interim measures will be necessary to slow the accelerating disturbance of prehistoric resources. Such measures include maximizing the use of current Federal, State, and local programs.

A strong program for educating government agencies and the public is needed for successful prehistoric resource conservation. Thus, an education program must be started immediately and ultimately be responsive to the conservation plan.

Development and implementation of the conservation strategy should begin immediately. The legislative mandate of the Division of Archeology makes it the logical agency to direct these efforts but its

funding and staff will have to be increased. As the locations of approximately 30% of the prehistoric resources predicted to occur along the study area shoreline already are known, interpretive studies are needed to provide the framework upon which assessments of significance and optimal mitigation choices can be made. Thus, it is recommended that regional baseline studies begin with a pilot study that uses distributional information developed by the present study and emphasizes qualitative apsects of the prehistoric resources. In addition, as the lead agency, the Division of Archeology should initiate planning and data gathering meetings with members of the archeological, planning, and regulatory communities as soon as possible. Finally, the Division of Archeology should oversee the immediate implementation of interim measures and the creation of an education program.

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Chapter 2

Environmental Dynamics

Chapter 2

Environmental Dynamics

In order to understand the nature and distribution of Maryland's prehistoric resources, it is necessary to understand the changing environments to which prehistoric people adapted. Environmental changes altered the availability of plants and animals, in turn affecting where people settled. These changes also affected the preservation of prehistoric remains in that natural forces through time created a patchwork of preserved remains of various ages and functions. Therefore, the record of prehistoric remains in the Maryland coastal zone is expected to be complex, both in its original content and as it is presently preserved.

Documenting important environmental changes in Maryland occupies most of this chapter; it concludes by focusing on the implications these changes have for the distribution and preservation of prehistoric remains in the study area.

Geology and Physiography

There are three physiographic provinces in Maryland: the coastal plain, the Piedmont plateau, and the Appalachian Mountains. These provinces parallel the Atlantic coast in bands of varying width, increasing in elevation and relief to the west. Figure 2-1 illustrates their locations, including the kinds and ages of the underlying rocks that largely determine the topography of each province (Vokes and Edwards 1968).

The coastal plain is a low, flat surface that extends from the coast of Maryland to the Fall Line west of Chesapeake Bay (Fig. 2-1). This plain is a wedge of unconsolidated clays, silts, and sands with some gravels, ranging in age from Cretaceous to Pleistocene. Underlying these sediments is an eroded surface of predominantly Pre-Cambrian crystalline rocks that emerges at the Fall Line. While the Eastern Shore coastal

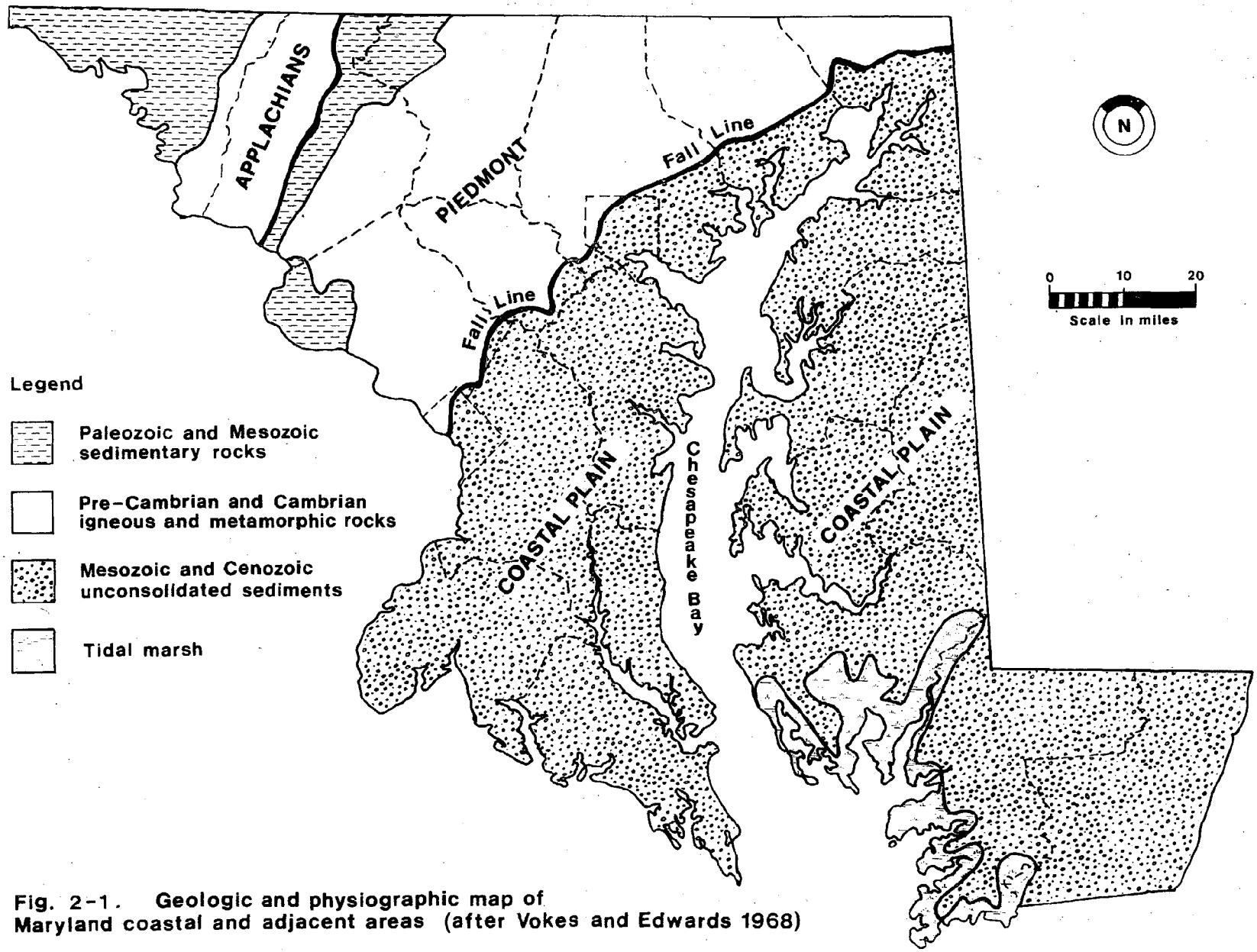


Fig. 2-1. Geologic and physiographic map of Maryland coastal and adjacent areas (after Vokes and Edwards 1968)

plain is low and flat, the Western Shore is a rolling upland marked by relatively higher elevations.

Most of the Maryland shoreline is broken and sinuous because sediments on the coastal plain offer little resistance to erosion and because low-lying portions are easily inundated. Only the bayshore of Calvert County and parts of Anne Arundel, Queen Annes, and Kent counties are marked by higher bank or relatively straighter shorelines.

The Piedmont plateau starts at the Fall Line, where the more resistant crystalline rocks meet coastal plain sediments, creating a drop in stream gradients (Fig. 2-1). The Piedmont consists of a broad upland with low knobs and ridges, cut by narrow stream valleys (Vokes and Edwards 1968).

The Appalachian Mountains province (Fig. 2-1) is characterized by a series of ridges formed of more resistant materials and separated by valleys cut into less resistant materials.

During the Pleistocene epoch, over 1,000,000 - 10,000 B.P. (Before the Present), variations in temperature and precipitation caused huge continental ice sheets alternatively to expand and to contract. Many studies have reconstructed the nature, history, and age of landforms altered by the glaciers and sediment derived from them. During the height of the most recent continental glaciation (about 25,000 B.P.), the nearest edge of the continental ice sheet was about 200 km. north of what is now Maryland (Prest 1969).

Although none of Maryland's physiographic provinces was glaciated, indirect effects of glaciation can be seen, particularly in the coastal plain, where there is evidence of sea level changes and sediments deposited by rivers, seas, and winds. A layer of loess (windblown silt) of varying thickness covers much of the land along Chesapeake Bay. This deposit dates from the end of the last glaciation, about 14,000 - 10,000 B.P. (Foss, Fanning, and Miller 1974). The dominant geologic process affecting the coastal plain today is erosion from surface runoff (Gottschalk 1945; Costa 1975) and shoreline wave action (Maryland Geological Survey 1975; Schubel 1968; Singlewald and Slaughter 1949).

Postglacial Sea Level Rise

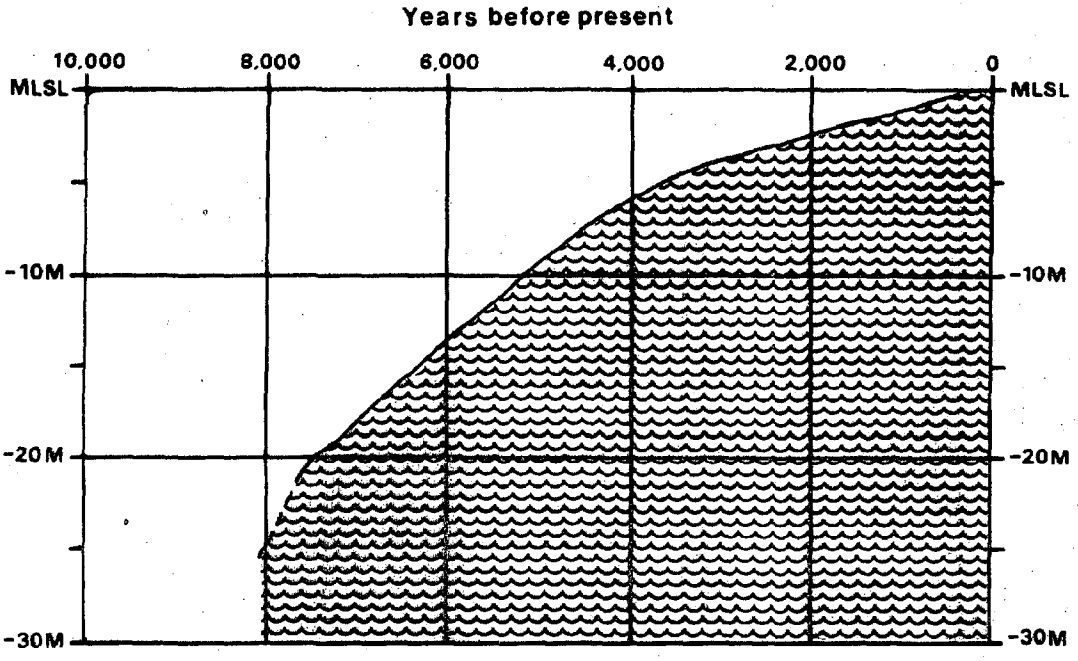
The most striking changes in the Maryland landscape are associated with the formation and continuing evolution of the Chesapeake Bay estuary. This drowned drainage system originally was the valley of the ancestral Susquehanna River and included deeply cut major tributaries in addition to short, steeply graded minor tributaries.

Scientists estimate that at its greatest regression, sea level stood about 100 m. lower than it stands today (Flint 1971:342). This situation coincided approximately with the maximum extent of continental glaciation, some 25,000 B.P. The lowered sea level displaced the Atlantic shoreline eastward about 250 km., increasing the downcutting capacity of the Susquehanna River and its tributary streams.

When the late-glacial warming period began about 18,000 B.P., the level of the world's oceans began to rise. Kraft, Biggs, and Halsey (1973) have developed a model for recent sea level rise, based on dated samples of peats formed during the early stages of this rise along the Delaware coast. These samples were extracted from various depths, radiocarbon dated, and the results graphed (Fig. 2-2). The curve suggests that sea level has been steadily rising, although at an ever-decreasing rate, for at least 8,000 years.

Since little work has been done on sea level changes in the Chesapeake Bay area, there is no information to confirm the applicability of the Delaware model there. Our research in the northern Bay area provides some data relevant to sea level changes. For example, a radiocarbon date of 5,565 ± 65 B.P. was obtained from a sample of oyster shells from the base of a prehistoric shell heap at the mouth of Fairlee Creek in Kent County. Another date of 5,065 ± 165 B.P. was obtained from the base of a shell heap at the mouth of Big Marsh, next to the confluence of the Sassafras River and Chesapeake Bay.[1] The extent of the deposits and the

[1] These radiocarbon dates were provided by Dr. Robert Stuckenrath, Smithsonian Institution. Their laboratory numbers are S.I. 1906 (5,565 ± 65 B.P.) and S.I. 1917 (5,065 ± 165 B.P.).



Note: Curve based on data from Delaware Coast.

Fig. 2-2. Relative sea level rise curve of Kraft et al. (1973)

size and thickness of the shells suggest that a vigorous oyster reef was established in this extreme northern position at least 6,000 years ago.

The history of oysters in Chesapeake Bay is important because sites related to oyster gathering are the most readily detectable sites in Maryland's coastal zone. Further work is needed in clarifying the time and the extent of sea level rise; however, the evidence at hand suggests that human populations occupied the area before the Chesapeake Bay formed. Many of the very early sites have of course been lost to the combined processes of sea level rise and erosion.

Figure 2-3a shows the current shoreline of the Chesapeake Bay region. In contrast, Fig. 2-3b shows a reconstruction of the same area during a period of lowered sea level. The Atlantic shoreline is shown at the present 18 m. depth contour and represents a condition extant at approximately 7,000 B.P. (Kraft, Biggs, and Halsey 1973). The margins of Chesapeake Bay and the Atlantic Ocean were displaced inland with the rise in

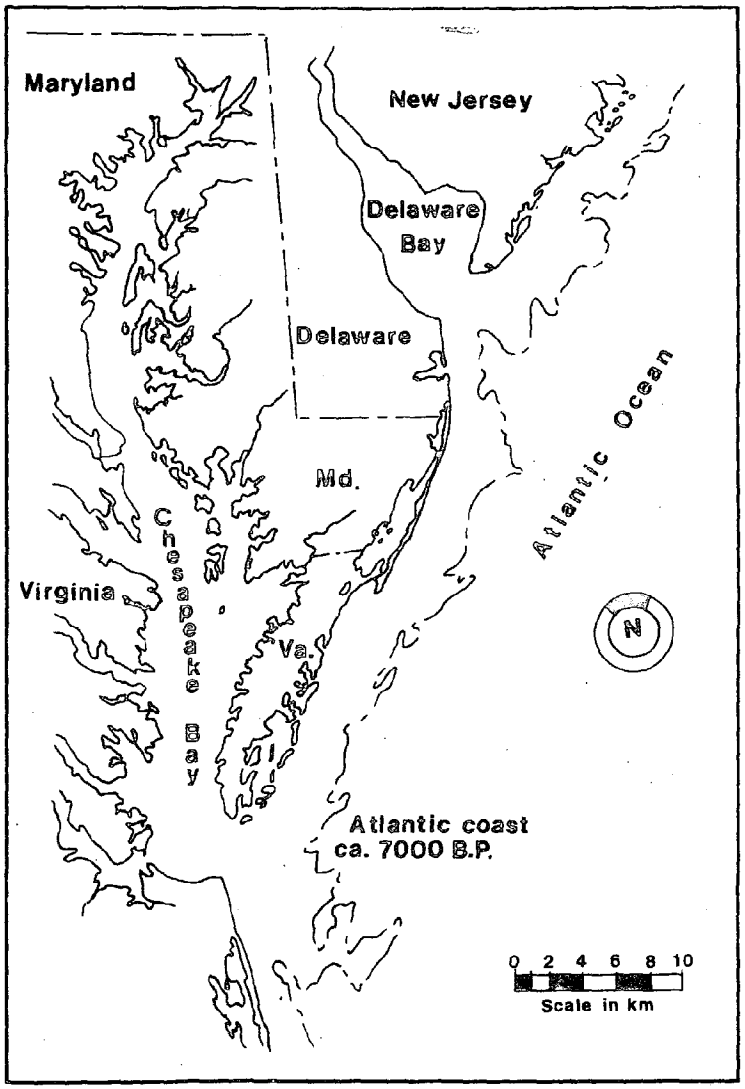


Fig. 2-3a. Chesapeake Bay region today

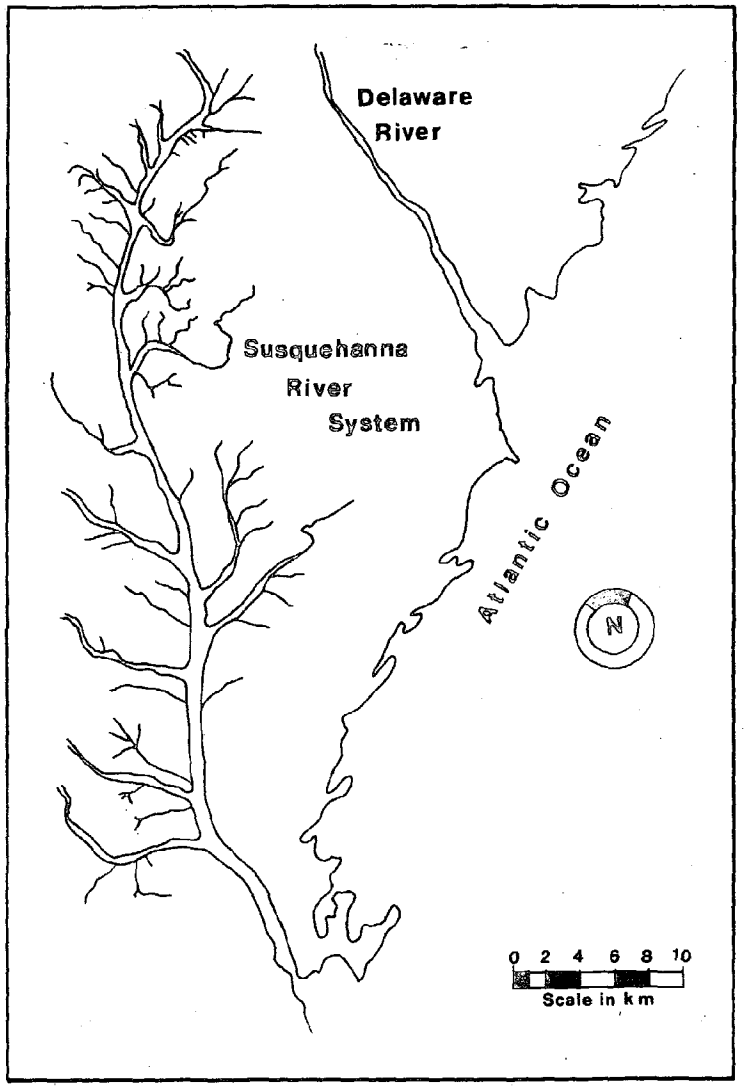


Fig. 2-3b. Schematic representation of Chesapeake Bay region ca. 7000 B.P.

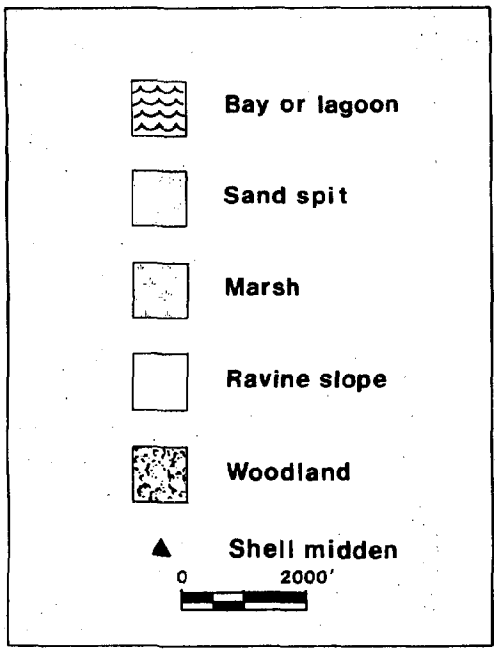
water level. The continued submergence of the area means that low profile parts of the coastal zone are being inundated rapidly, and thus we are losing many prehistoric resources related to earlier positions of the shoreline.

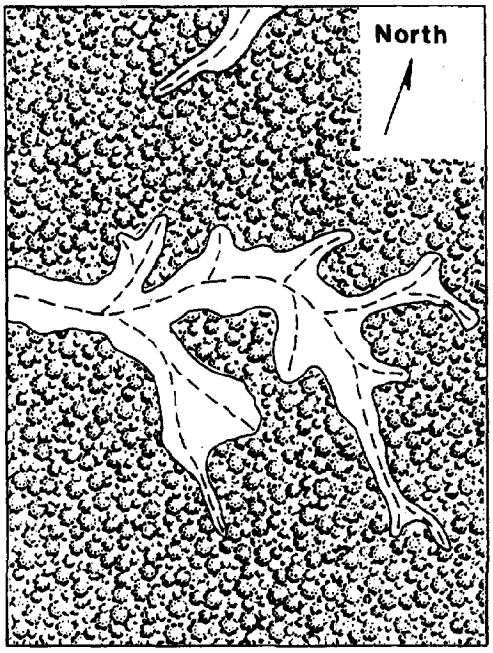
Once the Chesapeake Bay was established, related natural processes began to change local environments. Shore erosion, along with the transportation and deposition of sediment, played an increasing role. As the sea began to flood each area, newly formed estuaries expanded across former flood plains to abut flanking uplands which were composed of relatively soft, unconsolidated and easily eroded sediments. A highly indented coastline with numerous bays and coves was created. The expanding estuary extended the distance over which prevailing winds could create waves. In some areas, as the water rose and depths increased, the destructive power of the waves grew because they did not lose force in crossing extensive shallows. The result of all these factors was probably an ever increasing rate of shore erosion.

An Example of the Environmental Effects of Sea Level Rise

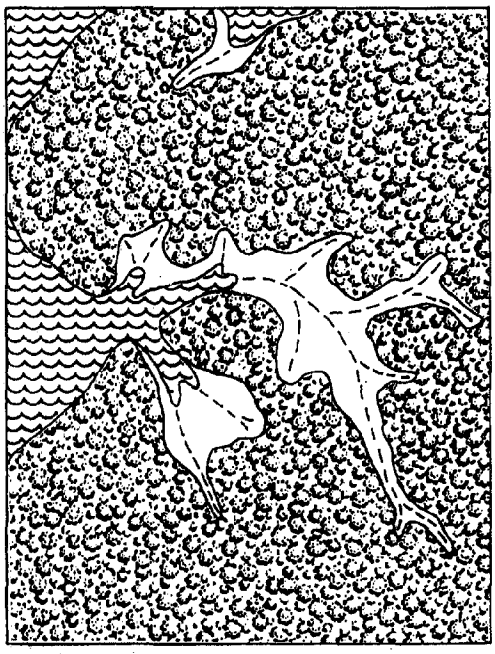
The following discussion indicates the nature and extent of the changes which the Maryland coastal zone has undergone over the past 10,000 years. The example shows the effects of sea level rise and shore erosion. Thus, Fig. 2-4 illustrates reconstructed stages of landscape development for parts of the Maryland coastal zone where shoreline changes have been documented by our studies.

Figure 2-4A shows the area as it probably appeared before inundation. The locale was characterized by an upland deciduous forest, ravine slopes, and freshwater streams. With the beginning of inundation (Fig. 2-4B), the stream and ravine slope were transformed into a brackish water shore zone. Continued inundation (Fig. 2-4C) increased the proportion of open water relative to the surrounding uplands.

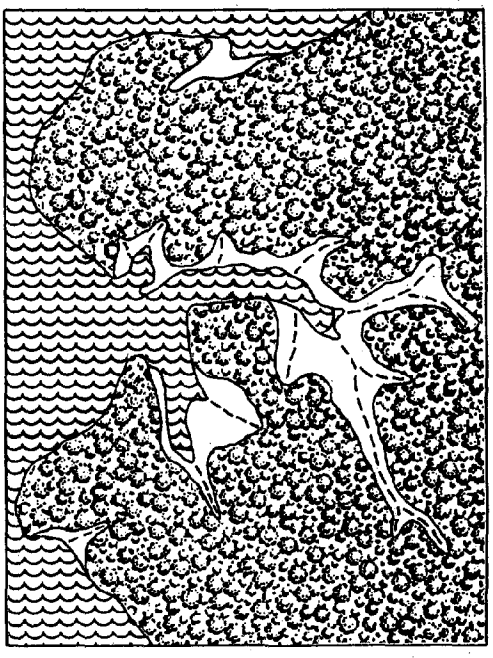




A. Pre-inundation drainage



B. Encroachment of brackish water, minimum date 7000-9000 B.P.



C. Continued inundation

Fig. 2-4. Example of postglacial shoreline evolution in Kent County, Maryland

As sea level continued to rise, erosion modified the shoreline. Sand spits formed downcurrent from eroding headlands (Fig. 2-4D). Many coves and inlets, once part of the highly indented shore zone landscape, closed completely (Figs. 2-4E and 2-4F).

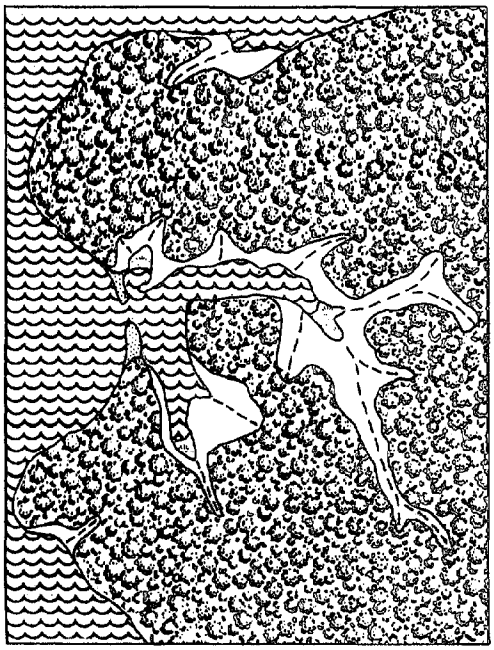
Figure 2-4G locates prehistoric shell heaps around this coastal lagoon, with basal radiocarbon dates from four sites. Prehistoric people began to use this location by at least 4,000 B.P. Figure 2-5 illustrates a portion of one of the thick shell heaps that ring this coastal lagoon.

The events which ended with the closing of the cove mouths by a stable sand spit would have had important implications for resources and hence for human population distributions. First, the proportion of marshland to open water behind the migrating sand spit increased. Also, waters behind the closed spit became fresh, as did the marsh. Final spit closure denied anadramous fish access to upper stream areas and denied oysters a suitable habitat. Subsequent changes in the landscape included continued filling of the lagoon by sediments, with increasing marsh and shrub vegetation. Ultimately, open water was displaced by woody plants and trees. Figures 2-4F and 2-6 show the present appearance of this coastal setting.

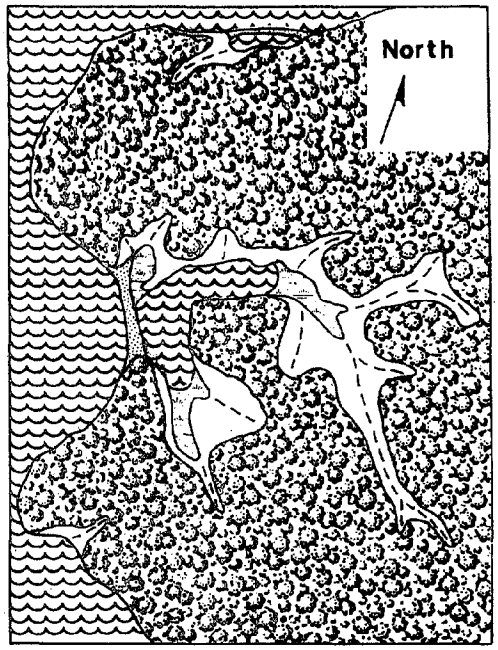
In summary, the coastal zone is dynamic, and some of its features are ephemeral. Prehistoric people had to change their resource procurement strategies in order to adjust to environmental change or abandon certain areas in favor of others.

Soils

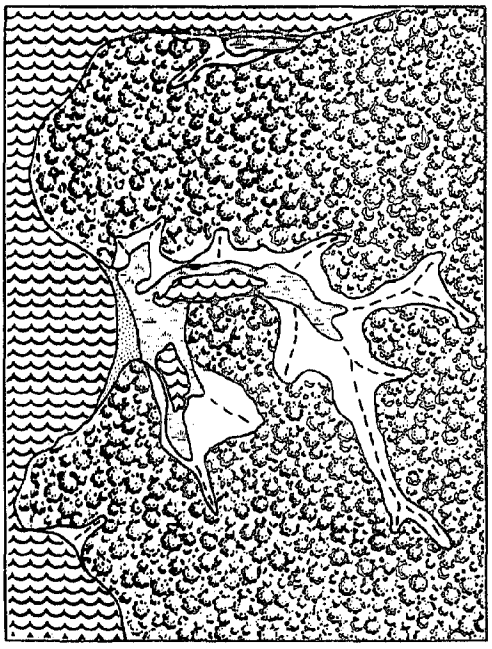
The soils that mantle Maryland result from complex chemical and physical interactions over long periods of time among parent material, climate, vegetation, and geomorphic factors. As a result of the granular parent material, coastal plain soils are sandy to silty, very light to medium in texture, and generally well-drained except in low-lying areas with high water tables or extensive hardpan development. These soils



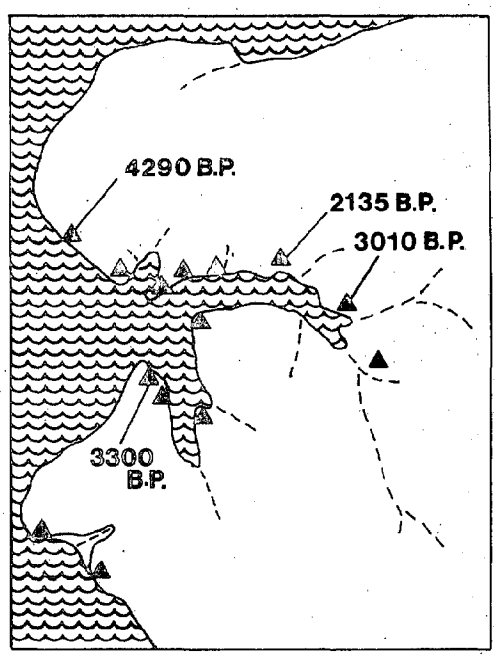
D. Initial sand spit formation



E. Complete sand spit closure, minimum date 900 B.P.



F. Coastal setting today



G. Prehistoric shell site locations with select basal radiocarbon dates

Fig. 2-4. Example of postglacial shoreline evolution in Kent County, Maryland

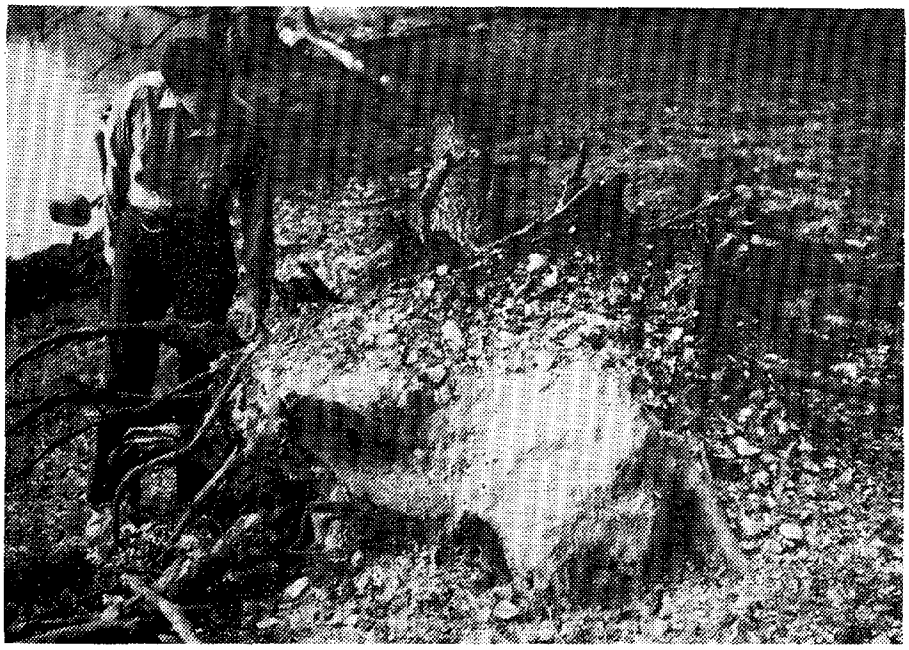


Fig. 2-5 Shell exposed along bank of coastal lagoon depicted in Fig. 2-4

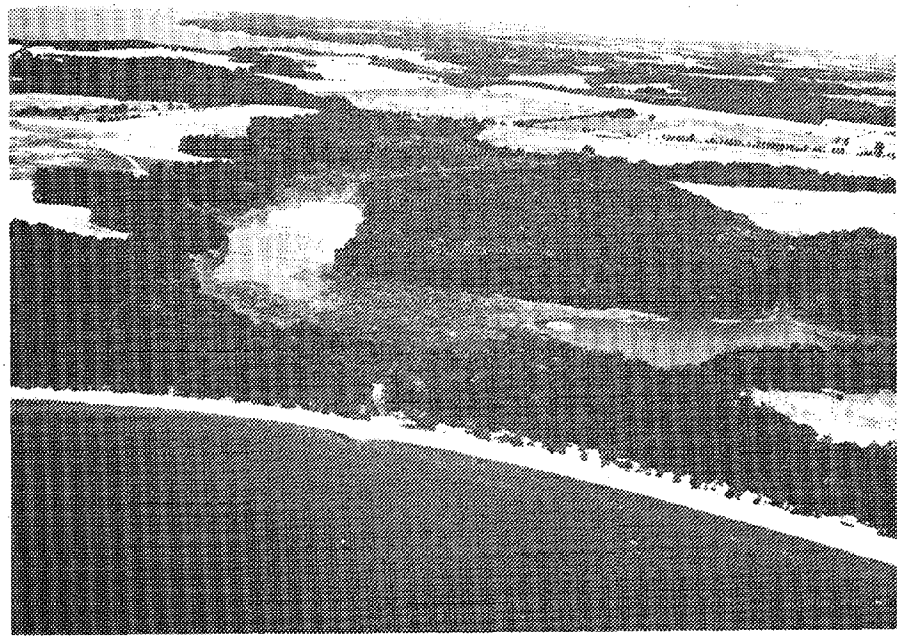


Fig. 2-6 Aerial view of coastal lagoon depicted in Fig. 2-4

are typically highly acidic. Piedmont and Appalachian soils are more variable, reflecting the complex geologic environments encountered in those areas.

The subsistence economies of Maryland's prehistoric people were influenced by the plants and animals available to them, and these were in turn influenced heavily by the nature of the soil. Varying widely in drainage, chemical, and physical characteristics, soils were variously used by prehistoric people in resource exploitation and settlement location.

In addition to contributing to land use and hence to the distribution of prehistoric remains, soils influence the preservation of these remains. Through time, strongly acid soils eliminate or deteriorate bone and antler materials, introducing strong bias into the prehistoric record. An important exception occurs, however, in areas where the soil has been influenced by shell debris left by prehistoric people. The resulting alkaline condition preserves bone and antler. Thus, in the coastal zone shell heaps provide a special opportunity for finding a wider range of prehistoric food and tool remains than would usually be found in areas with highly acid soils.

Forests

Maryland forests are characterized by a wide variety of deciduous trees and shrubs. Forests were important to prehistoric people because they supplied food and cover to them and to the animals they depended upon.

During the early period of European exploration and settlement, upland and mountain forests retained their natural state. Other areas, however, especially along the Piedmont river valleys, had been altered in prehistoric times by horticulture and burning. Since European settlement, forests have been greatly altered by clearing for agriculture, and cutting for fuel and lumber. Chestnut blight has accounted for the loss of American chestnut trees.

Before these changes took place, the Middle Atlantic Piedmont was a vast forest of oak-chestnut (Shelford 1963) which extended to the eastern flanks of the Appalachian Mountains. There, other kinds of forests dominated various elevations. In the coastal plain, the oak-chestnut forest gave way to oak-hickory. Both types of forest produced nuts, a valuable source of food for people and animals. The coastal plain also contained upland or drainage divide swamps, as well as riverine and coastal swamps and marshes (Braun 1950).

Although pollen experts disagree about how much Mid-Atlantic coastal plain forests changed during the last glacial age and the following warming period, a general outline of events is available. Whitehead (1965, 1973) has reconstructed vegetation for the area from Chesapeake Bay to southeastern North Carolina from the full-glacial period to the present time. He suggests that during the full-glacial period, 25,000 to 15,000 B.P., the Chesapeake Bay area was made up of spruce, pine, some fir, and birch forests. His map shows a spruce forest over the coastal plain and Piedmont, south of a tundra-taiga zone beside the ice sheet. Pine forest grew between the spruce forest and a southern deciduous forest. Whitehead suggests that the northern trees were displaced southward over 1,000 km. on the east side of the Appalachians, there developing forests with few deciduous trees over a broad area south of the ice.

Late-glacial vegetation changes saw the spruce-pine forest replaced by a pine forest, in turn replaced by a beech-hemlock forest. The oak-hickory forest became established by 10,000 B.P. Whitehead's conclusions are supported by the work of Harrison et.al. (1965) and Owens et.al. (1974) in the Chesapeake Bay area. It should be noted that the early northern type forest produced little plant or animal food that prehistoric people could use easily, when compared to the later, more productive deciduous forest.

Animals

Unfortunately, there is little information available on the makeup of Maryland animal populations during the past 10,000 years. The varied physiographic sections of Maryland today support a similar animal life. However, the populations and ranges of Maryland mammals and birds have been radically changed by European settlement. Certainly some species which prehistoric people hunted are no longer found in the state.

The diversity of land resources was matched by equally diverse and abundant water resources. The broad, slow-moving tidal waters of the coastal plain provided habitats for huge populations of fish and shellfish as well as vast flocks of migratory waterfowl. In addition, the Bay and the upper freshwater parts of the river-estuaries provided spawning and nursery areas for large schools of anadramous fish, such as shad and alewife.

How Environment Affects the Distribution and Preservation of Prehistoric Resources

The rise of sea level after the last continental glaciation was the single most dynamic change to which prehistoric people in the area adapted. The drowning of the Susquehanna River system by the sea created the complex set of environments that now compose Chesapeake Bay and its coastal zone. Here, over time, differences in salinity, topography, soils, vegetation, and substrate have formed an increasingly diverse set of habitats, supporting rich and varied plant and animal life. Because of the dynamic nature of the coastal zone, the record of prehistoric resources is expected to be complex -- both in content and in particular the remains preserved.

The radical change in sea level affected the distribution and preservation of prehistoric resources in six major ways:

The ancestral Susquehanna River drainage system became a large coastal plain estuary. The rising sea increased the environmental complexity of the area through time, creating more diverse wildlife habitats. Because

the coast was a richer area to exploit than either land or sea alone, prehistoric people came to exploit the coastal zone. As a result, prehistoric resources are concentrated along the land-sea interface, decreasing in number with increased distance from the shoreline.

Other changes resulted from the continued flooding. Chesapeake Bay increased in size, changing the land to water ratio; the shoreline lengthened and became more complex; water depths increased; stream gradients decreased; currents and salinity altered; and the erosion rate increased. Such changes affected the number, complexity, and location of natural resources, and therefore suggest that many kinds of prehistoric resources of various ages exist in the Maryland coastal zone.

Because the physiographic makeup of a coast determines the ease with which it can be inundated by rising water, higher bank shorelines (although less accessible to people from the water) are less susceptible to inundation. Therefore, more and older coast oriented resources are probably preserved in these areas than along low ground areas such as the lower Eastern Shore.

The topographic character of the coast being flooded controls the shape of shorelines, as well as the range of landforms that result. Highly indented shorelines offer more shelter and natural resources in less space than do straight, featureless coastlines. Hence, sinuous coastlines are likely to contain high densities of prehistoric resources.

Owing to the effects of ongoing flooding, landscape features representing various periods of time have been preserved. Of primary importance are old Bay shorelines, now the uplands around lagoons and marshes (see Fig. 2-4). Because they were once the shoreline, these areas may be the only places where coastal prehistoric resources of certain ages are preserved.

Natural events have preserved some resources but destroyed innumerable others. The rising sea has almost completely destroyed certain environments, such as ancestral flood plains, thus eliminating certain ages and kinds of prehistoric remains around Chesapeake Bay. Many prehistoric resources lie under the tidal waters and marshlands of Maryland, because

they have been inundated by the advancing sea.

Other considerations affect the distribution and preservation of prehistoric resources. Changes in the physical and chemical makeup of Chesapeake Bay waters may have directly influenced the distribution of prehistoric inhabitants. Bay salinities were of particular importance: Bay waters are characterized by a continuum of salinity values. Although the absolute values of the salinity gradient change with the season, the basic lateral and vertical stratification remains. Each of the Bay's major tributaries, like the Bay itself, is characterized by fresh waters at the source and brackish waters at the mouth. Therefore, for any given period a variety of resources might be expected to occur along each body of water. Both in the Bay and in its tributaries, the transition area between fresh and brackish water provides an environment for harvesting both fresh and brackish water resources. Prehistoric resources may be dense along transition areas.

Owing to environmental changes (particularly silt deposition from run-off caused by modern land clearing and agriculture), the distribution of oysters is now reduced. Therefore, the distribution of prehistoric resources near oyster reefs is probably greater than the present distribution of living oyster reefs.

Surface geological deposits not only determine what the coast looks like, but they also provide the parent material on which soils, plants, and animals establish themselves. In a broad sense, prehistoric remains may differ with geological settings. Another way in which the coast, as a geologic setting, has affected prehistoric resources include: a thick layer of loess (windblown silt), deposited from 15,000 to 10,000 B.P. covering parts of the uplands along the upper eastern Chesapeake Bay shoreline. Very early prehistoric resources in this area are now under perhaps five feet of sediment. Such remains are likely to be uncovered only by surface erosion or deep excavations.

The raw materials for making stone tools were limited in the coastal zone. Pebble cherts, jaspers, quartz, and quartzite were available. The presence of other raw materials, such as rhyolite, soapstone, and argil-

lite, all of which had to be imported, indicates prehistoric people had contact with other areas.

Different geologic materials have different resistances to erosion, affecting changes in local landforms. Fewer coast-oriented prehistoric resources may be expected in areas with high rates of erosion.

Soils formed on coastal plain sediments affected the activities of prehistoric people and continue to modify their remains: coastal plain soils influence the plant and animal makeup of upland areas, thus helping to determine the nature and location of resources. Correlations between soil type and prehistoric resources are likely; for example, late period horticultural settlements would be expected to be most common in areas with fertile, well-drained, and easy-to-work soils.

The highly acid nature of coastal plain soils directly affects the preservation of prehistoric remains, in destroying artifacts differentially. Perishable food and tool remains such as wood and bone are removed from the record; more resistant materials such as stone and ceramics remain. An important exception is in coastal shell heaps where a basic soil favors the preservation of bone and antler. Thus, materials in coastal sites vary according to soil conditions as well as according to the age and culture. Sites which represent extensive use of organic raw materials may be difficult to document unless accompanied by shell deposits or certain other conditions (such as charring) which help preserve organic remains. It should be noted that soil chemical analysis may aid in delineating sites of this type.

Finally, the character of the plant and animal resources available for human exploitation influenced the economic systems which prehistoric people devised to exploit them: many of the most important coastal zone animals are available only during specific seasons; for example, saltwater fish which spawn in rivers and migratory waterfowl. Prehistoric resources should be found that relate to specific seasonal exploitation activities. These remains should be located in areas permitting the greatest harvest at the time of their availability.

Important plant resources also were available only during specific

seasons. The best time for gathering berries and grasses, for example, would be summer; nuts would be available in the fall, and roots, in the spring. Prehistoric resources should exist in the coastal zone or in nearby upland areas, where seasonal plant gathering took place.

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Chapter 3

Cultural Dynamics

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The story of the people who lived in Maryland before the Europeans came can be told only by the prehistoric archeological record. When Europeans began to settle the area at the end of the sixteenth century, they wrote descriptions of the lifeways of the Native Americans they met. These descriptions provide some information on prehistoric land use and hence on the nature and distribution of archeological sites dating to that period. However, for the 12,000 or more years during which prehistoric cultures existed before the coming of the Europeans, there is only the prehistoric record.

Prehistoric people inhabited the Maryland coastal zone for thousands of years, which suggests that the area is likely to contain abundant prehistoric resources. Furthermore, these resources are likely to be varied as activities changed along with and independently of environmental changes through time. What do archeologists know about prehistoric resources in Maryland's coastal zone?

At present, archeologists know little about prehistoric people and their economic adaptations to the Maryland coastal zone. What information is available is sketchy and not necessarily representative of the range of diversity of the prehistoric record. In fact, there have been very few professional projects, especially along the Eastern Shore. Virtually no systematically derived information exists for Maryland's Atlantic shoreline, aside from what can be generalized from similar nearby areas in Delaware. Most available studies describe artifacts at individual sites or offer untested speculations about past activities. In short, there is no detailed regional information available on the kinds of prehistoric resources, their interrelationships, distributional patterns, or relative abundance in the coastal zone. In general, information about past culture decreases in detail and amount as one considers older and

older time periods.

Most available studies reflect the early goals of archeologists who were primarily interested in establishing regional chronologies. These studies concentrated on the age and distribution of artifact types, especially ceramics and projectile points (or arrowheads). Although they continue to be interested in establishing regional chronologies, archeologists now are increasingly interested in studying prehistoric lifeways. More recent studies concentrate on regions, rather than individual sites. Such studies are valuable because they seek to explain changes in settlement patterns and subsistence systems. Information of this sort is necessary for constructing rational frameworks for assessing site significance and representativeness.

Archeological studies have recognized four prehistoric cultural traditions in Maryland: Paleo-Indian, Archaic, Broadspear, and Woodland. The cultural units of these traditions are summarized in Fig. 3-1.

The prehistory of the Maryland area may be summed in a general way by referring to adaptive changes through time. These changes are reflected in the nature and distribution of prehistoric artifacts and groups of artifacts in the coastal zone. The earliest culture, the Paleo-Indian Tradition, may be seen as a hunting and gathering adaptation to a time of changing environmental conditions at the end of the last continental glaciation. As the environment stabilized to near its present form, Archaic Tradition cultures of seasonal hunters and gatherers established themselves, expanding through time toward the limits of the environment's carrying capacity and their technology. The spread of the Broadspear Tradition about 4,000 years ago appears to have signaled new technological advances; hunting and gathering in the coastal zone became more efficient. The final adaptive change was the adoption of horticulture late in the Woodland Tradition about 1,000 years ago. The population then increased beyond that which could be supported by hunting and gathering alone.

Fig. 3-1

Time-Space Chart of Maryland Area
Prehistoric Cultures

Years B.P.			Lower Potomac Valley (Gardner & McNett 1971; McNett & Gardner ms.; Stephenson et al. 1963, Wright 1973)	Delaware State (Thomas 1974)
500	WOODLAND	Late	Algonquian Tribes	Nanticoke/Leni Lenape
1,000		Middle	Potomac Creek Phase Townsend Phase Mockley Phase	Webb Phase Slaughter Creek Phase
2,000			Accokeek Creek Phase	Delmarva Adena Phase
	BROADSPEAR	Early	Popes Creek Phase	Carey Complex
3,000			Marcey Creek Phase	Susquehanna Phase
4,000			Broadspear Tradition, Susquehanna Phase	Piedmont, Laurentian Traditions, Koens-Crispin Phase
5,000	ARCHAIC	Late		
6,000				Crude-Notched Point Tradition
7,000		Middle	Archaic Tradition Projectile Points	
8,000				
9,000		Early		
10,000	PALEO-INDIAN			Bifurcate Point Tradition Corner-Notched Tradition
pre - 10,000			Fluted Projectile Points	Fluted Projectile Points

Paleo-Indian Tradition

At the close of the last continental glaciation when the ice retreated, (by about 13,000 B.P.), grasslands quickly colonized the areas north of Pennsylvania; deciduous forests followed, and the present vegetation zones became established. Paleo-Indian populations probably followed the northward migration of plant communities and herd animals along the East Coast.

Although many archeologists assume that Paleo-Indian tradition cultures engaged only in the hunting of now extinct herd animals, the distributions of Paleo-Indian remains over forested as well as grassland environments in the eastern United States suggests that these groups more probably gained their subsistence by exploiting a variety of resources. Gardner (1974) has investigated a series of Paleo-Indian occupations, called the Flint Run complex, located in the middle Shenandoah Valley of Virginia. These materials (dating between 11,000 and 8,000 B.P.) represent the quarrying of local jasper and river cobbles, tool manufacturing, and habitation activities.

The earliest Paleo-Indian remains are recognized by a distinctive projectile point called the Clovis point. Later in the tradition, several projectile point styles replace the Clovis point, suggesting that through time several adaptations may have developed in local environments.

Paleo-Indian tradition sites have not been reported in the Maryland coastal zone; however, a number of projectile points of this tradition have been found in Maryland and Delaware (Handsman and Borstel 1974, Solecki 1961, Thomas 1974). Coastal oriented sites of this tradition are not expected in the Maryland coastal zone. The Atlantic coast was located east of its present position and the Chesapeake Bay had not yet formed. Only sites related to Paleo-Indian exploitation of coastal plain uplands would be found in what is now the coastal zone; but the Paleo-Indian settlement pattern in the coastal plain is not well enough understood to suggest what kinds of remains might be present and their relative abundance. In addition, sites of that age were probably

few and small; and a great deal of time has elapsed during which they could have been destroyed or buried by natural and human agents. Beginning about 10,000 B.P., with the establishment of modern vegetation zones, Paleo-Indian groups were replaced by Archaic Tradition peoples.

Archaic and Broadspear Traditions

Archeologists usually define the Archaic Tradition as prehistoric remains without evidence of pottery or horticulture, while the following Broadspear tradition shows the beginnings of pottery or the use of steatite (soapstone) vessels. The Archaic tradition is usually divided into Early, Middle, and Late segments. None of these segments is very well known in the Maryland coastal plain, although more remains are found of late than of early and middle Archaic. That so few remains are found probably results from the fact that populations were small and dispersed.

The preservation of remains, especially older ones, is poor in this area where there have been few environments with aggrading sediments during the past 12,000 years. Archaic groups probably followed a mobile settlement pattern of hunting and gathering seasonally abundant plant and animal resources.

The Archaic Tradition is known from well documented archeological sequences in several areas, particularly in West Virginia (Broyles 1971) and South Carolina (Coe 1964). In its early stages, the Archaic tradition throughout most eastern states is characterized by stylistically similar projectile points. Late in the tradition, many local styles become differentiated.

Early Archaic projectile point styles are found on the surfaces of many sites along the Potomac River and its interior hinterlands, such as along Zekiah Swamp. These points are identified by referring to the West Virginia and South Carolina prehistoric sequences. A possible Early Archaic Tradition occupation has been found at the Ruppert Island site on the upper Potomac River (McDowell 1972); this site may represent a small camp for mining a local outcrop of vein quartz.

Only one Early Archaic tradition site is known from Maryland's Eastern Shore, although Early and Middle Archaic projectile points are found in many locations. The Chance site, located in Somerset County, has been referred to as the most productive Early Archaic site in Maryland (Cresthull 1971).

In Delaware, Thomas (1974) has found that Middle Archaic tradition sites include interior hunting camps containing evidence of repeated seasonal occupation. These sites have restricted artifact inventories; contemporaneous middle Archaic sites found along the coast and major rivers contain more varied artifacts. Late Archaic sites are found in several microenvironments, suggesting that these groups undertook a wide range of subsistence activities (Thomas 1974).

McNett has defined several Late Archaic tradition archeological cultures for the Potomac River area, including the Piscataway, Vernon, and Holmes cultures, represented at several sites. According to McNett, the settlement pattern contains base camps along the Potomac River with seasonal inland camps, such as those along Zekiah Swamp, for hunting, gathering, and quarrying stone materials. In Kent County, the authors of this study identified a series of late Archaic sites representing the exploitation of both coastal and inland environments.

Beginning about 4,000 B.P., Broadspear tradition cultures appear in the coastal plain from northern Florida to the Northeast. These cultures are recognized by similar tool kits, especially broad-bladed projectile points and steatite or ceramic vessels. These tools may represent a technological advance in adapting to the coastal plain environments, which also may have changed at that time. While Broadspear tradition cultures appear very similar in their early projectile point styles, they too gradually differentiated over time.

Broadspear Tradition sites occur along rivers that empty into the Atlantic Ocean and along estuaries. Turnbaugh (1975) has attempted to explain the development of this culture, which he believes represents a migration of groups from the coastal plain of the Southeast. He suggests that these groups followed a hunting, gathering, shellfishing, and fishing

way of life along rich tidal streams and estuaries. The movement northward may have resulted from environmental changes that made northern areas suitable for this subsistence system. Perhaps the slowing rate of sea level rise about 4,000 B.P. enriched these coastal environments by permitting large populations of waterfowl, anadromous fish, and shellfish to become established. The movement also could have resulted from a technological advance in exploiting these rich resources.

Present in Broadspear Tradition technologies are several kinds of artifacts that could have been used for fish exploitation -- broad-bladed projectile points, net weights, spear-thrower weights, and stone roasting platforms. Steatite vessels and ceramics certainly represent an advance in cooking procedures, and there is indirect evidence for the use of canoes. It seems likely that Broadspear Tradition prehistoric cultures represented increased population growth and expansion throughout the coastal plain.

Along the Maryland coastal zone several Broadspear sites have been investigated, including the Marcey Creek site at Potomac Palisades, where spring runs of herring, shad, and sturgeon could have been exploited (McNett & Gardner ms.). In Delaware, Broadspear tradition sites are larger than Archaic sites and contain denser debris. These sites are found along the rivers, with hunting and gathering camps found in inland areas (Thomas 1974). Witthoft (1953) suggests that steatite vessels probably indicate the existence of river travel and that the use of raw materials from other areas, such as steatite, suggests trade.

Woodland Tradition

When ceramics are found in the artifact inventory of prehistoric cultures, the remains are usually referred to as belonging to the Woodland Tradition. Although the presence of ceramics was earlier taken to mean that horticultural subsistence also must have been present, this inference is no longer automatically made. Indeed, no direct evidence for horticulture in the Middle Atlantic area has been found before 1,000 B.P.,

although pottery was used since about 3,000 B.P. Even after 1,000 B.P., it is possible that some groups did not adopt horticulture because the resource yield from hunting and gathering in some areas (for example, in the coastal zone) was too high to make horticulture advantageous.

The earliest prehistoric culture in which ceramics have been documented was the Marcey Creek phase. The addition of ceramics has not been demonstrated to signal any dramatic change in the aboriginal lifeway, except perhaps for increasing efficiency of the diversified hunting and gathering economy. Several phases of the Early (3,000 to 2,500 B.P.) and Middle Woodland (2,500 to 1,200 B.P.) periods have been distinguished in the Potomac coastal plain area by McNett (Gardner & McNett 1971; McNett & Gardner ms.) He suggests that the transition area formed by the juncture of fresh and brackish waters was especially important in providing a great variety and number of plant and animal resources. McNett has identified a series of coastal and interior sites that he believes represents winter domestic and shellfish gathering camps, spring fishing camps, and other sites in a seasonal round, including summer freshwater mussel procuring stations and locations for processing plant resources. Fishing sites were located near the Fall Line on the Potomac River.

In the late Middle Woodland (by about 1,500 B.P.), according to McNett (McNett and Gardner ms.) Mockley Phase sites show a shift away from the previous extensive use of oysters to smaller sites with fewer and smaller oyster remains. A similar trend toward smaller shell sites is seen along the Severn River (Wright 1973) although this shift takes place slightly later in time. Change is also seen in the upper Eastern Shore, where the authors of the present study have noted that markedly fewer shell middens seem to have been established after about 2,000 B.P.

McNett believes that this change represents the probable addition of corn horticulture to the established hunting and gathering subsistence pattern, although no evidence for horticulture exists until later and then in a different cultural tradition. An alternate explanation for the upper Eastern Shore may be that continuing shoreline erosion caused sand spits to close many small estuaries, rendering many habitats no longer suitable for oyster growth and anadromous fish runs. The degradation of

these important resources could have created an imbalance between population and available resources, perhaps requiring movement to remaining environments where oysters and fish continued to prosper. Such a move would have left some areas virtually abandoned and open for occupation by the horticultural groups that later moved into the coastal plain. The presence of competing groups and the resistance to land or resource loss by local inhabitants might help explain the stockaded villages European explorers saw in the coastal plain.

On the Eastern Shore, the authors of the present study have recorded a sequence of coastal shell and interior nonshell sites that span the phase sequence defined for the Potomac River. However, only a few Mockley Phase ceramics and almost no later ceramics, except for Potomac Creek wares, are found.

Little is known of the Late Woodland Townsend culture (1,000 to 300 B.P.) that follows the Mockley Phase in the Potomac coastal plain. More is known of Townsend culture prehistory in Delaware, where the subsistence-settlement pattern apparently included the summer coastal exploitation of shellfish, finfish, deer, and plants, while fall-winter exploitation included nut gathering and deer and fowl hunting in the interior. In addition, spring exploitation of anadromous fish along the rivers is postulated.

A new prehistoric culture, Potomac Creek, appears in the Maryland coastal plain not long before European contact, about 800 B.P. McNett (McNett & Gardner ms.) suggests that this culture developed in Piedmont river valleys, including those of the Shenandoah and Potomac, from a prehistoric culture called the Montgomery complex. This complex, beginning about 1,100 B.P., is characterized by large permanent horticultural villages at several sites. Refuse remains include corn, squash, deer and small mammals, fish, and freshwater mussels, showing that the subsistence pattern included both horticulture and the use of seasonally available resources. Sites contain many pits, probably originally dug for food storage but later used for refuse and burials. These sites were surrounded by defense stockades.

In the coastal plain the Potomac Creek culture has been investigated

at several sites including Accokeek Creek and Potomac Creek or Patawomeke. Evidence has been found for large stockaded villages with large ossuary or burial pits in which the bones of many people were found. In addition to the villages, at least one camp for procuring shellfish has been found, at Loyola Retreat (McNett & Gardner ms.).

At the time of European contact, both the Potomac Creek horticulturalists and the descendants of the earlier hunting and gathering groups may have been present in coastal areas, although only the horticultural groups were mentioned by Smith (1907). However, natives of the Maryland coastal plain probably felt the effects of European contact in the form of contagious diseases and movements of other native groups well before actually seeing the Europeans themselves. Thus, remnant hunting and gathering groups may have been destroyed before Smith's voyage of 1612.

Native American Inhabitants at the Time of European Contact

Archeologists derive some information on lifeways from the study of contemporary written accounts made by the Europeans. Such written accounts for the Chesapeake Bay area include reports of English exploration and settlement from about 1584 through 1620. These accounts contain information on native groups including their distributions, interrelationships, and the resources they exploited. Although these accounts are valuable for indicating the nature, location, and distribution of late prehistoric remains, the limitations of these accounts must be considered. The use of these early accounts poses two main problems: the first concerns the extent to which the reported lifeway already may have been altered by earlier European contacts, and the second concerns the difficulties of reports made by people who were not trained to make observations about other cultures.

Accounts of the Roanoke and Jamestown colonies do not represent the first contacts between Europeans and the native inhabitants. Instead, regular contacts began by the early sixteenth century in Canada and shortly

thereafter in Florida, spreading European trade goods and diseases throughout the eastern seaboard in advance of the Europeans themselves. Further, the intergroup warfare so extensive at and after European contact may not have been very widespread before European contact stimulated it. Likewise, the importance of agriculture may have increased or declined with the onset of depopulation and instability. In short, it is difficult to measure the reliability of European accounts.

The second problem concerns the reports themselves. Few firsthand accounts exist that describe aspects of native lifeways in detail. Also, these reports were seasonally oriented: explorations usually were made during the summer months, resulting in more descriptions of summer activities than of other seasons. Different observers who saw the same group at different seasons may give the impression that two different groups were contacted.

There are further limitations to the accuracy of European observations. Europeans were describing a culture that had some understandable aspects, such as agricultural techniques and village life. Other aspects, such as hunting and gathering techniques and the scheduling of the yearly activities, were less familiar. Again, the resulting accounts report some activities in too little detail and others in too much detail. The plethora of local dialects and the prevalence of internecine warfare confused these untrained observers. Finally, the Europeans who described the new land and its inhabitants were trying to justify their experience to those who remained in Europe; their descriptions frequently exaggerated certain aspects of the new land.

After the English colony was established at Jamestown in 1608, John Smith sailed up the Chesapeake Bay exploring and mapping resources and noting the distribution of native groups according to their strength in fighting men. His description provides information on the contemporary native inhabitants throughout tidewater Virginia and Maryland (see Fig. 3-2). Smith found that Algonquian-speaking groups occupied most of the tidewater area on both the Eastern and Western shores of Chesapeake Bay. He mapped nearly 200 villages, 30 of which he designated by a symbol that stood for king's house or tribal capital (Fig. 3-2). The people lived in

Fig. 3-2 John Smith's Map [1612] of the Chesapeake Bay Area

permanent villages or towns along the Bay and its tributary rivers, particularly at the intersections of the many waterways.

From the time of the Roanoke colony onward, the English were impressed by the amount of territory held in the tidewater and the number of groups that belonged to the Powhatan Confederacy. This confederacy included approximately 30-36 tribes located on Chesapeake Bay's Western Shore, from the Potomac River south to the James River. Most of these tribes acknowledged the leadership of Powhatan, apparently as a result of conquest (Garrow 1974: 33-44). In addition to periodic fighting among themselves, the Algonquian-speaking groups of the tidewater area fought with Siouan-speaking groups of the Piedmont west of Chesapeake Bay, including the Monacan and Manahoac confederacies, although no changes in territory seem to have resulted from this fighting during early English colonization. The Algonquians also regularly fought bitter wars with the Iroquois-speaking groups, particularly the Susquehannocks and probably the Senecas, who inhabited the Piedmont north of the Chesapeake Bay.

The Iroquois groups, known as Susquehannocks and Massawomekes or Senecas, consisted of permanently settled villages or towns of agricultural peoples living in the river valleys that flowed into the Susquehanna River. Through trade with groups further northward, they obtained brass and copper goods, which originally came from the French explorers and settlers in Canada. Their wars with Chesapeake Bay groups may have been stimulated by population expansion or by the need to establish a new territory because of being pushed southward by other groups, who had in turn been dislocated by the French settlers. As he traveled up Chesapeake Bay, Smith noted that the Patuxent River Algonquians were clustered tightly together and that north of them the area was deserted; both observations are understandable in view of the hostile relations that existed between the Algonquians and the Iroquois to the north. Figure 3-3 presents the general location of the major native groups thought to have inhabited the greater Chesapeake Bay area at the time of English settlement.

Although several scholars have estimated the population density of tidewater Algonquian groups at the time of European contact, the most thorough work is that of Feest (1973), who estimates 14,300 to 22,300

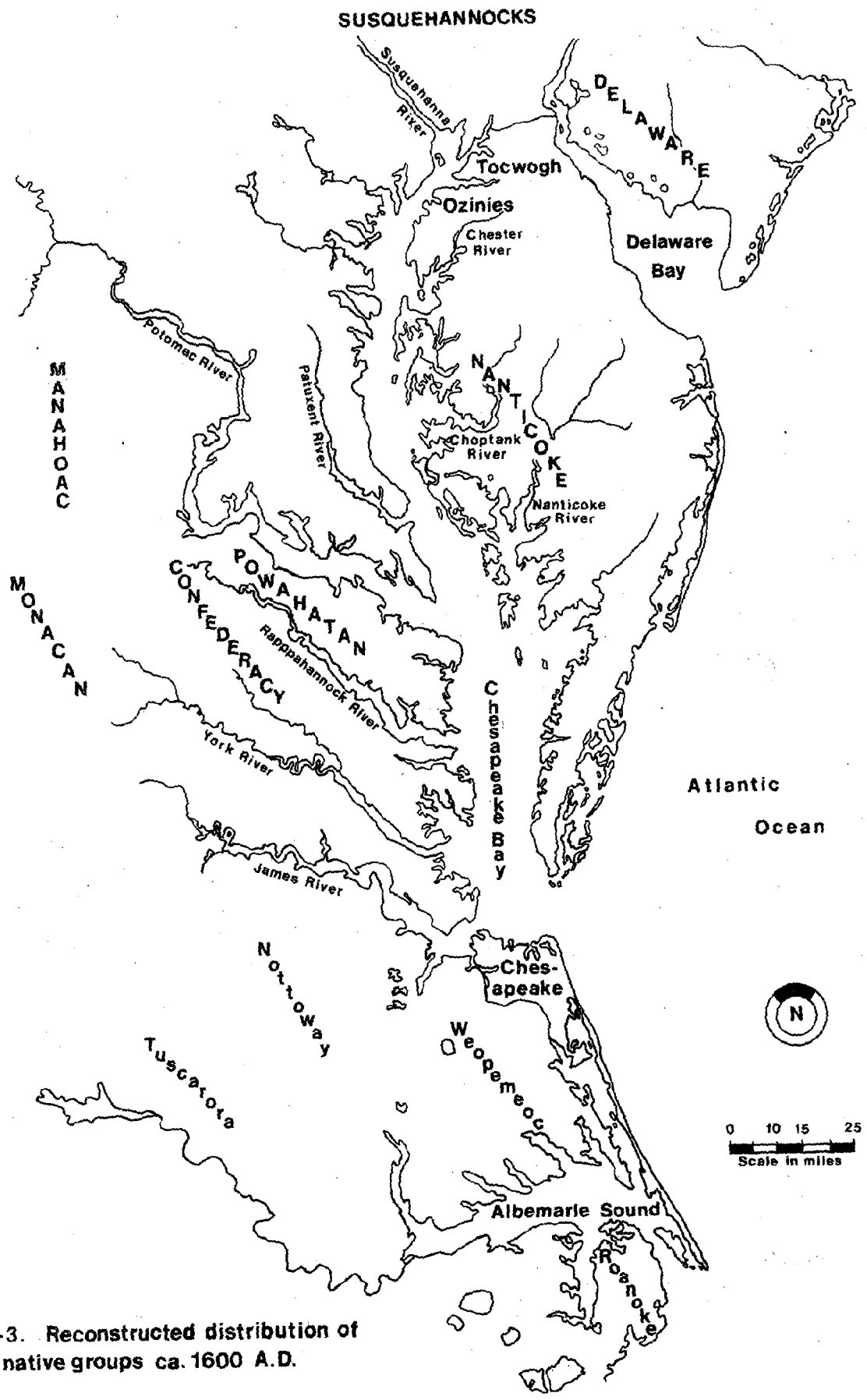

Fig. 3-3. Reconstructed distribution of major native groups ca. 1600 A.D.

people for the Virginia Algonquian. Mooney (1907) has traced the rapid decline of Powhatan Confederacy groups from an estimated 8,000 to a few family groups in 1705.

Tidewater Algonquian groups lived in small villages or towns always located near the coast, according to Hariot's (1893, 1971) report of the Roanoke area. He described the number of houses per town as being 10 to 12, with some towns having as many as 20 or 30. The houses were constructed of poles covered by bark or mats made of rushes. They were usually 12 to 16 feet long and half that in width. A wiroance or chieftain ruled one, sometimes a few towns, and at most 18 (where according to Hariot's report, there were 700 to 800 fighting men). Many local dialects were spoken in these villages.

For Virginia, Smith specificied that settlements were found along rivers near fresh springs, with from two to 100 houses together. Fields and gardens surrounding the houses ranged from 20 to 40 and sometimes 100 to 200 acres. Both Hariot and Smith reported that towns were fortified; fortifications are represented on Smith's map of the Chesapeake Bay (Fig. 3-2). Fields and houses were located outside the wooden palisades. The location of settlements along tidewater rivers allowed access to the greatest number and diversity of the area's resources. Upper river areas were used primarily for the seasonal hunting of wild game.

The subsistence pattern of tidewater Algonquian groups consisted of the resources they used throughout the year, the places from which the resources were obtained, and the technology for acquiring and preserving the resources. This information not only aids in understanding the native lifeway at the time of European contact, but also indicates the potential nature, variety, and locations of contact period archeological remains.

In general, tidewater Algonquian groups depended upon a wide variety of wild and domesticated plants and hunted and collected animals. Garrow (1974: 24) enumerates the variety of resources the Powhatans obtained by cultivation, collection, fishing, and hunting, and concludes that although cultivated crops satisfied little more than one-third of the yearly subsistence requirement, the value of crops lay in their reliability as a

controlled source of food. Smith (1907: 97) remarked of the Virginia groups that "for neere 3 parts of the yeare, they naturally affordeth from hand to mouth, etc."

In discussing Virginia groups, Smith also noted that the year was divided into five seasons: 1) winter, 2) the budding of spring, 3) the earing of corn, 4) summer, and 5) harvest. During the winter some of the people moved their residences to temporary camps in the "deserts" or deserted areas of upper river drainages. There they participated in individual and communal hunts, using bows and arrows, snares, and drives, in which many deer and other animals, including bear, were taken (Smith 1907). Wintering migratory birds, such as ducks and geese found along the waterways, also were used at this time.

From March through May overlapping part of the crop-planting season, fishing was also important; herring, shad, gar, and sturgeon filled the streams in migratory runs. That fishing was an important part of Algonquian subsistence is apparent in the variety of devices used, including weirs or traps, canoes, nets, lines, spears, harpoons, and bows and arrows.

Fishing was practiced to a degree and extent that greatly impressed the English settlers, evidenced in their many discussions and illustrations of native fishing techniques.

The planting of crops took place from March through June or July. Cultivated plots 100 to 200 feet square were prepared by removing the bark from near the roots of trees and then scorching the roots with fire (Strachey 1953 and Garrow 1974: 23). At the same time stubble was gathered and burned. Sharpened sticks were used to plant several varieties of squash, passion fruit (maycocks), tobacco, beans, and corn. Until harvest, the crops were weeded and protected from birds and other animals.

Although the gathering of animal and plant foods took place throughout the year, Garrow (1974: 26) states that it was particularly important in spring and summer, the period between harvests when the previous year's store of agricultural products had been exhausted. Many kinds of roots, fruits, nuts, oysters, clams, mussels, birds, eggs, and insects were collected. Shellfish were preserved by smoking, while many plant foods were dried.

Crops were harvested from August to October, and corn was dried or roasted for storage. From harvest time until winter, the greatest variety and amount of food was available, resulting in extensive feasting. When stored supplies were exhausted in late winter, the next annual subsistence round began.

Implications for Prehistoric Resources

Information derived from the known prehistory and ethnohistory of the Maryland coastal zone can give planners a very general idea of the prehistoric resources that could be expected even though this information was not produced for managing these resources. Most importantly, prehistoric resources should be abundant in the coastal zone because of the long period of prehistoric occupation as well as the great number and variety of natural resources available for exploitation.

Second, prehistoric resources would be expected to be varied in many ways including what artifacts and features are present, the size of the areas covered, density of artifacts, and the ages and kinds of activities represented. This variation results from changes in coastal environments, prehistoric activities, and population size during the long period of occupation.

Several generalizations can be made about the nature and preservation of prehistoric remains in the Maryland coastal zone. From the various kinds of remains expected in the Maryland coastal zone, two obvious categories emerge: shell and nonshell (or lithic). Shell sites consist of quantities of oyster shell, Crassostrea virginica, along with stone tools and sometimes ceramics. Bone remains may also be preserved in the shell deposits. All of the remains may be stratified in a layer sequence based on age. Nonshell sites consist of stone tools and manufacturing debris and possibly ceramics, usually confined to the top few inches of the soil. Shell sites are typically more visible than nonshell sites.

Several types of shell and nonshell sites would be expected.

Because of increased population densities and better preservation,

more later than earlier prehistoric sites are expected in the coastal zone. Older sites are important because they are rare.

In locations where the shoreline underwent changes during prehistoric occupation, there may be evidence relating to land use at each stage of environmental development. Prehistoric people either moved to more familiar environments or stayed and changed their activities. For example, Fig. 2-4 shows the stages of coastal geomorphic change in an area. Each setting would have been characterized by prehistoric resources relating to its contemporaneous use as well as to use during earlier stages of development. Such continuous use of a restricted area often produces overlapping or superimposed remains.

Numerous coastal oriented sites can be expected to have functioned as part of complex subsistence systems having more stations located in interior as well as other coastal settings. Thus, sites cannot be understood solely on an individual basis.

The Maryland coastal zone contains unique prehistoric areas and sites. The Potomac, Patuxent, Susquehanna, and Choptank rivers (and their tributaries) probably contain resources that relate to prehistoric communication and trade routes and to population movement into Maryland's coastal zone as well as remains similar to those of the rest of the coastal zone. Zekiah Swamp is a unique area, containing a large number of Archaic Tradition resources, probably hunting camps, along its margins. Finally, the Chance site in Somerset County is uniquely large, very productive Early Archaic tradition site that is now located in the coastal zone because of the rising sea levels.

Differences and changes in prehistoric adaptation are expected to be reflected in the prehistoric resources of the Maryland coastal zone, in the nature of these resources, the size and number of areas they cover, and the inter-relationships among ages and activities they represent. Only archeological resources can provide information on prehistoric lifeways before European contact introduced written records. Thus, preserving a representative sample of all kinds and ages of prehistoric resources from the Maryland coastal zone for study and display should be a prime consideration in land use planning.

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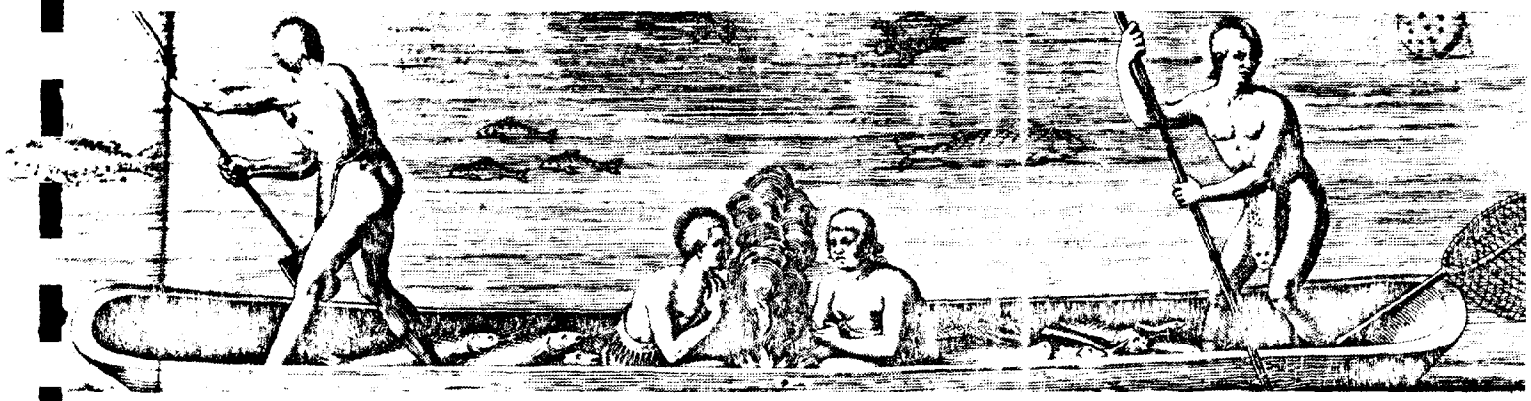
Chapter 4



Resource Evaluation

Chapter 4

Resource Evaluation

What kind of information is needed to manage prehistoric resources? Chapter Three demonstrates that prehistoric resources are present in the Maryland coastal zone and that they are abundant. To manage them, planners need to know what kinds of resources are present according to age and activity, the relative abundance of each kind, distributions throughout the area, and finally current condition.

Does the information necessary for prehistoric resource management already exist? As Chapter Three points out, few studies have been made of Maryland's prehistoric remains. Moreover, these studies have been aimed at answering questions other than those of resource management. Hence, little of this information is directly applicable to managing prehistoric resources.

The information on Maryland coastal prehistory presently available comes from studies conducted by archeologists from the areas's universities and local amateur groups, studies conducted in Delaware by that state's Section of Archeology, and files kept by the Maryland Division of Archeology. However, in spite of its dense population and the many colleges and universities surrounding the area, little professional work has been undertaken in the Maryland coastal zone. For those areas where professionals have worked -- the middle Potomac River, the Severn River, and western Kent County -- information on age, function, and relationships is becoming available for prehistoric remains (see Fig. 4-1). In contrast, most of the Eastern Shore outside Kent County is little known, as are parts of the Western Shore, particularly the Patuxent River area.

Local professionals have had to rely heavily on "nearby" work as a source of interpretation, in fact drawing analogies and making comparisons with areas that are not always very near and frequently have different environmental histories. Although they probably participated in broad regional trends, Chesapeake Bay area cultures were confronted with and

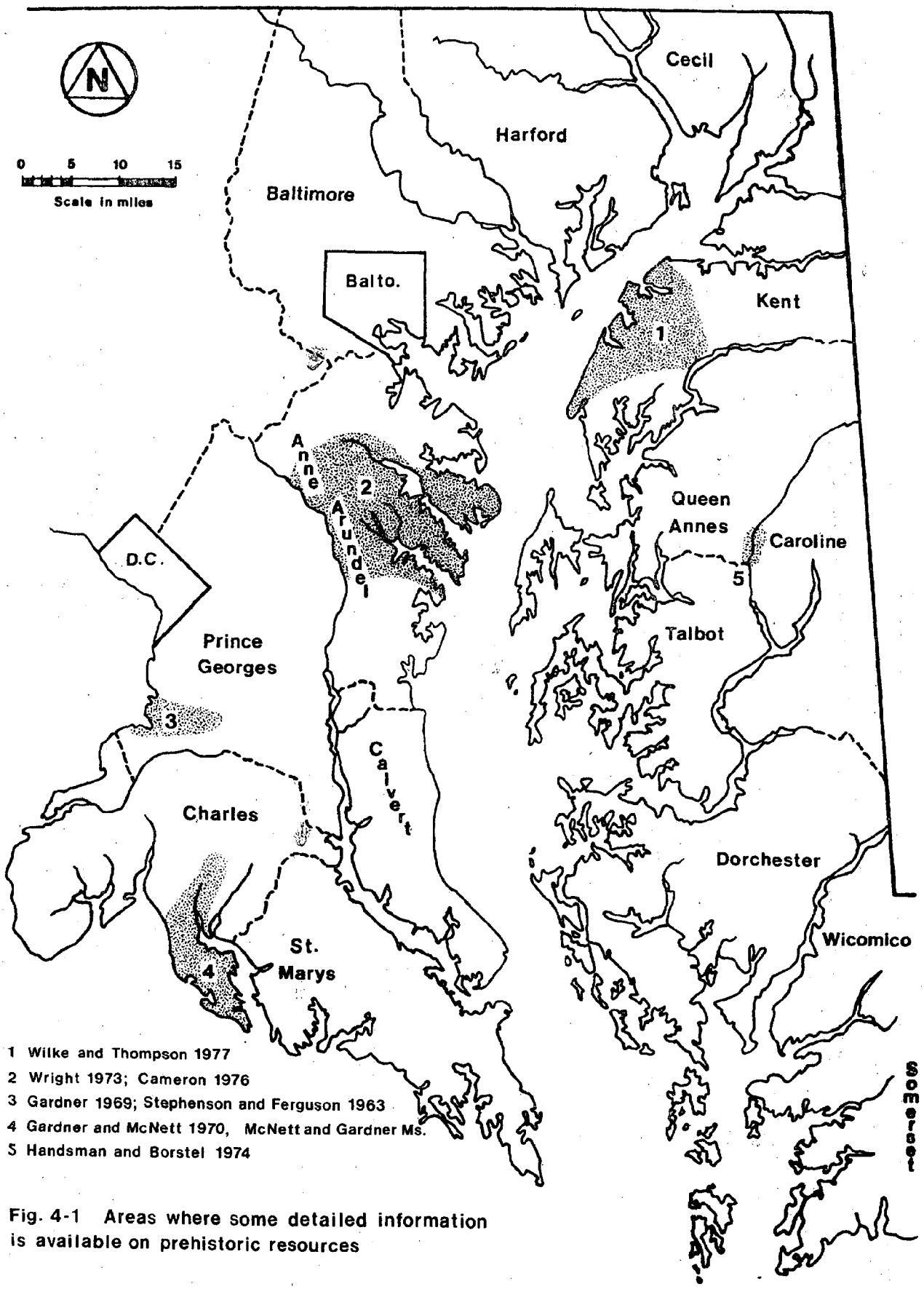


Fig. 4-1 Areas where some detailed information is available on prehistoric resources

solved problems unique to their own environment. Hence, an understanding of culture dynamics has not yet been achieved in the area.

The Division of Archeology, located in the offices of the Maryland Geological Survey, maintains records on prehistoric sites. Included are files of site description forms for each county in the state as well as site locations mapped on U.S.G.S. 7.5 minute quadrangles. The information contained in these records varies in detail and quality, reflecting the wide range of interests of the professionals and amateurs who voluntarily submit the records. In addition, there is no uniform definition of what constitutes a prehistoric site for the purposes of recording or mapping.

Although the Division of Archeology records contain information on a large number of prehistoric sites, these records were not designed for managing prehistoric resources; their usefulness for that purpose is limited. Thus, any apparent spatial patterns of prehistoric sites are probably biased to represent areas which have been examined. Because records are not kept of the areas where sites are not found, no distributional information on prehistoric resources is available. Thus, the lack of recorded sites for an area is often insignificant; gaps probably reflect places that have not been examined. Finally, information on the age and prehistoric activities represented in these recorded sites is usually very limited. When combined with the lack of detailed prehistoric studies in the Maryland coastal zone, the scant information on individual sites makes it difficult to assess relative significance for preservation or mitigation efforts.

Awareness of prehistoric resources varies from place to place within the coastal zone, and this variety is reflected in the records of the Division of Archeology. For example, Fig. 4-2A shows the density of sites recorded in coastal Kent County by the Division of Archeology prior to the present study. Although they were known to local artifact collectors and landowners, additional sites had not been reported to the Division of Archeology. A review of the archeological literature concerning the county added 13 sites, shown in Fig. 4-2B. Since both the files and the archeological literature provide few site locations and no information at all on

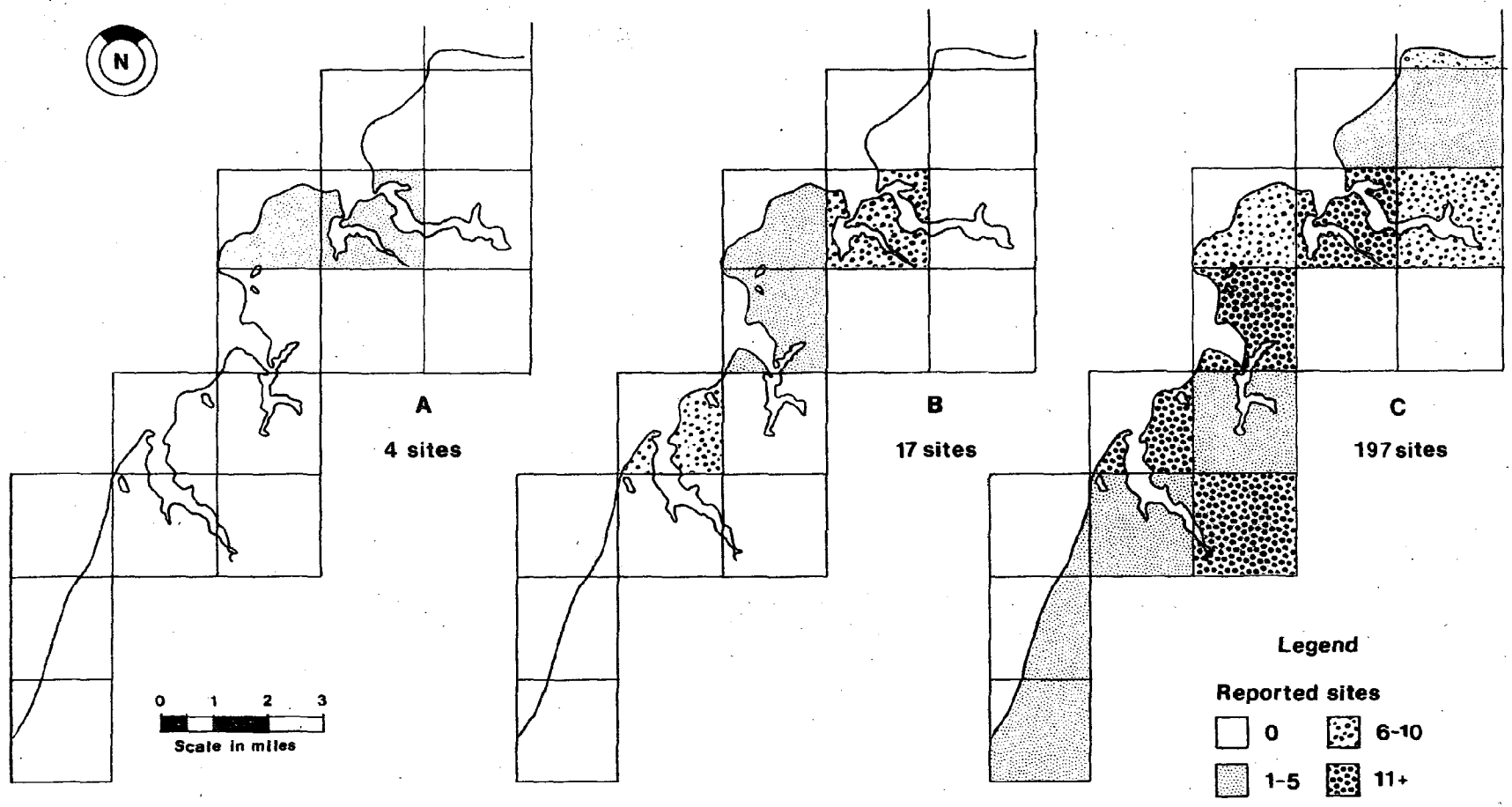


Fig. 4-2 Number of reported sites in a portion of Kent County based on (A) records of state archaeologist 8/73 (B) addition of sites mentioned in literature and (C) addition of sites located by intensive survey program

areas where sites are not found, it is difficult to derive the environmental parameters of site distribution.

In contrast, Fig. 4-2C shows the high density of prehistoric sites in the area recorded by the present survey. Because the survey examined the shoreline systematically, meaningful statements can be made about where sites do not occur as well as where they do occur. This example illustrates the need for field investigations oriented to resource management. Also important, Fig. 4-2C shows the danger of relying on extant records not compiled for resource management, when attempting to assess the prehistoric remains in an area.

To generate the kinds of information necessary for managing prehistoric resources, studies must design a sampling plan to locate remains systematically according to environmental parameters. Also, such studies must obtain surface or excavated assemblages of artifacts for study. The term systematic is used here to mean foot coverage of areas at predetermined intervals. This definition contrasts with the meaning that the term often carries in prehistoric studies, where it is used to mean methodical interviews with landowners and relic collectors or methodical examination of areas thought likely to contain prehistoric resources. In the more specific definition used here, systematic coverage produces information on the distribution of prehistoric remains in addition to information on locations because the areas examined are differentiated from areas not examined; and in examined areas the places in which remains are found are differentiated from those where remains are not found.

A sampling plan is needed in management studies, simply because it is expensive, time consuming, and unnecessary to examine all of Maryland's present and former shorelines. Data collected on prehistoric resources, including artifacts, should be analyzed for information on the age and activities represented. Thus, collecting and analyzing data gathered from sampling will provide information on kinds of prehistoric resources, their distribution, abundance, and present condition.

Although expensive and time consuming, detailed studies are necessary in local environmental areas such as river basins in the coastal zone. With-

out funds and time to undertake detailed management studies, however, interim studies can provide information on the magnitude and present condition of prehistoric resources, also determining where there are any obvious differences in distribution among kinds of sites such as shell and nonshell.

The purpose of the fieldwork reported here was to increase information on Maryland's coastal zone prehistoric resources, especially for the least known areas such as parts of the Eastern Shore. The fieldwork was designed to provide information concerning the general nature, abundance, and distribution of coastal zone prehistoric resources. In addition, this information was used to test the feasibility of constructing a predictive model of resource distribution based on environmental parameters. As an interim measure, it is hoped that this information will help planners to focus their conservation efforts on particular areas.

Survey Design

Effective resource management requires statistically reliable data on the nature and distribution of the resource. Although the best results are obtained by examining the entire area of interest, the expense of foot inspection by qualified observers, coupled with the size of the study area, argued against complete examination. Thus, the present study attempted to sample 10% of the study area and apply the resulting information to the entire study area. The figure 10% was chosen arbitrarily because it was believed to be the maximum that could be accomplished, given the time and budget limitations of the study.

In order for the information gained to be applied confidently to the larger area, a sample must be an accurate, reliable representation of the larger area. Statistical sampling specifies reliability by placing samples so as to reduce bias (choices that tend to make samples consistently different from the population). To reduce and control bias most effectively, samples are selected at random. Random selection makes it more likely that the study results will reflect the true characteristics of the population being sampled and gives a method to estimate the actual bias.

In recent years, random sampling strategies have been used increasingly in prehistoric research (Mueller 1975) for investigating both sites and regions. These strategies yield the most accurate results when dealing with large numbers of small sampling units; they most frequently have been used in areas where few permissions to trespass were necessary and where all parts of the study area were fairly accessible to survey teams.

In the present study, limited funds and limited time prevented the use of random sampling. The wide distribution of small sampling units throughout the large study area would have resulted in very limited coverage. The highly indented shoreline would have required extensive travel between sampling units, and private ownership would have required numerous permissions to trespass small areas.

Thus, a purposefully dispersed and stratified sampling strategy was chosen for this study. The sample was designed to provide information for the study and to control unintentional bias, by explicitly defining the sampling units and carefully dispersing their location throughout the study area.

The advantages of this type of sampling lie in reduced cost and faster and better coverage of the study area. Disadvantages lie in the inability to state statistically the amount of error expected in the sample, due to the unknown nature of the population to be sampled and to the possibility of introducing patterns into the data during the process of purposefully dispersing the sample. These disadvantages are discussed further in the following sections.

For this study, the coastal zone was defined as all land within 200 feet of present or former tidal waters. Previous experience in the area indicated that a 200 foot setback would be sufficient for the study as our research in Kent County has indicated that prehistoric coastal land use was highly linear; the density of artifacts falls off rapidly as distance from the shoreline increases. However, it should be noted in passing that areas of low artifact density represent another kind of prehistoric land use and contain unique artifact types. Thus, these areas should be

considered for preservation, along with denser, more spatially coherent artifact clusters. In addition, modern activities that disturb prehistoric remains occur along the coast line within the 200 foot boundary of this survey. Examples of these activities are bulkheading, waterfront homes, docks and piers, and marinas.

In order to understand how aspects of the present environment may relate to the distribution of prehistoric resources, the study area was divided into a series of sampling strata. These strata, termed environmental sampling units, formed the basic unit of observation and recordation for the field survey. Environmental sampling units were defined by the intersection of variables in important environmental parameters, waterbody and landform. Eighteen possible environmental sampling units resulted from combinations of each variable of waterbody size and each variable of land form type, as shown in Table 4-1.

The nature of the body of water interfacing with the land determines the seasonal and year-round aquatic resources available for human exploitation. These resources vary in kind, number, and accessibility, depending on such factors as water temperature, salinity, wave and current regimes, bathymetry, and substrate. Owing to the lack of baseline data and the highly dynamic character of the foregoing factors, they were not used. Instead, size classes based on water surface area were used; waterbody size might have directly affected prehistoric activities by influencing the availability and density of aquatic resources, local routes of communication, exposure, and erosion rates.

The type of shoreline, or landward component of the coastal zone, influences the distribution of terrestrial vegetation and wildlife and affects offshore plants and animals as well, by supplying nutrients, sediment, and freshwater. Access to the water also is controlled by factors such as high banks and marshes.

Other environmental parameters, such as plants and animals, undoubtedly have had an equal or even more important effect on the distribution of prehistoric populations. However, these parameters represent the most disturbed elements of the environment. European colonization and changes

Table 4-1 Environmental Sampling Units[3]

Landform	Waterbody Size[1]
1. Wetlands (marshes and spits)	1. More than 300 square miles
2. Low bank (under 20 feet elevation) fast ground	2. 30 through 299 square miles
3. High bank (above 20 feet elevation) fast ground	3. 12 through 29 square miles
	4. 3 through 11 square miles
	5. .25 through 2 square miles
	6. less than .25 square miles[2]

[1] Waterbody size increments are arbitrary.

[2] To qualify as a waterbody separate from adjoining coastline, centerline length must be more than width.

[3] Environmental sampling units are derived by combining each kind of landform with each size of waterbody. Thus, environmental sampling unit 11 consists of wetlands along waterbodies that are greater than 300 square miles in area.

in land use have rearranged and destroyed old plant and animal associations. Some regional studies have used environmental factors, such as carrying capacity or measures of biological productivity by season and environment, as guides. However, such approaches require considerable baseline information and these factors would be difficult to project backward in time in areas that have undergone dramatic and widespread environmental change.

Various cultural factors such as religious or aesthetic concerns probably played a part in the location of prehistoric activities. Since it is difficult to control for such factors, this study assumed that cultural concerns and economic activities overlapped in most kinds of sites.

In classifying the study area into the sampling strata, the coastal zone was differentiated into two kinds of land: developed and undeveloped. Sample areas to be inspected were drawn from undeveloped land, with the results to be applied to both.

"Developed land" refers to areas of urban or suburban housing or industry, where modern use of the landscape has likely destroyed, disturbed, or covered up prehistoric resources. In addition, two or more adjoining parcels of land under 300 feet each in coastal zone frontage also were designated as developed. It was assumed that as individual parcels of land become smaller in size that preservation efforts become more difficult. The increasing parcelization of the coastal zone increases the number of landowners and the likelihood that these smaller parcels will eventually be developed for housing or other soil disturbing activities. Developed land was identified on aerial photographs (provided by the National Aeronautic and Space Administration 1972) and Maryland Department of Assessments and Taxation Tax Maps (provided by the Energy and Coastal Zone Administration 1974). Of the 3535.0 miles of coastline classified for this study, 1261.7 miles (35.7%) were interpreted as developed and therefore unsuitable for inspection as sampling strata, as shown in Table 4-2.

Sampling tracts were chosen from undeveloped land in order to avoid the problem of looking for prehistoric resources in developed areas. Modern development destroys or obscures resources and many permissions

Table 4-2 Shoreline Development According to Environmental Sampling Unit for Study Area Counties

Environmental Sampling Unit	Total Miles[1]	Percent of Total	Miles of Developed Shoreline[1]	Percent of Total Miles in Environmental Sampling Unit
11	80.8	2.3	25.5	31.6
12	101.3	2.9	7.2	7.1
13	20.2	.6	6.6	32.7
14	82.7	2.3	18.5	22.4
15	141.9	4.0	27.1	19.1
16	502.2	14.2	118.3	23.6
21	126.5	3.6	62.0	49.0
22	247.0	7.0	75.5	30.6
23	48.9	1.4	35.3	72.2
24	250.8	7.1	118.0	47.1
25	395.3	11.2	167.6	42.4
26	1003.4	28.3	377.5	37.6
31	45.9	1.3	20.2	44.0
32	85.3	2.4	21.1	24.7
33	4.8	.1	3.2	66.7
34	76.1	2.2	44.2	58.1
35	91.4	2.6	37.1	40.6
36	230.5	6.5	96.8	42.0
Total	3535.0[2]	100.0	1261.7	35.7

1. As measured on U.S.G.S. 7.5 minute quadrangle maps using a dial measuring device. Measurement includes former shorelines not currently adjacent to tidal waters.
2. Excludes Somerset, Wicomico and part of Dorchester counties (see Fig.1-1).

to trespass are required. Sampling undeveloped land increases the potential for finding prehistoric resources, especially lithic or stone debris. However, such sampling is biased toward large parcels of agricultural land and this bias may affect survey results where historic settlement patterns corresponded with those of prehistoric populations. This bias may particularly affect the discovery of the most recent prehistoric sites if the earliest settlers chose the same locations because the land was cleared or appeared to be fertile.

The sampling design also incorporated stratification of the study area according to the location of sampling tracts on the Eastern and Western shores of the Bay and according to position along two important rivers, the Potomac and Choptank. At first glance the Eastern and Western shores appear to mirror one another; however, regional factors may have affected prehistoric settlement of each shoreline. Topographically, Western Shore counties are characterized by rolling countryside and by relief. In addition, the Western Shore has extensive, well-developed terraces or flood plains along the Potomac and Patuxent rivers. Furthermore, the Potomac and Patuxent rivers are quite long with upper reaches that thrust deep into the Piedmont and, in the case of the Potomac, into the Applachian Mountains. These extensive river systems not only provided avenues for prehistoric people to import raw materials and food resources unique to the Appalachian and Piedmont provinces; they also provided major corridors by which new peoples and different ideas entered the Maryland coastal zone. The effect, if any, of these differences on coastal site distribution is tested by dispersing the sample between the two shores.

A final consideration governing the stratification of the sampling tracts was the desire to see what effect salinity gradients may have had on the distribution of prehistoric resources. Because the differences between past and modern salinity gradients are not known and would have changed through time as sea level rose, spatial position along the shoreline, rather than modern salinity values, was used to stratify the sampling tracts. As salinity decreases with upstream position along both the Bay and its major tributaries, it was reasoned that prehistoric resources representing salinity dependent activities might be distributed similarly.

Owing to their length and known extremes in salinity, the Choptank and Potomac rivers were chosen for detailed examination of possible salinity effects. Each river was divided into equal thirds of length, based on the mid-river distance from mouth to the limit of tidal influence. An attempt was made to sample each portion equally.

Field Work

A systematic prehistoric site survey was conducted in the study area shown in Fig. 1-1. Fieldwork completed in July and August of 1974 included the inspection of portions of the Chesapeake Bay and Chester River shorelines of Kent County, the western shore of Kent Island in Queen Annes County, and the northern part of Calvert County's Chesapeake Bay shoreline. Fieldwork carried out in spring 1976 included the extensive survey of Anne Arundel, Cecil, Charles, Harford, St. Marys, and Talbot counties. Smaller lengths of shoreline were inspected in Baltimore, Caroline, Dorchester, Kent, and Queen Annes counties. Individual survey tract locations and summary information are provided in Appendix A, Figs. A-1 through A-12.

Two-person survey teams, spaced at intervals of 50 feet and 150 feet from the shoreline, conducted ground inspection. Each surveyor inspected a 50 foot area on either side. Naturally, deviations occurred in this coverage when obstacles were met. Because beach access varied from changes in nearshore water depths and tidal fluctuations and the presence of trees and other debris eroded from the bank above impeded progress, walkers were generally not stationed on the beach. However, in areas of very poor ground visibility, such as in forests or in fields of mature crops, one walker was stationed along the shoreline to view cliff exposures and eroded materials along the beach. In short, the upland surfaces of the coastal zone were preferred because they provided a greater surface area for viewing and more effective and reliable communication between surveyors.

The speed with which the field observation progressed depended on field conditions and the necessity for obtaining permissions to trespass. Progress was relatively more rapid in rain washed, planted fields than in

areas of heavy undergrowth or under marshy conditions. In areas of heavy forest litter, no attempt was made to clear or otherwise improve ground viewing conditions. Shovel testing or other subsurface testing procedures were beyond the scope of the study. But in areas of heavy forest litter, care was taken to inspect paths, farm roads, game trails, rodent holes, toppled tree roots, ravine slopes, and the bases of tree trunks when circumstances permitted. These conditions provided opportunities for viewing the ground beneath the forest litter. Deep forest surveying was not limited to such opportunities, but they were incorporated in the walker's path whenever possible. Wetlands, marshes, and sandspits -- the least accessible sampling strata -- all were inspected whenever possible. The photographs in Fig. 4-3 illustrate viewing conditions in agricultural fields, forests, wetlands, and residential areas, showing prehistoric shell remains in all of the situations except for wetlands.

In areas of multiple or corporate landownership, permission to trespass was often the biggest delaying factor. However, the use of county tax maps prior to starting survey in an area increased the efficiency of the field program. Land ownership and property boundaries were thus determined and communications established prior to ground inspection of each sampling tract.

Each survey team was equipped with maps or aerial photographs for reporting findings and survey conditions. Field notes and map annotations were codified later in the laboratory. For the purposes of this study, "artifact" meant anything owing its form or location to human intervention, not datable to the historic period. All artifacts were noted whether found in isolation or in dense clusters. It was not within the scope of this study to obtain artifact collections from the various sites discovered.

The remains of past human activities are spread across the ground surface in a continuum of varying densities. Clearly, the definition of what constitutes a site or an artifact cluster is quite arbitrary and depends on the problem under investigation. Sites in an area can vary from thousands to one or two artifacts, depending on the definition of site.

Fig. 4-3a Viewing conditions in agricultural field showing prehistoric shell site

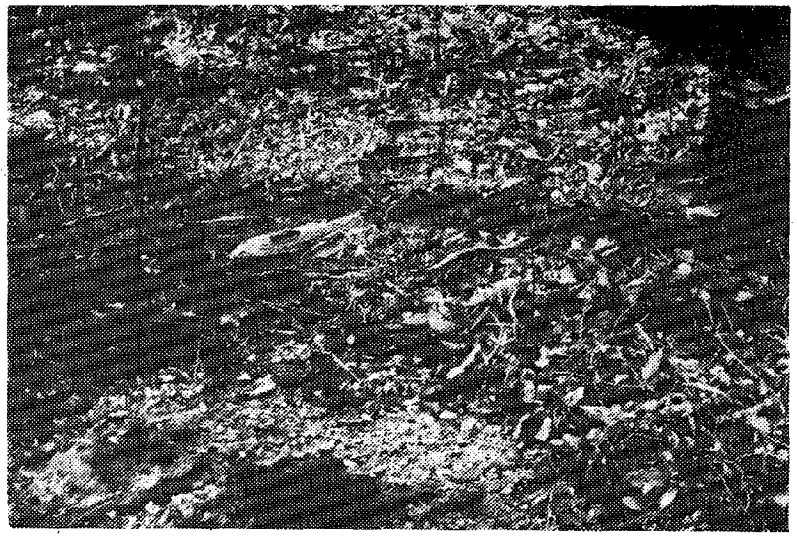


Fig. 4-3b Viewing conditions on forest floor showing prehistoric shell site

Fig. 4-3c Viewing conditions in wetland

Fig. 4-3d Viewing conditions in residential area showing prehistoric shell site

For this study, the basic unit of analysis, "site" is defined as any locality where three or more artifacts were found within 50 feet of one another. All sites recorded in the study had to meet this minimal requirement.

Sites composed primarily of food refuse in the form of oyster middens or heaps present a special problem. Euroamerican use of shells from these Native American refuse heaps has created secondary deposits. These shells were used for road beds, placed on fields to lime the soil, used in mortar, and quarried to produce powdered lime in kilns. Of course, such nonaboriginal activities transported both food refuse (oyster shells and vertebrate bones) and any manufactured items to new locations. In certain areas, oyster shells frequently are used in riprap or behind wooden breakwaters. Other accumulations of oyster shells around Chesapeake Bay mark the locations of former shucking houses and other activities associated with a long and active Euroamerican shellfishery. Therefore, each accumulation of shells encountered was carefully examined for the presence of Euroamerican and Native American artifacts. Most shell deposits were easily identifiable as to origin; they usually contained sufficient evidence to suggest aboriginal origin or they were barren of prehistoric artifacts and usually could be associated with historic sites or structures, or they contained artifacts from the historic period. Shell deposits whose origins could not be determined were not included in the analyses.

Biases and Limitations

Ideally, distributional studies for predictive models should be based on a data set or on an area that still retains most or all of the various patterned sets of remains deposited by prehistoric occupation. In other words, enough of the original patterns must be retained to insure their recognition. Further, these remains ought to be roughly equivalent in visibility throughout the study area. However, the coast is an extremely dynamic zone, where the energy and force of the sea are dissi-

pated against the land (see Chapter Two). Erosion and inundation have removed differentially, and in some areas completely, prehistoric remains. In short, the patterned remains of past coastal oriented cultural activities are now in various states of preservation. In some areas all materials are under the sea; in other areas, only a random patchwork of sites may remain. In yet other areas, most kinds of activities may still be represented in the prehistoric record. Further, certain remains now located in coastal settings may have been deposited originally in a riverine or interior environment and these sites can create "noise" within the data.

In order to explain and thus predict distributional patterns, relevant environmental sampling strata must be devised. Finally, and importantly, whenever possible, data gathering should provide for artifact collecting sufficient to identify the remains encountered by kind and age. Such analysis improves the chance of interpreting patterns of resource distribution and permits estimates about the relative abundance of various kinds of sites.

Because artifacts could not be collected in this study, all analyses are based on presence or absence of sites alone. Kinds or ages of sites, beyond distinguishing between sites with visible amounts of shell and those without visible shell, have not been taken into account. This shortcoming limits severely the interpretive possibilities of the data.

Further complicating the study of past land use patterns are the highly variable modern land use and field viewing conditions encountered during the survey (Fig. 4-3). Cultivated fields provide the best opportunity for discovering prehistoric resources, since relatively large areas can be easily searched by foot surveyors. Pastures, forests, and marshes, on the other hand, are characterized by low visibility and contain obstacles and entanglements.

The data set used in this study is biased toward easier to negotiate environments which tended to be oversampled, and biased away from environ-

ments which were too difficult to inspect and hence were under-sampled. Therefore, as Table 4-3 shows, some environmental sampling units were inspected disproportionately more and others disproportionately less than they should have been, given their representation in the study area. Because forests, pastures, lawns, and other settings do not reveal prehistoric remains as easily as do agricultural fields, the ability to see these remains was significantly greater in cultivated areas.

Only one set of distinctions differentiated kinds of sites during the study. A separate tally was kept for areas marked by deposits of oyster shells and for areas without shell debris. By their nature, shell sites are much more clearly visible than sites marked by small chips of rock and occasional shaped tools. Therefore, the results of this study are biased toward more readily detectable sites. This factor is especially critical in forested areas or in places with heavy ground cover. Here lithic debris alone is rarely visible, save in occasional bare areas. Shell debris, however, if in sufficient quantity, is clearly visible, even in areas with substantial forest litter (Fig. 4-3b).

Field viewing conditions changed during the survey, when essentially dormant forest understory and freshly planted fields grew to thickets and waist-high stands of corn, soybeans, and wheat. Thus, throughout the survey, viewing conditions generally deteriorated with time.

Rainfall patterns also affected survey results: rainfall is critical to successful reconaissance of cultivated fields. If fields are not washed after plowing, discing, planting, or cultivating, the ability to gain information from the surface is considerably reduced. The near drought conditions that prevailed over much of coastal plain Maryland during the spring of 1976 severely hampered the acquisition of site location information. Without rain, freshly worked fields maintain a powdery soil consistency, making visual inspection difficult. These drought conditions impeded the search for nonshell deposits. But shell deposits could still be found even at a distance in agricultural fields or capping the tops of banks. Thus, all figures relating to site numbers and densities represent minimum numbers. This reservation is particularly true for nonshell

Table 4-3 Percent of Shoreline Inspected by Environmental Sampling Unit

Environmental Sampling Unit	Study Area Miles[1]/Percent		Number of Instances Observed	Amount Surveyed Miles/Percent[2]	
11	80.8	2.3	42	9.96	2.2
12	101.3	2.9	5	.57	.1
13	20.3	.6	4	.91	.2
14	82.7	2.3	14	2.84	.6
15	141.9	4.0	17	3.90	.9
16	502.2	14.2	21	5.42	1.2
21	126.5	3.6	123	59.43	13.4
22	247.0	7.0	47	24.62	5.5
23	48.9	1.4	7	2.95	.7
24	250.8	7.1	75	38.56	8.7
25	395.3	11.2	121	55.57	12.5
26	1003.4	28.3	224	116.02	26.1
31	45.9	1.3	80	24.17	5.4
32	85.3	2.4	22	7.05	1.6
33	4.8	.1	4	1.82	.4
34	76.1	2.2	41	10.64	2.4
35	91.4	2.6	60	18.75	4.2
36	230.5	6.5	130	61.78	13.9
Total	3535.0	100.0	1037	444.96	100.0

[1]As interpreted on 1:24,000 maps and measured with dial map measuring device. Measurement includes former shorelines not currently adjacent to tidal waters.

[2]Figured as percent of total miles surveyed

deposits.

Table 4-4 presents information on the ground viewing conditions under which the sites discovered by this survey were located. These data suggest that fewer sites were discovered in unwashed agricultural fields than in forested and other apparent low visibility situations. Further, whenever viewing conditions were in the medium or low ranges, the number of nonshell sites rapidly dropped off. Shell site discoveries were more equally divided among the categories.

Table 4-4 Ground Visibility Conditions of Systematically Discovered Sites (N=777)

Relative Ground Visibility	Percent of All Sites	Percent of Shell Sites	Percent of Nonshell Sites
High[1]	37.1	33.0	42.3
Medium[2]	23.9	28.7	17.7
Low[3]	17.1	21.6	11.4
Unrecorded	21.9	16.7	28.6
Total	100.0	100.0	100.0

[1]Includes cultivated and well washed fields, beaches, and sandspits.

[2]Includes forests, lawns, pastures, marshes, and fields with mature crops (e.g., winter wheat).

[3]Includes cultivated but unwashed fields and fallow fields.

Another serious limitation inherent in evaluating prehistoric remains is the masking of one kind of remains by another. Nonshell deposits represent a cluster of lithic debris, and shell deposits represent a cluster of organic refuse along with lithic debris. In areas of dense shell deposits, lithic remains unrelated to the shell can be masked, either by overlap or by direct superposition of shell remains. Detailed

artifact analysis is needed in order to sort out such deposits.

The sampling strategy also could affect the results of the survey. Several considerations affected the choice of environmental parameters to classify sampling strata, particularly that they had to be relevant to past settlement and subsistence patterns, readily classifiable on 1:24,000 scale maps, and recognizable in the field. The U.S.G.S. 7.5 topographic series formed the base maps for sample stratification and data recordation. While these maps are quite accurate, they sometimes do not show small marshes and other coastal landforms. Likewise, their 20 foot contour intervals did not allow the identification of small gullies, springs, and other potential sources of freshwater which might have been useful in stratifying the environment.

Land to be walked was selected from undeveloped land, favoring large properties under single ownership. As noted above, this procedure could bias the survey results if historic development locations correlate highly with prehistoric, particularly late prehistoric, settlement patterns. As Table 4-2 shows, more low and high bank shoreline has been developed than wetlands and spits. Most of the developed shoreline is found on the Western Shore near the Baltimore and Washington, D.C. areas.

Crew-related factors are not expected to produce bias in this study. Three two-person survey teams composed of individuals with comparable abilities were assigned survey tracts randomly. Thus, no one team was responsible for all of the inspection work in any one county or area. Another crew-related bias is the potential for increased site reporting with increasing experience in the particular field situation. In this case, analysis of the density of sites discovered versus the mileage inspected for each environment did not reveal any significant relationship between site discovery and the amount of each environment inspected.

Results and Interpretation

The field program resulted in foot inspection of 225 sampling tracts of varying lengths and environmental composition. Appendix A, Figs. A-1

to A-12 locate these tracts, and Tables A-1 to A-12 provide summary information on them. In all, 443.7 miles of study area shoreline were surveyed, resulting in the discovery of 777 new prehistoric sites (see Table 4-5). This number represents more than half again as many sites as were known to the Division of Archeology by December 1976 for all study area counties. As Table 4-5 indicates, nearly two-thirds of all prehistoric sites reported for study area counties are located in the coastal zone.

In spite of the biases and limitations discussed above, this study resulted in numerous insights concerning the distribution of Maryland's coastal prehistoric resources. An inspection of the densities of shell and nonshell sites by survey tract, Figs. 4-4 through 4-7, reveals certain overall distributional patterns. The circles representing site densities on these maps are centered on individual survey tracts (see Appendix A), and their sizes are in proportion to the average site density calculated for each tract. Overlapping circles thus result from nearby survey tracts with different site densities. The most distinctive pattern is the limited distribution of shell sites: these sites are restricted to the middle and lower portions of major Bay tributaries, and south of a line extending west from Howell Point (Kent County) to the Harford County shoreline. This pattern probably reflects the limits of exploitable oyster populations, a spatially more extensive food source in the past.

Table 4-6 demonstrates this pattern for the Choptank and Potomac rivers. Here, the rivers were divided into equal thirds, and shell site densities computed. For each river, the density of shell sites increases downstream. This observation is expected to hold for the other large tributaries, including the Patuxent, Chester, and Nanticoke rivers. Fig. 4-8 summarizes the projected maximum distribution of shell sites. The area enclosed by this line is referred to as the shell area, while that outside the line is referred to as the nonshell area.

That the distribution of shell sites is more extensive than the distribution of modern oyster beds may be attributed to prehistoric transportation of shellfish. More likely, however, oyster beds contracted in response to environmental changes associated with Euroamerican settlement.

Table 4-5 Summary of Survey Results for Study Area Counties

County	Miles of Shoreline[1]	Miles Surveyed	Percent Surveyed	Sites Reported to Division of Archeology[3]	Sites Discovered by this Study	Percent of Reported and Discovered Sites in Coastal Zone
Anne Arundel	477.9	33.6	7.0	389	41	48.8
Baltimore	237.2	8.4	3.5	142	5	14.3
Calvert	174.7	13.1	7.5	38	0	100.0
Caroline	101.3	13.9	13.7	46	24	51.4
Cecil	206.8	35.5	17.2	83	55	52.9
Charles	269.7	54.8	20.3	110	114	74.6
Dorchester	65.8	7.3	11.1	52	0	73.1
Harford	240.5	21.7	9.0	98	52	64.0
Kent	346.1	82.6	23.9	11	146	100.0
Prince Georges[2]	69.8	--	--	155	--	37.4
Queen Annes	279.1	17.5	6.3	47	10	54.4
St. Marys	424.5	49.3	11.6	80	156	87.7
Somerset[2]	--	--	--	48	--	93.8
Talbot	641.6	106.0	16.5	55	174	90.0
Wicomico[2]	--	--	--	36	--	50.0
Total[4]	3535.0	443.7		1390	777	64.7

[1]As measured on U.S.C.G. 7.5 minute quad maps using a dial measuring device. Measurement includes shorelines not currently adjacent to tidal waters.

[2]No fieldwork conducted in county

[3]Includes sites reported to December 17, 1976. Figures include some prehistoric sites, estimated to number no more than 5% of the total for each county except St. Marys where it may reach 10% (Bastian, personal communication)

[4]Total excludes Somerset, Wicomico, and portions of Dorchester counties.

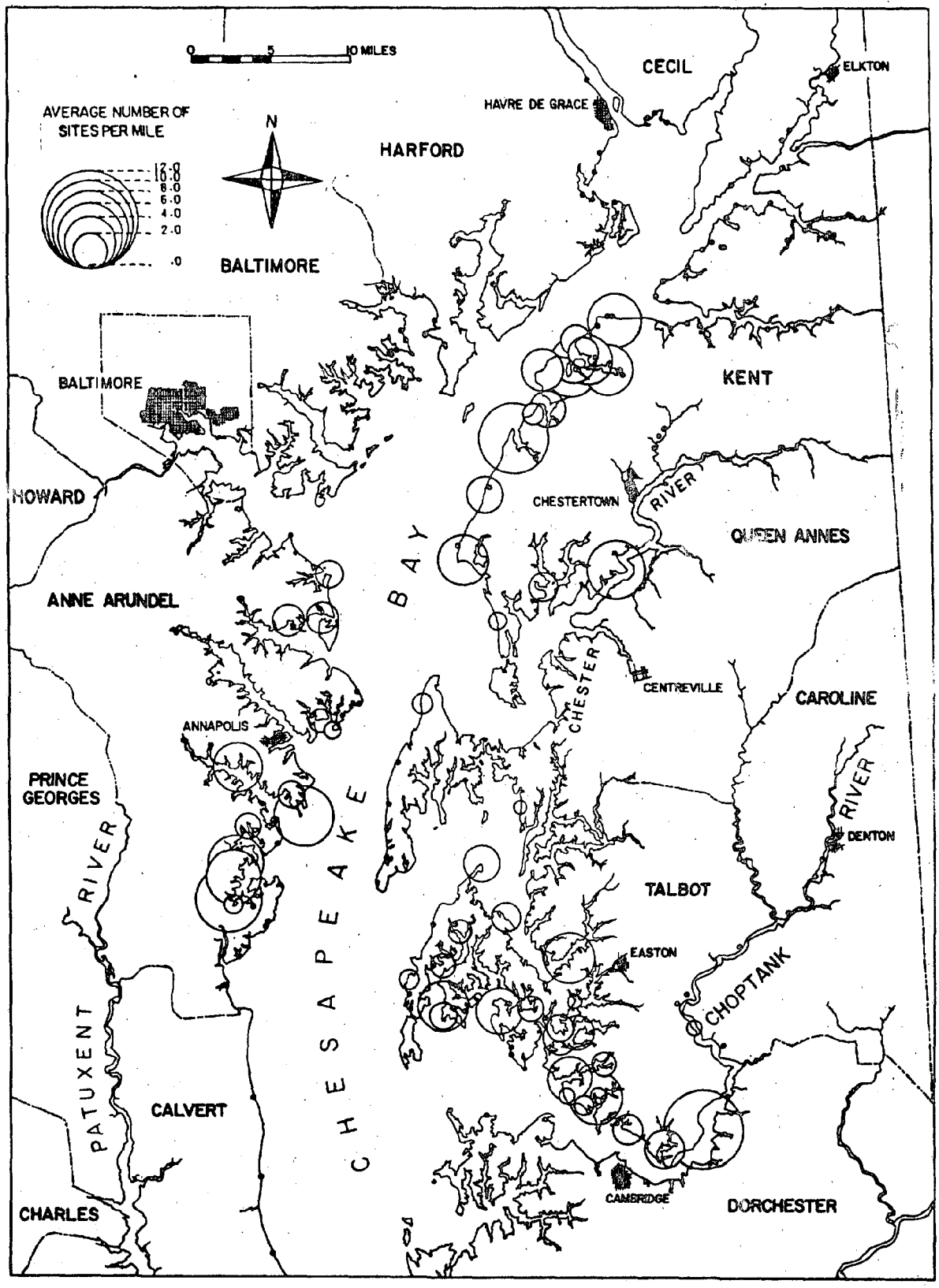


FIG. 4-4 SHELL SITE DENSITIES OF CHESAPEAKE BAY SURVEY TRACTS

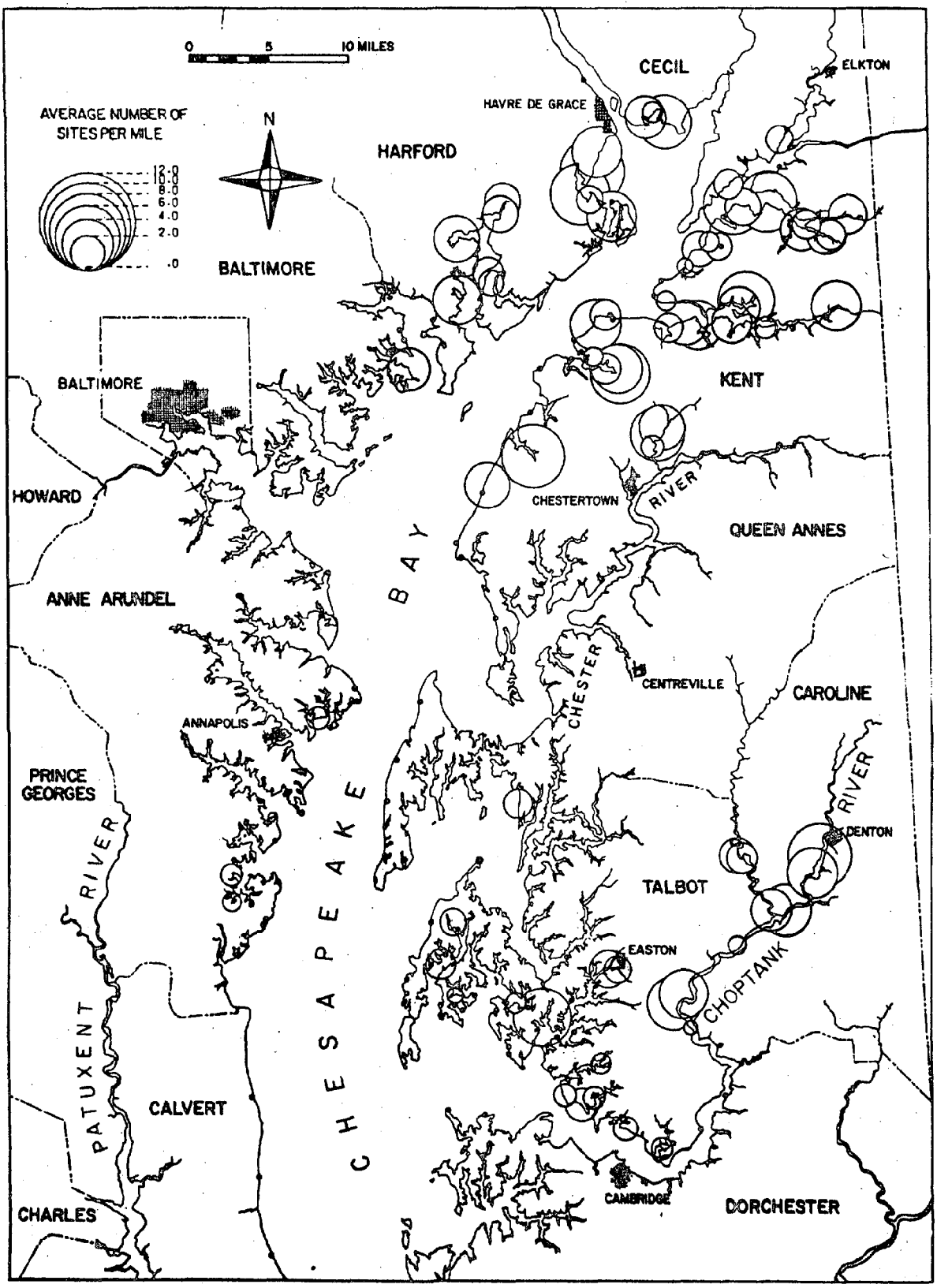


FIG. 4-5 NONSHELL SITE DENSITIES OF CHESAPEAKE BAY SURVEY TRACTS

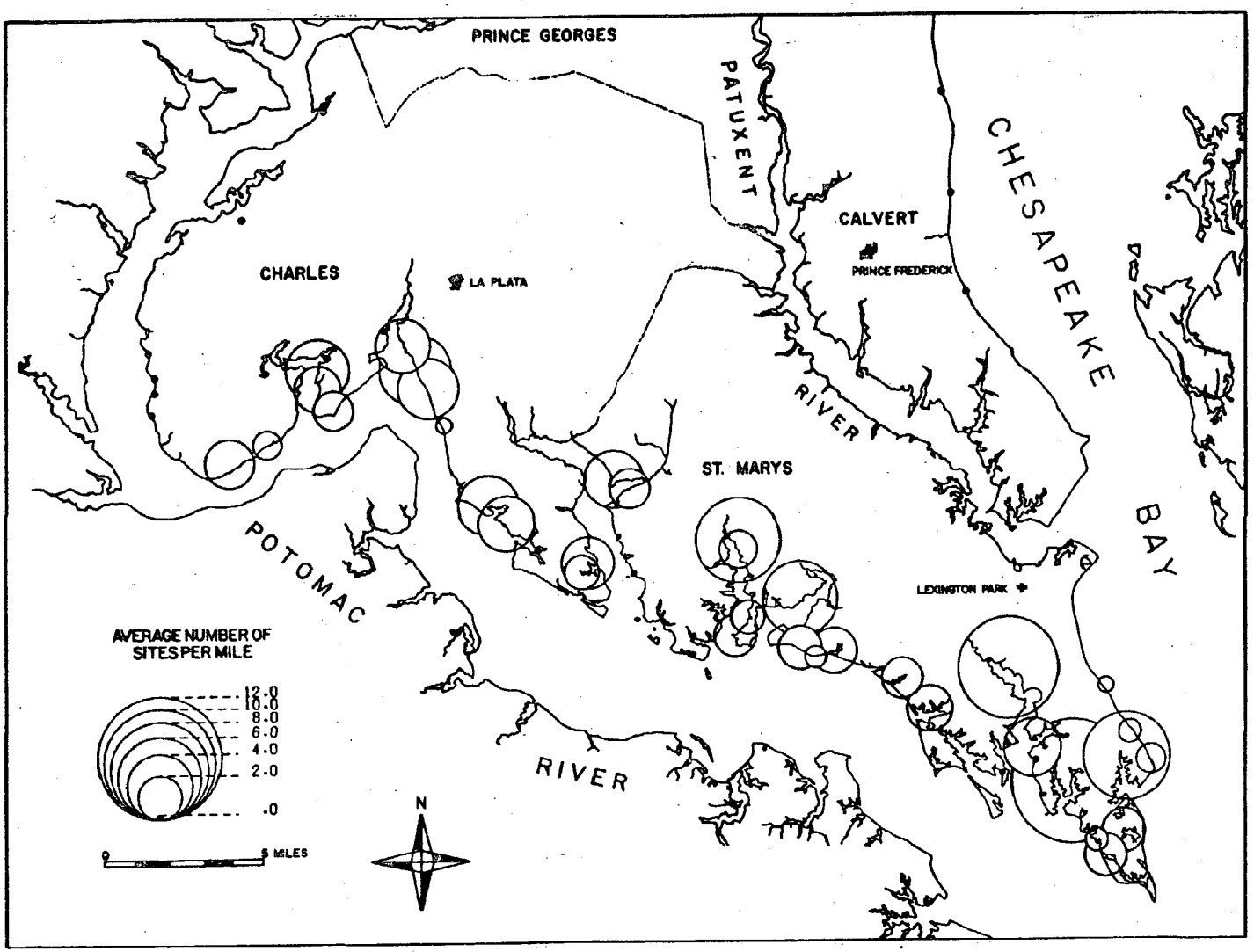


FIG. 4-6 SHELL SITE DENSITIES OF SOUTHERN MARYLAND SURVEY TRACTS

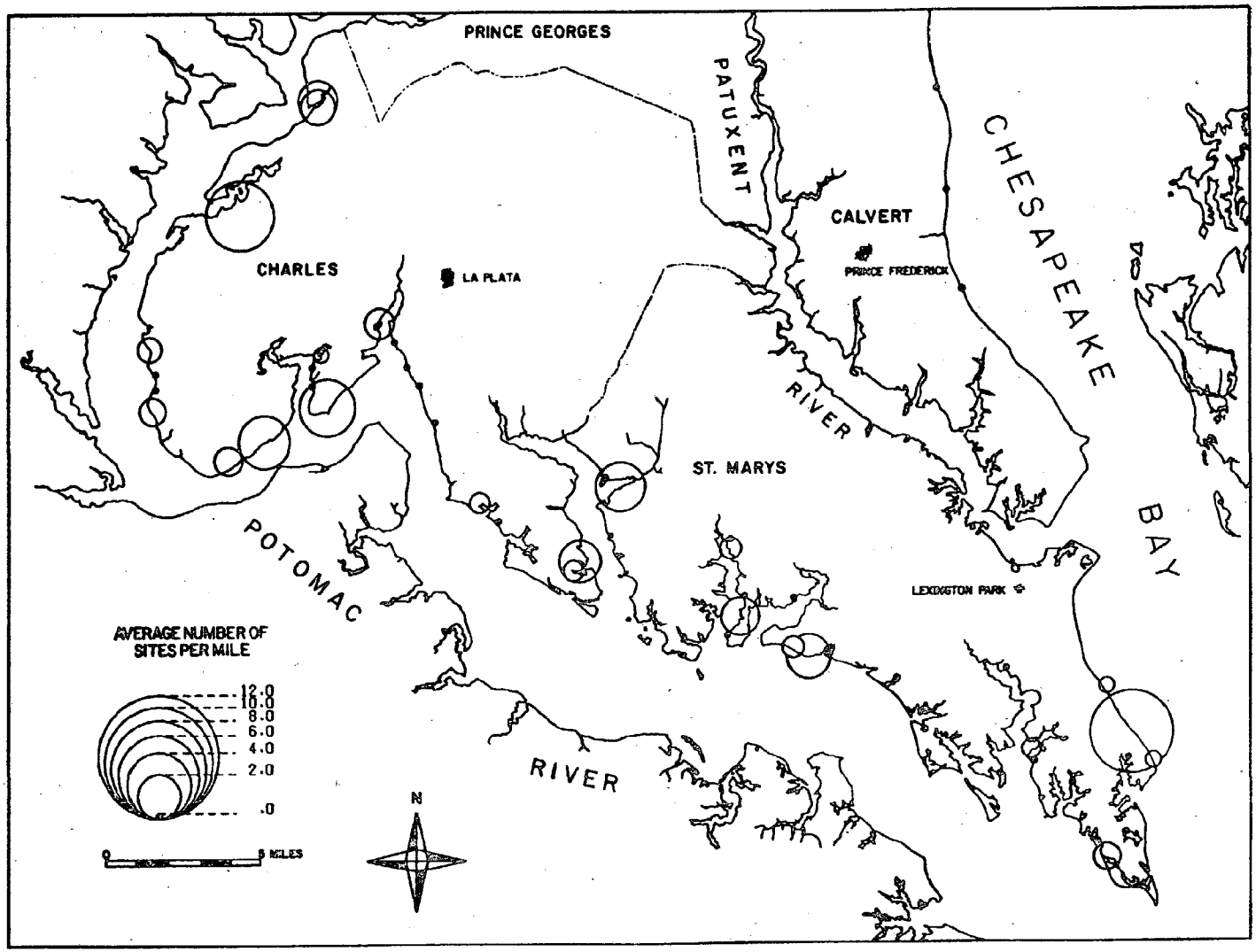


FIG. 4-7 NONSHELL SITE DENSITIES OF SOUTHERN MARYLAND SURVEY TRACTS

Table 4-6 Shell and Nonshell Site Densities in Sites per Mile by River System and Position

Potomac System (Hollis Point to Point Lookout)

	Upper	Middle	Lower
Number of Instances Observed	28	78	56
Density of Shell Sites	0	2.40	2.97
Density of Nonshell Sites	2.51	.74	.36

Choptank System (Denton to Chlora Point)

	Upper	Middle	Lower
Number of Instances Observed	55	26	31
Density of Shell Sites	0	.25	[illegible]2
Density of Nonshell Sites	2.49	1.02	.85

Figures 4-4 through 4-7 and Table 4-6 also show possible masking of nonshell sites by shell sites. Table 4-6 shows an inverse relationship between shell and nonshell site densities, depending on position along the Choptank and Potomac rivers. Likewise, Figs. 4-4 through 4-7 show a similar complementary distribution for the remainder of the Bay. This distribution may represent prehistoric shellfish exploitation in certain areas of the Bay, with seasonal movement to other areas for other activities. Early accounts suggest that this type of settlement pattern may have existed during the time of early colonial explorations (see Chapter Three). However, the tendency of nonshell remains to be masked by shell remains, along with the problems with finding nonshell sites caused by dry soil conditions during the survey, make it difficult to evaluate the reasons for the apparent patterns in site distribution. In summary, it seems that the trend to increased shell sites with downstream distance is indeed real, whereas the trend to increased nonshell sites with upstream distance may be only apparent. Further work is required in order to resolve this problem.

Table 4-7 compares site density for all survey tracts located on the

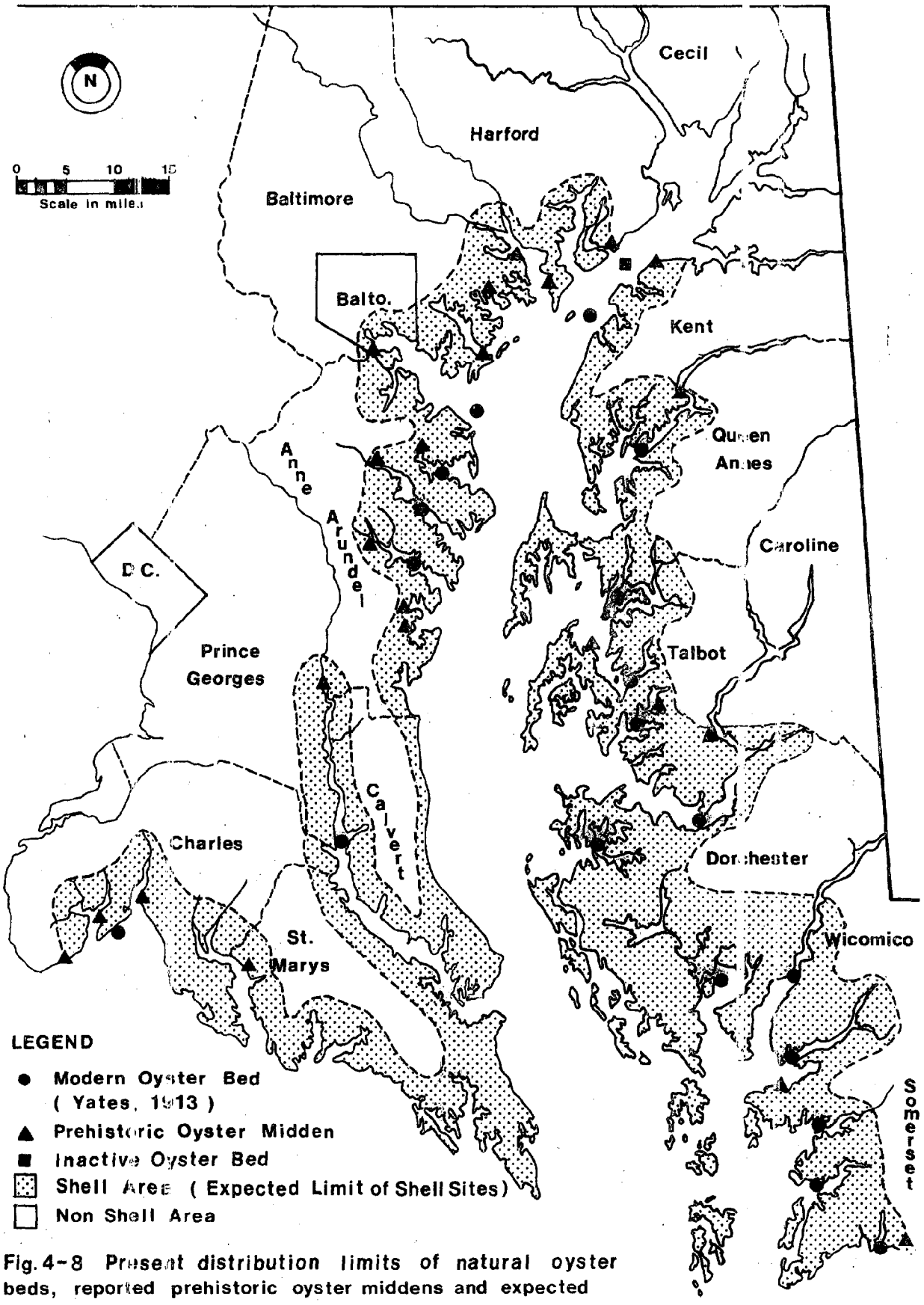


Fig. 4-8 Present distribution limits of natural oyster beds, reported prehistoric oyster middens and expected maximum extent of shell sites

Western and Eastern shores. This table shows little difference between the sides of the Bay, except for the density of nonshell sites outside the area of shell site occurrence. These data suggest that both sides of the Bay have equal potential for prehistoric resources. However, this statement applies only to site presence. Such equality cannot necessarily be expected in terms of the distribution of kinds and ages of prehistoric resources.

Table 4-7 Shell and Nonshell Site Densities for Shell and Nonshell Areas on the Eastern and Western Shores[1]

	Western Shore		Eastern Shore	
	Shell Area	Nonshell Area	Shell Area	Nonshell Area
Instances Observed	361 (147.6 mi.)	60 (33.7 mi.)	357 (175.2 mi.)	259 (87.7 mi.)
Density of Shell Sites	1.42	---	1.44	---
Density of Nonshell Sites	.41	2.70	.44	1.99

[1]The midline dividing the Susquehanna River and Chesapeake Bay provides the boundary between Eastern Shore and Western Shore.

Tables 4-8 and 4-9 present the density of shell and nonshell sites by landform and waterbody size in both shell and nonshell areas. In the shell area, shell site density increases with increasing elevation above sea level. The low, unstable, and wet ground that comprises landform 1 has the lowest site density. Marshes and sandspits were probably the least habitable environments, and marshes are certainly the most difficult environments to survey. Within the shell area, nonshell site densities are uniform but considerably lower than corresponding shell site densities. This finding may result from rare prehistoric use of this area for activities other than those associated with shell use, masking of nonshell by shell remains, or poor viewing conditions.

Further examination of Tables 4-8 and 4-9 shows that nonshell site

Table 4-8 Shell and Nonshell Site Densities According to Landform and Waterbody Size in the Shell Area

Environment	Total Mileage	Percent of Total Mileage	Instances Observed	Mileage Observed	Percent of Observed Mileage	Average Shell Site Density (sites/mile)	Average Nonshell Site Density (sites/mile)
Landform							
1	710.3	24.7	90	21.6	6.7	.51	.24
2	1771.6	61.6	463	245.4	76.0	1.36	.54
3	394.6	13.7	165	55.8	17.3	2.15	.27
Total	2876.5	100.0	718	322.8	100.0		
Waterbody							
1	229.3	8.0	229	88.5	12.0	.78	.15
2	269.5	9.4	43	18.9	5.9	2.76	.76
3	66.4	2.3	15	5.7	1.8	1.91	.07
4	23.9	11.3	86	39.5	12.2	2.23	.48
5	517.2	18.0	108	50.7	15.7	1.91	.90
6	1470.0	51.1	237	119.5	36.7	1.29	.50
Total	2876.5	100.0	718	322.8	100.0		

Table 4-9 Nonshell Site Densities According to Landform and Waterbody Size in the Nonshell Area

Environment	Total Mileage	Percent of Total Mileage	Instances Observed	Mileage Observed	Percent of Mileage Observed	Average Nonshell Site Density (sites/mile)
Landform						
1	253.1	38.4	13	2.0	1.6	3.54
2	248.0	37.7	134	49.9	41.1	1.47
3	157.4	23.9	172	69.6	57.3	2.53
Total	658.5	100.0	319	121.5	100.0	
Waterbody						
1	29.9	4.4	16	5.1	4.2	2.06
2	148.1	22.5	31	13.3	7.7	2.58
3	0	--	--	--	--	--
4	83.0	12.6	44	12.5	12.8	2.37
5	124.5	18.9	90	27.7	19.0	2.52
6	273.0	41.6	138	62.9	56.3	1.70
Total	658.5	100.0	319	121.5	100.0	

densities are considerably higher in the nonshell area than in the shell area. The unexpected high density in landform 1 in the nonshell area is either due to the special use of these settings or, more likely, due to the extremely small sample size. In general, for both shell and nonshell sites in both areas, land more than 20 feet above sea level has greater site densities. Wetlands are not expected to have abundant prehistoric resources, except in areas where these environments formed after prehistoric occupation. Of course, sites in wetlands have undergone more natural disturbance than have upland sites, owing to the dynamic nature of this environment.

With regard to waterbody size, within the shell area shell site density is uniform except for waterbody 1 (land fronting directly on Chesapeake Bay). This low value probably results not only from cultural factors, such as a possible preference for sheltered bays and coves, but also from the greater rate of shore erosion which typifies the Bay shoreline. Thus, through inundation and erosion, more sites fronting on the Bay have probably been removed from the prehistoric record. Again, the average density of nonshell sites is significantly lower than that of shell sites. In the nonshell area, lithic site density is uniform among the waterbody classes.

Table 4-10 shows that, of the sites discovered by this survey, shell sites are currently under more stress than nonshell sites from shore erosion. Table 4-11 shows that sites on larger waterbodies are under the most intense pressure from erosion.

Tables 4-12 and 4-13 present the average densities of shell and nonshell sites according to environmental sampling units in the shell and nonshell areas. From these data it is possible to estimate the expected number of sites by type and environment for shell and nonshell areas. The results in Tables 4-14 and 4-15 show that 3,920 shell and 2,585 nonshell sites may be expected in the study area. Because of the biases and limitations discussed previously, these figures represent only the minimum number of sites. Table 4-16 presents minimum number of shell and nonshell site calculations for each study area county. Differences in the total number of expected sites between counties reflect differences in shoreline length and

Table 4-10 Percent of Systematically Discovered Sites Exposed to Varying Intensities of Shore Erosion[1]

Erosion Rate	All Sites (777)	Shell Sites	Nonshell Sites
High	8.8	9.6	7.8
Moderate	1.7	1.8	1.5
Low	3.4	5.0	1.2
Slight	17.7	22.4	11.6
Accretion	8.8	9.6	7.8
No Information[2]	68.1	60.6	77.9
Total	100.0	100.0	100.0

[1]Based on "Historical Shorelines and Erosion Rates" (Maryland Geological Survey 1975).

[2]No erosion figures given or site located on former shoreline.

Table 4-11 Percent of Systematically Discovered Sites Exposed to Varying Intensities of Shore Erosion by Waterbody Size[1]

Erosion Rate	Waterbody Size Class					
	1	2	3	4	5	6
High (>8'/yr.)	2.5					
Moderate (4-8'/yr.)	14 8	1.2				
Low (2-4'/yr.)	4.9	11.1		7.5	1.1	.7
Slight (<2'/yr.)	46.9	46.9	8.18	10.8	10.2	6.9
Accretion	25.9	13.6	18.2	9.2	5.1	4.6
No Information[2]	4.9	27.2		72.5	83.5	87.8
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

[1]Based on "Historical Shorelines and Erosion Rates (Maryland Geological Survey 1975).

[2]No erosion figures given or site located on former shoreline.

Table 4-12 Shell and Nonshell Site Densities According to Environmental Sampling Units in the Shell Area

Environmental Sampling Unit	Total Miles	Percent of Total Miles	Instances Observed	Miles Observed	Percent of Total Miles Observed	Average Shell Site Density (sites/mile)	Average Nonshell Site Density (sites/mile)
11	67.8	2.4	41	9.92	3.1	.33	.08
12	68.6	2.4	3	.34	.1	0	0
13	16.4	.6	4	.91	.3	0	0
14	72.0	2.5	12	2.12	.7	2.20	.44
15	111.6	3.9	10	2.99	.9	.20	1.32
16	355.9	12.6	20	5.34	1.7	.19	0
21	114.7	4.1	117	57.80	17.8	.72	.27
22	151.3	5.3	29	15.49	4.8	2.39	.40
23	48.9	1.7	7	2.95	.9	2.20	.16
24	206.6	7.3	59	33.79	10.5	1.91	.58
25	348.9	12.3	79	39.20	12.1	1.37	.91
26	910.0	32.2	172	96.14	29.8	1.39	.58
31	34.5	1.2	71	20.72	6.4	1.13	0
32	51.4	1.8	11	3.07	1.0	4.50	1.11
33	2.6	.1	4	1.82	.6	3.30	0
34	44.8	1.6	15	3.60	1.1	3.53	.11
35	57.9	2.0	19	8.48	2.6	5.06	.60
36	165.6	5.9	45	18.14	5.6	1.39	.42
Total	2829.5	99.9	718	322.84	100.0		

Table 4-13 Nonshell Site Densities According to Environmental Sampling Units in the Nonshell Area

Environmental Sampling Unit	Total Miles	Percent of Total Miles	Instances Observed	Miles Observed	Percent of Total Miles Observed	Average Nonshell Site Density (site/mile)
11	13.0	1.8	1	.04	.1	0
12	32.7	4.6	2	.23	.2	0
13	13.8	.5	0	0	0	-
14	10.7	1.5	2	.72	.6	1.02
15	30.3	4.3	7	.91	.8	6.29
16	146.3	20.9	1	.08	.1	0
21	11.8	1.7	6	1.63	1.3	0
22	95.7	13.6	18	9.13	7.5	2.40
23	0	0	0	0	0	-
24	44.2	6.3	16	4.77	3.9	1.33
25	46.4	6.6	42	16.36	13.5	1.20
26	93.4	13.2	52	18.03	14.8	1.58
31	11.4	1.6	9	3.45	2.8	3.66
32	33.9	4.8	11	3.98	3.3	3.33
33	2.2	.3	0	0	0	-
34	31.3	4.4	26	7.05	5.8	3.12
35	33.5	4.7	41	10.27	8.5	3.23
36	64.9	9.2	85	44.81	36.8	1.79
Total	705.5	100.0	319	121.44	100.0	

Table 4-14 Minimum Number of Expected Shell and Nonshell Sites in the Shell Area According to Environmental Sampling Units

Environmental Sampling Unit	Mileage	Average Shell Site Density (sites/mile)	Expected Number of Shell Sites	Average Nonshell Site Density (sites/mile)	Expected Number of Nonshell Sites
11	67.8	.33	22.4	.08	5.4
12	68.6	0	0	0	0
13	16.4	0	0	0	0
14	72.0	2.20	158.4	.44	31.7
15	111.6	.20	22.3	1.32	147.3
16	355.9	.19	67.6	0	0
21	114.7	.72	82.6	.27	31.0
22	151.3	2.39	361.6	.40	60.5
23	48.9	2.20	107.6	.16	7.8
24	206.6	1.91	394.6	.58	119.8
25	348.9	1.37	478.0	.91	317.5
26	910.0	1.39	1264.9	.58	527.8
31	34.5	1.13	39.0	0	0
32	51.4	4.50	231.3	1.11	57.1
33	2.6	3.30	8.6	0	0
34	44.8	3.53	158.1	.11	4.9
35	57.9	5.06	293.0	.60	34.7
36	165.6	1.39	230.2	.42	69.6
Total	2829.5		3920.2		1415.4

Table 4-15 Minimum Number of Expected Nonshell Sites in the Nonshell Area According to Environmental Sampling Units

Environmental Sampling Unit	Miles in Environment	Average Nonshell Site Density (sites/mile)	Expected Number of Nonshell Sites
11	13.0	0	0
12	32.7	0	0
13	3.8	-	-
14	10.7	1.02	10.9
15	30.3	6.29	190.6
16	146.3	0	0
21	11.8	0	0
22	95.7	2.40	229.7
23	0	-	-
24	44.2	1.35	58.8
25	46.4	1.20	55.7
26	93.4	1.58	147.6
31	11.4	3.66	41.7
32	33.9	3.33	112.9
33	2.2	-	-
34	31.3	3.12	97.7
35	33.5	3.23	108.2
36	64.9	1.79	116.2
Total	705.5		1170.0

Table 4-16 Minimum Number of Expected Shell and Nonshell Sites[1] for Study Area Counties

County	Minimum No. of Expected Non-shell Sites	Minimum No. of Expected Shell Sites	Total Expected Sites	Percent of Total Expected Sites	Percent of Study Area Shoreline	Total Number of Reported Sites to 12/76
Anne Arundel	229.2	733.3	962.5	14.8	13.5	430
Baltimore	128.0	314.2	442.2	6.8	6.7	147
Calvert	70.7	267.3	338.0	4.9	4.9	38
Caroline	147.0	78.9	225.9	3.5	2.9	70
Cecil	352.7	--	352.7	5.4	5.9	138
Charles	323.1	240.2	563.3	8.7	7.6	224
Dorchester	31.2	73.8	105.0	2.0	1.9	52
Harford	154.0	146.9	300.9	4.7	6.8	150
Kent	238.9	274.5	558.4	7.4	9.8	157
Prince Georges	100.6	--	100.6	1.5	2.0	155
Queen Annes	181.3	298.2	479.5	8.2	7.9	57
St. Marys	230.8	667.1	897.9	13.8	12.0	236
Somerset	--	--	--	--	--	48
Talbot	352.9	825.8	1178.7	18.3	18.1	229
Wicomico	--	--	--	--	--	36
Total	2585.4	3920.2	6505.6	100.0	100.0	2160

[1]Computed by multiplying expected average site densities by cumulative mileages of each environmental sampling unit according to county

varied environmental compositions. Generally, as Table 4-16 indicates, there is a direct relationship between shoreline length and number of total expected sites. St. Marys, Charles and Talbot counties have higher expected site frequencies than indicated by their shoreline length, thus suggesting the added affect of environmental composition in these areas. It should be reiterated that, based on current knowledge, the Potomac and Choptank valleys could be expected to have considerable prehistoric resources, owing to the importance of these rivers as trade and communication routes.

The above data form the basis for higher level predictive inferences. As shown in Tables 4-12 and 4-13, several instances of each environment were observed. Elementary statistics, calculated using a CDC 6400 computer with programs developed by Nie et al. (1975), provided the degree of variance of average density for each observed instance of each environment. Using these data, confidence intervals were calculated for each environment's average density. Figure 4-9 presents average site density and the 95 percent confidence interval for each environment, by site type and area. (For example, based on survey data, there is a 95 percent likelihood that between 1.27 and 2.55 shell sites occur for each mile in environment 24.)

Figure 4-9 shows considerable overlap among the confidence intervals for the sampling strata. This overlap makes it impossible to divide the average densities into groups based on discrete predicted site potentials. Such broad and overlapping confidence intervals make it impossible to assess whether the differences in average site density among the environments are real or apparent. Higher level statistical procedures, such as analysis of variance and multiple regression analysis, further confirmed the high degree of variance within the data set and the consequent impossibility of explaining a significant amount of that variance in terms of the environmental variables chosen to guide the fieldwork.

Environmental sampling units containing landform 3 (low bank) generally have the narrowest confidence intervals. Categories with broader confidence limits are characterized by consistent undersampling in the case of landform 1 (spits and marshes) or by mixed under- and oversampling,

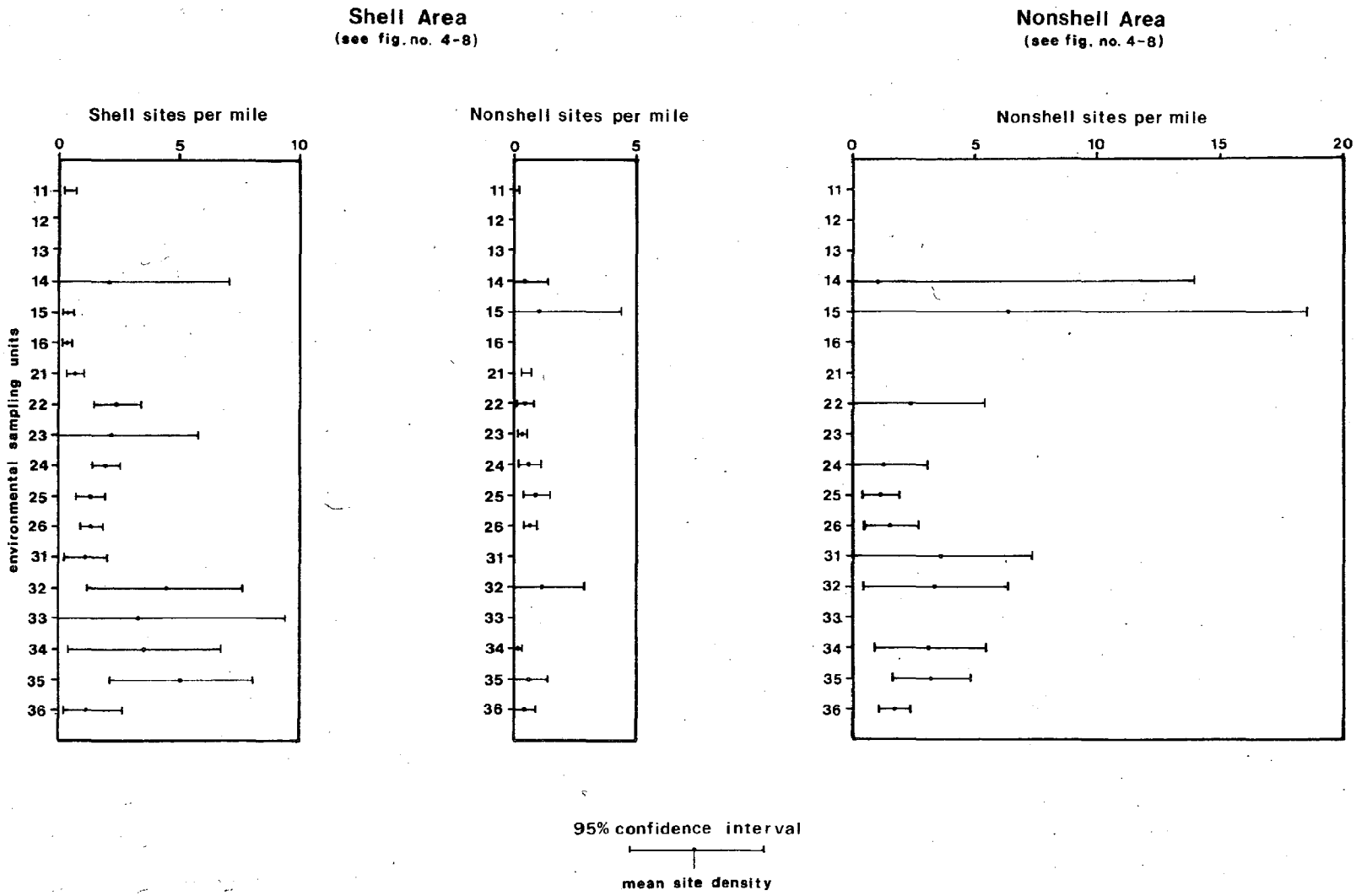


Fig. 4-9 Mean densities and 95% confidence intervals of shell and nonshell sites by area and environment

as in the case of landform 3 (high bank). Landform 3 areas included most of Calvert County and much of the upper Potomac area, areas characterized by little cultivated land and hence by generally poor ground visibility.

The data were subjected to two additional statistical procedures. The first hypothesis tested was that the distribution of sites was uniform across environments. Appendix A Tables A-13 through A-15 present Chi-square calculations on which the hypothesis is rejected at the .010 level of significance. A second hypothesis, that sites are randomly distributed across the environments in which sites are found, was tested by the inverse sampling method. These computations are presented in Appendix A Tables A-16 through A-18. Chi-square calculations indicate that this hypothesis cannot be rejected at the .010 level of significance.

Thus, within the context of this study and based only on site presence, these analyses suggest that prehistoric resources are not uniformly, but may be randomly, distributed among the environments chosen to typify the study area coastline. This conclusion appears to counter the expected results, given the assumptions about the nature of prehistoric cultural remains. Perhaps the primary reason for these results is the inability of this study to consider site age or function. While these analyses indicate that the data are not highly structured or explained by the chosen environments, were temporal and functional information considered, the data might be found to be structured in terms of these environments. Changes along the coast have probably biased the prehistoric record. In addition, highly variable inspection conditions hindered perception, as did the presence of nonshell sites that may not relate to the coast.

Conclusions

The fieldwork reported here has increased the information available on Maryland's coastal prehistoric resources to a considerable extent and at the same time provided information about little known areas such as portions of southern Maryland and most of the Eastern Shore. This study makes it clear that prehistoric resources are abundant in the Maryland

coastal zone with approximately one shell site and one nonshell site expected for each mile of shoreline. Although they are more abundant than has previously been documented, prehistoric sites are not so abundant as to prohibit development -- providing enough baseline information is developed to judge individual sites in terms of significance, mitigation options, and so on.

Prehistoric resources are distributed along former as well as present shorelines and submerged beneath the waters of the Bay and its tributaries. Although sites are fairly evenly distributed, more sites are found along indented shorelines than along straight Bay-fronting shorelines which have few creeks or lagoons. Straight coasts may have fewer sites because their lack of indentation provided less diverse resources for prehistoric people, although the erosion that has straightened these shores may have removed any traces of prehistoric remains. The most obvious distribution pattern in the collected data is that of shell sites. Spatial restriction to what is termed the shell area (see Fig. 4-8) probably reflects past limits in the availability of this food resource.

The study failed to determine particular patterns in the presence or absence of shell and nonshell sites according to the selected environmental parameters of landform and waterbody size. It is possible that such patterns could have been determined if information on the age and function of each of the sites located by the survey could have been collected. If further work with detailed artifactual information drawn from a sample of the located sites does not allow the determination of statistically significant site distribution patterns along these environmental parameters, then the environmental parameters may have to be redefined. Further detailed survey work should be concentrated in areas of more manageable size and environmental integrity. Suggestions for further survey work appear in Chapter Six.

Although artifacts could not be collected to provide information on site age and function during the fieldwork for the present study, the authors recorded impressions about site age whenever prehistoric ceramics and projectile points were encountered. Together with known information on Maryland prehistory (see Chapter Three), these impressions allow some prelimi-

nary conclusions about the distribution of prehistoric resources in the coastal zone. Archaic sites have been found throughout the study area. Most Early and Middle Woodland sites have been found on the Western Shore and in portions of Kent County on the Eastern Shore. Of the two Late Woodland ceramic traditions, Potomac Creek occupations have been found on the Western Shore and in portions of Kent County on the Eastern Shore, while ceramics of the Townsend ceramic tradition have been found along parts of the Western Shore and especially along the Choptank River on the Eastern Shore. Thus, it may be concluded that sites will be differentially distributed within the study area according to age and cultural tradition.

The fieldwork has provided information for other generalizations about coastal prehistoric resources. Prehistoric coastal land use was observed to be most dense adjacent to the shoreline, falling off rapidly inland. The size and thickness of prehistoric shell sites often appeared to be primarily related to immediate topographic considerations. Thick shell deposits may often represent accumulations of smaller superimposed occupations, particularly on restricted necks of land. Further work will be required to assess the full significance of site size and thickness. The territories of aboriginal groups probably varied through time according to economic, political, population, and other factors and this is expected to be reflected in the distribution of the remains of these groups.

The oldest surviving shell sites recorded to date come from Kent County, which apparently provides a unique situation for the preservation of these sites. The deep channel of the ancestral Susquehanna River lies just off the present coast of most of the Kent County shoreline. The drowning of this channel prior to 6,000 years ago by sea level rise, along with the establishment of an oyster resource, provided a rich environment for prehistoric people to exploit. These groups were able to live on the adjacent uplands, now the coast of Kent County, and their sites have been preserved to the present day.

In providing information on the abundance and distribution of Maryland's coastal zone prehistoric resources, the surface survey method was successful. This method allowed quick and economical recovery of infor-

mation on where prehistoric sites were located and where they were not located. Because success depended upon the availability of soil exposures, the method is best used in agricultural areas of the Maryland coast.

Prehistoric Resources of the Study Area Counties

The following discussion briefly summarizes present information on the nature, abundance, distribution, and significance of prehistoric resources in the study area counties, as shown by the present survey and by previous work. The study area counties are discussed individually except for those with extensive wetlands, Dorchester, Somerset, and Wicomico. Because the present study was designed to evaluate them without fieldwork, these three counties are discussed together at the beginning of this section.

County discussions are included as a convenience to county planners. Political units such as counties of course may bear no particular relationship to prehistoric settlement patterns and subsistence activities. Therefore such units may not always be appropriate in conceptualizing strategies for gathering data on and managing prehistoric resources.

Dorchester, Somerset, and Wicomico Counties

Dorchester, Somerset, and Wicomico counties share similar environmental features. Most of their low bank coasts have been inundated by sea level rise to form extensive marshes along the borders of Chesapeake Bay and its tributary rivers. The present survey did not examine areas in the marshes because of the difficulty of archeological investigation and because these areas are afforded some protection from disturbance by the Maryland Wetlands Act. Two areas were examined north of the marshes along the Choptank River in Dorchester County for a total of 7.3 miles and no prehistoric sites were discovered.

Little professional attention has been given to these counties; their prehistory is relatively unknown and only a few shell and nonshell sites have been recorded. Most of the recorded sites are located along tributaries away from the Bayshore, probably reflecting the difficulty of finding and expense of working on sites located in the marshes. One amateur, J. Messick, reports finding many sites of various ages eroding out of marsh vegetation along the shores of Somerset County (personal communication).

Important sites are known from the marshy counties -- for example, the Early Archaic tradition Chance site in Somerset county's coastal zone. The early occupation at this site probably does not represent coastal activities, although as a result of sea level rise, the site is currently in the coastal zone. Coastal sites would probably be recent because older sites would now be submerged. Contact period sites from villages mapped by Smith (1612; Fig. 3-2) would be expected in these counties along with sites resulting from the location of the early Native American reservations (Marye 1936, 1938). In addition, three ossuaries (large accumulations of human bones) have been reported along the lower Choptank River in Dorchester County (Ubelaker 1976). Finally, the Nanticoke River may have been important to prehistoric travel and communication because its upper reaches extend far into the interior of the Delmarva Peninsula.

Thus, the marshy counties probably contain a considerable number of prehistoric sites in their wetlands and on their broad offshore shallows, as shown in Fig. 4-10. While all offshore waters adjacent to the study area shoreline can be expected to have submerged prehistoric remains, the areas indicated on Fig. 4-10 are expected to yield more sites at shallower depths because of their more recent inundation. This assessment is based partly on interviews with watermen who report uncovering large numbers of prehistoric materials from these areas with clam dredges, including occasional intact ceramic vessels. The numbers of nonshell and shell sites are not predicted for the shoreline of the marshy counties.

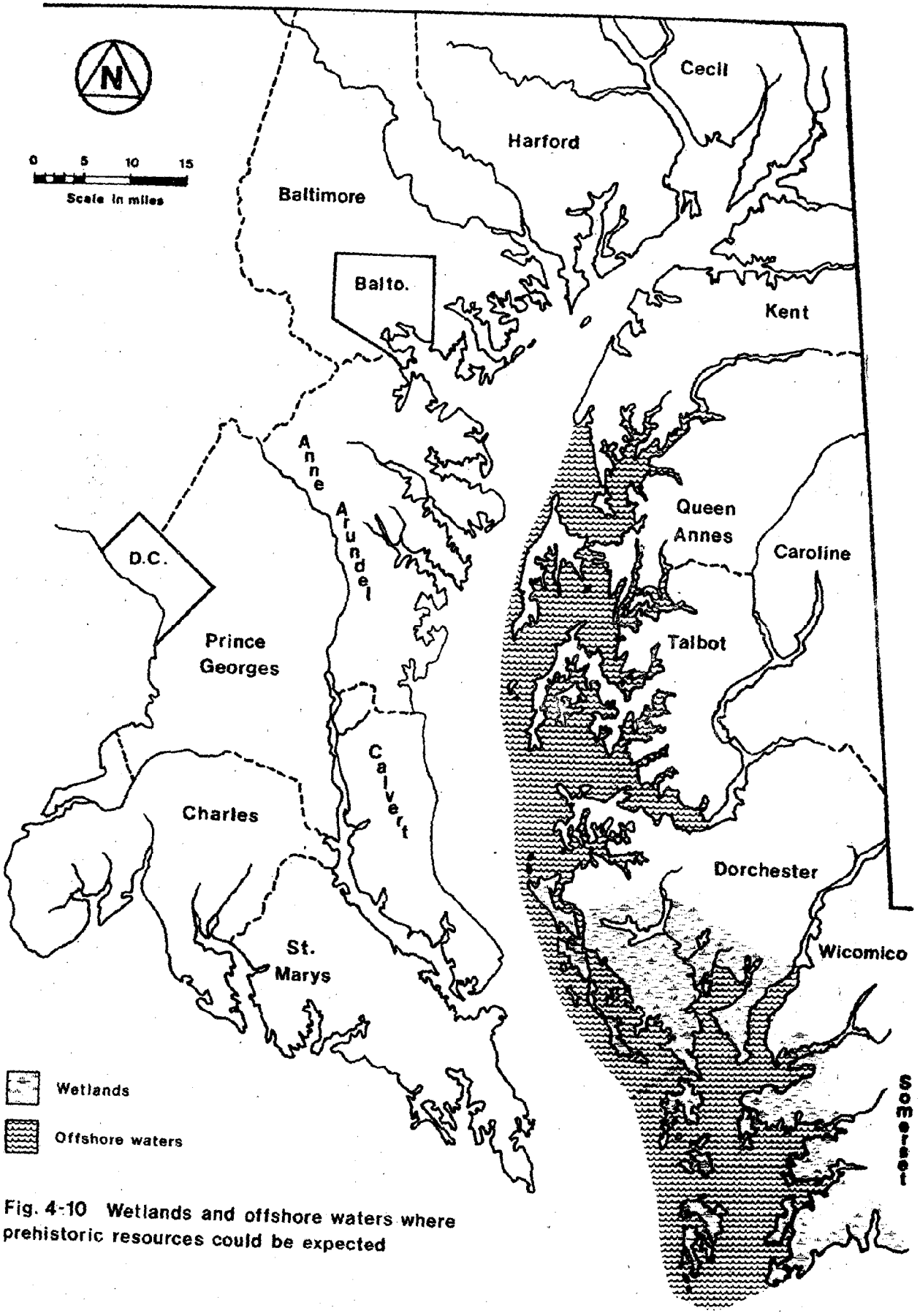


Fig. 4-10 Wetlands and offshore waters where prehistoric resources could be expected

Anne Arundel County

The coastal zone of Anne Arundel County is greatly indented by a large number of Chesapeake Bay tributaries. The present study examined areas of the county for a total of 33.6 miles, finding 38 shell sites and three nonshell sites. Because Anne Arundel County is highly developed for residential use, fewer sites probably were found than would have been if the shoreline were less developed. More sites were found along tributaries than along Chesapeake Bay, probably as a result of erosion along the Bay.

Professional and amateur archeologists have given attention to Anne Arundel County, including Cameron (1976), Stearns (1937), and Wright (1973). As a result, some understanding of the county's prehistoric occupation has been achieved and more sites have been reported for Anne Arundel than for the other study area counties. Archaic through Woodland tradition sites are found, including the recently reported West River Adena site, which contains many large stone blades and tubular pipes (Ford 1976). A minimum of 229 nonshell sites and 733 shell sites is expected to occur along the county's shoreline.

Baltimore County

Baltimore County's coastal zone is indented by tributaries of the Gunpowder, Middle, Back, and Patapsco rivers. Unfortunately, extensive industrial and residential development hindered archeological survey in the county. Undoubtedly many prehistoric sites have been disturbed or destroyed. The present survey examined a few areas along the northeastern shoreline of the county for a total of 8.4 miles. Although Baltimore County is located within the shell area and shell sites have been discovered along its shoreline, the present survey discovered no shell sites and only five nonshell sites. Most of the county's known sites, reported by amateurs, are located along the Gunpowder River, partly because this shoreline is less developed than that of the rest of the county and partly

because of the concentration of work in this area. A minimum of 128 nonshell sites and 314 shell sites is expected to occur along the county's shoreline.

Calvert County

Extensive, almost uninterrupted high bank Chesapeake Bay coast borders the eastern part of Calvert County; the Patuxent River with its predominantly low bank and many tributaries forms the western border. The southern coast of the county is particularly complex, with a series of creeks and former embayments near Drum Point. The authors surveyed much of the northern two-thirds of the county's Chesapeake Bay shore for a total of 13.1 miles. Although none of the Patuxent River shoreline was examined, information on this area is found in the work of Stearns (1951).

Because Calvert County is located within the shell area, both shell and nonshell sites would be expected. The present survey located no prehistoric remains along the Bayshore surveyed. Indeed, only two prehistoric sites have been reported for the Chesapeake Bay coast of Calvert County, near the mouths of Fishing and Parker Creeks. The high banks along the Bayshore may have made access difficult for prehistoric people and severe erosion may have removed many of their traces. The present dense forest cover inhibits effective field survey, perhaps also accounting for the seeming lack of coastal oriented sites along the Bay.

In contrast to the Bayshore, 49 sites have been reported for the Patuxent coastal zone. Most of these sites are located along the river itself rather than along its tributaries, reflecting the methodology of Stearns (1951) who searched for shell deposits from a small boat. Few sites are reported from the northern portion of the Patuxent to Cocktown Creek, an area that Stearns did not investigate. From Cocktown Creek southward along the Patuxent River, 33 shell sites have been reported; one nonshell site is known to be located along Hunting Creek. Several contact period sites would be expected along the county's Patuxent shoreline, as shown on Smith's (1612; see Fig. 3-2) early map. A minimum of

71 nonshell sites and 267 shell sites is expected to occur along the county's shoreline.

Caroline County

The coastal zone of Caroline County is made up of the shorelines of the upper Choptank River and Tuckahoe Creek. The present survey examined a few areas for a total of 13.9 miles, primarily along the upper Choptank River and near its intersection with Tuckahoe Creek. Twenty-four nonshell sites and no shell sites were found. Many of the sites along the Choptank River were located near springs or small creeks; these sites contained quantities of Late Woodland tradition ceramics. Although little is known about Caroline County's prehistory, prehistoric sites from the Archaic and Woodland traditions have been discovered by professional and amateur archeologists (Handsman and Borstel 1974). A minimum of 147 nonshell sites and 79 shell sites is expected to occur along the county's shoreline.

Cecil County

The transition between coastal plain and Piedmont in Cecil County forms an area of high bank shoreline that is broken by few trituaries, especially along the Susquehanna River. The remainder of the county is more indented by the Northeast, Elk, Bohemia, and Sassafras rivers with their many tributaries and coastal lagoons. In addition, the Chesapeake Bay shoreline is broken by many tributaries in the southern part of the county. The present survey examined a series of tracts along the Bay and the Elk, Bohemia, and Sassafras rivers for a total of 35.5 miles where 55 nonshell sites were recorded. Shell sites are not expected, since the county lies outside the shell area (see Fig. 4-8).

In addition to the present survey, prehistoric sites in Cecil County are known primarily from the work of amateur archeologists, especially

along the Susquehanna, Sassafras, and upper Elk rivers. The activities and ages represented by Cecil County's prehistoric remains are largely unknown, although many Archaic remains and a few Woodland ceramic sites are known. Most of the sites discovered by this study appear to date to the Archaic tradition. The county is expected to figure prominently into Maryland prehistory, owing to its proximity to the mouth of the Susquehanna River. This river served as a major north-south conduit for the movement of people, goods, and ideas during prehistoric times. A minimum of 353 nonshell sites is expected to occur along the county's shoreline.

Charles County

The Charles County shoreline is made up of the Potomac and Patuxent rivers. The Potomac shoreline contains many tributaries and coastal lagoons, including Mattawoman and Nanjemoy creeks and the Port Tobacco River. It presents a continuum of environmental change throughout its length with gradually decreasing salinity. The Patuxent River also has many tributaries. The present survey examined numerous areas along the county's Potomac shoreline for a total of 54.8 miles; 73 shell sites were found in the shell area (downstream from Maryland Point) and 41 nonshell sites were found in the shell and nonshell areas (upstream from Maryland Point) of the county.

Four sites have been reported along the Charles County section of the Patuxent River. A significant portion of this coastline has already been disturbed by construction associated with the town of Benedict; many sites may have been located on the peninsula now occupied by the town. Several archeologists, including Looker and Tidwell (1963), Hickey (1970), and Gardner and McNett (1970), have investigated Zekiah Swamp and its tributaries, Newport Run and Gilbert Swamp, where more than 50 nonshell sites have been recorded. Many shell sites are known for the Potomac River shore, especially along Nanjemoy Creek, at the mouth of the Port Tobacco River, and near Piccowaxen Creek.

The prehistoric sites of Charles County are better known than those of Maryland's other coastal counties, due to the work of McNett, who defined the Potomac River phase sequence in the county (McNett and Gardner ms). In addition, ossuaries (large accumulations of human bones) have been found along Nanjemoy Creek and the Port Tobacco River (Ubelaker 1976). Finally, several contact period sites are expected in the county as shown on Smith's map (1612; see Fig. 3-2). A minimum of 323 nonshell sites and 240 shell sites is expected to occur along the county's shoreline.

Harford County

The shoreline of Harford County is varied and complex, including part of the Susquehanna and the Bush and Gunpowder rivers. The present survey examined several areas along the county's shoreline for a total of 21.7 miles, where 52 nonshell sites and no shell sites were recorded. Unfortunately, Aberdeen Proving Ground restricted access to most of its shoreline. The transition between shell and nonshell areas lies within the county (Fig. 4-8) and Marye (personal communication) has reported finding no shell sites north of Romney Creek. Nonshell sites are known along the Susquehanna River and many are found near the river's mouth south of Havre de Grace. As with Cecil County, the character and number of sites in Harford County could be expected to reflect its proximity to the Susquehanna River, a major route for the movement of people and ideas.

Nonshell sites also are found along the upper reaches of the Bush and Gunpowder rivers, while shell sites are known only from their lower reaches. From the work of amateur archeologists, particularly Cresthull, Harford County sites are known to span the Archaic and Woodland traditions. Many examples of Late Woodland Potomac Creek ceramics were found during this survey. A minimum of 154 nonshell sites and 147 shell sites is expected to occur along the county's shoreline.

Kent County

The coastal zone of Kent County is highly indented between the Sassafras and Chester rivers by Still Pond, Churn, Worton, and Fairlee creeks. The present survey examined some areas along the Sassafras and Chester rivers and extensive areas along the Bay and its tributary creeks for a total of 82.7 miles, where 88 shell sites and 58 nonshell sites were recorded. The oldest reported coastal oriented prehistoric sites in Maryland are located in this area. Prehistoric sites are abundant in the county's coastal zone as a result of its many miles of present and former shorelines. The density of prehistoric sites, however, is low between Tolchester and Swan Point where severe shore erosion has probably occurred.

The prehistory of Kent County is becoming known through the authors' research and through Stearns' (1945) report on the area. Kent County is known to contain large numbers of prehistoric sites, and a minimum of 284 nonshell sites and 275 shell sites is expected to occur along the county's shoreline.

Prince Georges County

Both the Potomac and Patuxent river shorelines of Prince Georges County contain a large number of tributaries. Although the present survey examined none of the county's shoreline, shell sites and nonshell sites have been reported along the Patuxent River. Likewise, nonshell sites have been recorded for the Piscataway Creek area of the Potomac River, including the well-known Accokeek Creek site (Gardner 1969; Stephenson and Ferguson 1963).

Prince Georges County contains prehistoric sites of the Archaic and Woodland traditions, including the type site for the Accokeek Creek Phase (Stephenson and Ferguson 1963). The Accokeek Creek site also contains a Late Woodland Potomac Creek Phase stockaded village occupation and ossuary; it was observed by Smith in his early exploration of Chesapeake Bay (1612). Other contact period sites also should be found in the county. A minimum

of 101 nonshell sites is expected to occur along the county's shoreline.

Queen Annes County

Except for western Kent Island, the Queen Annes County shoreline is highly indented with many tributaries of the Chester and Wye rivers and Eastern Bay. The west coast of Kent Island is quite straight, although close inspection shows that a number of tributaries and coastal lagoons are present though their mouths have probably been disturbed by erosion. The present survey examined almost all of the western shore of Kent Island and an area along Eastern Bay for a total of 17.5 miles.

Although Queen Annes County is located within the shell area (Fig. 4-8), only six shell sites and four nonshell sites were found in the survey tracts. The small number of sites probably results from erosion of the tracts surveyed and residential development along the western shore of Kent Island. Little professional attention has been given to Queen Annes County, and as a result the county's prehistory is relatively unknown.

Prehistoric sites would be expected underwater along the county's eroding shores; watermen report recovering prehistoric artifacts in clam dredges. A minimum of 181 nonshell sites and 298 shell sites is expected to occur along the county's shoreline.

St. Marys County

St. Marys County is bordered by the Potomac and Patuxent rivers, both indented by many tributaries, and Chesapeake Bay with both straight and indented portions. The present survey examined many areas along the county's Potomac shoreline and a few along the Bay for a total of 49.3 miles, recording 125 shell sites and 31 nonshell sites, including several Archaic Tradition nonshell sites in tracts along the Bayshore.

Large numbers of prehistoric sites would be expected in St. Marys

County because of the many miles of present and former shorelines. Many contact period sites would be expected as shown on Smith's map (1612; Fig. 3-2). However, in the past only a few shell sites and nonshell sites have been recorded for the county, probably owing to the lack of systematic surveys. As McMillan (1972) notes, much attention has been given to the colonial history of the county, but little has gone to the prehistoric resources. In fact, McMillan's and Robertson's (1976) work are the only reported examples to date. A minimum of 231 nonshell sites and 667 shell sites is expected to occur along the county's shoreline.

Talbot County

Talbot County's coastal zone is greatly indented by tributaries of the Miles, Oxford, and Choptank rivers. The present survey examined many areas throughout the county's shoreline for a total of 106 miles, where 62 nonshell sites and 112 shell sites were recorded.

Many sites are known in Talbot County as a result of the work of several amateurs. However, because of little attention by professionals, the county's prehistory is relatively unknown. Sites are known for the Archaic and Woodland traditions, including the Late Woodland Townsend Phase along the Choptank River. The Choptank River is marked by increased numbers of shell sites near the river's mouth. The many miles of highly indented shoreline of the county adjacent to Chesapeake Bay contain fewer sites than might be expected, perhaps as a result of few freshwater sources in prehistoric times. The many necks of land in this area have small drainage basins due to their small area, low elevation, and flat topography. Because of the county's eroded low bank coast, prehistoric sites would be expected offshore under the waters of the Bay and its tributaries. A minimum of 353 nonshell sites and 826 shell sites is expected to occur along the county's shoreline.

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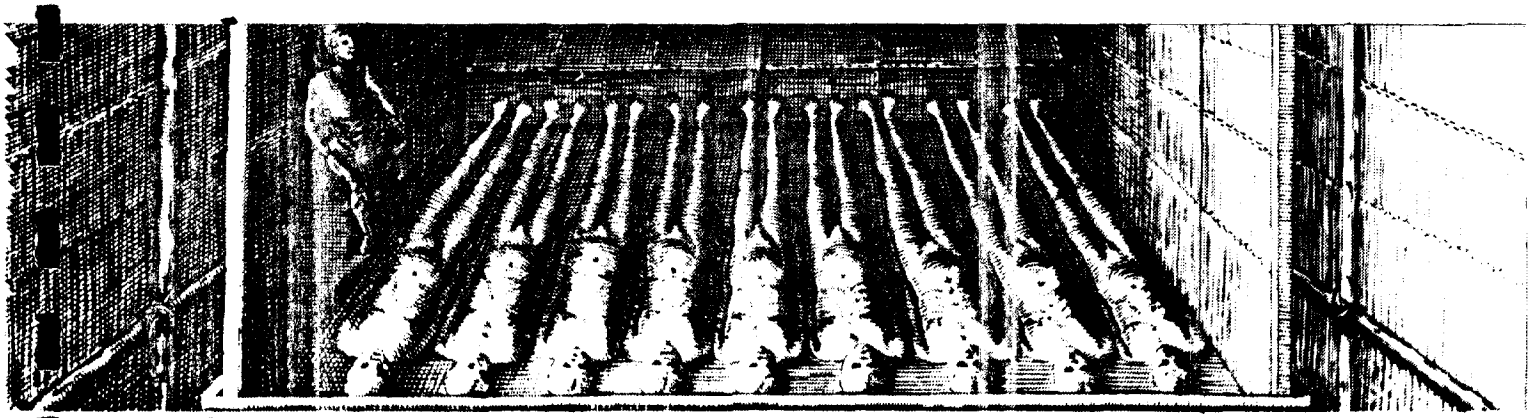
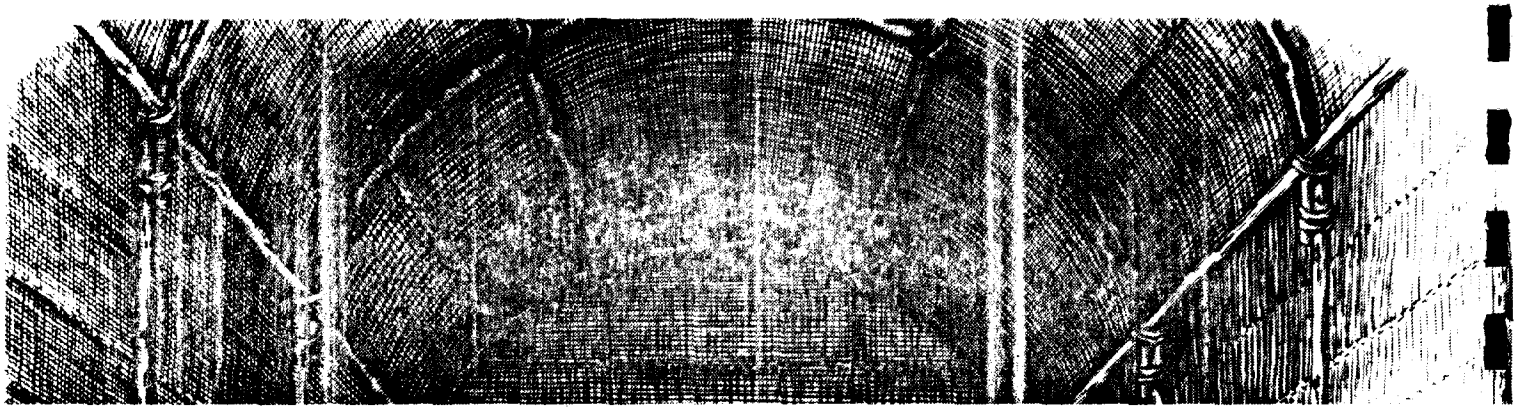
hapter 5



Stress on Prehistoric Resources



Chapter 5

Stress on Prehistoric Resources

This chapter discusses the sources of disturbance and destruction to prehistoric resources in the Maryland coastal zone. This information is as necessary to the management of these resources as information on their nature and distribution. Because prehistoric resources are found in the soil and because contextual relationships are among their most valuable aspects, soil disturbance reduces or destroys the value of these resources. Further contributing to the relative ease with which they may be disturbed is the fact that most coastal plain prehistoric deposits are shallow.

What harm will be done if development over the next decade destroys 10% of the prehistoric resources in the coastal zone? Since prehistoric resources are finite and nonrenewable, any destruction reduces the total number of sites available for preservation and study. Although there is no way to calculate the original number of prehistoric sites, clearly there is not now a 100% sample of these sites. Many prehistoric resources have already been destroyed by a variety of activities. Thus, we are dealing with an unknown percentage of the original number. Because destruction, at even a conservative rate, is irreversible, the value of the sites lost is impossible to calculate.

Based on the numbers of sites located in parts of the Maryland coastal zone during this study, a minimum of 6,500 prehistoric sites is predicted to occur in the coastal zone of the study area (Fig. 1-1). While this number may seem large, few of these sites, if any, are likely to have escaped some damage through natural or cultural activities.

Sources of disturbance or destruction to prehistoric resources include such natural processes as shore erosion and inundation, as well as such cultural activities as agriculture and the construction of erosion

controls, residences, and facilities for recreation, transportation, and industry. In addition, other less common disruptive activities include munitions testing and relic collecting as well as past shell quarrying.

Although agriculture brings the most widespread disturbance of prehistoric resources and through time can destroy them, prehistoric resources in cultivated areas usually can be studied and should be considered for conservation efforts. (McManamon 1976; Talmage et al. 1977). Unfortunately, relic collecting most often takes place in agricultural areas, disturbing or destroying sites. On the other hand, construction activities are far more destructive of prehistoric resources. Thus, the less developed an area is, the more intact its prehistoric remains are likely to be.

Stresses act differentially to disturb or destroy coastal prehistoric resources. Coastal resources are stressed more intensively than those inland because of the concentration and overlap of prehistoric and modern activities in the coastal zone. In addition, as discussed in Chapter Three, the qualitative and quantitative differences among prehistoric resources mean that certain ages and kinds are more endangered than others. Some kinds probably were never very abundant; others may already have been largely destroyed.

Attrition, or the disturbance of prehistoric sites, is more widespread than the destruction of complete sites. Taken in individual instances, attrition may seem small; but its cumulative effect is great. Thus, while the annual rate of site destruction in the state may be as small as one percent, it is likely that most of the state's prehistoric sites are disturbed each year.

Although there is a great deal of disturbance to prehistoric resources each year, very few activities intentionally disturb these resources; instead, most disturbance, save that resulting from relic collecting and past shell quarrying, comes from ignorance of the nature, location, and importance of prehistoric resources. Because many prehistoric resources have already been destroyed and most are being disturbed at present, it is important that these resources be considered in land use planning. Conservation should begin as soon as possible.

Stress from Inundation and Shore Erosion

Inundation and shore erosion are natural processes that continually destroy prehistoric resources in the coastal zone. As discussed in Chapter Two, the sea has been rising nearly five inches each century (Kraft, Biggs, and Halsey 1973). The consequences of this continuing change are most noticeable in areas with low profile coastlines, particularly Dorchester, Somerset, Wicomico, and parts of Talbot counties. Here, small increases in water level are translated laterally over a considerable area. For example, Metzgar (1973) identified more than 52,000 acres of land in these counties as susceptible to conversion to tidal marsh. Foss (personal communication) has documented the rapid rate of this conversion, noting that nearly one foot of tidal marsh now occupies lands actively farmed within the last 100 years.

Each year, shoreline erosion causes even more extensive damage than does inundation. Singlewald and Slaughter (1949) and the Maryland Geological Survey (1975) have published area-wide studies on Chesapeake Bay shore erosion. By comparing Chesapeake Bay survey charts produced over many decades, their studies identify areas of net gain and net loss through shore erosion and sediment transport. Clearly, most of the 4,400 miles of Maryland's inland shores are being eroded, at least to some degree. For example, a shoreline loss of two to six feet per year is reported for the Bay coast of Calvert County (Calvert County Planning Office 1974). Relatively few areas of net gain have been reported; most eroded sediment is deposited either in the Bay or in the Atlantic Ocean. An inspection of selected maps reproduced in Singlewald and Slaughter (1949) and the map series produced by the Maryland Geological Survey (1975) suggests that the shoreline has receded greatly in several places around Chesapeake Bay. Although it varies, in some areas this recession amounts to 500 feet over the past 100 years. Thus, in the past, considerable areas of land have been lost to erosion.

It is impossible to estimate the number of prehistoric sites lost

to erosion around Chesapeake Bay, although the number is likely to be very large. For example, nearly two-thirds of the sites discovered by this study located on Chesapeake Bay (waterbody size class 1) are being eroded (see Table 4-11). In addition, almost all the known sites that front on Kent County's Bay shoreline are being actively eroded. Figure 5-1 illustrates the erosion of one of Maryland's known coastal prehistoric sites.

Figure 5-2 shows shore erosion rates to be higher along the Bay coastline than along its tributaries, particularly along straightline segments of the Bay's coast and along marshy segments of lower Eastern Shore counties. Table 5-1 shows the amount of coastline being eroded in study area counties, where Dorchester, Harford, Queen Annes, and St. Marys counties are shown to have the greatest amount of shoreline loss in the higher rate categories.

Several methods have been developed to help control coastal erosion, including bulkheading, groin emplacement, wall construction, and riprap fill. Disturbance to land along the shoreline that often accompanies these measures can disturb or destroy prehistoric resources. Because the density of prehistoric resources is highest along the shoreline, even small scale erosion control measures can damage sites.

Grading is necessary for many shore erosion control structures. Figure 5-3 illustrates the disturbance associated with placing a sloping riprap revetment along part of the Potomac River. Unfortunately, grading for this project disturbed an area known locally to contain prehistoric artifacts.

In order to alter the Chesapeake Bay shoreline, an application must be submitted to the Army Corps of Engineers. More than 1,000 such applications were sought for Maryland in 1973 (see Fig. 5-4). Although most projects involving shoreline alteration are very small in scope, it is easy to see that the cumulative effect of numerous small projects can be substantial, as Table 5-2 shows.

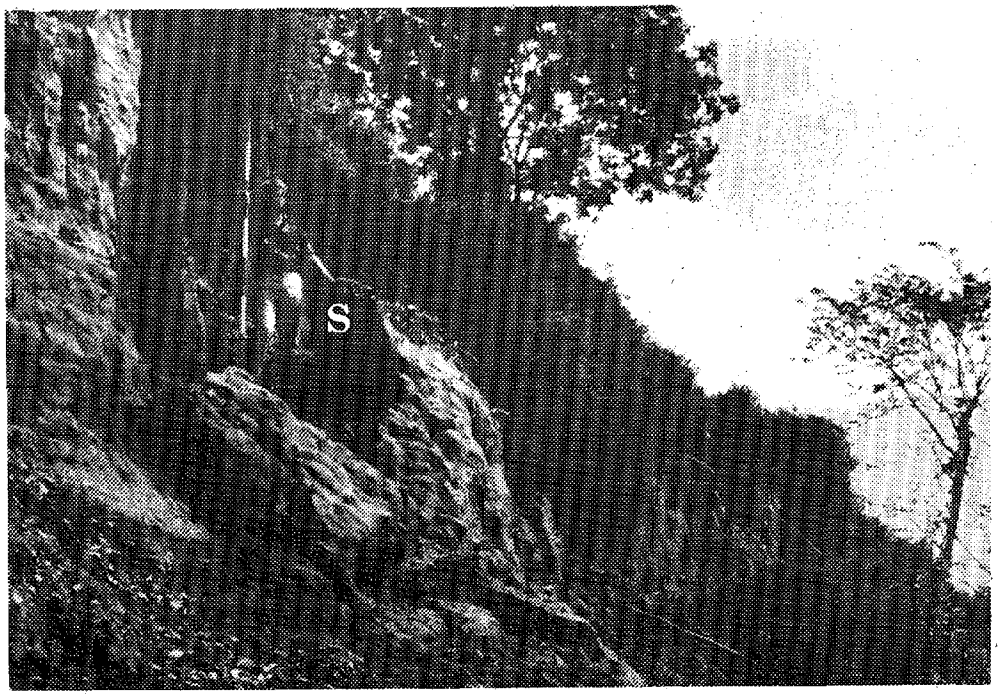


Fig. 5-1a An example of eroding prehistoric resources in Kent County showing slump block with midden layer(S)

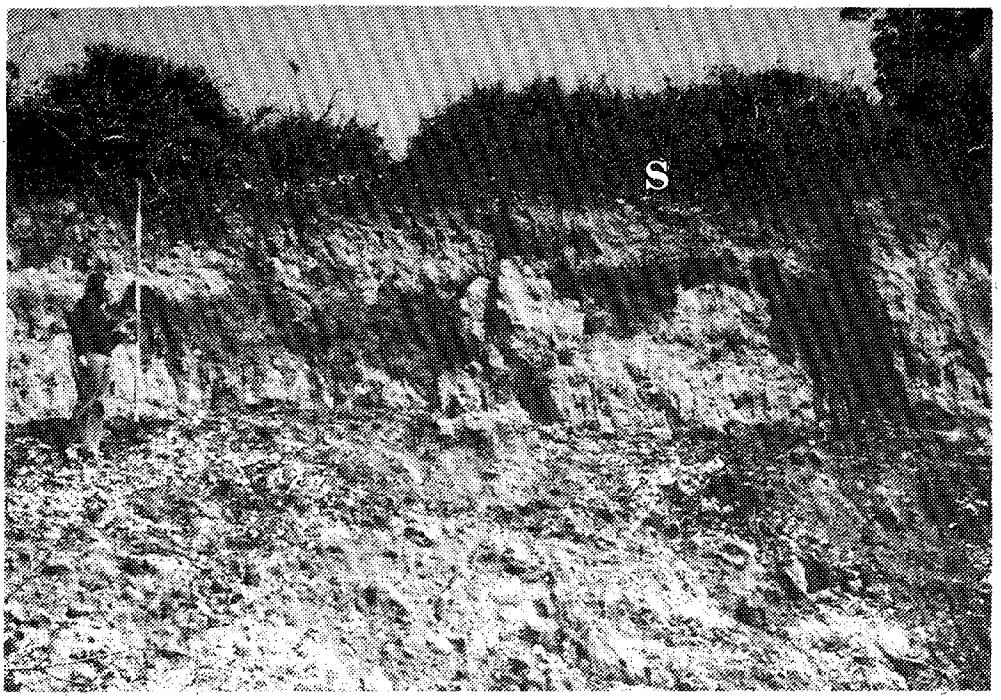
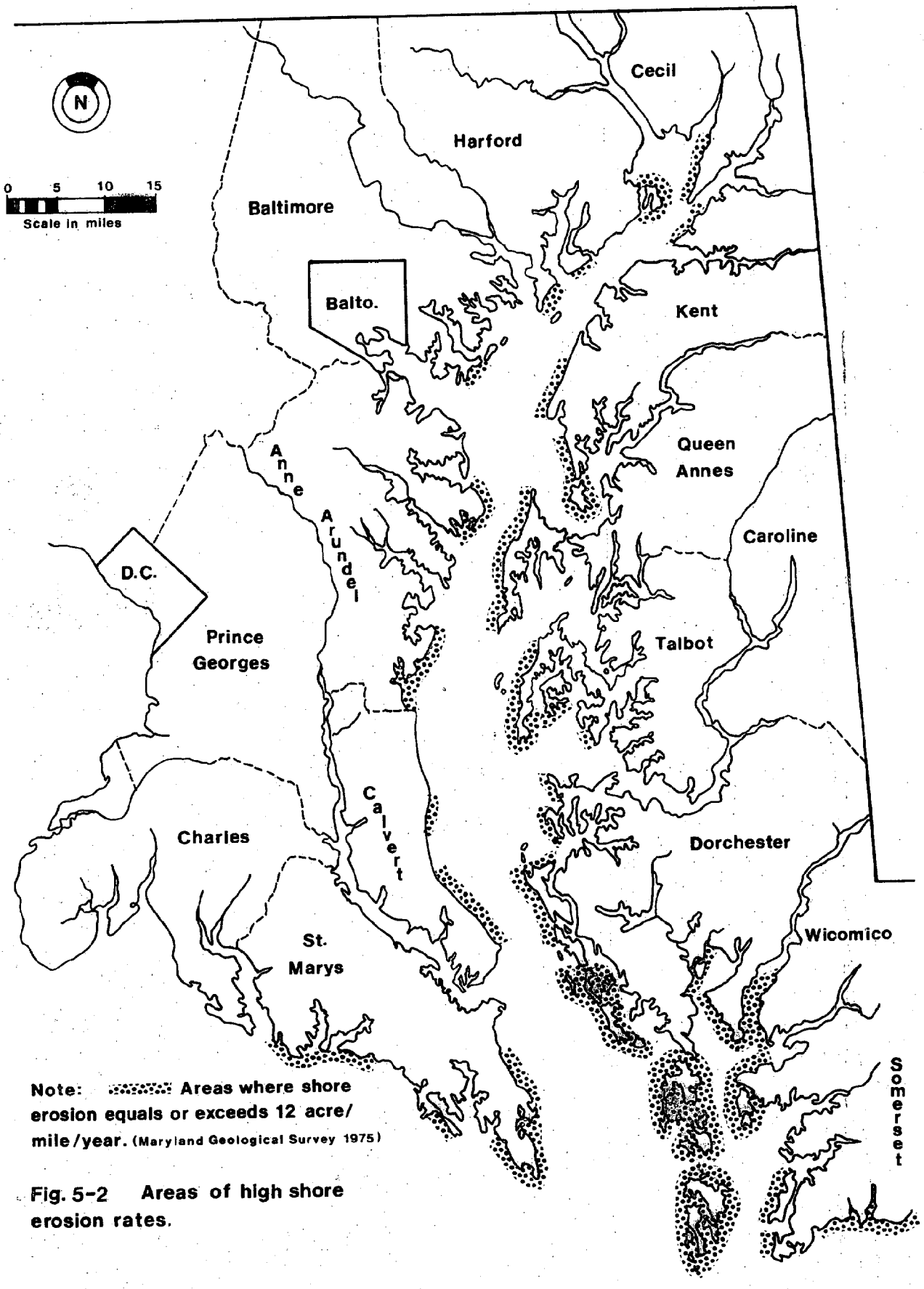


Fig. 5-1b An example of eroding prehistoric resources in Kent County showing eroding midden layer (S)



Note: ⋯⋯ Areas where shore erosion equals or exceeds 12 acre/mile/year. (Maryland Geological Survey 1975)

Fig. 5-2 Areas of high shore erosion rates.

Table 5-1 Shoreline Erosion Rates for Study Area Counties
(After Maryland State Conservation Needs Committee 1971)

County	Shoreline Length (miles)	Percent Receding	Miles of Shoreline Receding Each Year 0-1'	1-2'	2-4'	4-6'	6-10'	10-20'	25'+
Anne Arundel	419	84.3%	338.5	7.7	4.0	2.4	.8	--	--
Baltimore	209	93.5%	180.7	9.4	3.8	1.5	--	--	--
Calvert	143	86.6%	104.5	13.3	3.4	--	2.7	--	--
Caroline	66	98.5%	62.5	2.5	--	--	--	--	--
Cecil	200	94.7%	157.2	26.6	5.6	--	--	--	--
Charles	183	97.3%	171.0	7.0	--	--	--	--	--
Dorchester	498	98.3%	324.5	81.8	52.3	11.0	10.4	7.4	2.2
Harford	139	96.8%	100.9	17.8	10.9	5.0	--	--	--
Kent	268	92.1%	213.6	14.3	13.3	5.5	--	--	--
Prince Georges	44	92.3%	40.6	--	--	--	--	--	--
Queen Annes	323	95.7%	242.7	33.0	26.1	3.0	4.4	--	--
St. Marys	297	95.5%	237.5	17.2	14.6	13.3	1.1	--	--
Somerset	619	99.3%	563.7	22.7	17.5	7.1	2.2	1.4	--
Talbot	442	96.6%	362.3	32.6	13.3	13.3	2.0	3.5	--
Wicomico	89	96.1%	79.1	6.4	--	--	--	--	--
Total	3,939	94.9%							

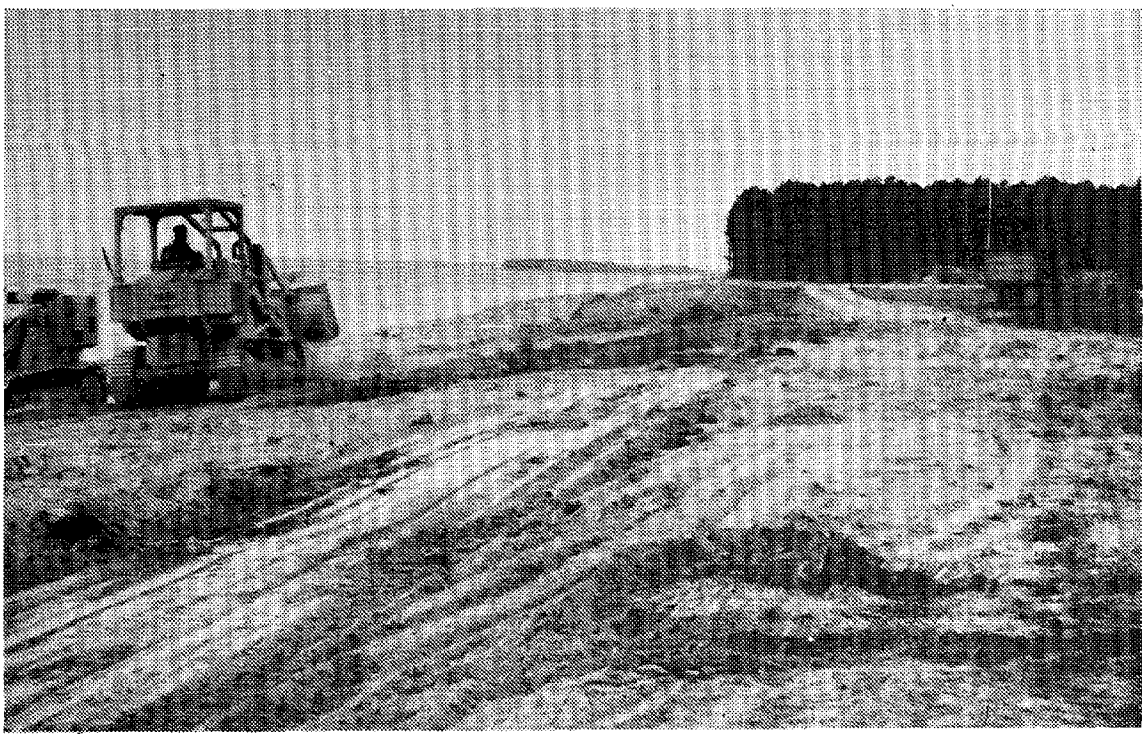


Fig. 5-3a Shoreline preparation prior to placement of stone revetment

Fig. 5-3b Shoreline after placement of stone revetment

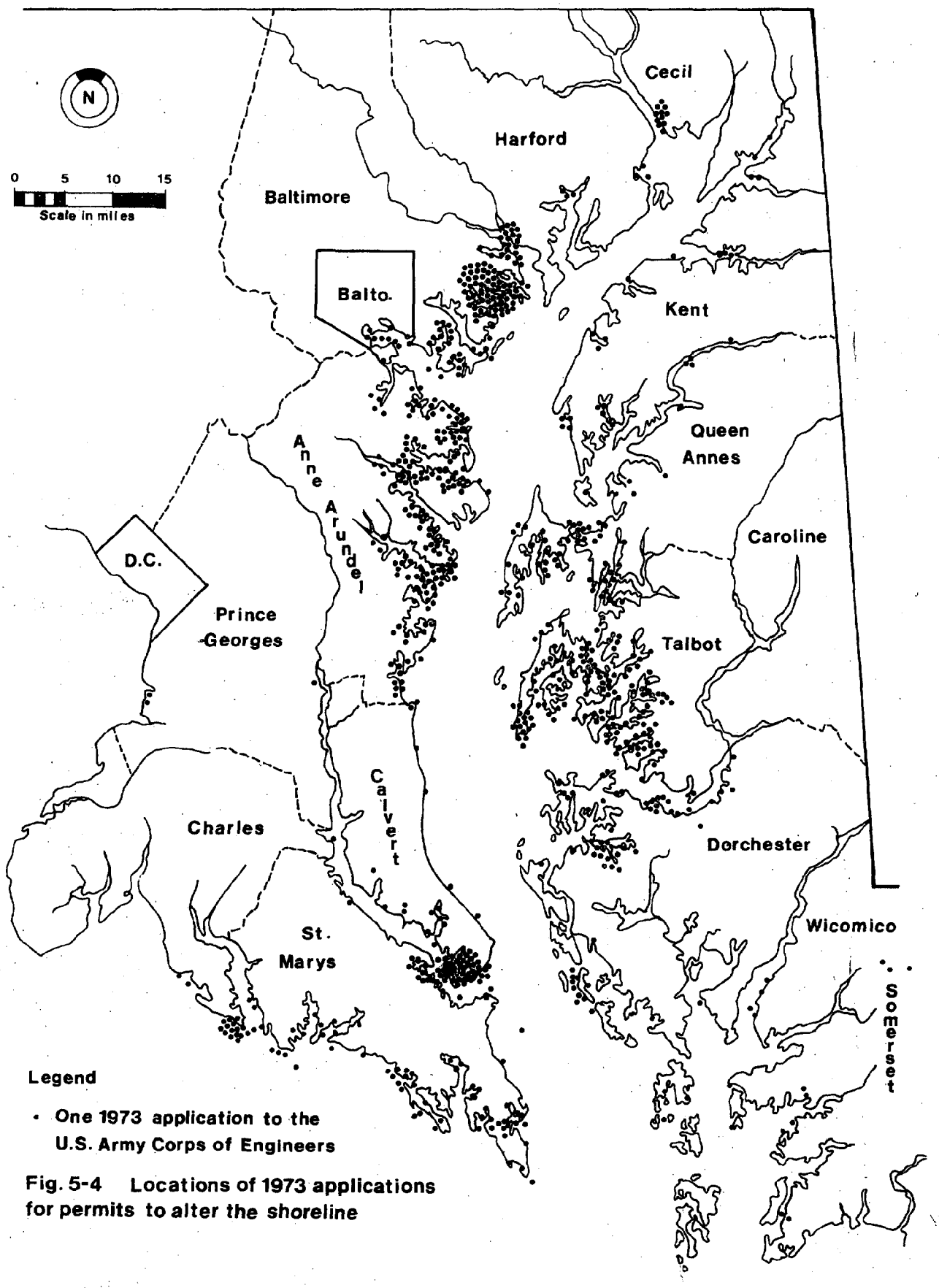


Fig. 5-4 Locations of 1973 applications for permits to alter the shoreline

Table 5-2 1973 Bulkhead Permits Granted by the U.S. Army Corps of Engineers Through March 15, 1974 (After Eberhart, Chapman, and Dugger 1974: 14)

Bulkhead Extent	No. of Permits	Percent of Total Permits	Linear Ft. of Bulkheading	Percent of Bulkheading
0 - 150'	63	62%	5,570	28%
150 - 500'	28	28%	5,660	29%
over 500'	10	10%	8,500	43%
Total	101	100%	19,730	100%

For example, a recent study by the Maryland Geological Survey shows that 39% of the Anne Arundel County shoreline has some form of erosion protection. As a result, more than half of this county's shorelines along the Chesapeake Bay and the Patapsco and Magothy rivers have been altered (Slaughter et al. 1976).

Stress from Population Growth

The animating force behind much cultural stress on prehistoric remains is the continued population growth of the Chesapeake Bay region. Several published reports (e.g., Maryland State Highway Administration 1975; Metzgar 1973; U.S. Army Corps of Engineers 1973; Wallace, et al. 1972) document the nature and extent of current development and attempt to predict future growth in the Bay area. The Maryland Department of State Planning estimates that population in the study area counties (see Table 5-3) will increase 48.7% by 1990. This population growth, and the expansion that accompanies it, will intensify the activities presently disturbing or destroying prehistoric resources in the coastal zone.

Related to population growth, the overall use of the state's 6.3 million acres has shifted. Figure 5-5 illustrates land use changes ob-

Table 5-3 1970 Population and Projections to 1990 for Study Area Counties (After Maryland Department of State Planning Figures)

County	1970	1980	1990	% Increase (1970-1990)
Anne Arundel	297,539	412,227	504,270	69.5
Baltimore	621,077	702,996	867,649	39.7
Calvert	20,682	26,621	33,026	59.6
Caroline	19,781	19,001	21,141	6.9
Cecil	53,291	61,929	69,333	30.1
Charles	47,678	65,095	89,792	88.3
Dorchester	29,405	29,800	33,280	13.1
Harford	115,378	175,527	207,592	79.9
Kent	16,146	16,116	17,147	6.1
Prince Georges	660,567	871,109	985,936	49.3
Queen Annes	18,422	19,659	20,748	12.6
St. Marys	47,388	57,246	73,021	54.1
Somerset	18,924	19,119	19.739	4.3
Talbot	23,682	25,662	27,699	17.0
Wicomico	54,236	61,042	69,898	28.9
Total	2,044,196	2,563,149	3,040,269	48.7%

served between 1958 and 1967 and makes projections to 1986 (Maryland State Conservation Needs Committee 1971:61). Principal among these changes has been the decrease of crop, pasture and forest

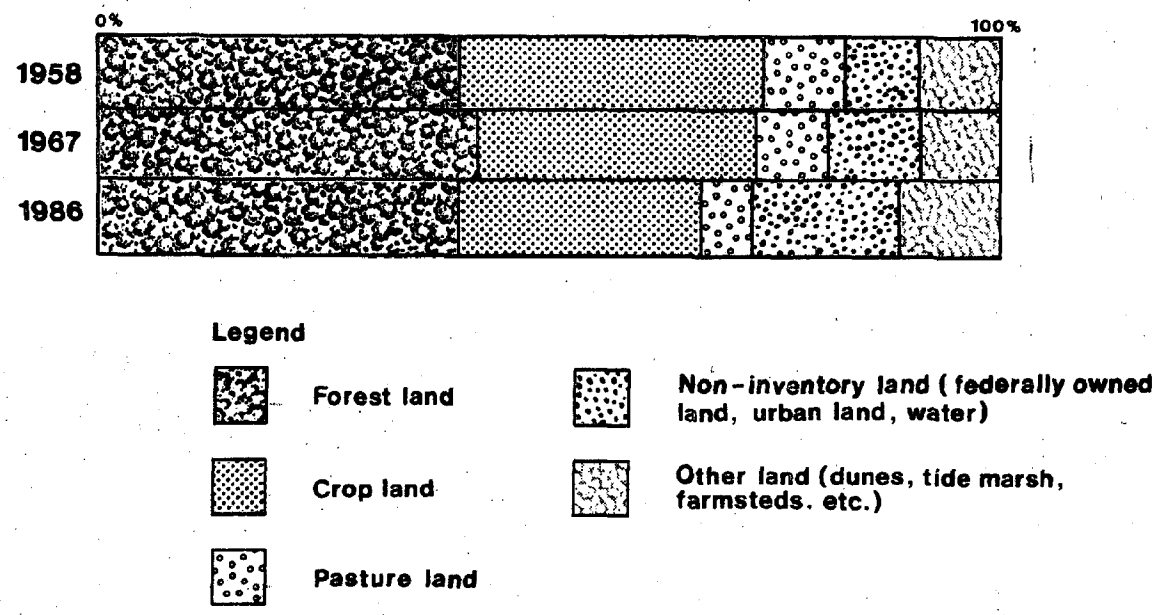


Fig. 5-5 Maryland land use 1958, 1967 and projections to 1986 (after Maryland State Conservation Needs Committee,1971)

land, and the increase of other, generally more soil-disturbing, uses which result from continuing urbanization. If the 1986 projections are accurate, between 1967 and 1986 approximately 26,000 acres of forest, crop, and pasture land will be converted to the more soil disturbing uses each year. As the reservoir of land with relatively low intensity use shrinks, the total stress on prehistoric resources, both in terms of number of sites and severity of impact, grows. Thus, using current population densities for the coastal counties under study and multiplying by projected population figures for the year 2000 (Wallace et al. 1972: 261), it appears that over 717,000 acres will be required for urban development. Table 5-4 presents these calculations by county.

Table 5-4 Estimated Urban Development Acreage Required in Study Area Counties for the Year 2000 (After Wallace, et al. 1972: 261)

County	Total Acreage	Urban Development Requirements in Acres	% of Total Acreage
Anne Arundel	266,841	125,460	47.0
Baltimore	389,260	105,110	27.0
Calvert	140,159	172,300	122.4
Caroline	204,801	12,257	5.9
Cecil	225,281	32,722	14.5
Charles	293,126	242,500	82.7
Dorchester	371,198	7,040	1.8
Harford	286,720	82,400	28.7
Kent	181,760	14,790	8.1
Prince Georges	310,258	88,130	28.4
Queen Annes	238,719	30,600	12.8
St. Marys	234,878	35,200	14.9
Somerset	212,480	3,270	1.5
Talbot	178,560	8,040	4.5
Wicomico	243,201	8,270	3.4
Total	3,777,242	968,089	25.6

It is important to observe that ownership of the Maryland shoreline is overwhelmingly private. Scattered parcels of land within the public trust are devoted to recreation, wildlife management, or military activities. Only about three percent of the Chesapeake coastline is publicly owned and accessible (Wallace et al. 1972).

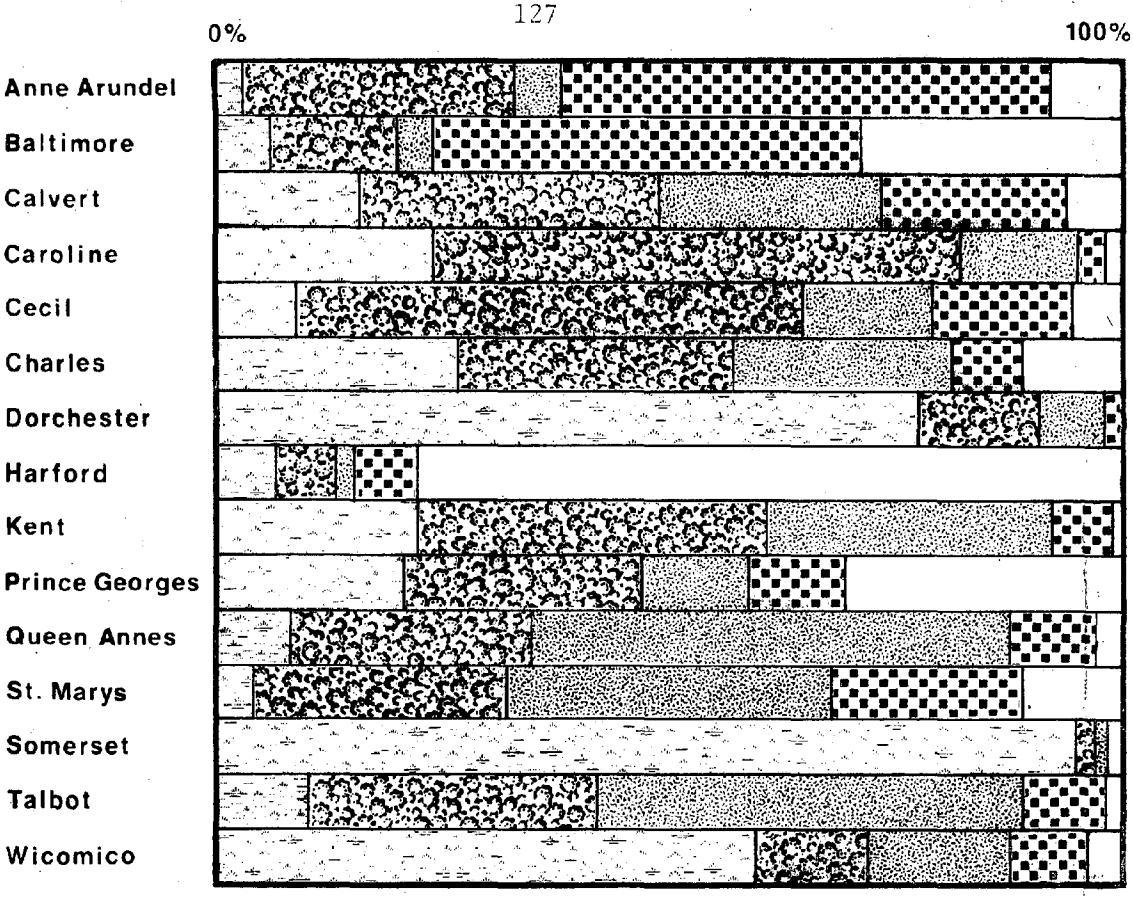
Stress from Agricultural Activities

Agriculture was the foundation of Maryland's early settlement, and thus, the soil of many coastal areas has been cultivated for more than 300 years. Even today, a high proportion of the land in coastal areas is devoted to agricultural activities (see Fig. 5-6).

Because early farming methods lacked contour plowing, protective plantings, and other modern practices, erosion rates increased dramatically after the forests were cleared. Gottschalk (1945) has documented the startling changes from erosion and sedimentation that took place during historic times in many of the coastal waterways surrounding the Chesapeake Bay. For example, the head of navigation was displaced more than 8 miles downstream on the Patuxent River. Costa (1975) estimates that from 7.6 cm. to 30.5 cm. of soil have been lost from Piedmont areas since the time the forests were cleared. Because of its rolling topography, the Western Shore coastal plain has probably undergone similar deflation.

Modern agriculture involves many kinds of land preparation and conservation practices that can affect prehistoric resources. For example, land clearing often requires heavy equipment, such as bulldozers, that uproot trees and other obstructions. The impact of land leveling and other field preparation procedures on prehistoric resources has been documented in Arkansas by McGimsey and Davis (1968) and Ford, Rollingson, and Medford (1972).

The annual cycle of preparing, planting, and harvesting involves repeated use of plows, discs, fertilizer applicators, cultivators, roto



Measured shoreline lengths in miles[1]

Anne Arundel	421.5	Charles	167.5	Queen Annes	323.0
Baltimore	209.0	Dorchester	415.3	St. Marys	311.1
Calvert	124.3	Harford	120.5	Somerset	619.0
Caroline	66.0	Kent	226.5	Talbot	442.0
Cecil	152.8	Prince Georges	45.6	Wicomico	81.8

NOTE:
1. As measured from 1 in. = 1 mi. county land use maps (MD. Dept. of State Planning 1973)

Fig. 5-6 County shoreline land use in percent of total measured shoreline

hoes, and harvesters. The use of larger and heavier equipment to cultivate fields has increased the potential for damage to prehistoric sites in recent years. For example, the use of deeply penetrating (12" - 18") chisel plows has increased the depth to which site disturbance can occur. In addition, the cultivation of certain crops, particularly sod, can disturb prehistoric resources; they are removed from prehistoric sites in each load of sod.

It is hard to monitor the disturbance of agricultural activities on prehistoric resources because no central planning agency is involved. Nor do these activities necessarily follow a predictable schedule. Plow disturbance affects the top several inches of all prehistoric sites in agricultural fields and thus, all artifact relationships in shallow sites; but only the top layers of thick sites are affected. However, because shallow sites are far more common than thick sites in the Maryland coastal zone, few sites are expected to remain undisturbed. Fortunately, archeologists can gain useful information from prehistoric resources that have been disturbed by agricultural activities, although through the years continued disturbance decreases the amount of information that can be obtained.

Soil erosion also can disturb prehistoric resources. Erosion rates on the Eastern Shore often average 15 to 30 tons per acre each year, with extreme cases reaching 100 tons (D. Wilson, personal communication). Erosion rates in counties with more topographic relief unquestionably equal or exceed these figures. Loss of soil also occurs from wind erosion in some areas (Maryland State Conservation Needs Committee 1971). Erosion can displace artifacts and in deflating the surface, tend to concentrate artifacts from different levels. When this concentration has occurred, it is very difficult to interpret the artifacts' original relationships. Valuable contextual information is thus lost and potential information is greatly reduced.

Unfortunately, some measures devised by agencies such as the Soil Conservation Service to deal with erosion can create additional stress on prehistoric resources. For example, ditch, pond, and dam construction frequently displace large amounts of soil that may contain prehistoric re-

mains. Soil conservation practices, including land smoothing and waterway diversions, open channels, and field drainage ditches, are summarized for study area counties in Table 5-5. It should be observed that not all these practices occur in the coastal zone, and that totals represent the summary of many individual projects of varying size and scope. Although each project may be insignificant by itself, the cumulative effect of these projects is great. Approximately 1,700 acres of ponds, 6,900 acres of waterways, and 1,050 miles of diversions, channels, and ditches have been built in the counties under study. Furthermore, the future need for these measures is anticipated to be great (Maryland State Conservation Needs Committee 1971: 11). While these measures can disturb prehistoric resources, the Soil Conservation Service has recently begun to study the potential impacts of some projects, particularly watershed plans, on prehistoric resources.

Stress from Historic Shell Quarrying

In a report to the governor, Maryland State Geologist J. F. Ducatel noted the abundance of shell deposits as early as 1834. Ducatel's maps show the locations of many Native American shell heaps around Chesapeake Bay. But between the early 1800's and the turn of the century, many of these deposits of oyster shells were burned for agricultural or mortar lime, hauled away for road construction, and used in the production of iron.

Several early writers discussed shell quarrying and commented on the nature of the shell heaps. From their discussions, it appears that during the long period of time that shell quarrying took place, many large shell heaps were destroyed. Although the deposits were recognized as the remains of prehistoric occupation, little information on their contents was ever recorded (Ducatel 1834: 29).

Comments made by visitors to the quarrying operations indicate the great size and number of shell heaps on both the Eastern and Western shores. For example, antiquarian Francis Jordan commented on the Still Pond area of Kent County, which he visited during the 1870's:

Table 5-5 Status of Conservation Measures in Study Area Counties
(R. R. Nagel, personal communication)

County	Ponds[1] (No.)	Diversions (Ft.)	Waterways (Ac.)	Open Channels (Ft.)	Drainage Ditches (Ft.)
Anne Arundel	147	10,000	116	35,500	47,970
Baltimore	755	340,700	720	0	576,000
Calvert	125	92,000	100	0	9,510
Cecil	282	151,000	173	11,363	111,989
Charles	67	36,719	32	0	88,500
Dorchester	210	0	0	3,300	853,800
Harford	395	0	5,200	0	0
Kent	509	75,000	307	0	430,000
Prince Georges	53	222,524	160	10,901	120,009
Queen Annes	215	1,660	10	335,300	500,376
St. Marys	165	21,419	161	0	461,606
Somerset	183	0	0	230,071	71,760
Talbot	162	6,165	0	0	749,711
Wicomico	141	0	0	896,401	0
Total	3,409	957,187 (189.29 miles)	6,979	522,836 (199.02 miles)	4,021,231 (761.60 miles)

[1]Average size pond = 1/2 acre

> Indeed, the magnitude of the remains exceed in area anything I have seen north of Florida; so great as to suggest, as a profitable financial venture, the erection of kilns at the head of the creek for burning the shells for the lime. At the time of my visit the lime burner had collected for that purpose in a nearby ravine shells roughly estimated at over 200 tons, and yet, notwithstanding this drain on the shell heaps which began many years before the civil war and still goes on with an occasional inter-regnum, the visible supply warrants the continuance of this industry for a long time to come (Jordan 1906: 36-37).

> The excavations made by the limeburners enabled me to ascertain the depth of some of the larger mounds, which by actual measurement I found to be from sixteen to twenty feet (Jordan 1895: 138-139).

Similarly, Holmes (1907: 114) reported on the shell deposits at Popes Creek, which were famous for their extent and thickness, and noted that some 500,000 cubic feet of shells had been removed from them. The exploitation of shell deposits was strongly encouraged; for example, State Geologist J. F. Ducatel wrote:

> The value of this material [i.e. oyster shells]... cannot be too strongly impressed upon the farmers of the lower counties on the Eastern Shore of Maryland. It is the principal agricultural resource which they possess, by a proper application of which they may double the produce of the lands [emphasis Ducatel's]. Can any farmer doubt that the discovery on the Eastern Shore, of limestone quarries even of moderate lime, would be of immense benefit to the country? The equivalent of such quarries we found in the shell banks [i.e. Indian middens] that have just been indicated. They should no longer be neglected. (1836: 50-51).

Thus, a great many shell heaps were either totally destroyed or severely disturbed. Both Jordan and Holmes (1907) reported that burials uncovered while quarrying shell went unrecorded and unstudied, although the origin of the shell heaps was generally understood.

Field surveys done in conjunction with the present study located several areas that had been disturbed by shell quarrying. Four of the largest middens in Kent County showed such signs. Figure 5-7a shows the front of a limekiln located in the midst of extensive prehistoric shell deposits near Still Pond Creek. Parts of the final charge of oyster shell were still lodged in the upper portion of the kiln. Figure 5-7b shows an area in which shell had been quarried from a midden located near the

Fig. 5-7a Nineteenth century limekiln located in coastal zone

Fig. 5-7b Quarry scars in prehistoric shell midden

mouth of Fairlee Creek. It is difficult to interpret prehistoric resources in areas of such complex historic disturbance.

In sum, large thick shell middens were sought and exploited for almost a century, with a serious impact on the reservoir of shell sites. More critical is the fact that the thickest shell deposits seem to have been the most heavily exploited. Because extremely thick deposits may represent functionally distinct kinds of sites and because they usually offer the best opportunity to obtain artifacts in a stratified context, such a loss seriously impairs the understanding of prehistoric economic practices. Large, thick midden deposits which have escaped shell quarrying and which today remain undisturbed should be considered to be very rare and ought to be preserved.

Stress from Relic Collecting

Relic collecting exacts a continuous toll on prehistoric resources. The results of this activity are destructive, although not visually striking. It is of course important to differentiate destructive relic collectors from people who occasionally pick up an artifact and from people who, because of a serious interest in archeology, join amateur archeological and historical societies that sometimes undertake archeological investigations. But relic collecting is practiced as a hobby or an avocation by thousands of people who comb cultivated fields for prehistoric artifacts. Some of these people closely study the best conditions for collection, waiting for favorite fields to be plowed and then washed by several rains. Areas with concentrations of artifacts are searched annually and, over time, systematically depleted.

Relic collecting destroys prehistoric resources because it strips sites of their artifacts. These sites are less useful for study because collectors remove artifacts from them differentially thus biasing the kinds and quantities of artifacts remaining. Perfect examples and artifacts with special shapes or exotic raw materials are usually preferred over broken, common, or unfamiliar artifacts. Some kinds of sites are

differentially collected; for example, most relic collectors prefer non-shell to shell sites. Projectile points or arrowheads are probably the most commonly collected artifacts from prehistoric sites. The systematic removal of these items is particularly detrimental in that they provide the major means of dating sites which lack ceramics or organic materials capable of being radiocarbon dated.

Collecting or "surface hunting" has particularly serious consequences in the upland areas of the coastal plain. The vast majority of sites inside Maryland's coastal zone are relatively thin, with all artifacts concentrated in the plow zone. Therefore, diminishing surface sites by further collecting reduces our ability to understand the past or to preserve representative parts of it for future study and enjoyment.

Because their interest usually lies in unusual or aesthetically pleasing objects rather than in knowledge about prehistoric lifeways, collectors frequently do not label finds with information on their natural or cultural contexts. Unprovenienced artifacts cannot be studied scientifically or displayed correctly; hence, they add almost nothing to prehistoric studies. Digging is extremely destructive to prehistoric resources and it is fortunate that few relic collectors engage in it. Figure 5-8a shows disturbance caused by unsupervised excavations in a coastal Archaic Tradition site, while Fig. 5-8b illustrates a private relic collection made from coastal Archaic sites.

Relic collecting is illegal on Federal and on Maryland state land. However, laws concerning relic collecting on public lands are not well known and rarely enforced. These laws do little to curb this stress on prehistoric resources. To reduce losses to prehistoric resources from relic collecting, it is necessary to educate the public about the need for studying prehistoric artifacts <u>in place</u>, and to encourage people interested in prehistory to join local archeological and historical societies.

Fig. 5-8a Disturbance caused by unsupervised excavations in coastal Archaic site

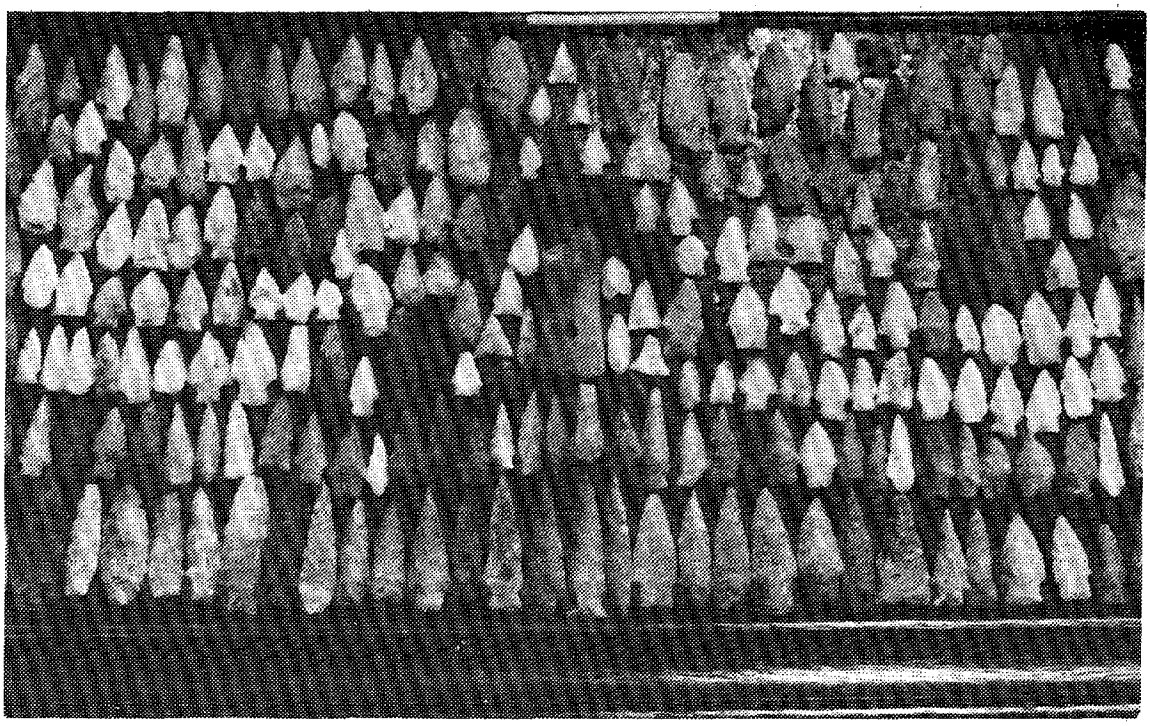


Fig. 5-8b Private relic collection from coastal Archaic sites

Stress from Residential Development

The Maryland Chesapeake Bay Study prepared by Wallace et al. estimates that as many as 165,000 acres adjacent to Chesapeake Bay and its tributaries will be developed for residential use during the thirty year period which began in 1970 (Wallace et al. 1972: 183). Year round housing has been and is expected to remain concentrated near large urban centers in the peninsular areas of Anne Arundel and Baltimore counties (Wallace et al. 1972: 179).

Second or recreational housing, however, has been and is expected to remain oriented to the shoreline. Figure 5-9 shows that areas of complex shoreline near population centers and transportation corridors are favored for this kind of development. Second or recreational housing in Maryland is influenced by local economic conditions as well as by growth in neighboring states whose residents seek the amenities of Chesapeake Bay, and this kind of development is expected to increase as individuals of the post-World War II population surge attain higher incomes and eventually retire.

The Morton, Hoffman and Company, Inc. (1974) report on second home development in Maryland estimates that the overall growth in second home construction from 1974 to 1980 will be 34%. In addition, the report predicts that the lower Eastern Shore and southern Maryland will experience the greatest growth in second homes, with other Chesapeake Bay areas showing very small gains or even decreases (Morton, Hoffman and Company, Inc. 1974: 145).

Residential development can disturb the shoreline in several ways. Building construction often requires land leveling, fill, and excavations. In addition, pier construction usually involves excavations and, if erosion control is necessary, the methods used disturb the soil and any prehistoric resources that might be present, as discussed earlier.

The effects of second home development on prehistoric resources can

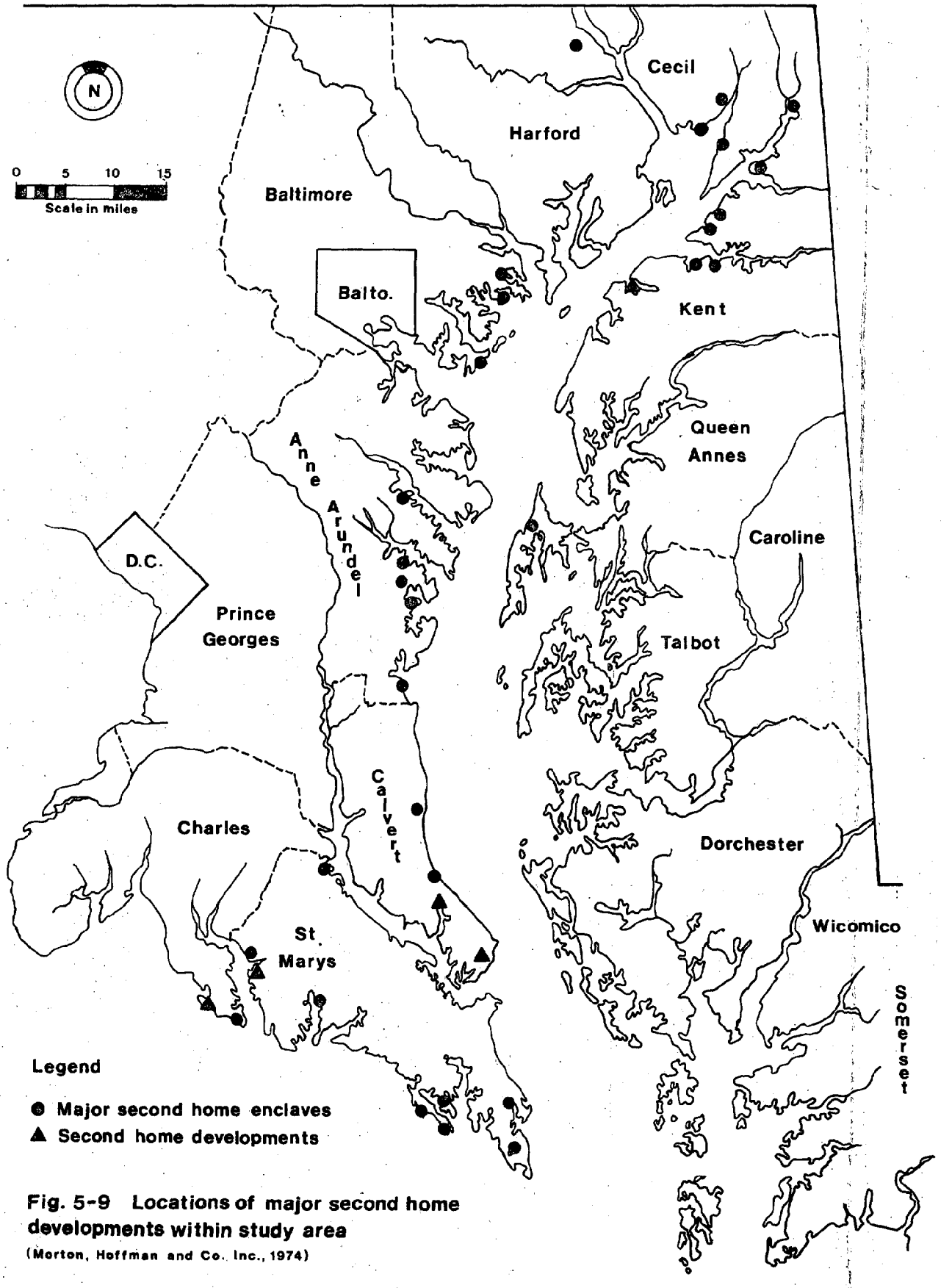


Fig. 5-9 Locations of major second home developments within study area
(Morton, Hoffman and Co. Inc., 1974)

be illustrated best by an example from southern Maryland. This project presently occupies 4,500 acres of wooded land and 21 miles of shoreline. The tract has been subdivided into 8,000 single family lots. A development of this size makes a huge impact on the landscape, calling for roads, utilities, house sites, and recreational facilities. The 25,000 to 35,000 people who will live in this development will increase the demand for goods, services, and transportation improvements in the local area and along the major transportation links. Undoubtedly, the potential for disturbing prehistoric resources through cumulative landscape disturbance is great in this and other coastal zone residential developments. Figure 5-10 illustrates the amount of shoreline land disturbance that can accompany residential development.

In addition, it is important to note that preferred housing sites are frequently locations where prehistoric sites are found. Thus, environmental intersections, such as shorelines along bays and terraces that provide view overlooks, are preferred. Since large numbers of prehistoric resources are often found at environmental intersections, the presence of prehistoric resources should be assessed before such areas are developed for residences. Figure 5-11 illustrates the disturbance of prehistoric resources that can come from residential construction.

Stress from Recreational Activities

Because Chesapeake Bay is a focal point for recreation in one of the nation's most populous regions, its recreational facilities are intensively used and pressure to expand them is increasing. The Maryland Outdoor Recreation and Open Space Comprehensive Plan Phase II (Urban Research and Development Corporation 1972: 41) estimates that approximately 600,000 acres will be required to accommodate the recreational activity projected for the state by 1990. In order to meet design requirements, 355,000 acres must be added to those available in 1970. Figure 5-12 shows major areas in the coastal zone currently publicly owned and classed as open space or recreation areas. As this figure shows, little shoreline in the Maryland coastal zone is accessible to the public for natural area conserva-

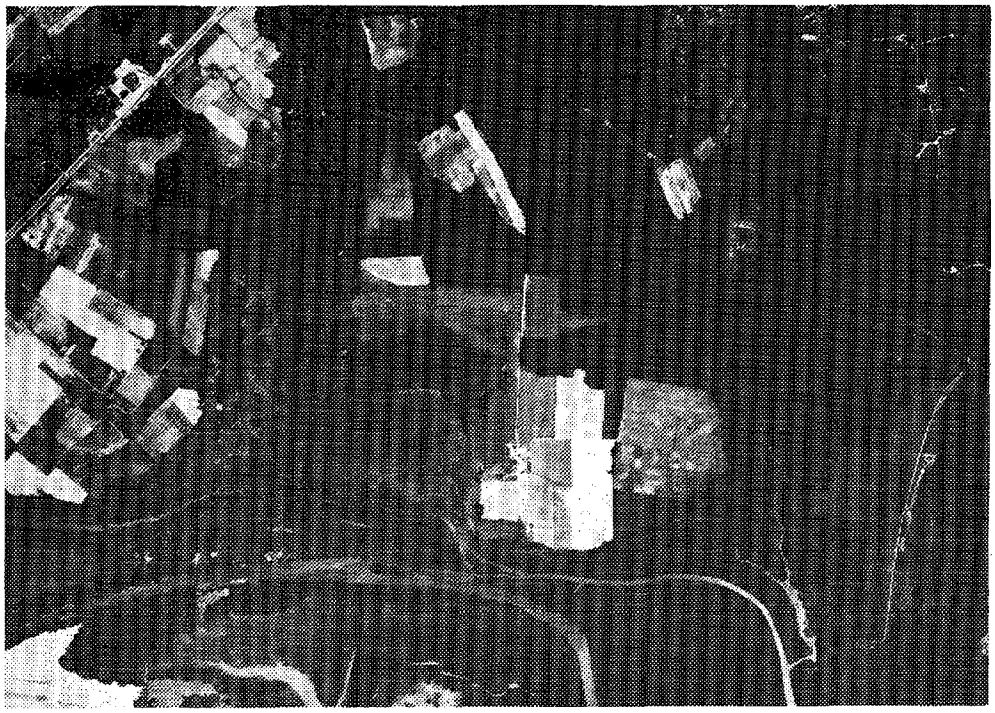


Fig. 5-10a 1952 view of coastal area prior to residential development

Fig. 5-10b 1971 view of same area showing extensive shoreline residential development

Fig. 5-11a Shell midden disturbed by grading at house construction site

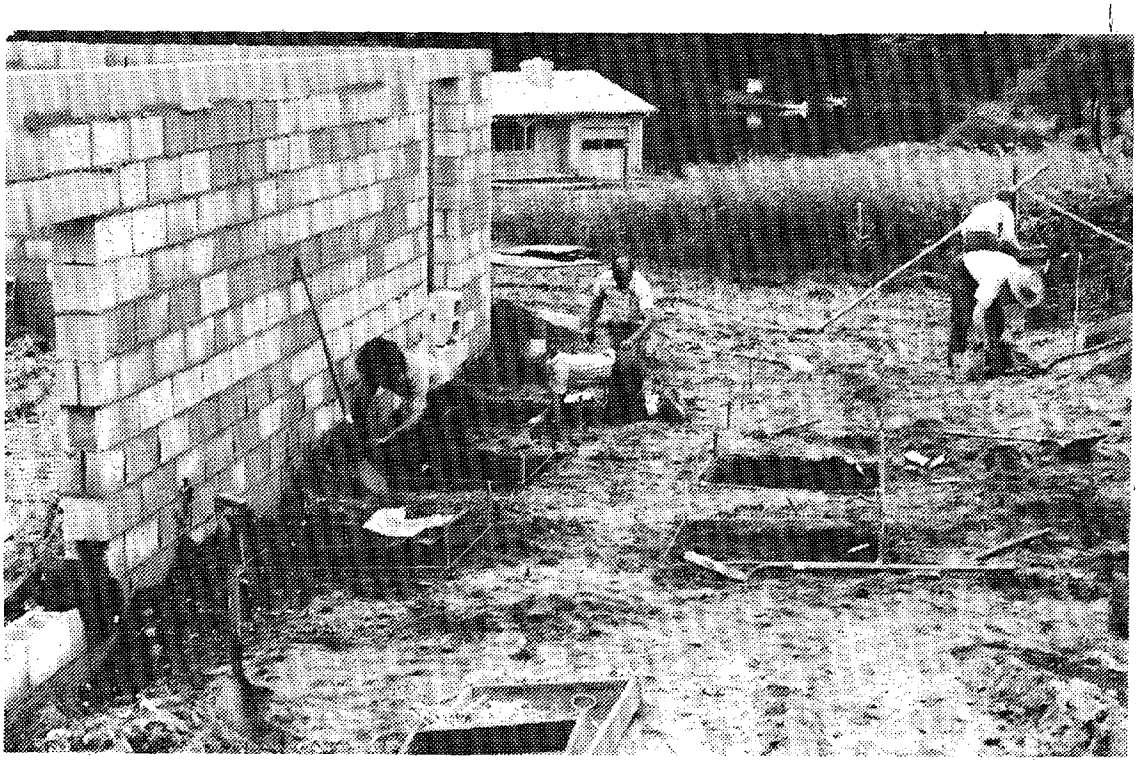


Fig. 5-11b Emergency prehistoric excavations of coastal site disturbed by residential construction

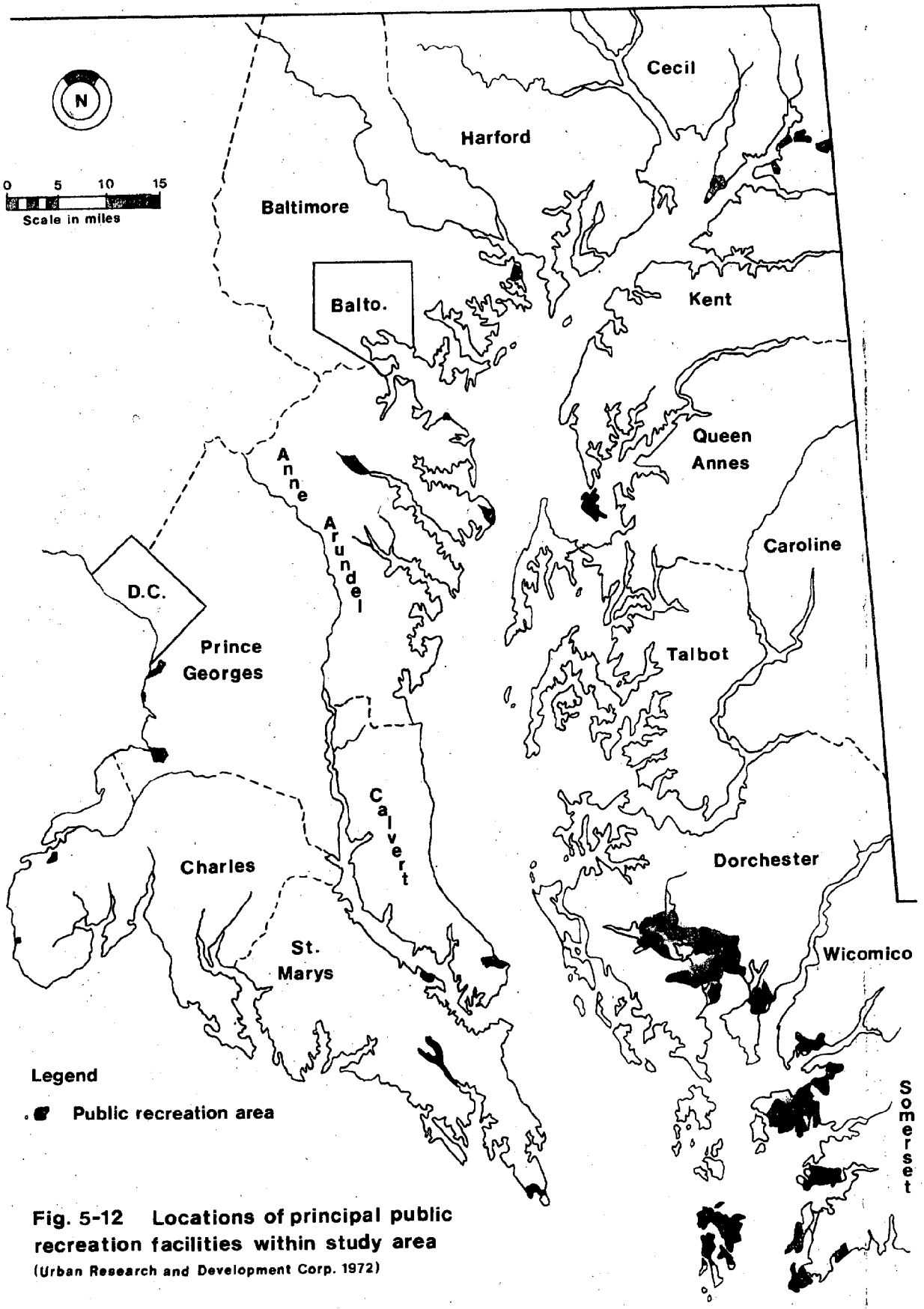


Fig. 5-12 Locations of principal public recreation facilities within study area
(Urban Research and Development Corp. 1972)

tion and recreation. Adding more land could preserve prehistoric resources as well as meet recreational needs, depending on the location of the area and its projected land use.

Recreational Boating on the Tidal Waters of Maryland (Roy Mann Associates, Inc. 1976: 5) points out that the number of pleasure boats registered in Maryland increased 9% per year between 1968 and 1974. This study concludes that the demand for facilities, especially launching ramps, is quickly exceeding the supply, particularly near the Baltimore and Washington, D.C., metropolitan areas. Likewise, the Maryland Outdoor Recreation and Open Space study estimates that annual boating activities will more than double by 1990 (Urban Research and Development Corporation 1972: 35).

Boating recreation can stress prehistoric resources in the coastal zone because boating services require considerable shoreline construction, such as marinas, gas docks, launching ramps, and marine parks. Figure 5-13 shows the locations of marinas in the study area. Because these facilities are frequently situated in coastal lagoons, their construction can disturb prehistoric resources often associated with such settings.

During the fieldwork for the present study, several marina developments which involved extensive shoreline modifications were noted. Many of these marinas were located in areas where prehistoric sites either are known or are expected to occur. Figure 5-14 illustrates the amount of shoreline disturbance that can accompany marina development.

Stress from Wetlands Destruction

As shoreline development has proceeded, coastal wetlands have been particularly vulnerable to destruction. In 1908, nearly 500,000 acres of wetlands were reported for the state (Metzgar 1973: II-2); however, by 1968, only 300,000 acres remained. Two general categories of wetlands can be recognized; these include broad fringing marshes typical of the lower Eastern Shore and coastal marshes occupying the sites of former open embayments. Prehistoric sites have been reported in association with both

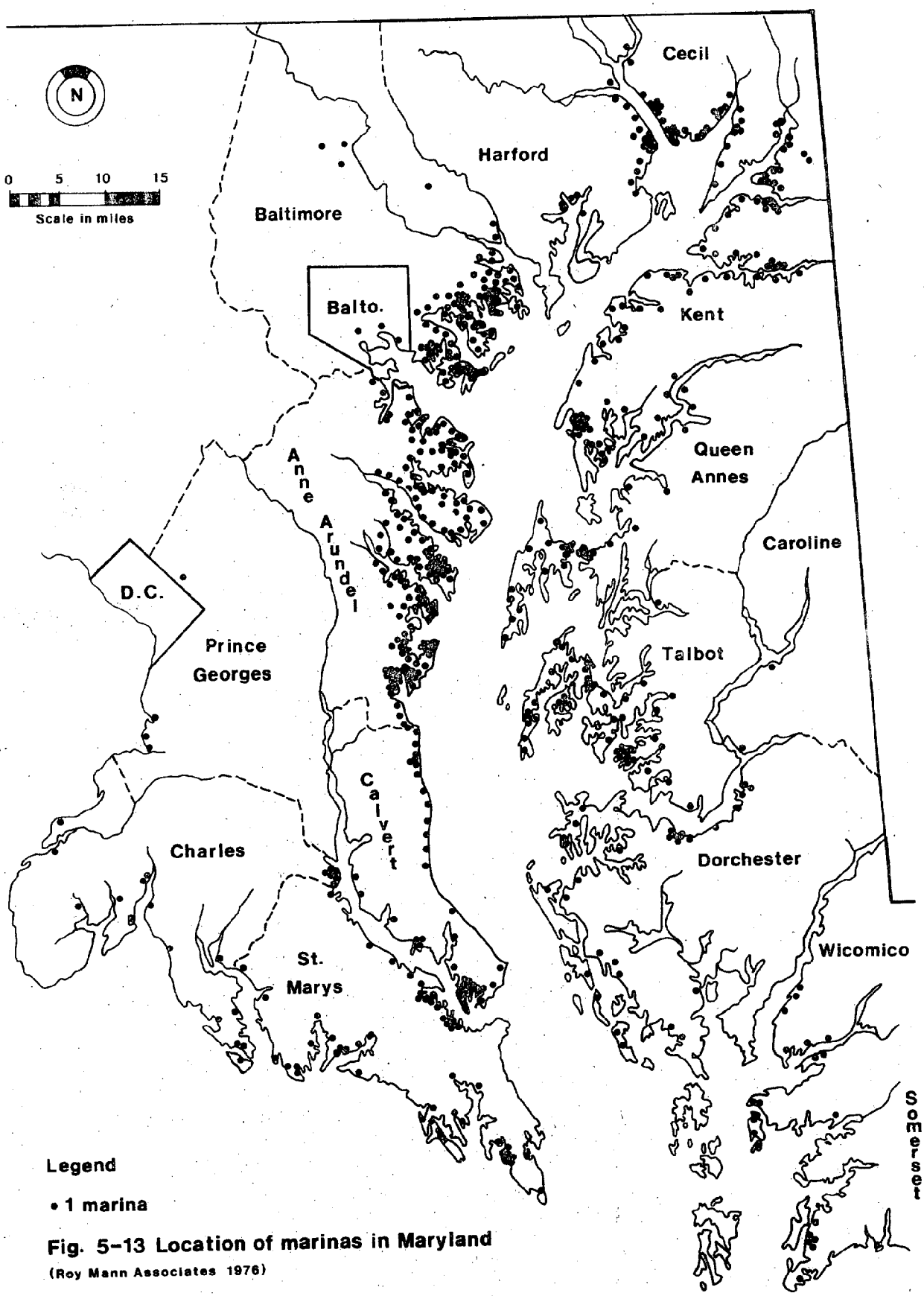


Fig. 5-13 Location of marinas in Maryland
(Roy Mann Associates 1976)

Fig. 5-14a 1952 view of Eastern Shore coastal area prior to marina development

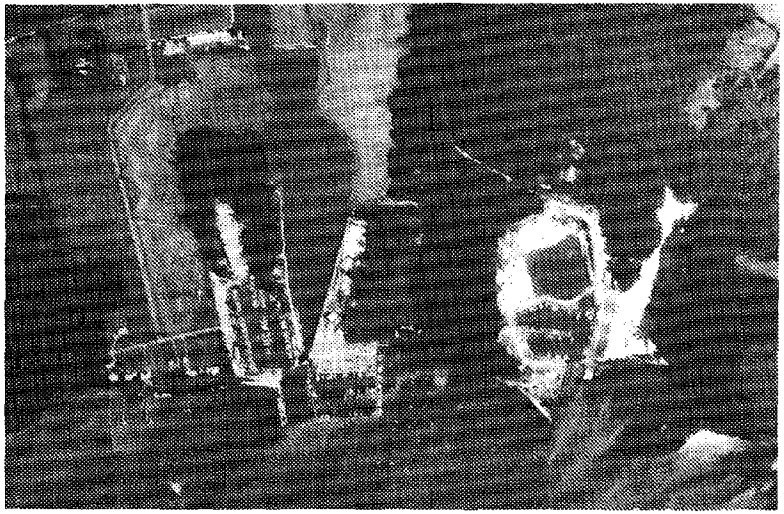


Fig. 5-14b 1972 view of same area after development

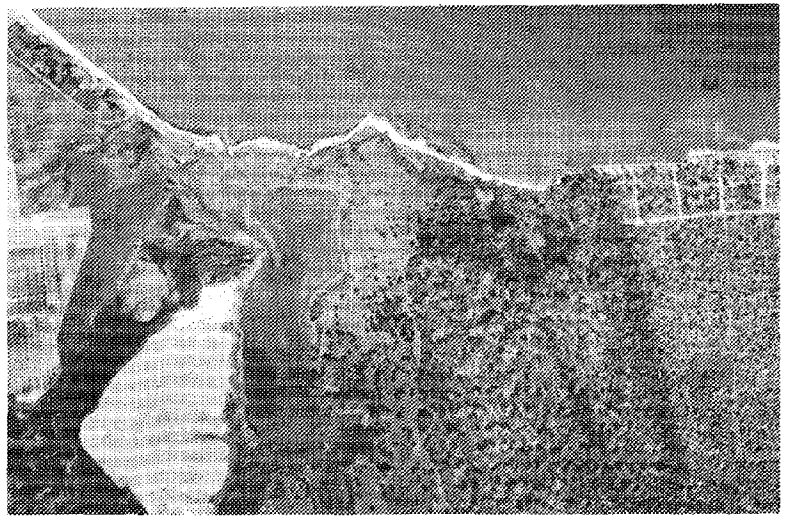


Fig. 5-14c 1938 view of Western Shore coastal area prior to marina development

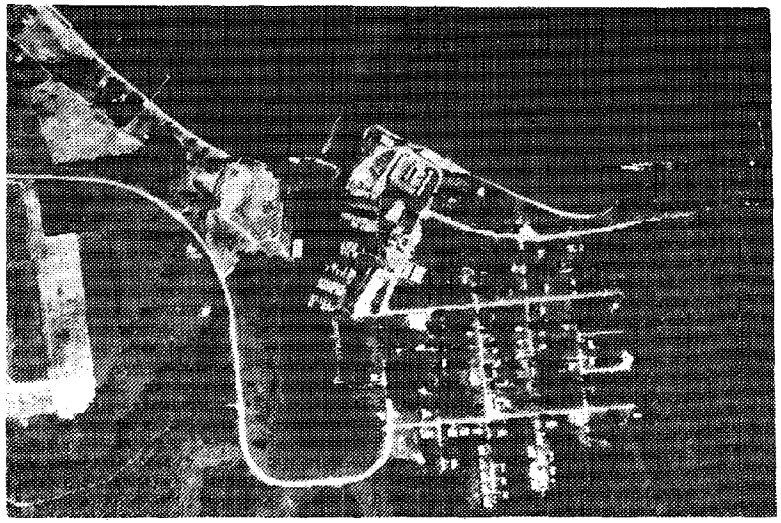


Fig. 5-14d 1970 view of same area after development

categories. For example, amateur archeologists in Somerset County report finding prehistoric artifacts and shell deposits eroding out from under marsh deposits or appearing as small mounds in the midst of otherwise extensive marshes. In addition, areas now marked by embayed coastal marshes were once the site of open bays capable of supporting different kinds of subsistence activities; and hence, the uplands adjacent to such areas are frequently found to contain numerous prehistoric remains.

Fortunately, the state Wetlands Act (Art. NR title 9 (1974; 1975 Supp.)) now controls the disturbance of both publicly and privately owned wetlands, thus decreasing the disturbance of prehistoric resources associated with wetlands. However, some activities, for example, agricultural and mosquito control drainage ditches, are not controlled by this act. The potential impact of these activities on prehistoric resources should be evaluated for each project. In addition, upland areas adjacent to wetlands should be evaluated for prehistoric resources prior to soil disturbance by wetlands related activities.

Stress from Transportation

In considering this stress on prehistoric resources, the direct effects of transportation include improving road systems, constructing bridges, and disposing spoil from channel maintenance. But, in addition to these direct effects, improvements in transportation indirectly affect prehistoric resources by increasing development in the coastal zone. The Maryland State Highway Administration (1974) has estimated that use of the state road system will double or even triple in the next twenty years. Improving state roads to accommodate this increased use involves straightening and widening present roads, as well as constructing new ones.

Indirect effects of improved transportation on prehistoric remains begin when an area becomes more accessible to tourists, vacationers, and potential residents from metropolitan areas. Increased tourism and residential development require more services and better roads, which quickly turn rural areas into suburban residential communities. For example,

southern Maryland is currently pressured by residential development from Washington, D.C., and population increases are being noted in areas of Charles, St. Marys, and Calvert counties. This effect is discussed in the Calvert County Comprehensive Plan (Calvert County Planning Office 1974: 1-3) which shows that population increases in the northern part of the county are correlated with the recently completed dualization of Highways 2 and 4 linking Prince Frederick with Washington, D.C.

Further residential development unquestionably would be stimulated by the construction of bridges over major bodies of water. Crossings of the Potomac River and Chesapeake Bay have been considered (Maryland-National Capital Park and Planning Commission 1974; Maryland State Highway Administration 1975), and a bridge near the mouth of the Patuxent River is now under construction. Figure 5-15 shows the location of these bridges and indicates the areas likely to be affected. These bridges will alter traffic and development patterns, contributing to extensive changes in some areas of the coastal zone.

The secondary effects on the coastline that result from new bridge links are amply illustrated in the case of Queen Annes County. Following the opening of the cross-Bay Bridge, parts of Kent Island underwent dense strip development, as shown in Fig. 5-16. In addition, numerous recreational facilities and residential areas have been established. The Queen Annes County plan comments:

> The greatest amount of subdivision activity has been on Kent Island. Nearly 80% of all the lots created since 1947 have been in this area...All but about six of these subdivisions have been along the shoreline, and most of the actual building development in these subdivisions has been on the actual waterfront lots... (Tarrant 1965: 23)

Finally, transportation improvements offshore, not directly related to the coastal zone, can stress prehistoric resources. Perhaps the most potentially disruptive of these activities in the foreseeable future is the depositing of spoil from channel maintenance and alteration in northern Chesapeake Bay. Continuous harbor and channel dredging is needed because of the influx of sediment from Bay tributaries, especially the Susquehanna River. The question is, where will dredge spoil be de-

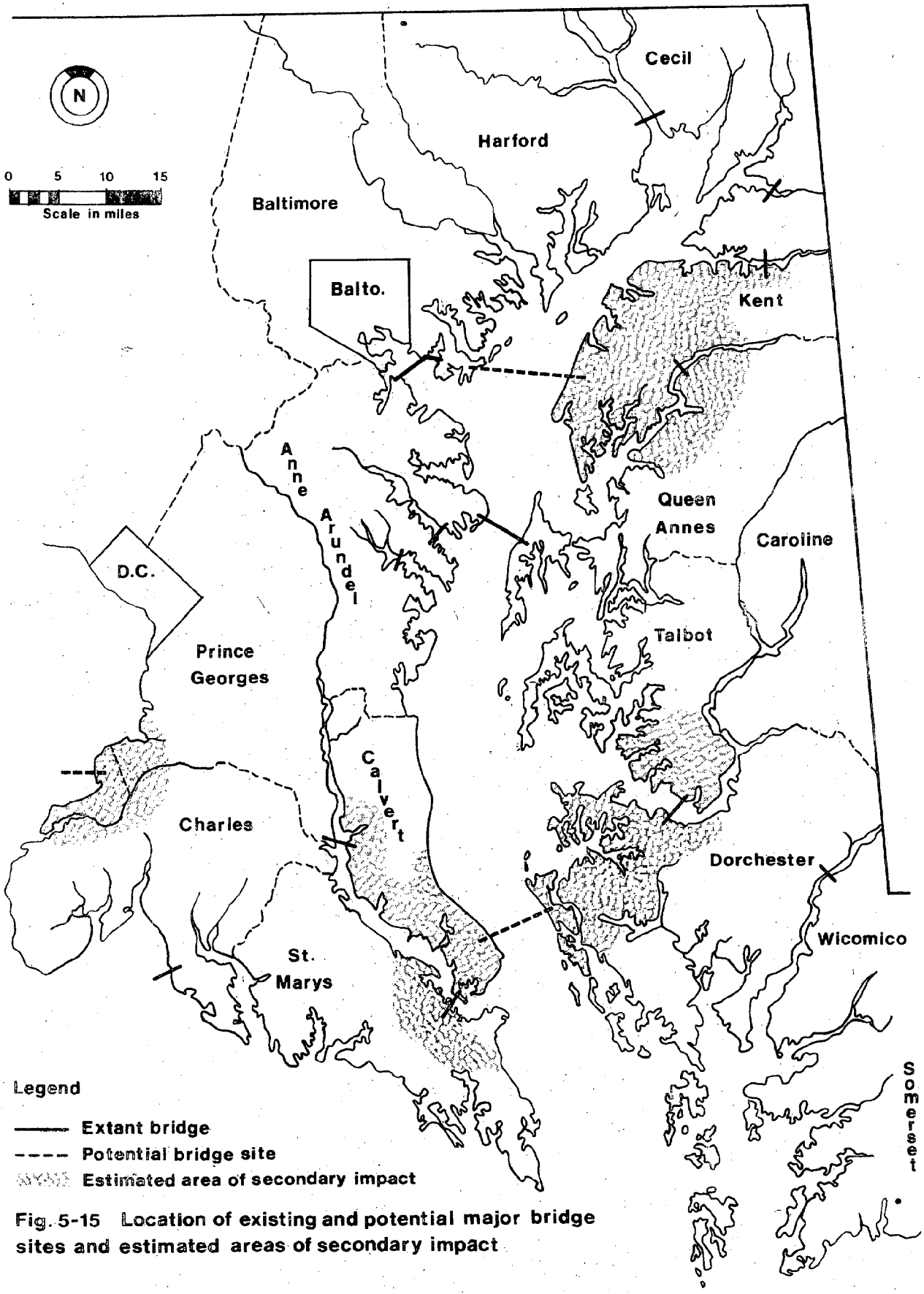


Fig. 5-15 Location of existing and potential major bridge sites and estimated areas of secondary impact

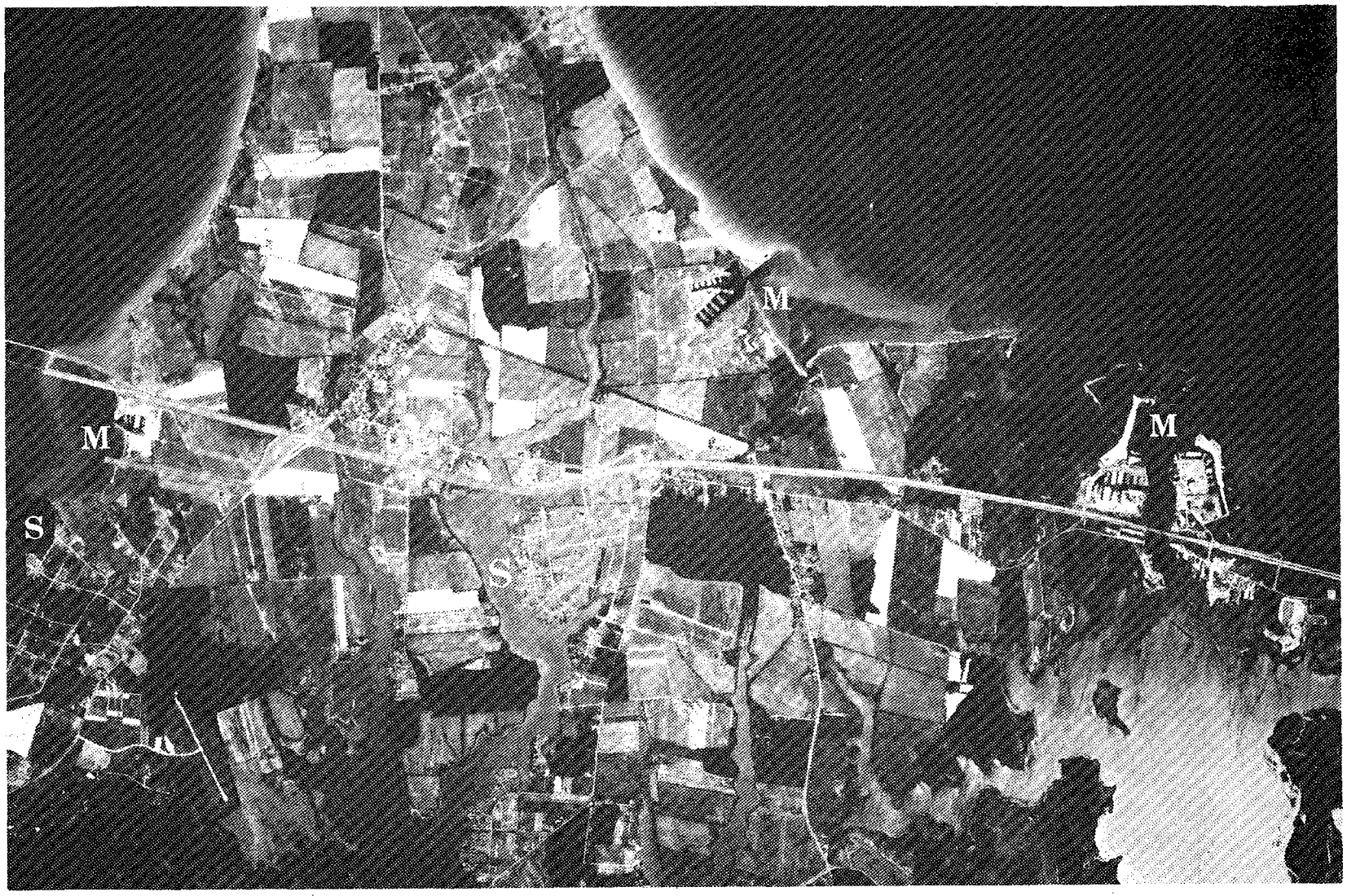


Fig. 5-16 Development associated with transportation improvements showing marina locations (M) and second home developments (S)

deposited as the number of suitable locations fill up?

A considerable amount of dredging takes place in the Bay area. Gottschalk (1945) notes that the Federal government began dredging Baltimore Harbor in 1836 and had removed more than 111 million cubic yards of spoil by 1956. From 1957 to 1968 alone, 38 million cubic yards of sediment were dredged from the harbor and its approaches (Metzgar 1973), and the Department of State Planning has estimated that between 1969 and 1989, another 99 million cubic yards of sediment will have to be dredged from the same area. Large dredging projects are undertaken in less industrialized areas also; for example, the U.S. Army Corps of Engineers Wicomico River Channel project has generated over 900,000 cubic yards of spoil since 1950. In addition, other projects, including residential developments and marinas, require dredging.

In the past, offshore areas and wetlands were used for disposing spoil. The Wetlands Act, however, prevents further use of wetland areas; instead, spoil is now dumped on uplands (in addition to offshore areas). Dumping spoil on upland areas in the coastal zone can cover prehistoric resources which, unless mapped before they are covered, will never be recorded. In addition, preparation for spoil disposal, (i.e., diking), can involve substantial alteration of the soil and of any prehistoric resources that may be present. This fact has recently been recognized by the U.S. Army Corps of Engineers, which requires a consideration of prehistoric resources in environmental impact statements for Federally sponsored projects.

Finally, should the Chesapeake Bay area become more active in marine shipping, for example, in handling offshore oil (which will require the construction of more ports and piers) stress on prehistoric resources in the coastal zone would probably increase.

Stress from Military Activities

Military agencies control a large part of Maryland's coastline, especially in Charles, St. Marys, and Harford counties, where large test

facilities are located. For example, over 77,000 acres (approximately 27% of Harford County) are occupied by Aberdeen Proving Ground. This reservation in fact controls most of Harford County's shoreline.

Table 5-6 (see also Fig. 5-17) gives the location and extent of major military landholdings in the coastal zone. It has long been recognized that there are substantial prehistoric resources on military lands, especially on Aberdeen Proving Ground. Stearns (1943) and Mayre (1938), in particular, observed and mapped prehistoric remains in coastal Harford County. Aerial photographs indicate that large parts of military tracts are not actively used. But significant land use alteration does occur, as may be seen in Fig. 5-18. Aberdeen Proving Ground, for example, is used for a variety of purposes, some of which, such as ordnance testing, disturb the soil (Fig. 5-19).

Therefore, prehistoric resources on military lands have been subject to disturbance. Further, as the report by Downing et al. (1975: 49) shows, as much as 80% of lands on Edgewood Arsenal are considered contaminated. Thus, the prehistoric resources in these areas either have been disturbed or are practically inaccessible. Reclaiming these areas would be prohibitively expensive and likely to cause further disturbance.

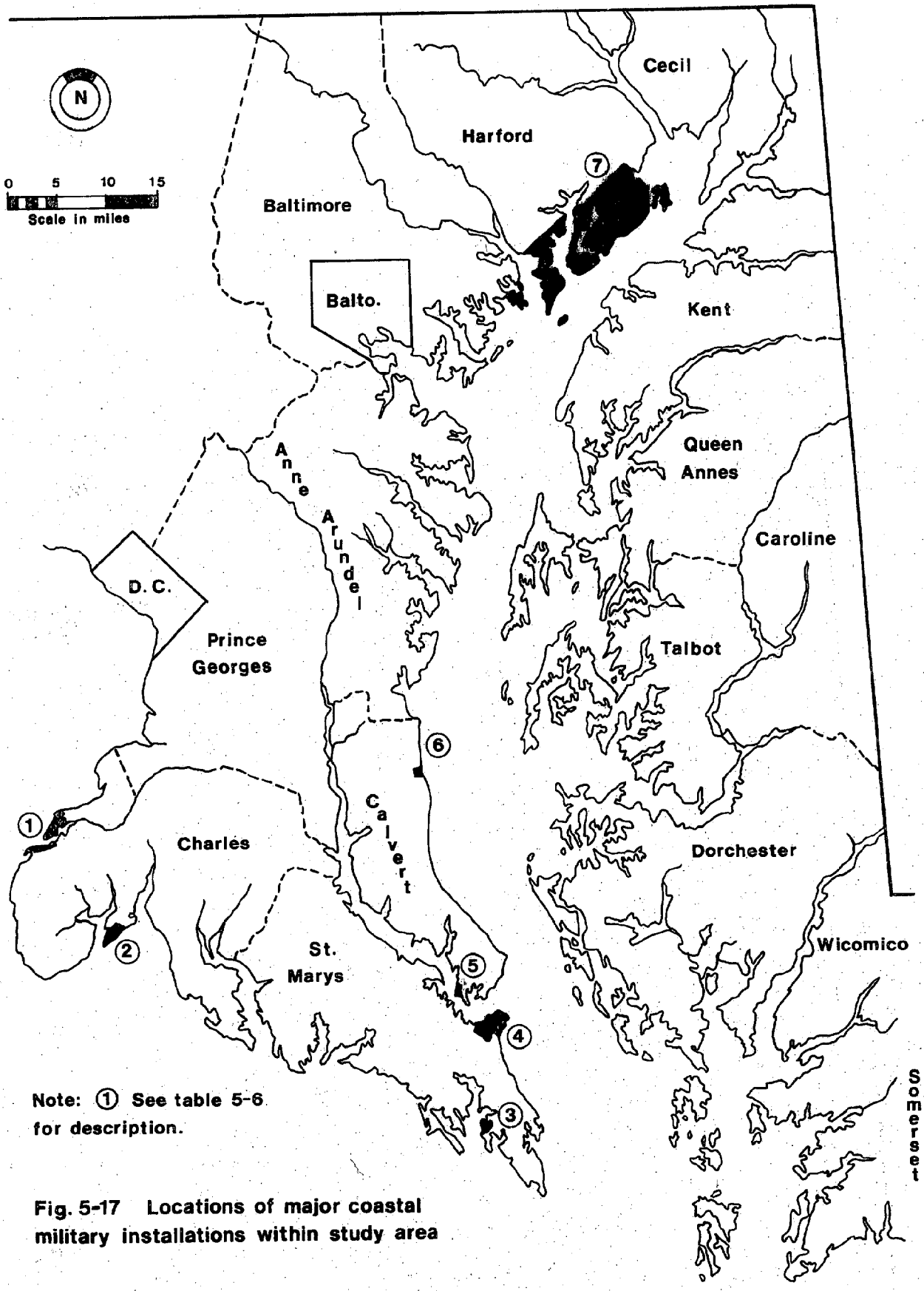
Secondary impacts created by military operations and expansion also put demands on the landscape, in the form of increased housing, service, and recreation related construction. Disturbance created by these activities is especially critical in St. Marys, Calvert, and Harford counties, where military agencies are among the main employers of the local labor force.

Stress from Industrial Activities

Except for activity concentrated in the greater Baltimore area, industrial development in Maryland's coastal zone has generally been dispersed and related to single purpose activities. Among these is the location there of such facilities as power and sewage treatment plants. Numerous power plants are located around Chesapeake Bay, and continued in-

Table 5-6 Major Coastal Zone Military Facilities
(Maryland Department of State Planning 1974)

County	Map No. (Fig. 5-17)	Facility	Acreage
Charles	1	Naval Ordnance Station and Research Laboratory - Indian Head	3,511.0
Charles	2	U.S. Army Blossom Point Proving Ground - Upper Cedar Point	1,300.0
St. Marys	3	Naval Electronic Systems Test and Evaluation Facility	852.0
St. Marys	4	Patuxent Naval Air Test Center - Lexington Park	6,837.9
Calvert	5	Naval Testing Center - Solomons	295.8
Calvert	6	Naval Research Laboratory - Randall Cliff Beach	174.9
Harford	7	U.S. Army Aberdeen Proving Ground	71,250.0
Harford	7	U.S. Army Edgewood Arsenal	6,025.0
Cecil	8	Naval Training Center - Bainbridge	1,249.4
Total			91,496.0



Note: ① See table 5-6 for description.

Fig. 5-17 Locations of major coastal military installations within study area

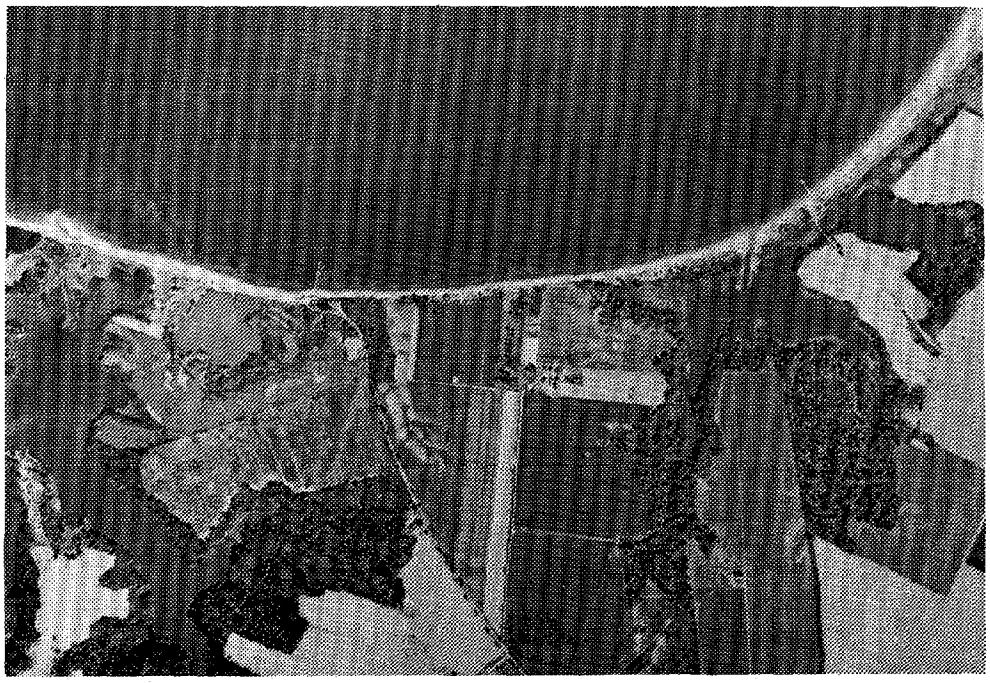


Fig. 5-18a 1938 view of coastal area prior to construction of a military facility

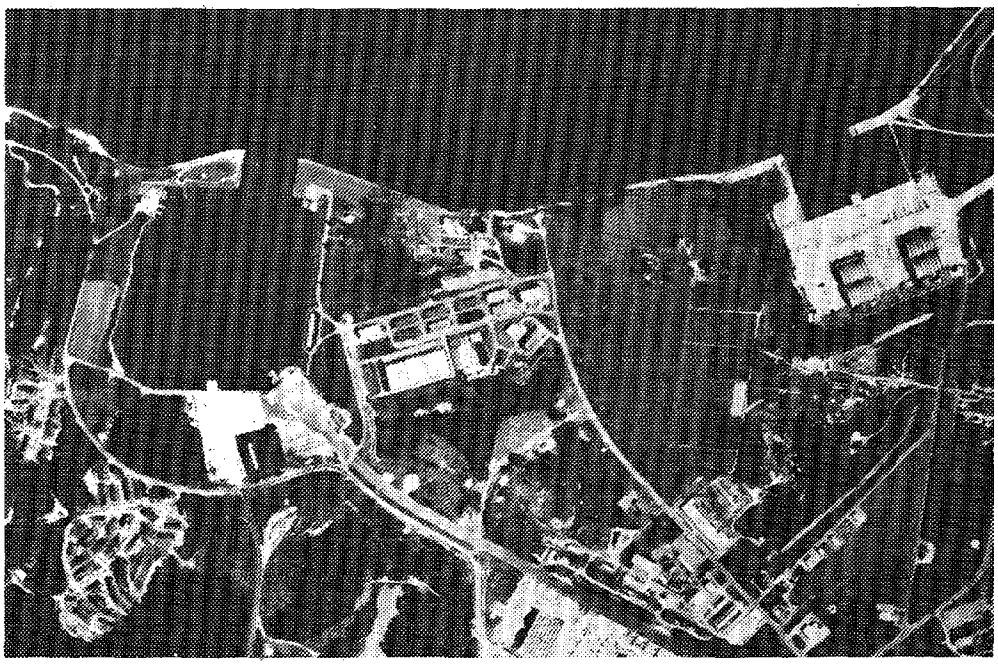


Fig. 5-18b 1972 view of same area showing shoreline alteration associated with facility construction

Fig. 5-19 Effects of munitions testing on shoreline of a military facility

terest in the coastal zone for power plant siting is evidenced in the number of coastal locations chosen for preliminary study by the Maryland Power Plant Siting Program (Perkins 1974).

Figure 5-20 shows the locations of major industrial activity around the Bay. Smaller scale commercial activity, usually related to commercial fishing and services for recreational boating, also is found in the coastal area.

As the coastal counties attempt to expand and diversify their economic bases, opportunities for developing new industries and expanding present ones will increase. In addition, secondary impacts, such as residential construction stimulated by industrial expansion in interior areas, are likely to be more critical to coastal prehistoric resources than actual industrial plant construction. Figures 5-21 and 5-22 illustrate the effects of industrial development in two portions of the Maryland coastal zone.

Although it is assumed that the Maryland coastal zone will not become highly industrialized, today's assumptions may be modified by tomorrow's necessities. For example, if quantities of petroleum were discovered and produced off the middle Atlantic coast, the Chesapeake Bay area could become involved in refining and shipping petroleum products. The need to expand docking, storage, and other facilities would quickly increase the impact of coastal industrial activities on prehistoric resources.

Evaluation of Current and Predictable Stress On Prehistoric Resources for Each Study Area County

For each study county, the following narrative with accompanying maps presents an overview of where planners can expect the most critical stresses on prehistoric resources over the next two decades. This estimate assumes that development generally will follow the direction set forth in available county comprehensive plans.

Figure 5-6 presents by county the relative percentages of shoreline

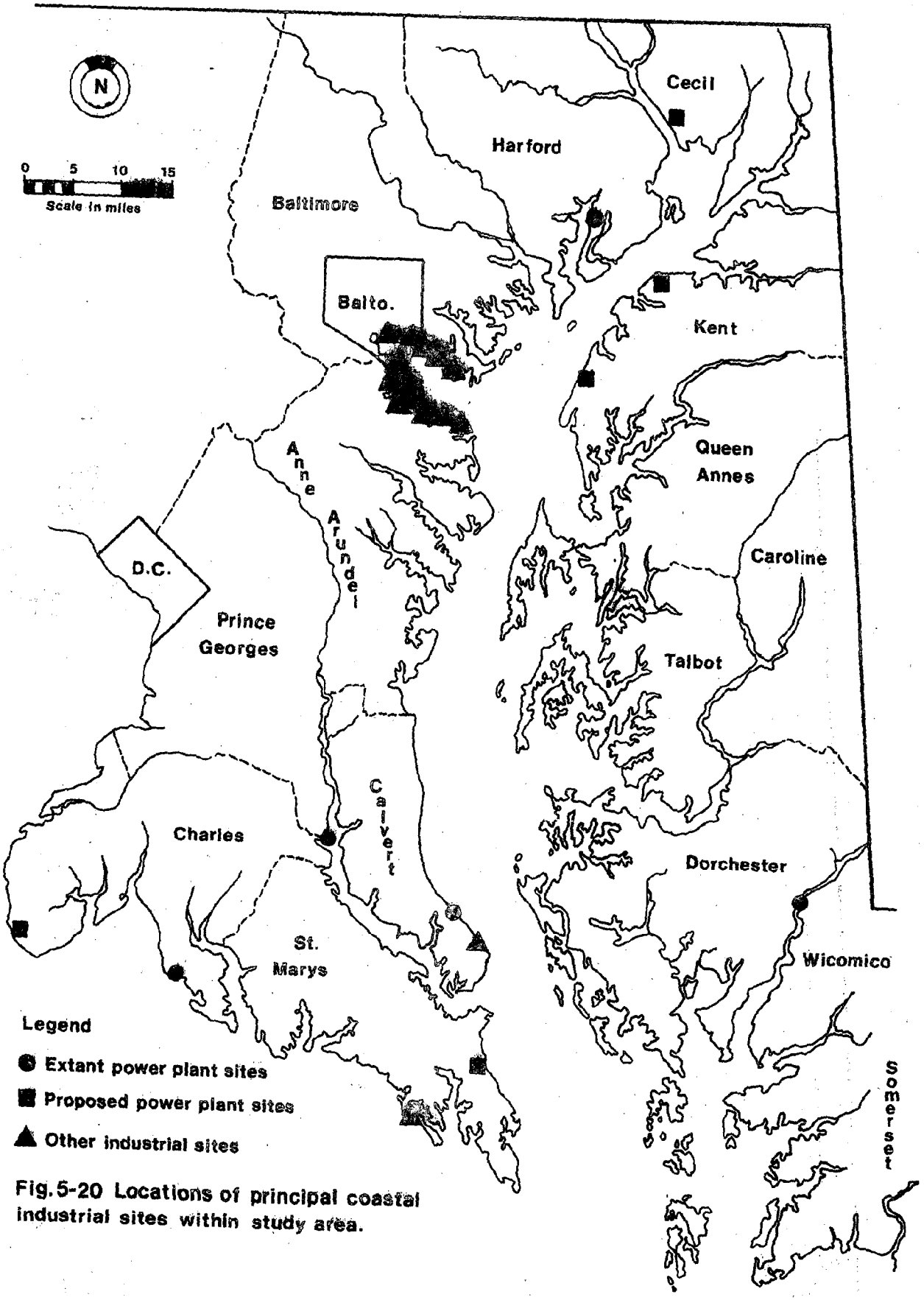


Fig. 5-20 Locations of principal coastal industrial sites within study area.

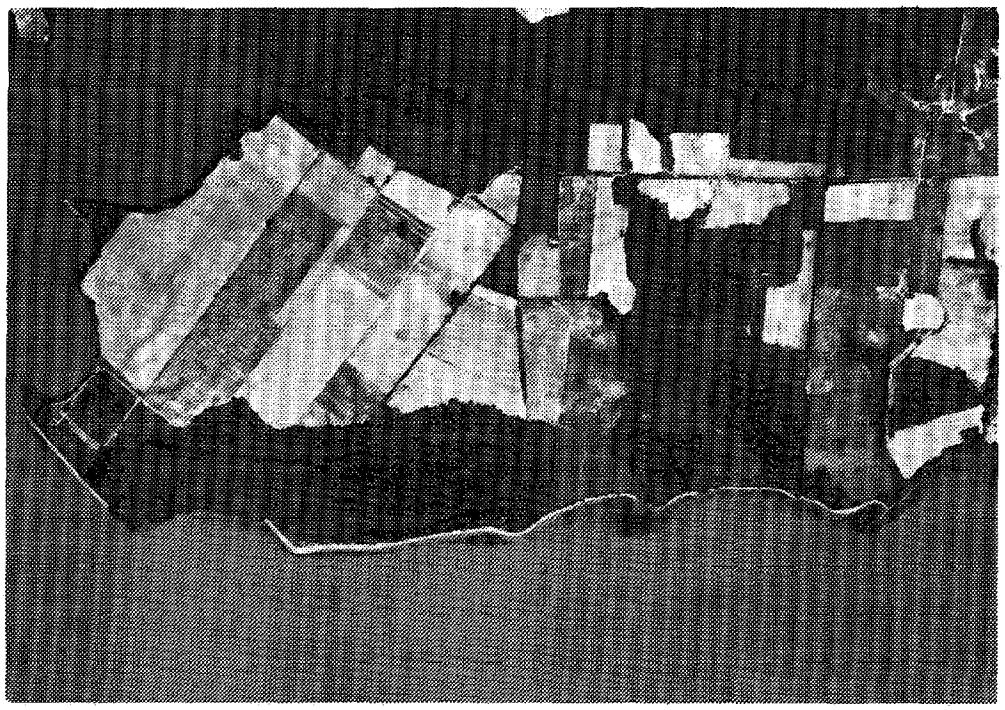


Fig. 5-21a 1952 view of coastal area prior to industrial development

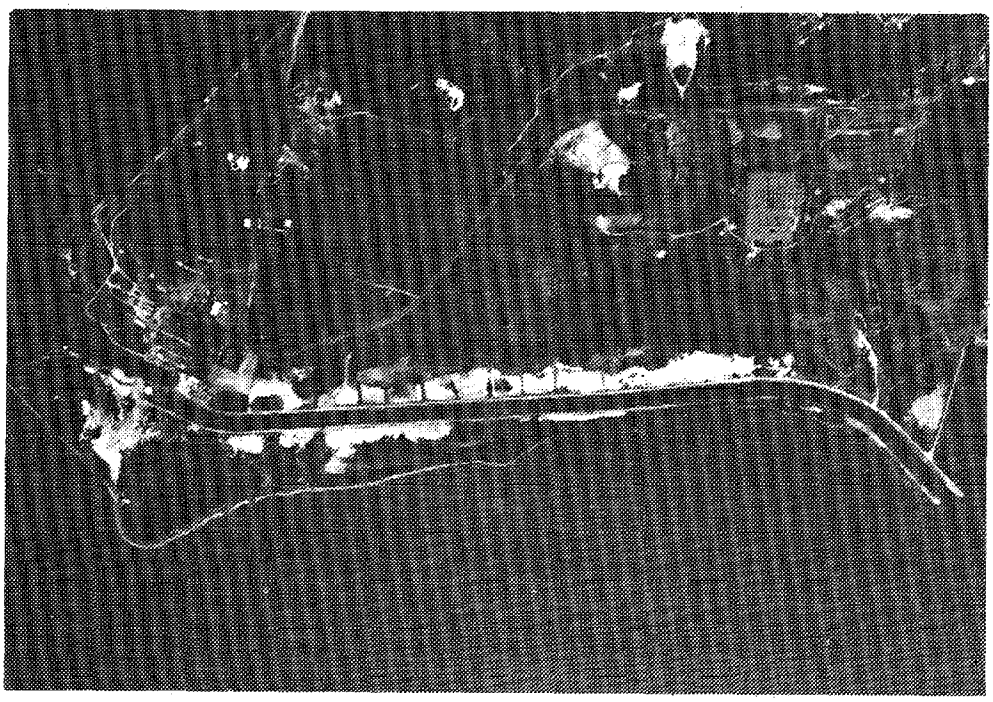


Fig. 5-21b 1970 view of same area after development

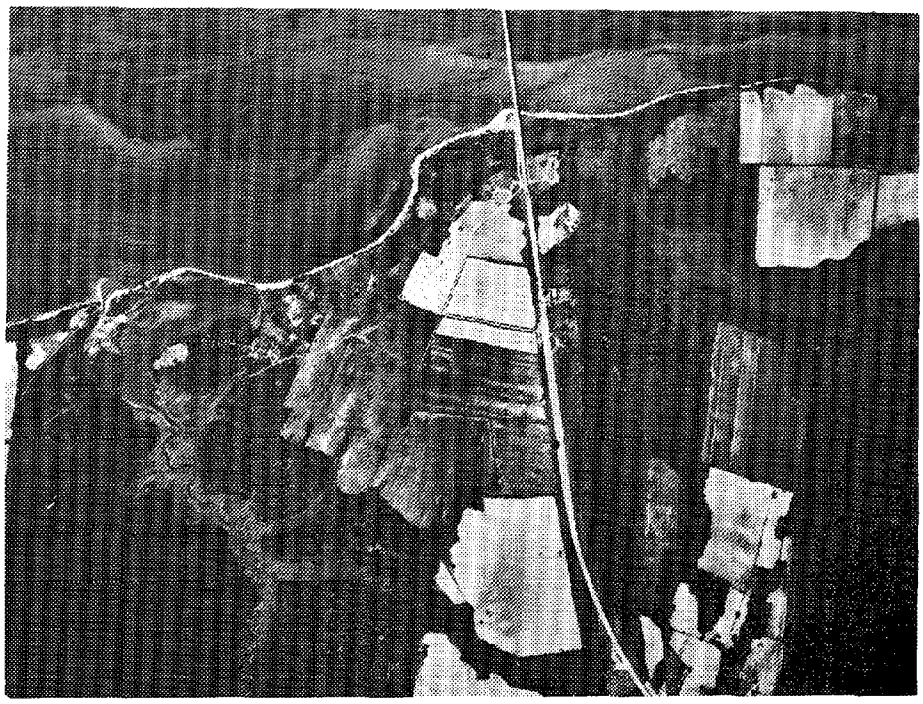


Fig. 5-22a 1952 view of coastal area prior to intensive development for industrial and recreational facilities

Fig. 5-22b 1972 view of same area after development

currently devoted to five land use categories: residential, industrial, cropland, wetland, and forest. Each category has a different potential for disturbing the landscape and, with it, prehistoric resources. Thus, residential and industrial areas disturb intensively; prehistoric resources are already greatly stressed in areas of extensive residential and industrial development. Although prehistoric resources may still exist in these areas, it is likely that they have been damaged or destroyed. Sites in these areas would be extremely difficult to investigate because of land use constraints (e.g., pavement, buildings). On the other hand, although croplands and wetlands are both receiving moderate stress (from cultivation and surface deflation in the former, from shore erosion and inundation in the latter), useful information on prehistoric resources still may be found in these areas. Controlled surface collection of artifacts is economical and useful in agricultural areas. But investigation of sites in wetland areas is more costly than similar investigations on firm land, because water removal is required. Finally, forested areas currently are under the lowest stress, although land use prior to the establishment of the present forest may have altered many of them. Thus, those counties containing high percentages of wetlands and forested shorelines, including Calvert, Charles, Dorchester, Prince Georges, Somerset, and Wicomico counties, may have the best preserved prehistoric resources. However, these are the most difficult environments in which to locate sites.

For convenience, study area counties can be divided into the upper and lower portions of the Western and Eastern shores. The individual county discussions presented below show that Harford, Baltimore, and Anne Arundel counties probably have lost many of their coastal prehistoric resources to shoreline development, thereby increasing the value of any remaining sites. Residential development in the coastal zone of these counties is extensive. In addition, some of the Harford County shoreline and most of the Baltimore County and city shoreline are stressed by military or industrial development.

Prince Georges, Charles, St. Marys, and Calvert counties are all under

pressure for development from the Washington, D. C. or Baltimore metropolitan areas. This pressure can be seen in residential and transportation development, with attendant increases in service and recreation facilities.

Cecil, Kent, Queen Annes, Talbot, and Caroline counties currently are relatively undeveloped. Cecil and Kent counties are under some degree of pressure from the Baltimore-Philadelphia corridor, while Queen Annes and Talbot counties are under some pressure from Baltimore and Washington, D. C. These pressures have taken the form of residential, transportation, and recreational use increases. Caroline County has relatively little shoreline; its prehistoric resources currently are affected primarily by agricultural practices. The construction of a cross-Bay bridge to Kent County would greatly stimulate development in the upper Eastern Shore counties.

Lower Eastern Shore counties, including Dorchester, Somerset, and Wicomico, are relatively undeveloped and under little pressure for development. However, the prehistoric resources in these counties slowly are being lost through erosion and flooding in the extensive wetlands. The dumping of channel dredge spoil in Wicomico County may have affected some prehistoric resources. Should a bridge be constructed linking Dorchester and Calvert counties, the pressure for development would be expected to increase greatly.

Table 5-7 presents summary information on development (as defined in Chapter Four). Development is seen to be heaviest in the counties comprising and bordering the Baltimore-Washington metropolitan districts. Eastern Shore counties are characterized by smaller amounts of shoreline development save for Talbot county, which contains a large number of small parcels of land.

Table 5-8 ranks principal present and predictable future stress-producing activities for each of the study area counties. These judgments have been based on qualitative assessments and relative evaluations of the nature of stress on prehistoric resources. Although most of the counties discussed below are concerned with the need to preserve aspects of their natural environments and their historic structures, few include a considera-

Table 5-7 Amount of Developed[1] Shoreline for Study Area Counties

County	Total Miles of Shoreline	Miles Developed[2]	Percent Developed
Anne Arundel	477.9	304.4	63.7
Baltimore	327.2	142.9	60.2
Calvert	174.7	51.2	29.3
Caroline	101.3	1.1	1.1
Cecil	206.8	48.0	23.2
Charles	269.7	43.4	16.1
Dorchester[3]	65.8	15.3	23.3
Harford	240.5	197.7	82.2
Kent	346.1	44.4	12.8
Prince Georges	69.8	9.4	13.5
Queen Annes	279.1	45.0	16.1
St. Marys	424.5	155.5	36.6
Somerset[4]	---	---	--
Talbot	641.6	203.4	31.7
Wicomico[4]	---	---	--
Total	3535.0[5]	1261.7	35.7

[1]See Chapter Four for definition of developed shoreline.

[2]As interpreted on aerial photographs and county tax maps and measured on 7.5 minute U.S.G.S. quadrangle maps

[3]Information applies only to portion of county which formed part of the area where fieldwork was done.

[4]Fieldwork was not conducted in these counties; they are not included in the total mileage.

[5]Shoreline mileages include former shorelines.

Table 5-8

County summary and ranking of sources of stress on coastal prehistoric resources

	Sea Level Rise and Shore Erosion	Wind Erosion	Urbanization	Agriculture	Industrial	Military	Transportation	Shoreline Modifications	Offshore Activities	Shoreline Residential	Marinas / Recreation
Anne Arundel	●	◎	●	○	○	○	●	●	○	●	●
Baltimore	●	○	●	○	●	○	○	●	○	●	●
Calvert	●	○	●	●	●	○	●	●	○	●	●
Caroline	○	●	○	●	○	○	○	○	○	○	○
Cecil	●	○	●	●	○	○	●	○	●	●	●
Charles	○	○	●	○	○	●	○	○	○	●	○
Dorchester	●	●	○	○	○	○	○	●	○	○	○
Harford	●	○	●	○	○	●	○	○	○	●	●
Kent	●	●	○	●	○	○	○	○	○	○	●
Prince Georges	○	○	●	○	○	○	●	○	○	●	○
Queen Annes	●	●	○	●	○	○	●	●	○	●	●
St. Marys	●	○	●	●	●	●	○	●	○	●	●
Somerset	●	●	○	○	○	○	○	○	●	○	○
Talbot	●	●	○	●	○	○	○	●	○	●	●
Wicomico	●	●	○	●	○	○	○	○	●	○	○

● Significant stress ● Moderate stress ◎ Low stress

tion of prehistoric resources in their planning processes or provide for prehistoric resources in zoning and other ordinances affecting land use.

Figure 5-23 shows locations in the study area where prehistoric resources are estimated to be under the most stress from current development.

Anne Arundel County

Owing to its location near the population centers of Washington, D. C. and Baltimore, Anne Arundel County is experiencing great pressure for development. Since no comprehensive plan for the county was available, the authors of the present study consulted a coastal zone land use profile (O'Connor, Ventre, and Krepner 1976) and the population projections prepared by the Maryland Department of State Planning. With its 478 miles of highly indented shoreline, Anne Arundel county is intensely pressured for residential development. At present, low density residential use takes up approximately 53% of the land use in the county (O'Connor, Ventre, and Krepner 1976). However, the population is expected to increase almost 70% -- from 297,539 in 1970 to 504,270 by 1990 (Maryland Department of State Planning). Thus, the greatest development pressure is expected to lie in residential growth, although commercial, recreational, and transportation activities will also increase. At present, no steps have been taken to conserve this county's prehistoric resources, documented by Wright (1973). Unless immediate measures are taken, few coastal sites will exist in 1990.

Baltimore County

Reference to the Baltimore County Comprehensive Plan (Baltimore County Office of Planning and Zoning 1975) shows that most of the coastal zone of the county has been developed. It is likely that most of the prehistoric resources along the coast have been disturbed or destroyed. But this

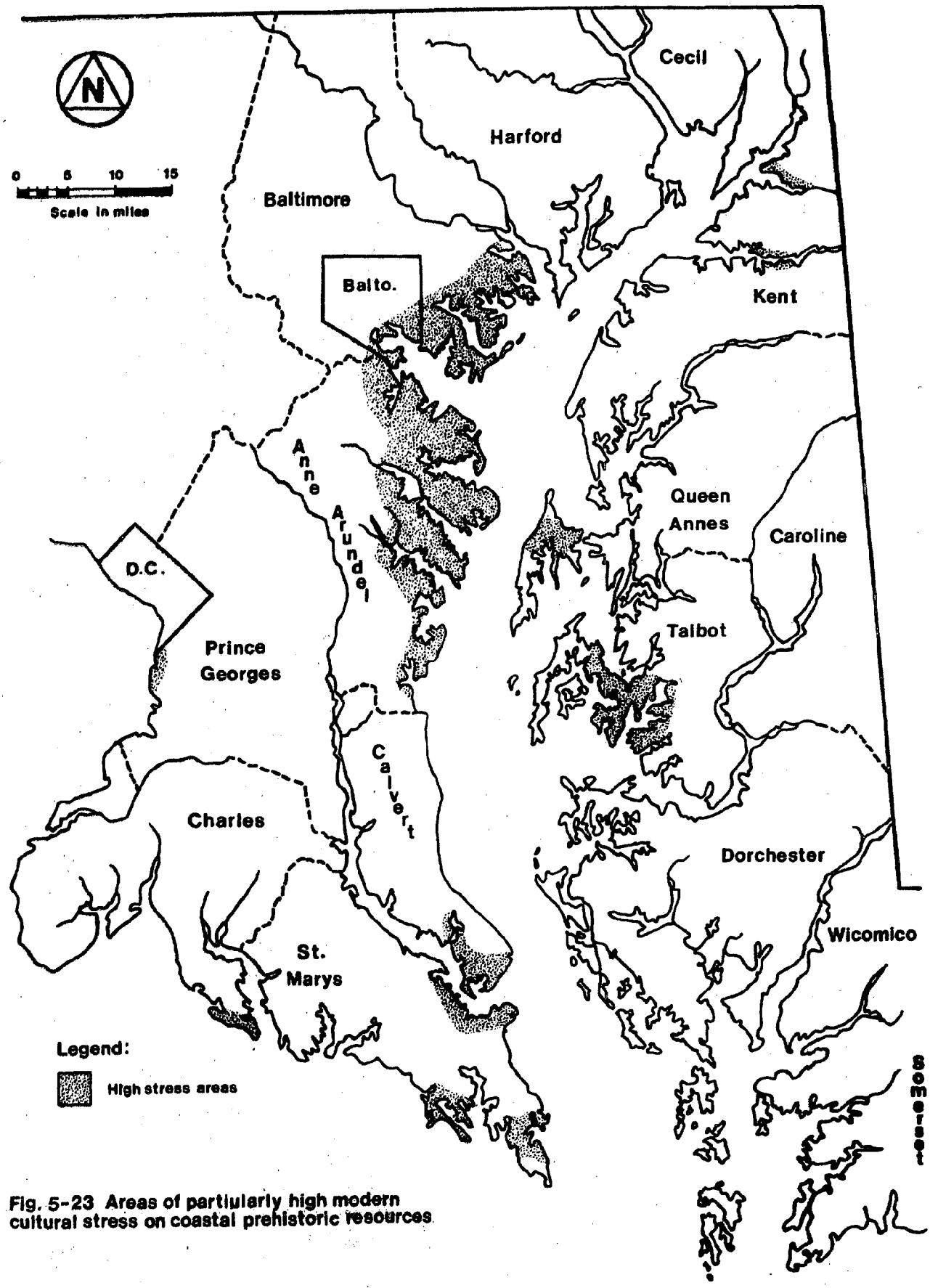


Fig. 5-23 Areas of partiularly high modern cultural stress on coastal prehistoric resources

destruction increases the value of the few prehistoric sites that may remain in the rare undeveloped areas of the county.

The county's Eastern Planning Area (Baltimore County Office of Planning and Zoning 1975:64) takes in the coastal zone. Here, intense development has encompassed Patapsco Neck completely and Back River Neck almost completely (see Fig. 5-24). Land uses in this area include heavy industrial, intensive commercial, and medium to high density housing. Some land remains in Back River Neck and Bowley's Quarters; this land is classified as low density rural-residential, a designation that allows development to reach the level of large residential lots. This use of the land involves the construction of many houses, and the accompanying soil disturbance leaves little chance for the preservation of prehistoric remains in the coastal zone.

Fortunately, a little land along both sides of the Bird River and at the intersection of the Bird and Gunpowder rivers remains in the agricultural classification. This land, along with the Aberdeen Proving Ground's Edgewood facility, is the only remaining coastal area in Baltimore County in which some prehistoric resources may be preserved. Every effort should be made to avoid stressing these areas by additional development.

The Baltimore County Comprehensive Plan gives little discussion to historic preservation and makes no mention of prehistoric resources (Baltimore County Office of Planning and Zoning 1975:23). However, the plan suggests expanding lands for recreation and open space. If this suggestion were adopted, it could help conserve prehistoric resources. Prehistoric resources could be considered in land acquisition and left undisturbed by the construction of facilities. Further, the statewide agricultural land preservation bill and the linear park system (p. 27) also could help conserve prehistoric resources.

Calvert County

The Calvert County Comprehensive Plan (Calvert County Planning Office

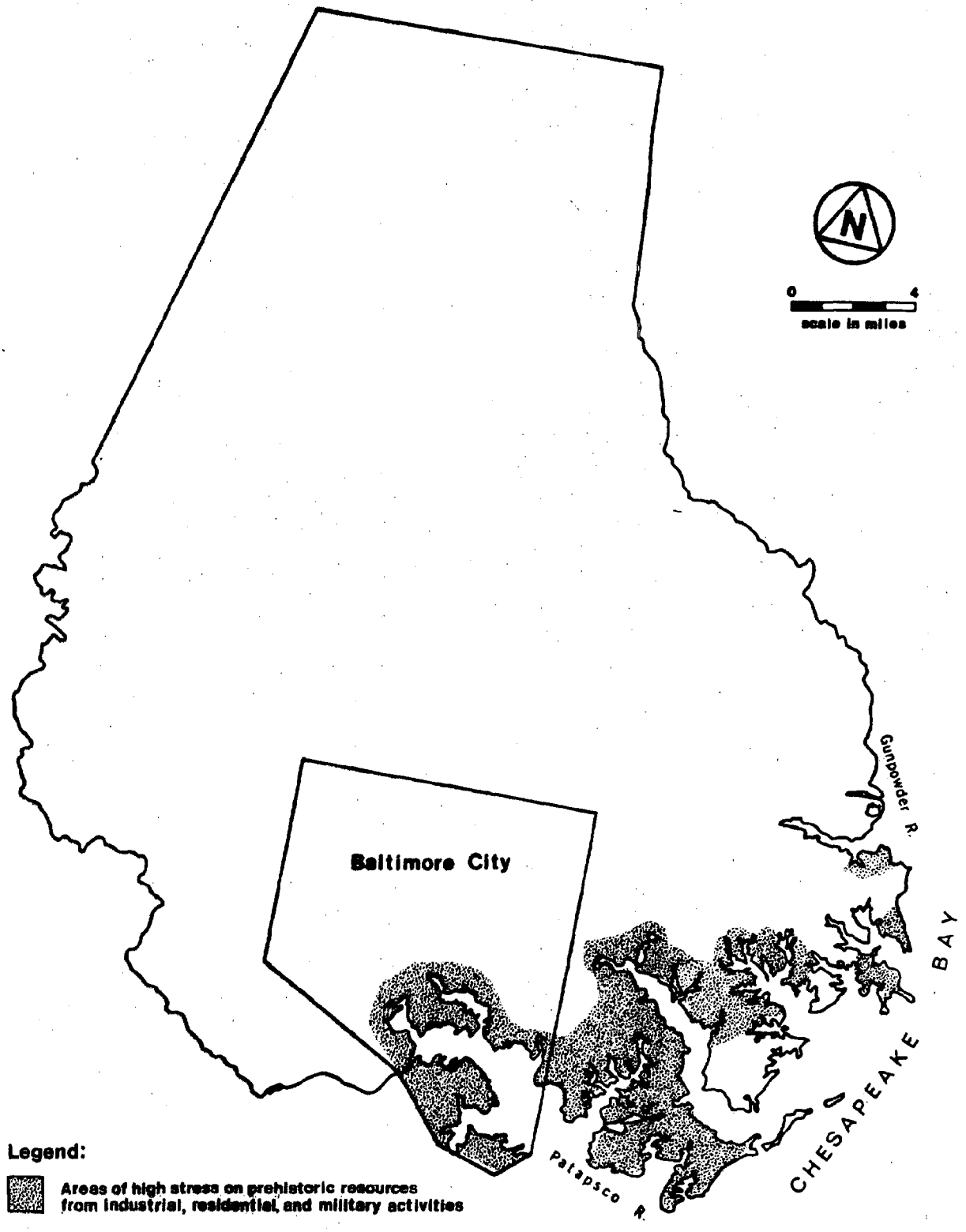


Fig. 5-24 Present and anticipated stresses on prehistoric resources in Baltimore County

1974) is based on a philosophy of slow growth; however, the county's population is expected to double by 1990, with the three major areas of development being Solomons, Prince Frederick, and Twin Beaches. Approximately 12,068 acres of land will be needed for this estimated development. At present, one percent of the county's land area is devoted to commercial or industrial activities. The only major industrial operations in the county, Calvert Cliffs nuclear power plant and the Columbia Gas Corporation liquefied gas plant, both occupy coastal locations (Fig. 5-25). Military installations also occupy 470.7 acres of land in the county, including 295.8 acres at the Naval Testing Center at Solomons and 174.9 acres at the Naval Research Laboratory at Randall Cliff Beach. Both installations contain coastal frontage.

Accelerated growth from transportation improvements has been noted already in the northern part of Calvert County, where 50% of the workers commute out of the county. Impact on the county may result from the completion of the lower Patuxent River bridge, not to mention the impact should lower Calvert County be used as one terminus for a new cross-Bay bridge to the Eastern Shore (Dorchester County). Even without a major bridge or industrial development, it has been estimated that the Solomons area will use most of its 1973 supply of agricultural and developable land by 1990 to accommodate the expected growth. Although the poorly drained soils in this lower portion of the county may have deterred extensive prehistoric use, large numbers of prehistoric resources could be expected. The present study recorded many prehistoric remains in a similar area along the lower Potomac River in St. Marys County.

To date, growth and development have been most intense along the Bayshore and in the southern part of the county. Metzgar (1973:VI-- 12) makes the following statement in regard to possible changes of the focus of development in Calvert County:

> the trend has been for more development to take place along the bay front than along river front. The economics of land development may bring about a change in this trend. At this time the best land along the bay front is either developed or in the process of development. The cream has been skimmed off and the remaining land is rugged, relatively inaccessible, and

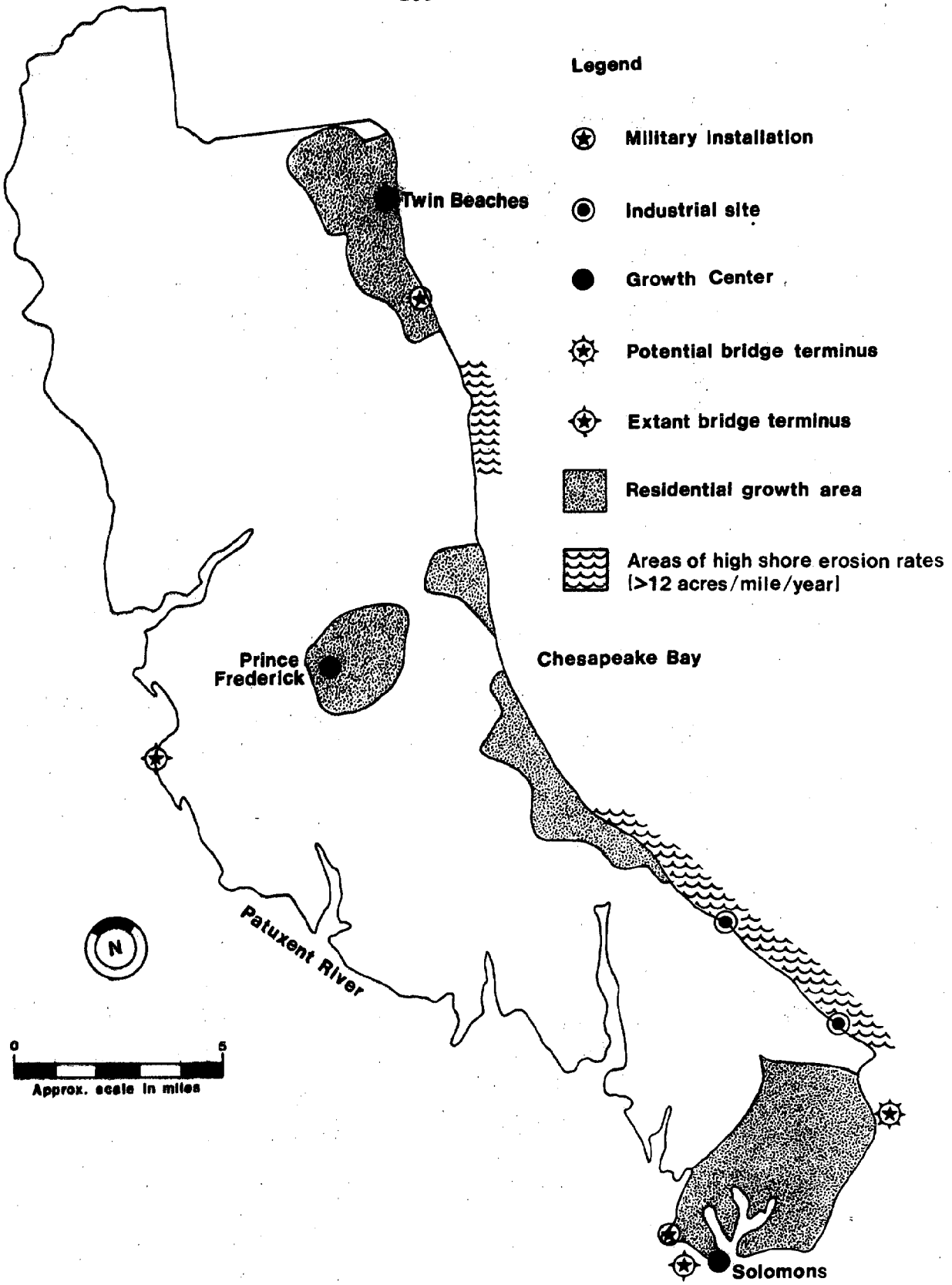


Fig. 5-25 Present and anticipated stresses on prehistoric resources in Calvert County

> has a limited amount of natural beach available. On the other hand, the land along the river (Patuxent) is relatively undeveloped in most cases, and topographically suited to extensive and economical development.

Development of the primarily agricultural Patuxent shoreline would pose a serious threat to the prehistoric resources of Calvert County. Most known prehistoric sites are located along the Patuxent shoreline. Subdividing farms along the Patuxent shoreline or at its intersection with significant tributaries could affect large numbers of sites.

Shore erosion is particularly critical along much of the Calvert County Chesapeake Bay shoreline, and significant losses of prehistoric resources can be assumed for this area. Moreover, the heavy forest and vegetation cover of the eastern half of the county makes it hard to detect sites in this area. The agricultural western part of the county fronting on the Patuxent River offers greater ease of site detectability.

The Calvert County Comprehensive Plan (Calvert County Planning Office 1974) does not consider the county's prehistoric resources. The list approach to site significance for natural areas (Smithsonian Institution 1974) and historic sites (the National Register) is used. But Calvert County can be assumed to have significant prehistoric resources, which should not be overlooked in county land use planning and zoning ordinances. Importantly, the plan does recommend that development be steered away from sensitive areas like Parkers Creek, and indicates that the overall level of development of the lower Patuxent region should be low.

In sum, from a resource point of view, the current most stressed areas are in the developing southern part of the county and along the Chesapeake Bayshore. The rate of growth in the Solomons-Appeal-Olivet planning district could increase at or above predicted rates with the completion of the St. Marys County-Calvert County bridge or with the construction of a new cross-Bay bridge.

Qualitatively, the destruction of prehistoric resources on the Bay shore is critical, because these sites are now rare and possibly unique (certainly there are few additional examples of sites available for pres-

ervation). Three major coastal features indent the Chesapeake shoreline of the county: Parkers Creek, Plum Point, and Fishing Creek. Of these, only Parkers Creek remains essentially undisturbed. A large marina has been constructed at the mouth of Plum Point, and much of the land around the mouth of Fishing Creek has been altered. Other areas of shoreline indentation along the Bay are found in the southeastern portion of the county; these areas currently are being stressed by residential development. Continued development around coastal indentations or any initial development of the Parkers Creek area will likely disturb the prehistoric record here, for which no examples have yet been studied.

Caroline County

No comprehensive plan was available to the authors for Caroline County. Agriculture and agricultural industries form the economic basis of the county. Because of this orientation, the population density is low, with most election districts having fewer than 99 people per square mile. The population is expected to increase slightly over the next 15 years from a 1970 population of 19,438 to a total of 21,141 (Maryland Department of State Planning n.d.).

Caroline County's coastal zone is limited to a few miles along the Choptank River and the Tuckahoe and Marshyhope creeks. Because of the county's low population density and its agricultural use of the land, little stress on prehistoric remains, other than those from agricultural activities as discussed earlier in this chapter, is anticipated. However, to insure conservation of prehistoric remains, county development and zoning plans should include a consideration of these remains, along with ways to minimize their disturbance.

Cecil County

The information on Cecil County presented here is taken from the

comprehensive plan for Cecil County, prepared by Stottler Stagg and Associates (1974). Cecil County's population has grown during the past 30 years as a result of its location in the Baltimore-Philadelphia corridor and because of its excellent transportation links. The comprehensive plan presents a philosophy of controlled development, estimating a growth rate of 2.4% each year, to a total county population of 78,000 by 1990.

Although only 14% of the land in Cecil County is classified as developed, there is pressure for residential and recreation (especially marina) development in the coastal zone. The comprehensive plan notes that growth will be channeled into four primary areas, Elkton, Northeast, Perryville, and Rising Sun, and three secondary areas, Cecilton, Chesapeake City, and the Route 40 corridor (see Fig. 5-26). Wherever these areas intersect with the coastal zone, stress on coastal prehistoric resources can be expected.

The comprehensive plan points out that the land most suitable for development ("stable land") consists of firm ground with gentle slopes (Stottler Stagg and Associates 1974:7 - 2). In addition, the plan provides a thorough consideration of historic structures, although no mention is made of the preservation of prehistoric resources. Preservation of these remains should be considered, because many sites would be expected to occur on stable land. Many other sites undoubtedly have been disturbed by dredging and spoil disposal associated with maintaining navigable channels to the Chesapeake and Delaware Canal.

Charles County

The proposed comprehensive plan for Charles County (Greenhorne and O'Mara, Inc. 1974) provides the information for this discussion of current and predictable stress on prehistoric resources. This county also emphasizes a philosophy of moderate growth in continuing recent trends. Formerly an agricultural area, Charles County has recently received pressure for residential growth from the Washington, D. C. metropolitan area, and its population has increased at the rate of 4 - 5% per year (Greenhorne

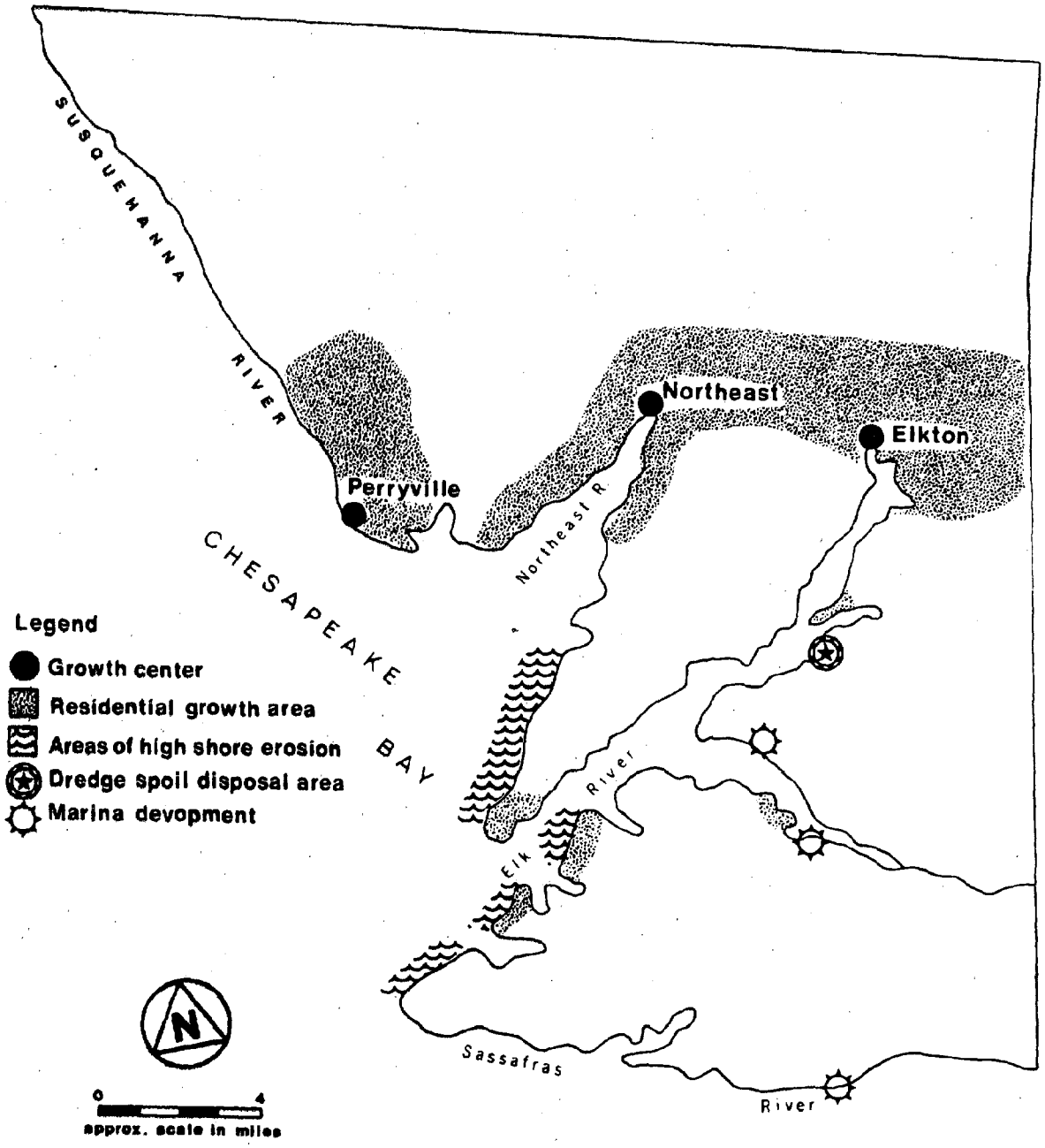


Fig.5-26 Present and anticipated stresses on prehistoric resources in Cecil County

and O'Mara, Inc. 1974:I - 4). However, most land in the county remains open, with 40.2% agricultural, 51.1% wooded, and the remaining 8.7% developed (Greenhorne and O'Mara, Inc. 1974:I - 1). Of the developed land, use for commercial and industrial concerns is still low. One power plant is located on the Potomac shoreline, and another is proposed (see Fig. 5-27).

In the past, development in Charles County has taken place along major highways. Because highway improvement and new highway construction will take place in the northern part of the county, thereby increasing access to and from Washington, D. C., it appears that the greatest development pressures will be found in this area. Proposed highway modifications include building an Outer Beltway and Southeast Expressway, as well as improving U.S. 301, connecting with Virginia, and MD 23, connecting with St. Marys County. Improvement of U.S. 301 will increase development pressures in the southern tip of the county (Greenhorne and O'Mara, Inc. 1974:II - 4).

Figure 5-27 illustrates stressed areas in Charles County. However, if a Chesapeake Bay crossing and associated highway are constructed to link southern Maryland with the Eastern Shore, development pressures will increase in both areas (Greenhorne and O'Mara, Inc. 1974:II - 8). At present development pressures on the county's coastal zone prehistoric resources are not great because the area is not readily accessible. If future transportation changes increase accessibility, stresses on prehistoric resources will also increase. Further, relatively few land owners control the Potomac River coastline from Chicamuxen Creek to Maryland Point. Should these lands begin to be subdivided and developed, stresses on prehistoric resources will increase accordingly.

Dorchester County

The philosophy expressed in the Dorchester County comprehensive plan (Urban Pathfinders, Inc. 1974) is one of slow, controlled economic and population growth along with protection of the county's abundant natural resources (pp. 5-7). This philosophy would guide growth to established towns, including Cambridge, Hurlock, Secretary, and Vienna (see Fig. 5-28).

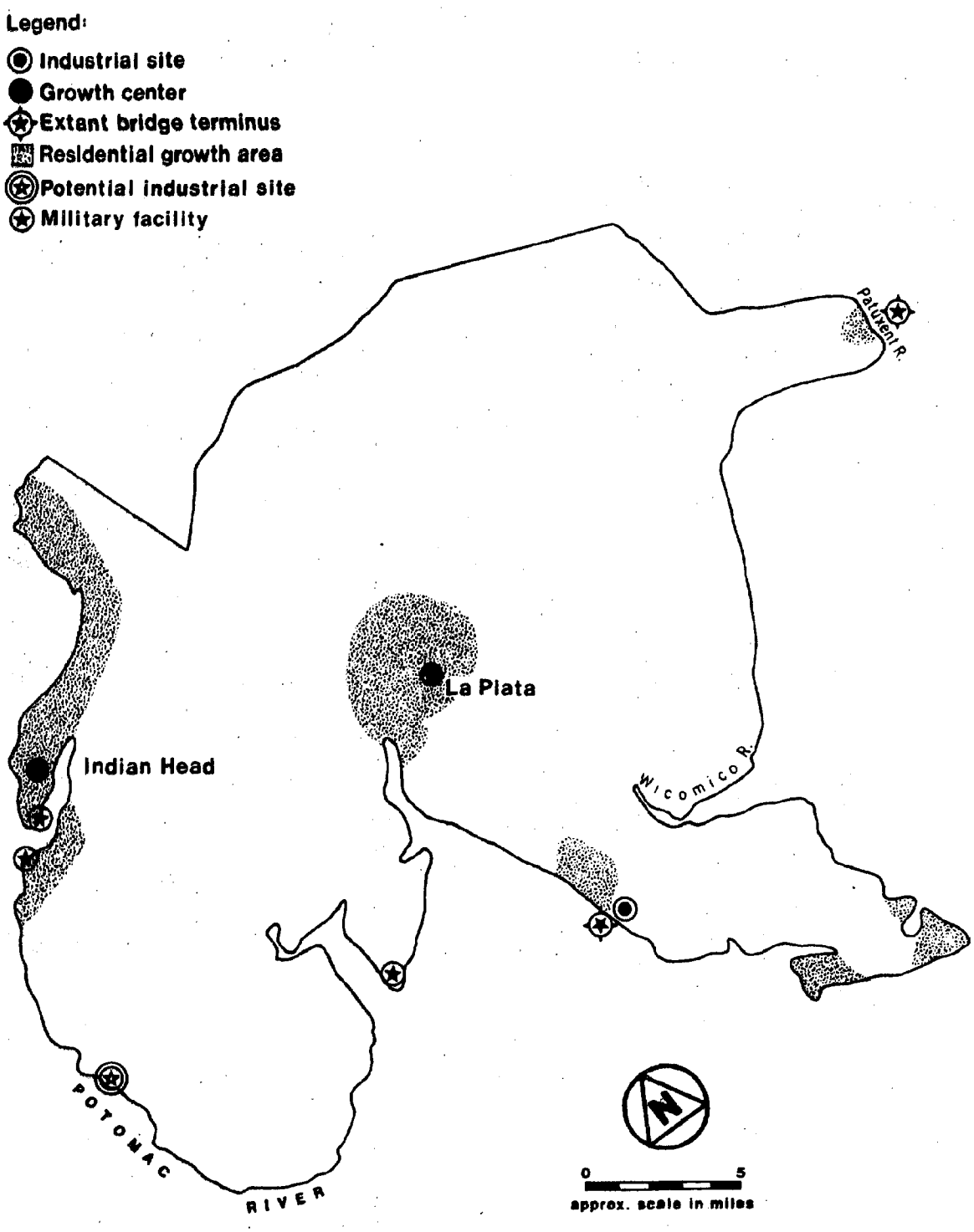


Fig. 5-27 Present and anticipated stresses on prehistoric resources in Charles County

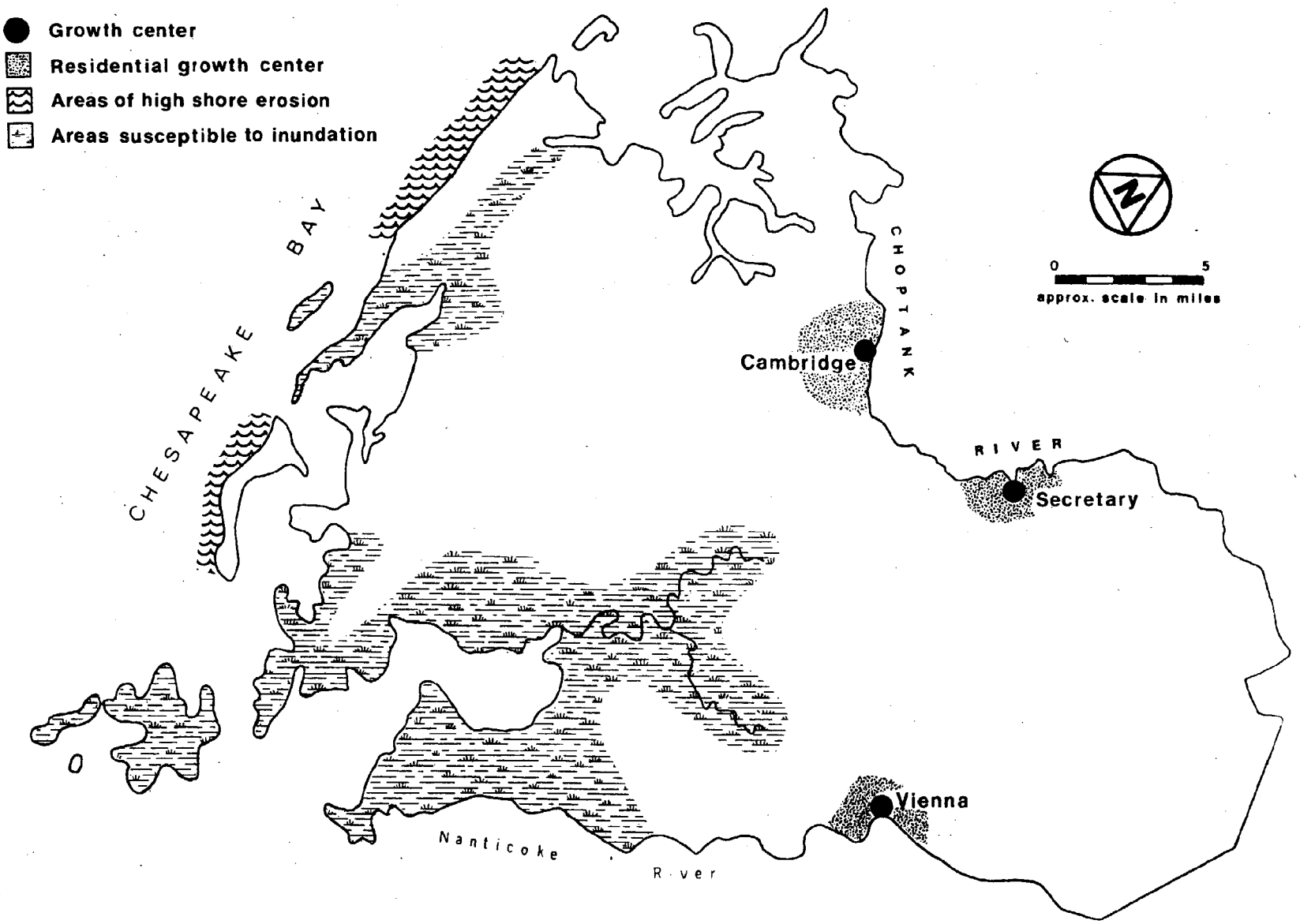


Fig. 5-28 Present and anticipated stresses on prehistoric resources in Dorchester County

Minor or no development of conservation areas, including wetlands (which compose 32% of the county's land), waterfront, farmland, and forests is recommended. The Plan is conservative in its attitude toward changes to the natural environment, and suggests that studies be carried out before extensive changes are made.

Although the preservation of historic structures and skills is discussed, prehistoric resources are not mentioned in the comprehensive plan; but they should be considered in all studies that evaluate proposed changes in land use. While fewer than 50 prehistoric sites in Dorchester County have been reported to the Division of Archeology, potentially important ancient prehistoric remains are known to exist along marshy coasts thanks to the work of local amateur archeologists (see Cresthull 1971). In addition, several important ossuaries have been reported in the vicinity of Cambridge (Ubelaker 1976).

Stress to prehistoric resources results from both natural and cultural land alteration processes in Dorchester County. Figure 5-28 shows the areas where prehistoric resources are now being or are likely to be stressed over the next 20 years. Shore erosion resulting from continuing sea level rise poses problems in the Neck District from Hills Point to Cook Point and along Taylors and Hoopers Islands (Urban Pathfinders, Inc. 1974: 53). Efforts that the Plan calls for to stabilize these areas could aid in preserving prehistoric resources from erosion; however, because coastal prehistoric sites could be disturbed in constructing erosion controls, these remains should be assessed as part of any stabilization plan.

Potential transportation development in the county also could disturb prehistoric resources. One alternative for a new transportation route through the northern part of the county could disturb local prehistoric resources by stimulating the conversion of agricultural land to commercial use. A second alternative, looked upon more favorably by the Plan, bypasses Cambridge and Vienna (Urban Pathfinders, Inc. 1974:75 - 76). In addition, building a southern Bay bridge crossing could disturb prehistoric resources through residential, commercial, and industrial development in the county.

The Plan calls for the construction of five additional boat launching ramps in the county and at least one large waterfront park; such construction could disturb coastal zone prehistoric resources. Boat launching ramps would be located in the northern part of the county along the Choptank, Nanticoke, and Marshyhope rivers near Cambridge, Vienna, and other incorporated towns. Such construction would require facilities for parking, sanitation, etc. (Urban Pathfinders, Inc. 1974:91). The Plan recommends locating a waterfront park near Cambridge at Gray (Great) Marsh Point, although several other locations are discussed (Urban Pathfinders, Inc. 1974:90). These projects should include a consideration of prehistoric resources to mitigate against their disturbance where possible, perhaps incorporating interpretative exhibits in the proposed facilities.

As with most land use plans, that for Dorchester County fails to consider specifically the preservation of prehistoric resources. However, a more serious problem is the recommendation of public collection of historic artifacts (Urban Pathfinders, Inc. 1974:67 - 70). Unsurpervised artifact collecting is not desirable.

Harford County

Information on Harford County comes from its Comprehensive Master Plan (Harford County Planning Office 1974). The county's population has grown dramatically over the past 15 years, and this trend is expected to continue as people move into Harford County for employment there and in nearby Baltimore. The population has grown rapidly because of the county's nearness to Baltimore and because of its excellent transportation links. The stresses that may be expected to disturb Harford County's prehistoric resources will come from residential construction and from the services associated with residential growth. In addition, the county intends to encourage the establishment of new local industries, so that county residents can work in the area instead of commuting outside, as 34% now do (Harford County Department of Planning and Zoning 1974:25).

Between 1960 and 1970, Harford County's population increased 50%. Since 1970 the increase has slowed to a rate of 5% each year. Along with the population increase, the amount of agricultural and vacant land was reduced by 9% between 1966 and 1973. This period also saw a 100% increase in the amount of land used for residences and a 300% increase in the amount of land used for commercial property (Harford County Department of Planning and Zoning 1974:35).

Because the Federal government controls most of the county's shoreline, there is great pressure for development on the remaining coastal zone lands, especially for residential use. As industry increases, even more pressure will be applied to the coastal zone for commercial enterprises, residences, and associated services. Figure 5-29 shows most Harford County coastal zone, including that under military control, as subject to present and future stress on prehistoric resources. Even though the county's comprehensive plan suggests that coastal areas be protected for public use as natural areas, it is anticipated that the pressure to develop will be great.

Since the early part of this century, the federal government has controlled the land that makes up Aberdeen Proving Ground, including Gunpowder Neck and the Edgewood area. In an environmental impact assessment of the Edgewood Arsenal, Downing et al. (1975:34 - 35) suggested:

> the value of the archeological sites on Edgewood Arsenal has been greatly enhanced by the policy of restricted access which has protected the areas from exploitation and vandalism. The lack of farming since 1917 has prevented further ground disturbances. As a result, even though there are many sites throughout the Upper Chesapeake Bay, those at Edgewood Arsenal are among the few that have been preserved in the original state with chronological layering largely still intact. The importance of this preservation to the archeoloical community cannot be overstressed.

Downing et al. failed to note, however, that archeological sites "protected" by the government have been subjected to destructive activities, particularly munitions explosions and disposal, over the past 50 years. The result has been the contamination of over 4,800 acres (80%) of the Edgewood installation:

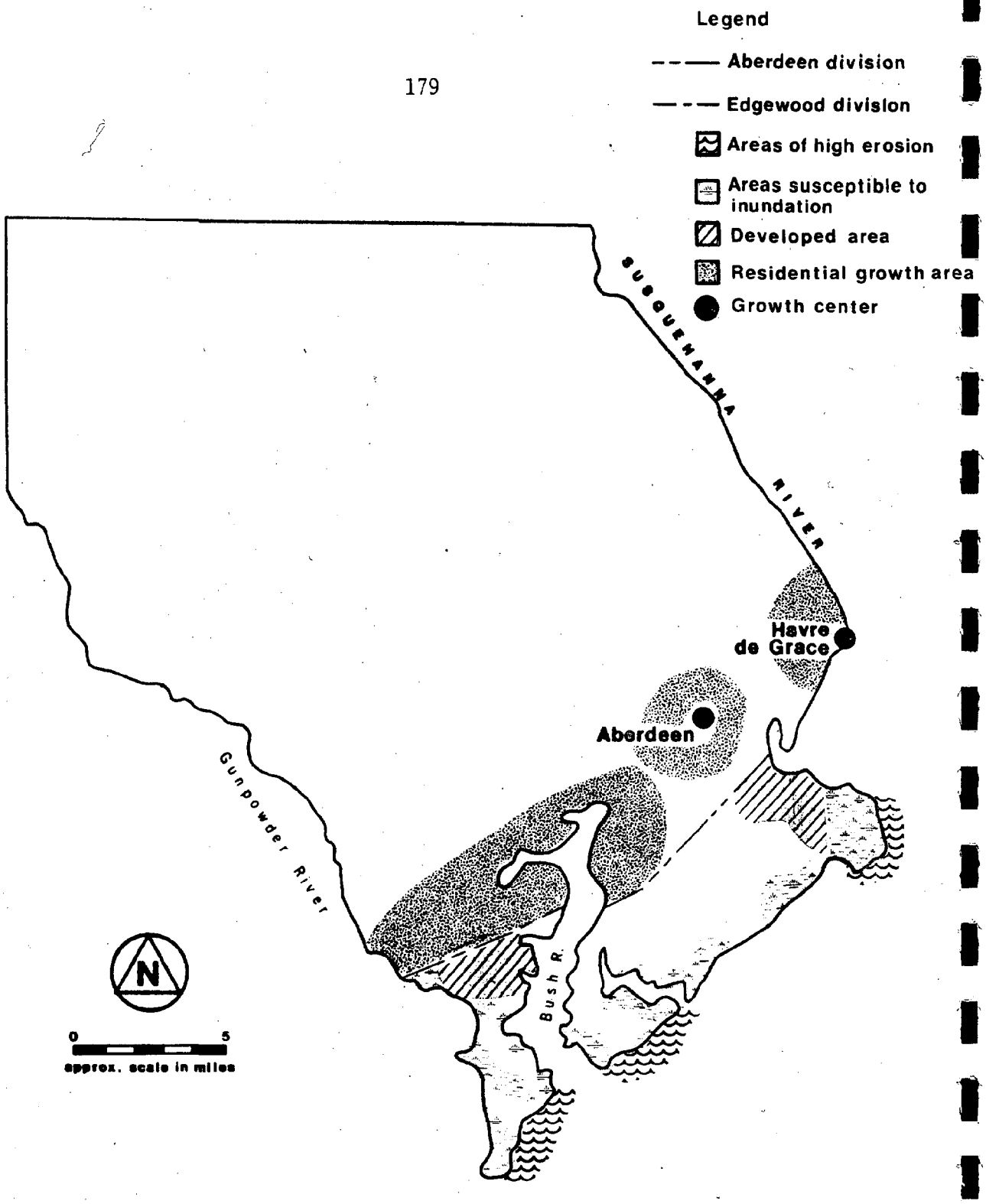


Fig. 5-29 Present and anticipated stresses on prehistoric resources in Harford County

> Contamination at Edgewood Arsenal is a serious problem. Wooded areas and marshy lowlands make access to some of the contaminated areas difficult. The fact that inert as well as live rounds (many of which have lost their identifying markings) have been used makes it difficult and hazardous to attempt to clear an area. Even if decontamination were attempted, the environmental consequences would be massive. Such an operation would require removal of all vegetation and soil to a depth of 10 feet or more. Further, the cost of such an effort would be immense and the resulting land would still not be certifiable for unrestricted use. These areas should be fenced and maintained in perpetuity under Federal control (Downing et al. 1975:52; emphasis added).

Thus, it appears that many of the prehistoric resources on Edgewood Arsenal may never be ascertained to be intact; those sites in contaminated areas may never be investigated by archeologists. These sites are irretrievably lost to conservation efforts.

Kent County

Kent County's economy is based primarily on agriculture, although a seafood industry is located in the Rock Hall area. Chestertown is the focal point for the acquisition of goods and services, and provides limited manufacturing. In regard to future development, Johnson (1974) estimates that 2,000 acres will be required for housing, recreational, industrial, and other needs by 1985. Countywide housing requirements will total 884 acres, 322 of them second home developments, which are likely to be located along the coast. Approximately 1,000 additional acres are needed for parks, recreation, and other public uses.

Parks located in the coastal zone, such as the proposed Fairlee Point State Park, could help preserve prehistoric resources. However, the construction of campsites, roads, and other park facilities could disturb certain prehistoric resources. The impact of new construction should be assessed in advance.

Agricultural activities and shore erosion are the major sources of stress on prehistoric resources in Kent County. In addition, certain

local sites along the coast are heavily stressed by relic collecting. Second home and marina developments have increased in recent years; if this trend continues, the threat to coastal sites in the county will increase greatly (see Fig. 5-30).

Although Kent County is not developing as rapidly as some other areas, prehistoric resources are under increasing pressure. During the period of this study (July 1974 through November 1976), several applications and plans for developing this county's coastal zone were put forward, and some of these projects already have been completed. Figure 5-31 and Table 5- 9 indicate the nature and location of the projects, many of which have had or may have an impact on prehistoric sites. Of course, some projects may not be approved or completed, but their consideration and planning shows the potential for soil disturbance in this county's coastal zone. Table 5-10 shows that the proposed developments represent a wide spectrum of interests. That so many diverse projects are proposed for a rural area like Kent County illustrates the increasing threat of disturbance to the coastal prehistoric resources.

It should be noted that an additional bridge linking the Baltimore metropolitan area with Kent County could lead to widespread disturbance of the area's prehistoric sites. With its 346 miles of waterfront and its large tracts of flat, well-drained land, Kent County would be subject to extensive residential development.

The magnitude of this impact is multiplied by a consideration of predicted population changes. Although the population of Baltimore is expected to remain essentially static, by 1990 the counties adjacent to the city will add more than one-half million people to their 1970 cumulative total. For the same period, Kent County is expected to remain the least populated county in Maryland, with a total gain of 1,000 inhabitants. A bridge between the Eastern and Western shores could greatly alter these figures for Kent County. The only way to mitigate the extent of this effect would involve advance planning and study. It should be recalled that Kent County is particularly important to prehistoric conservation efforts, because counterpart sites may have been heavily stressed on the

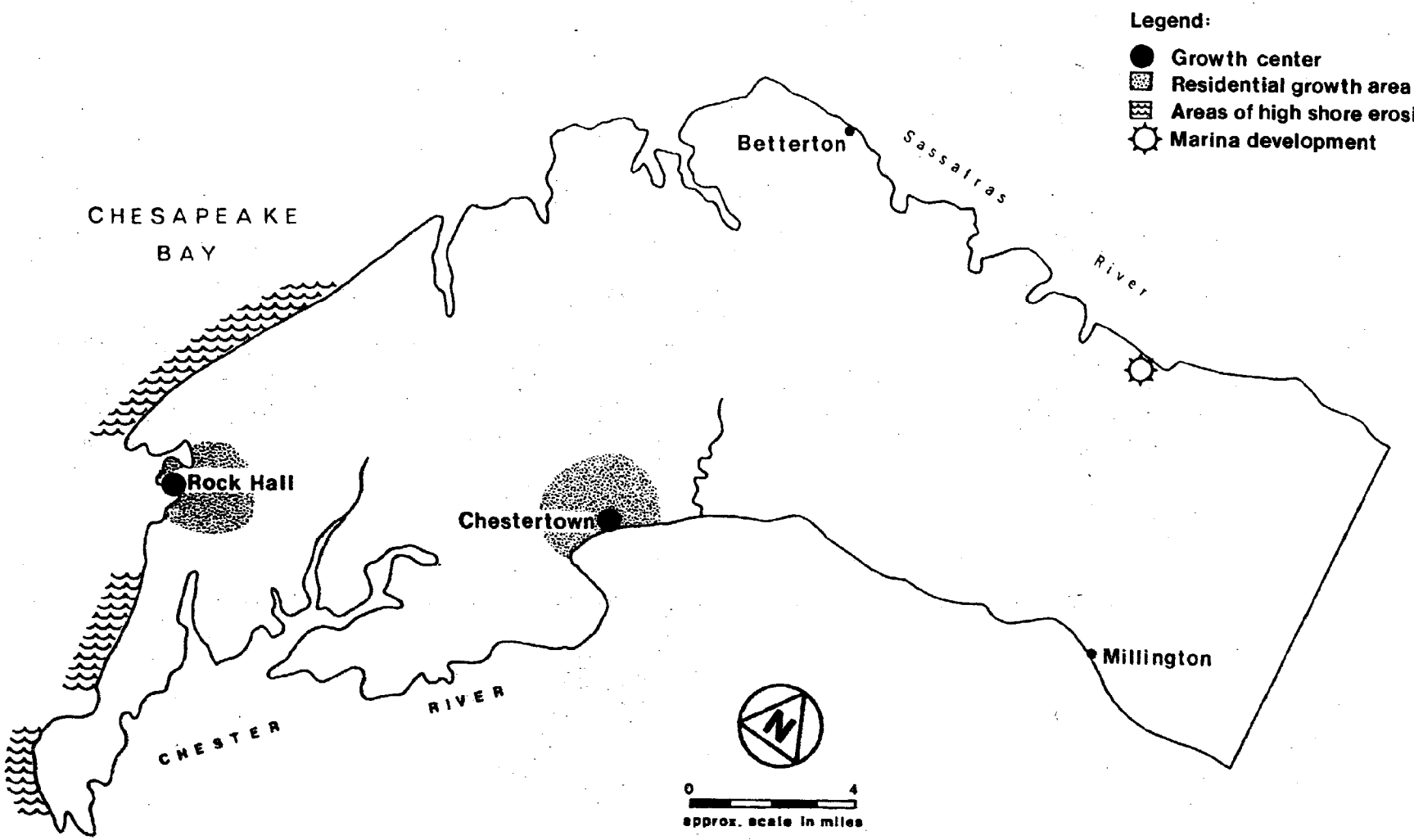


Fig. 5-30 Present and anticipated stresses on prehistoric resources in Kent County

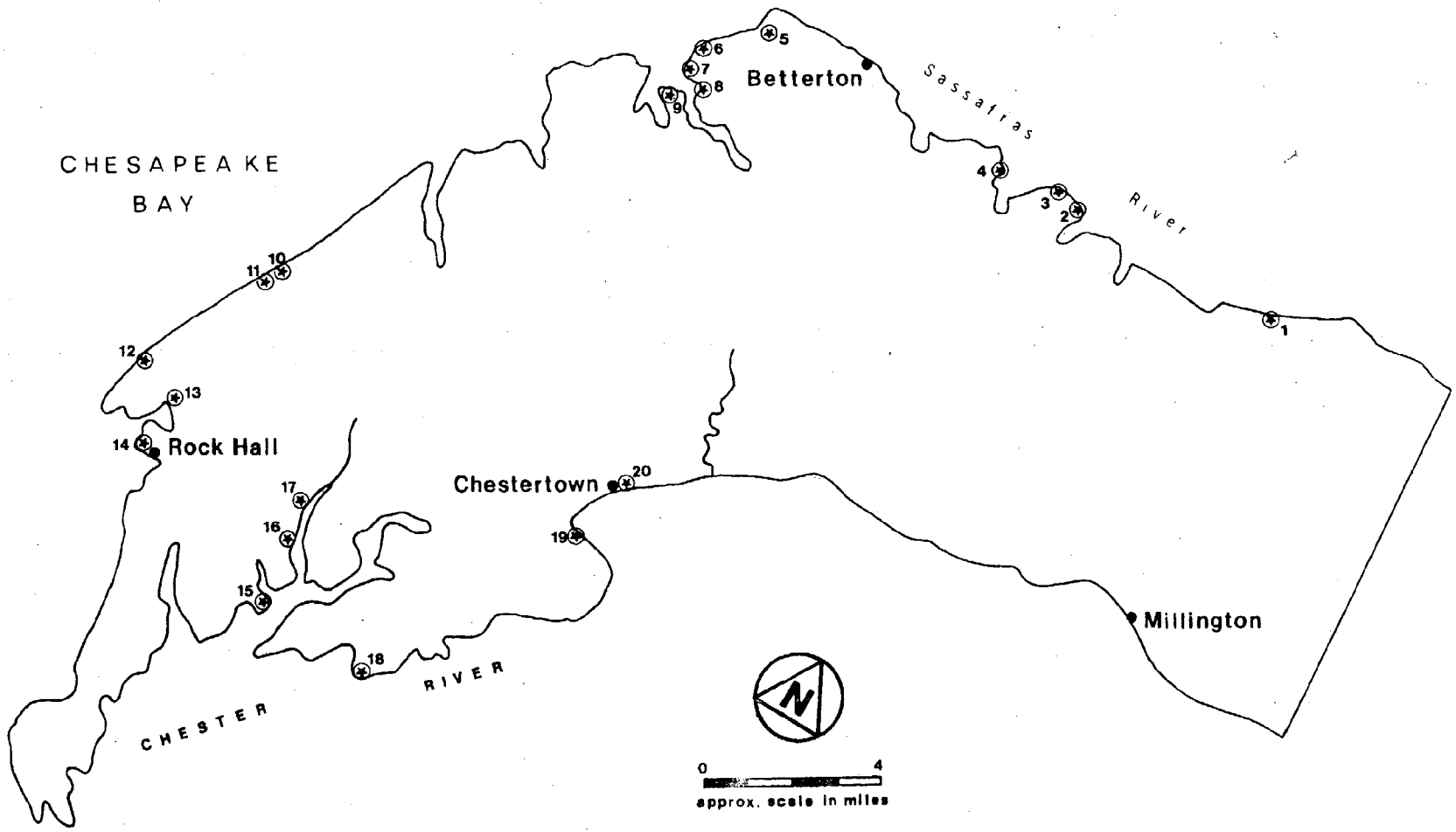


Fig. 5-31 Locations of development projects proposed for the Kent County coastal zone during the present study

Table 5-9 Development Projects Proposed for the Kent County Coastal Zone During the Present Study (taken from files of the Maryland Water Resources and Energy and Coastal Zone Administrations and the Kent County News)

Project Number (see Fig. 5-31)	Location	Type of Project	Size
1	Wilson Point	Timber bulkhead	320 feet
2	Glencoe	Timber bulkhead	155 feet
3	Kentmore Park	Stone revetment	530 feet
4	Turner Creek	Bulkhead	346 feet
5	Still Pond Neck	Power plant	581 acres
6	Still Pond Neck	Bulkhead	271 feet
7	Still Pond Creek	Dredge spoil disposal	--
8	Still Pond Neck	Sand/gravel quarry	675 acres
9	Kinnaird Point	Residential development	200+ acres
10	Tolchester	Power plant	1400 acres
11	Tolchester	Marina expansion dredge bulkhead	 64,000 sq. ft. 560 feet
12	Swan Point	Dredge spoil disposal dredge channel dredge basin dike	 300,000 sq. ft. 320,000 sq. ft. 350 acres
13	Swan Creek	Bulkhead	275 feet
14	Rock Hall	Dredge spoil disposal	14 acres
15	Davis Creek	Bulkhead	200 feet
16	Langford Creek	Stone dry wall	490 feet
17	Shipyard Creek	Stone revetment	1250 feet
18	Deep Point	Revetment	583 feet
19	Chester River	Bulkhead	350 feet
20	Chester River	Highway 213 improvement	--

Western Shore, owing to the activities at military test facilities in Harford County and the continuing expansion of metropolitan Baltimore.

Of course, similar serious impacts could result from the construction of a deepwater port off western Kent County or from construction for any other heavy industry, such as oil terminals. In summary, any major and relatively rapid influx of people or large employers into this county will increase the intensity of disturbance on coastal prehistoric resources.

The Plan (Johnson 1974:99) points out that one of Kent County's two major assets is its rich historic heritage, including historic buildings. The need to preserve these structures as well as develop facilities for recreation and tourism is discussed, and the Plan suggests that the county maintain its own list of historic sites for preservation and acquisition. Unfortunately, the Plan overlooks the county's abundant prehistoric resources and rich prehistoric heritage. Just as with historic structures, prehistoric remains can provide a focus for tourism.

Prince Georges County

Planning subregions V and VI contain Prince Georges County's only coastal lands -- the Potomac River in subregion V and the Patuxent River in subregion VI. Comprehensive plans have been prepared for both areas by the Maryland-National Capital Park and Planning Commission (1973, 1974). Subregion V includes the communities of Clinton, Accokeek, Piscataway, Brandywine,and vicinities (1974), while subregion VI includes Westphalia, Mellwood, Upper Marlboro, Rosaryville, Naylor, Aquasco, and vicinities (1973). Formerly a rural area, Prince Georges County is currently growing rapidly in population, owing to pressure from the Washington, D. C. area.

During the past 30 years the population of Washington, D. C. has nearly tripled, while that of Prince Georges County has increased sevenfold (Maryland-National Capital Park and Planning Commission 1974:2).

Because the county is growing as a suburban community for District of Columbia workers, great pressure exists for establishing residential developments, improving transportation routes, and constructing recreation sites and service facilities. As the Washington, D. C. metropolitan population continues to grow and transportation improvements in highways and rapid transit continue to be made, the pressures for growth and the distance of its radius from Washington will increase. Additional pressure comes from the present residents of Prince Georges County, who would like to establish more industry to provide jobs.

Regardless of the direction from which growth emanates, alterations of the landscape, particularly alterations near the coastal zone, can disturb the county's prehistoric resources. Local industrial development will probably involve little total acreage, although the sand and gravel industry in the county is one that can seriously disturb prehistoric resources. Because the planning maps for subregions V and VI indicate park and open space along the coastal zones of the Potomac and Patuxent shorelines, prehistoric resources in these waterfront areas may be secure from disturbance, providing development adheres to the plan.

Although subregion V and VI plans include maps of both historic and prehistoric sites and direct that these sites should be preserved, this approach has both advantageous and disadvantageous aspects. It is advantageous to consider prehistoric sites and to offer some of them protection. But this plan may lead developers and planners to believe that the sites mapped are the only ones which should be preserved. Actually, the sites listed represent but a few of the total resources. Potentially more important sites could be destroyed simply because no one knows they exist.

Queen Annes County

The Queen Annes County comprehensive master plan (Tarrant 1965) is somewhat dated, but relies on trends already established at the time of

writing or anticipated for the future. Queen Annes County has experienced rapid growth over the past 25 years and undoubtedly will continue to grow. Most of its growth has affected the residential, commercial, industrial, and recreational portions of the county's economy, and results from the construction of the Chesapeake Bay bridge. Because this bridge links Washington, D. C. and Baltimore with Maryland's Atlantic coast, thousands of people move through Queen Annes County each year. In addition, the bridge enables many workers to live in Queen Annes County and commute to jobs on the Western Shore.

As a result of recent development, Kent Island and Kent Narrows have become almost suburbanized. Increases in residences, commercial services, and recreational facilities, such as marinas, all place stress on the prehistoric resources of the county. According to Metzgar (1973:VI - 20), "the construction of the first Chesapeake Bay Bridge had a significant impact on developmental activity, particularly of subdivisions along the shoreline....with rising real estate prices, increasing land speculation, and completion of the second bridge, a significant surge in pressure for development seems certain."

Figure 5-32 illustrates several areas of Queen Annes County which, according to the comprehensive plan, will experience continued development. All of Kent Island, including Kent Narrows, and areas along U.S. 50/301 to Queenstown, are expected to increase in residential, commercial, industrial, and recreational construction. Marinas are particularly numerous in this area. Preferential siting of these structures at the mouths of tributaries and lagoons along the coast means that they can disturb prehistoric resources. Figure 5-32 also shows that areas around Millington, Crumpton, Kingstown, and Corsica Neck (near Centreville) are expected to experience residential growth.

Erosion has been responsible for the loss of 2,026 acres of Queen Annes County during the past century (Tarrant 1965:2), while only a small amount of land has been created by deposition. The western shore of Kent Island has probably been eroded more than other area of the county, as can be seen in its current straight coastline. Prehistoric

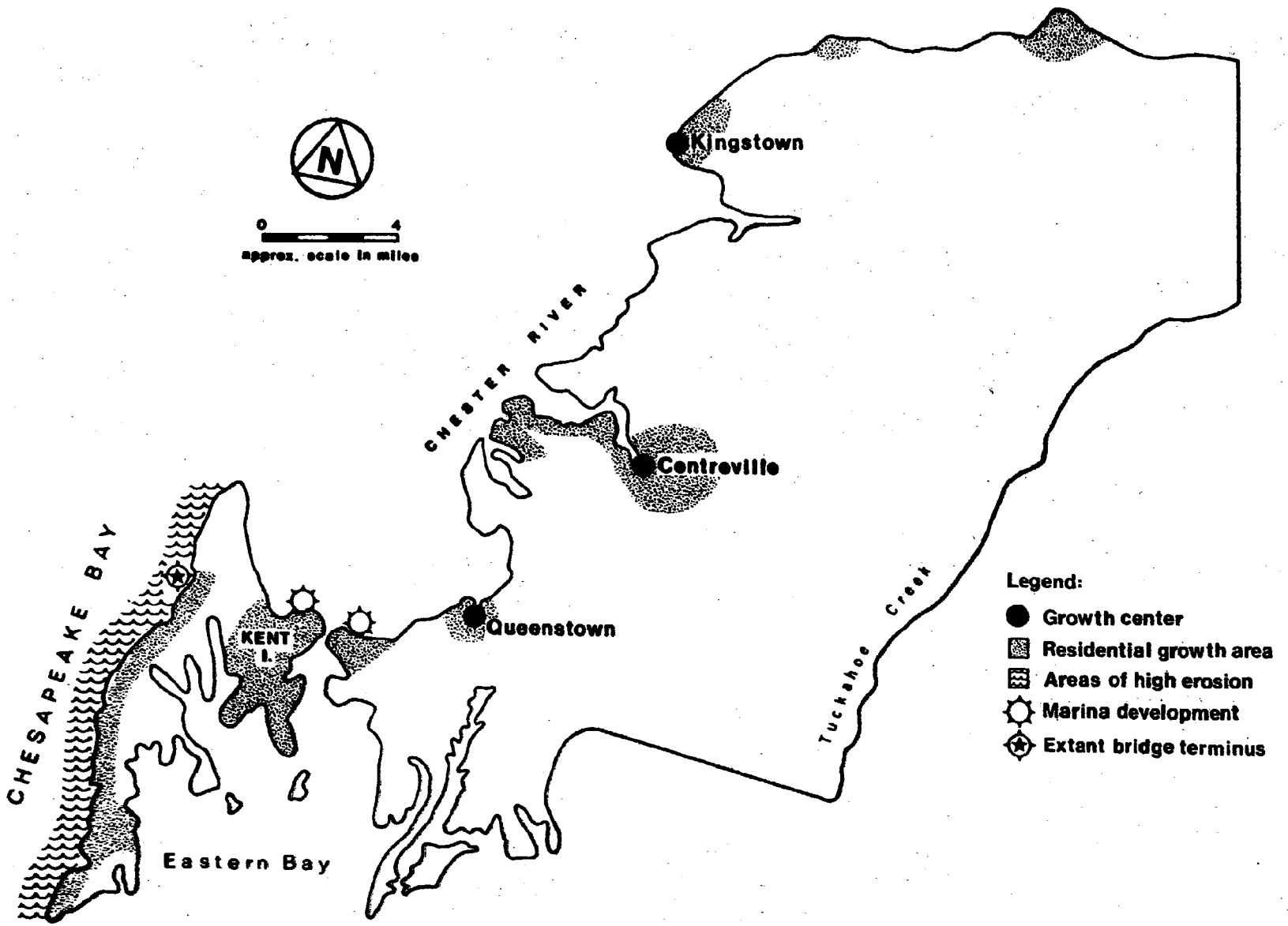


Fig. 5-32 Present and anticipated stresses on prehistoric resources in Queen Annes County

resources along the western shore of Kent Island may have been destroyed through erosion, and field inspection of this shore revealed fewer prehistoric sites than expected. Because of this destruction, remaining sites should be carefully conserved and immediately studied in order to assure that important information is not irretrievably lost.

St. Marys County

The development philosophy of St. Marys County is to maintain and improve the natural environment while accommodating a reasonable level of urban oriented economic growth (Demetriou 1974:3). At the present time approximately 5% of the land is urban, including residential, commercial, and industrial uses; an additional 5% is public or quasi-public; 41% is agricultural, mainly in the northern half of the county and along the Patuxent River; and 49% is forested. In recent years agriculture has decreased; developed land has increased. Currently developed areas include Lexington Park, an economic center; Leonardtown, a governmental center; St. Marys City, a tourist center; and scattered linear development along the major traffic arteries and scattered subdivisions and marinas in the coastal zone. The industrial-commercial element has been small and oriented mainly to services. While at present one-third of the county's labor force is employed by the federal government, chiefly at the Patuxent Naval Air Station, in the future, the county will attempt to broaden its industrial base.

During the period from 1960 to 1970, the population of St. Marys County increased 20%, but this rate of growth is increasing. The population increase results from growth in the Baltimore-Washington, D. C. corridor, which first spilled over into the adjacent counties, Anne Arundel and Prince Georges, and then into Calvert, Charles, and St. Marys. During the 1960 - 1970 period, the population growth rate was high in Charles County (3.9%) and Calvert County (2.7%) because of their greater proximity to the Baltimore-Washington corridor. Continued growth in St. Marys County is expected to follow the pattern in Calvert and Charles

counties, although the growth will be slightly delayed in time.

The Comprehensive Plan for St. Marys County (Demetriou 1974) identifies future centers of development in several areas. As Fig. 5-33 indicates, the Mechanicsville-Charlotte Hall area at the north end of the county is expected to experience residential growth as a result of its location along Route 235, a commuter arterial; Hollywood is expected to experience commercial and residential growth, as is California, owing to its location near the intersection of Route 235 and the Patuxent River crossing (under construction). Piney Point is expected to experience residential and industrial development related to a nearby petroleum installation, and Lexington Park is expected to grow as a result of its location near the Patuxent crossing, where major Baltimore-Washington transportation routes will intersect. In general, waterfront residential development is anticipated in scattered locations along the upper Potomac and other areas.

Although the potential for new industrial development in St. Marys County is limited, Piney Point will be affected if resident petroleum facilities are expanded. The comprehensive plan discusses the possibility that an oil refinery may be developed. Such development might attract other petrochemical operations, along with a port facility. Increased land disturbance in the area could disturb prehistoric resources. Such activities should be accompanied by an evaluation of the impact on any prehistoric resources, with important sites designated for preservation. Residential and commercial development associated with facility expansion would undoubtedly favor coastal locations, further disturbing prehistoric resources.

The comprehensive plan suggests a number of potential environmental preserves following from a study of important natural areas of the Chesapeake Bay region (Smithsonian Institution 1974). Unfortunately, prehistoric resources were not consistently used as a criterion for determining important natural areas in this study.

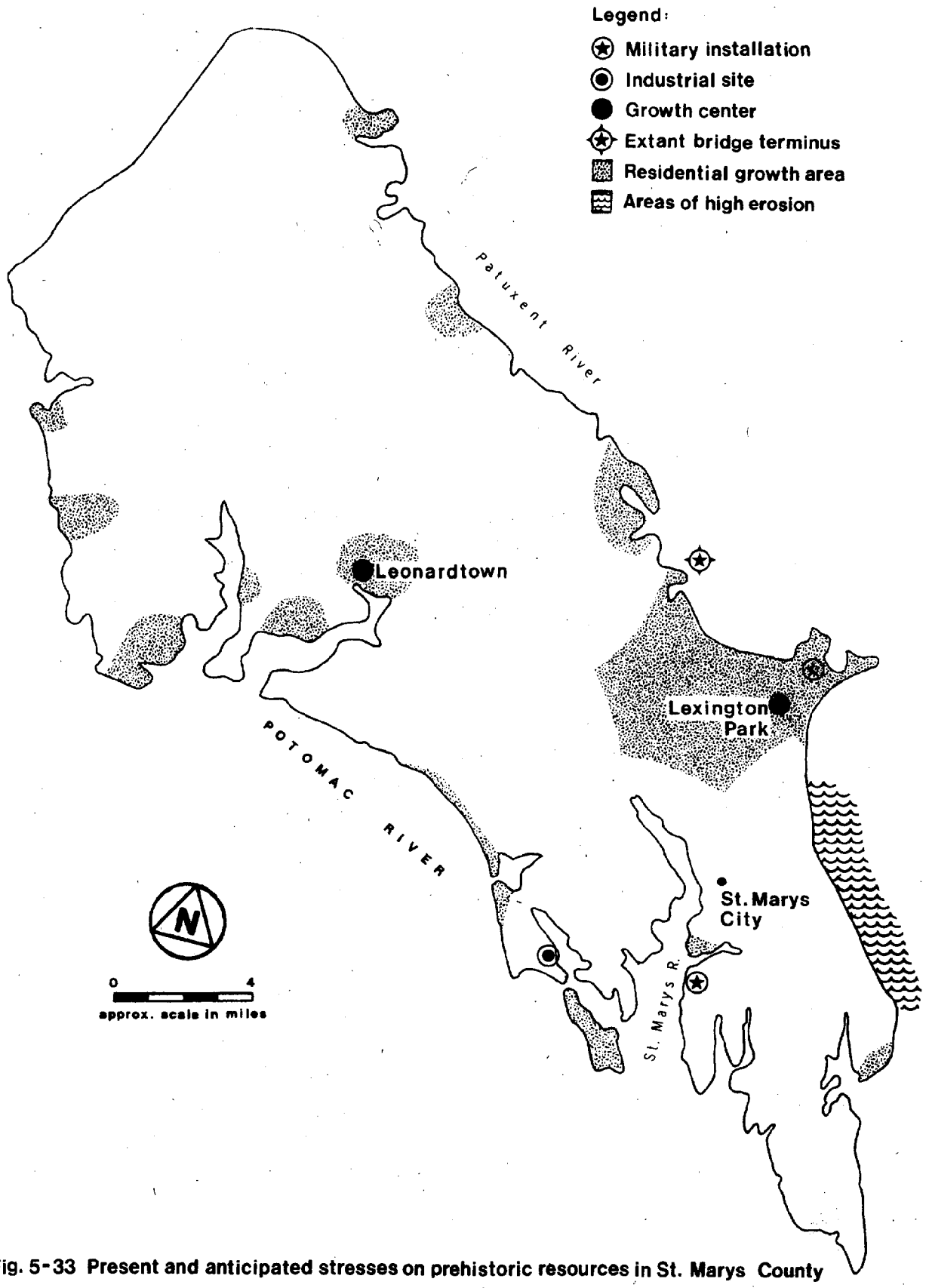


Fig. 5-33 Present and anticipated stresses on prehistoric resources in St. Marys County

Somerset County

According to the Comprehensive Plan for Somerset County (Stottler Stagg and Associates 1975), agriculture, fishing, shellfishing, and seafood processing comprise most of the county's economy. Although the population of the county has declined during this century, it has recently begun to stabilize; the Plan anticipates slow growth through the next few decades. In order to stimulate population growth and improve the local standard of living, the Plan recommends that the county attract a diversified economic base by increasing present economic activities and providing for others, (for example, a deepwater port and marine terminal at Crisfield and an inland industrial park).

At present the primary source of disturbance to the county's prehistoric resources comes from inundation and erosion in the coastal zone. However, if a deepwater port and marine terminal are developed at Crisfield, the soil disturbance associated with these structures and with the industries that they would stimulate could greatly stress the county's prehistoric resources. Figure 5-34 shows the location of current and potential stress on prehistoric resources.

Although the Plan discusses the county's historic structures and sites as well as their potential for attracting tourists, no mention is made of prehistoric resources. But at least one important ancient site is located in the county's coastal zone; others probably exist and should be considered in the planning process.

Talbot County

The comprehensive plan for Talbot County (Urban Pathfinders, Inc. 1973) outlines a conservative plan for future development in the county. Growth is intended to be controlled and moderate, so that the population will increase no more than 10% per year through the year 2000. The policies set out to guide this growth could in several cases be used to conserve prehistoric resources.

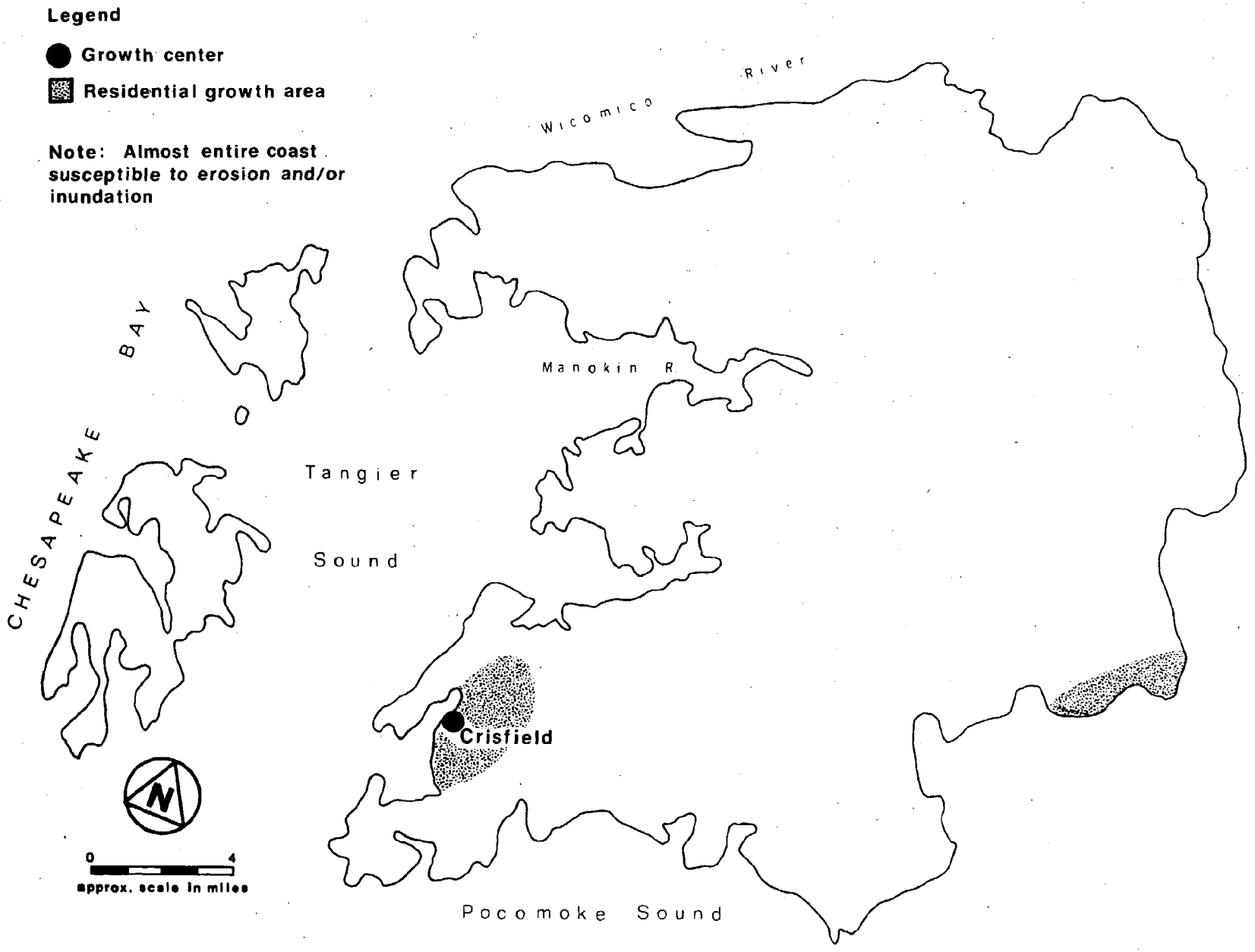


Fig. 5-34 Present and anticipated stresses on prehistoric resources in Somerset County

The plan intends to discourage the conversion of farmland into other uses, a goal which can minimize disturbance of prehistoric resources (beyond that involved in cultivation). Further, the plan also suggests that wildlife management areas be designated, conservation easements encouraged, and tax incentives provided for persons who develop and maintain such areas (Urban Pathfinders, Inc. 1973:28 - 29). Also, restrictions on the development of waterfront property are suggested. All these measures should minimize the amount of land disturbance in the coastal zone. Particularly useful for the conservation of prehistoric resources would be the insurance of a setback restriction and controls for docking facilities (p. 66). The plan calls for channeling growth into established towns and villages. Preserving the waterfront and the agricultural lands can aid in preserving prehistoric resources, providing some mechanism exists for discovering prehistoric sites in coastal zone lots and then offering some alternatives directed at conserving them.

Figure 5-35 shows areas in Talbot County that are now under stress from development or may be stressed in the future. County zoning for processing seafood along the coastal zone could stress coastal prehistoric resources (Urban Pathfinders, Inc. 1973:31), although the seafood industry is not expected to grow much. In addition, the plan calls for a consideration of the possibility of utilizing water transportation (p. 59). If water transport were found to be feasible, any extensive coastal zone port construction would also disturb coastal prehistoric resources.

Finally, historic structures and architecture are considered in the comprehensive plan, where it is suggested that the county undertake a study to provide a way to insure the preservation of historic features (p. 73). Unfortunately, prehistoric sites are not mentioned in the study. These cultural resources should be taken into consideration along with historic resources.

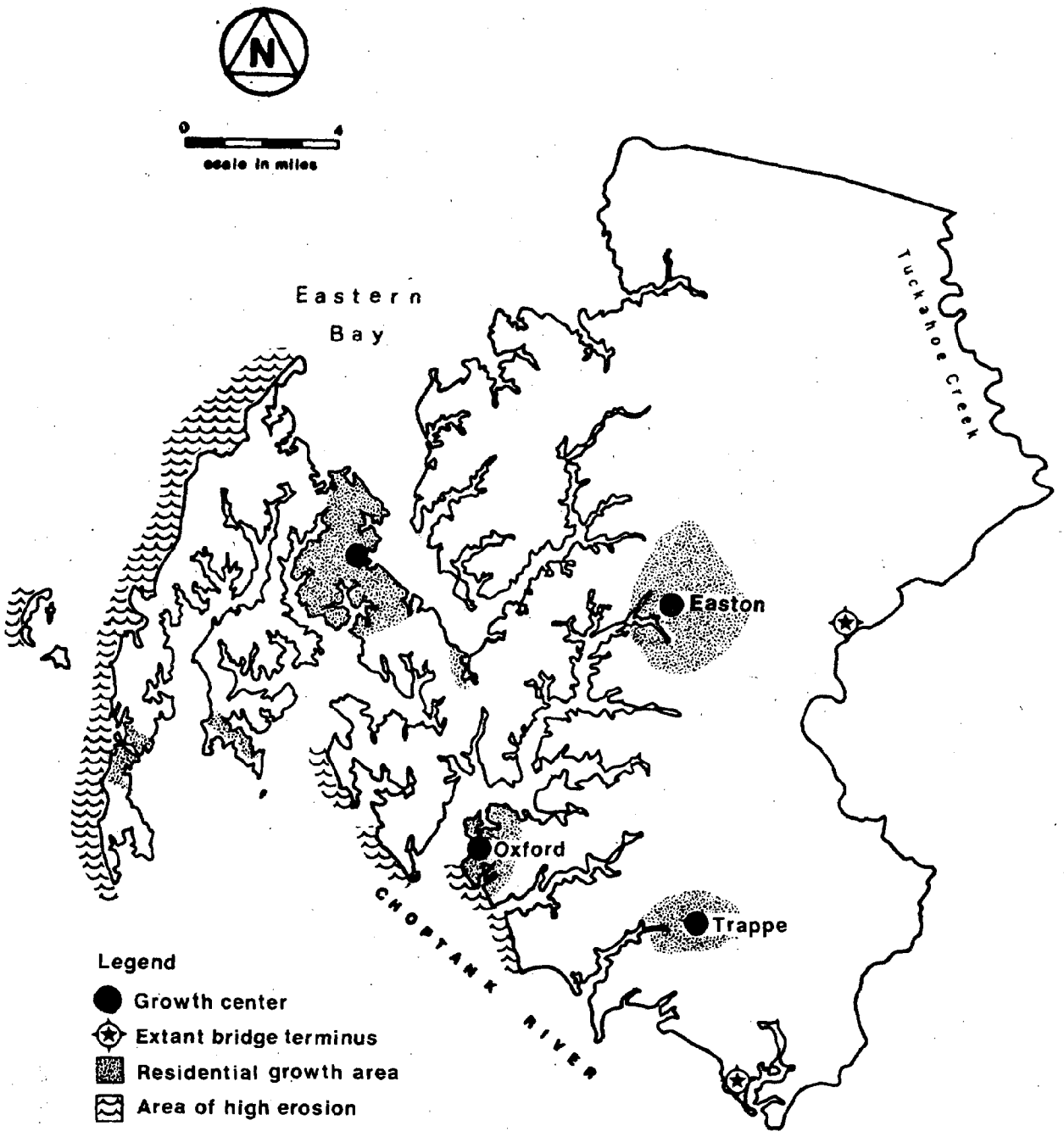


Fig. 5-35 Present and anticipated stresses on prehistoric resources in Talbot County

Wicomico County

Agriculture, particularly poultry farming, along with industry in the Salisbury area, form the economic base of Wicomico County. The county's population has grown relatively rapidly during the past 25 years, and this trend is expected to continue (Maryland Department of State Planning n.d.) as suburban areas grow around Salisbury. According to the Comprehensive Plan for Wicomico County (Salisbury-Wicomico County Planning and Zoning Commission 1976), development will be guided into the Salisbury area and smaller towns in the county.

Most of the county's coastal zone is comprised of wetlands which are designated as conservation areas by the Plan. Thus, little development and associated disturbance to prehistoric resources would be expected. In these areas the primary source of disturbance to prehistoric resources results from inundation and erosion. In addition, some prehistoric sites may have been disturbed by dredging and spoil disposal for the Nanticoke and Wicomico rivers and the shipping channel to Salisbury. Because continued dredging and spoil disposal are required to maintain these channels, the U.S. Army Corps of Engineers has recently begun to prepare assessments of the possible effects on prehistoric resources associated with current projects. Figure 5-36 shows the locations where prehistoric resources are or may become stressed.

The Plan discusses the need for preservation of historic and prehistoric remains and makes suggestions for ways in which preservation could be accomplished. Only three of the 68 sites suggested for preservation are prehistoric, however; thus, more prehistoric sites probably could be added to the list.

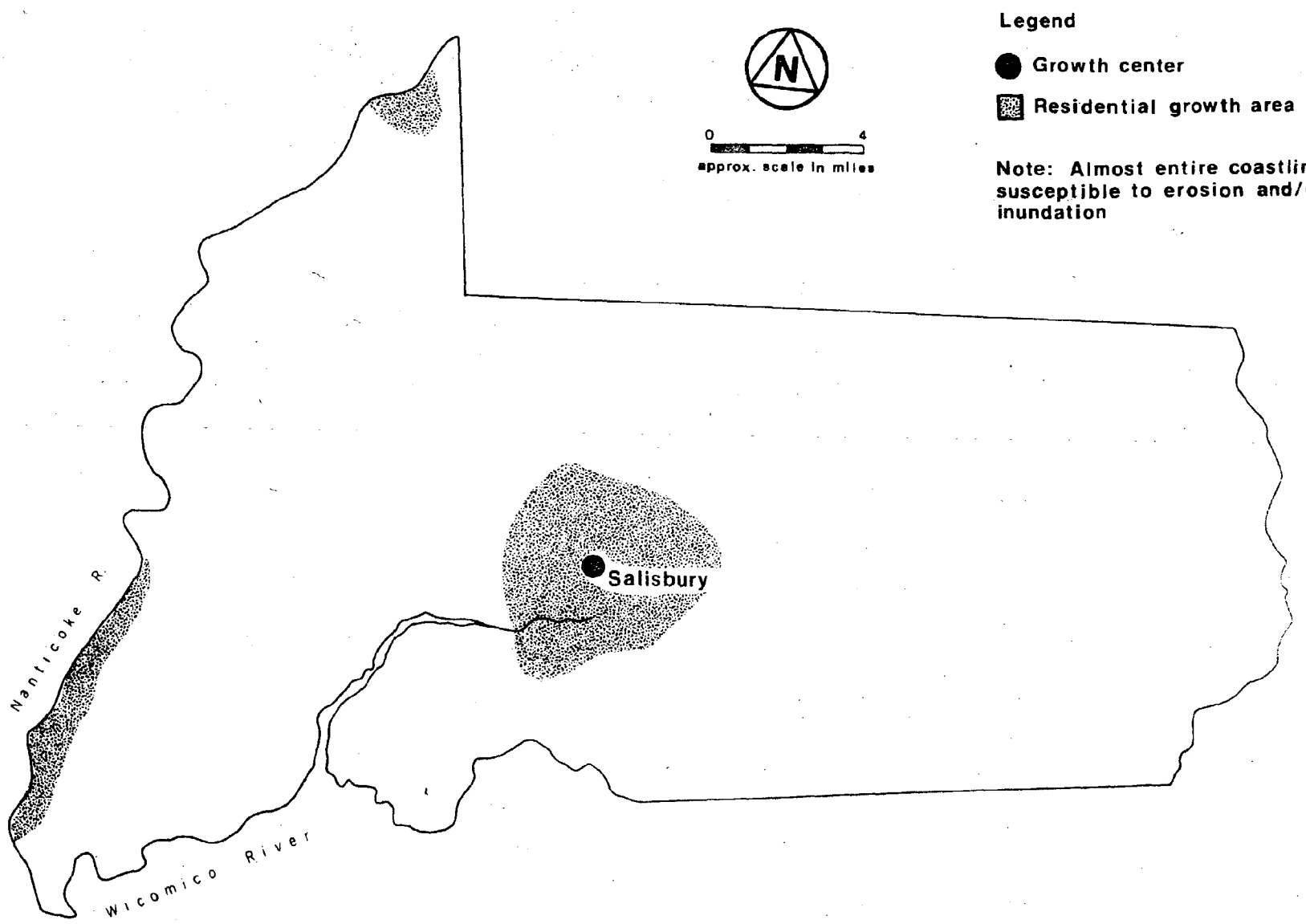


Fig. 5-36 Present and anticipated stresses on prehistoric resources in Wicomico County

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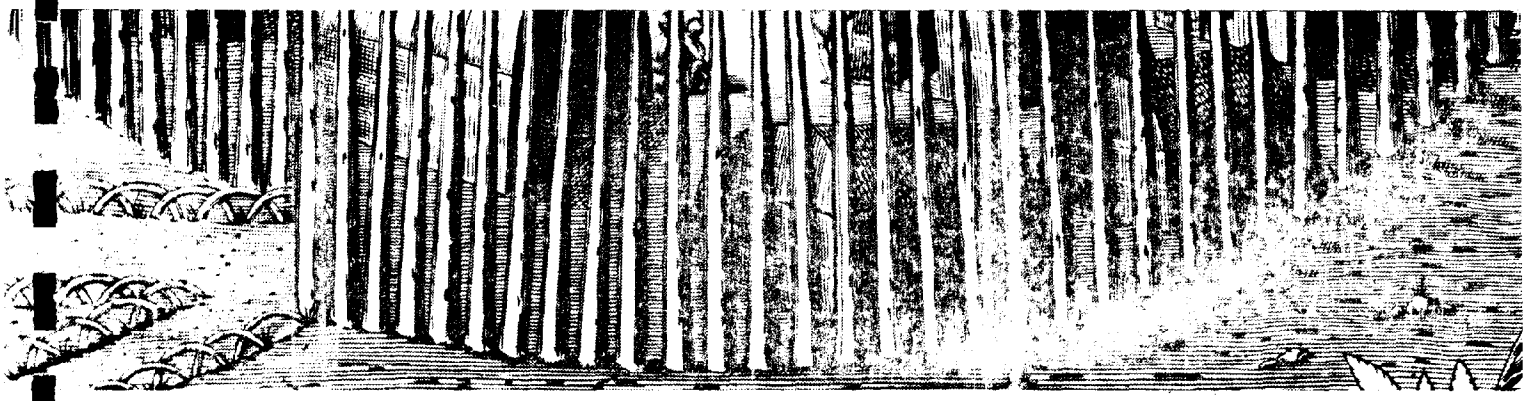
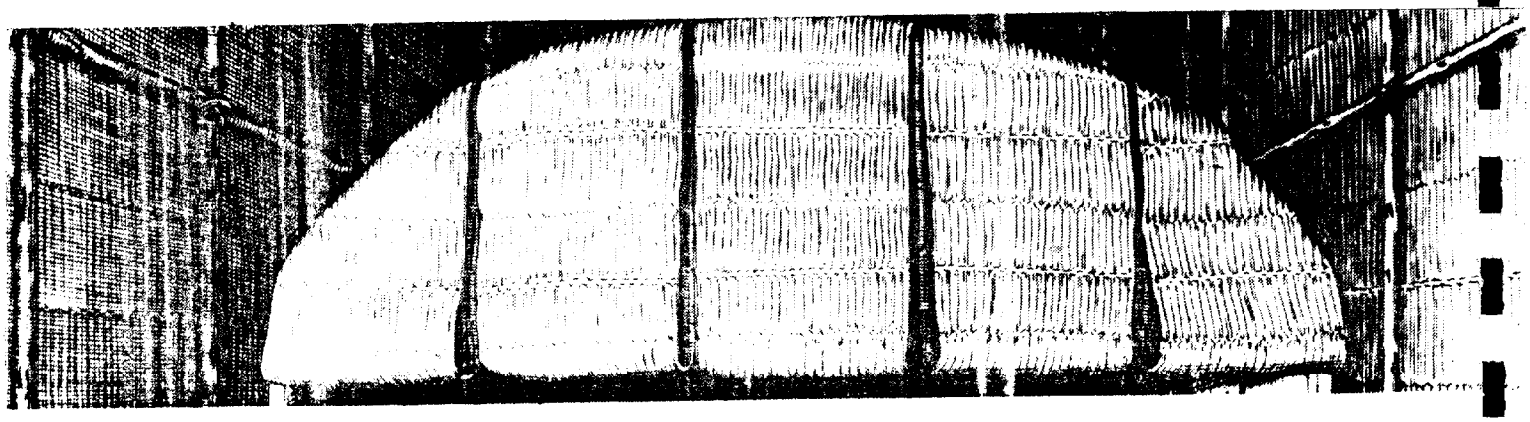
Chapter 6



Management Strategy



Chapter 6

Management Strategy

Based on existing information and new data, previous chapters have shown that the Maryland coastal zone holds considerable and as yet poorly understood prehistoric resources. Numerous cultural and natural factors continue to disturb or destroy these remains of previous human activity. Important, endangered, and mandated for conservation, prehistoric remains are fragile and nonrenewable resources. Applying an effective management strategy can help prevent the loss of this irreplaceable data bank on human behavior. A few recently instituted programs do exist, such as those conducted by the Division of Archeology for the State Highway Administration and for the Capital Programs Office of the Department of Natural Resources. However, no coordinated, centrally administrated program manages prehistoric resources within the Maryland coastal zone or in other parts of the state.

Prehistoric resources in Maryland generally have been neglected or salvaged piecemeal when required by federal agencies. As a primary management strategy, salvage operations are ineffective. Usually involving intensive excavation, salvage is expensive and in its own way consumes the resource. Further, because of continuing developments in related fields and theoretical advances in the field of prehistoric archeology, information gained through today's salvage operations may be of questionable use in future research. In addition, multiple examples of the same kind of site may be excavated, producing redundant information. Projects requiring salvage are located arbitrarily, that is, without respect to prehistoric resource distribution; hence, such projects are not integrated into any overall scheme or research design. Archeologists also must adjust their techniques and operations to construction priorities, timing and

funding, instead of understanding the resource.

On the other hand, an occasional need for salvage exists; for example, in areas where a number of sites are inadequately documented and in areas where remains must be sacrificed. When baseline information has already been gathered, salvage operations can be planned in advance to best exploit the information potential of the project. However, despite positive aspects outlined by Wildesen (1975), salvage as the only means of mitigating disturbance to prehistoric resources provides a crisis solution that wastes resources and money (Dicauze and Meyer 1975). Designed to broaden management options, this chapter suggests a strategy for the conservation management of prehistoric resources.

Proposed Management Strategy

The proposed management strategy contains three main elements; interim measures, including legislation; education; and resource conservation plan. Maximizing current programs for prehistoric resource conservation, developing an education program, and systematizing data acquisition on prehistoric rexources are short term objectives (about 5 years). Data synthesis, plan formulation, and plan implementation will require additional time (about 10 years). Figure 6-1 presents a schematic diagram of this strategy.

"Interim measures" means creative and increased use of current state and federal programs and laws until the new plan is formulated. At this time, some measures would be incorporated and others modified or superseded by those developed in the plan. In other words, interim measures means the process of maximizing currently available mechanisms. These measures, then, represent existing and potential conservation tools for the next decade.

An education program gives governmental agencies and the public an opportunity to learn about the nature, importance, and current state of prehistoric resources. Results of prehistoric studies should be presented in an understandable and interesting manner, and an education program must be a continuing feature of prehistoric resource management in Maryland.

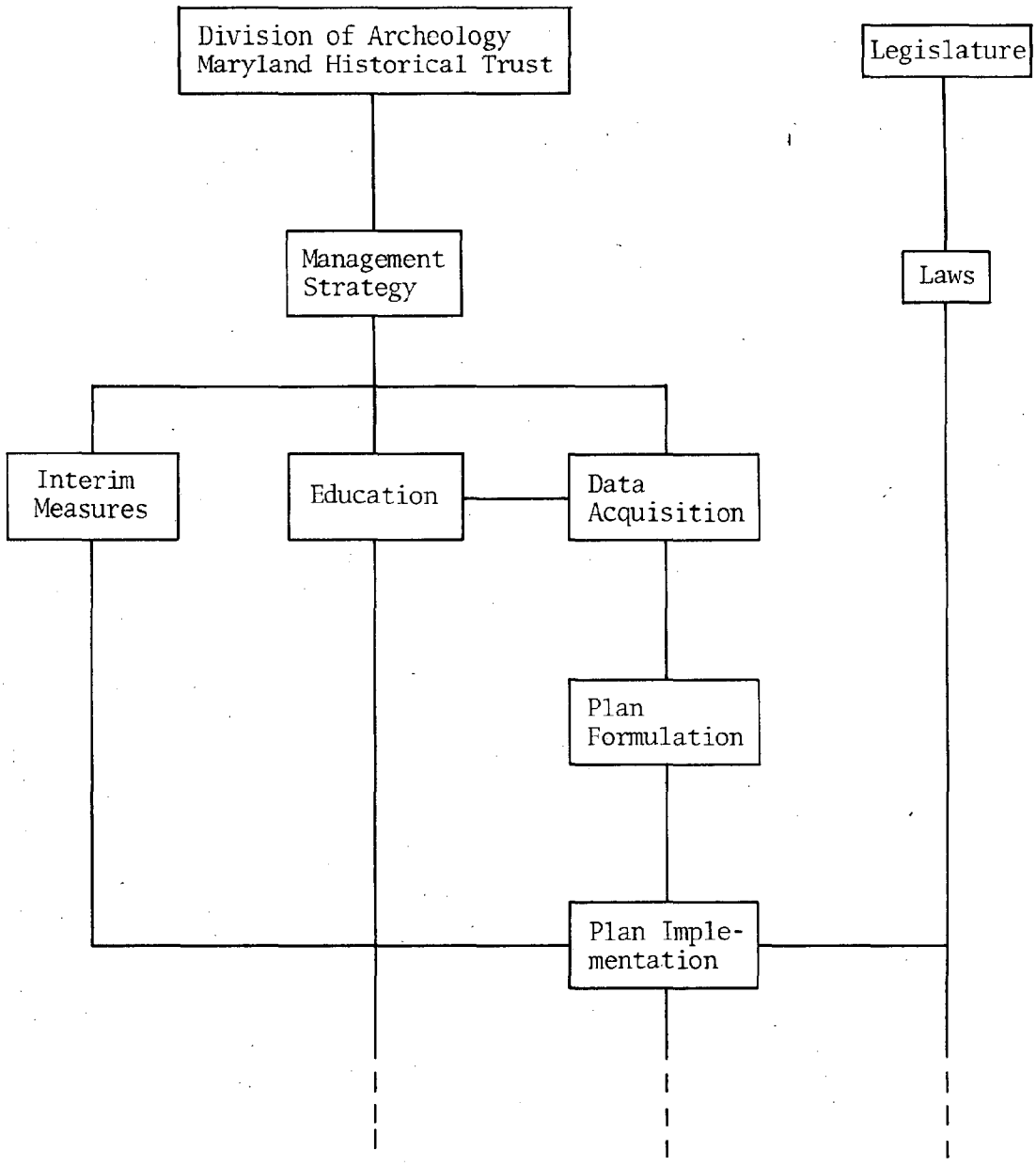


Fig. 6-1 Schematic diagram of proposed management strategy

The education program will be modified, particularly with information from regional baseline studies and during plan implementation.

Likewise, legislative measures will be used continuously in this strategy for prehistoric resource management. Numerous laws and regulations currently affect prehistoric resources. A later section of this chapter discusses potential legislative approaches to prehistoric resource conservation; these approaches might be considered during plan formulation and introduced to legislative bodies during plan implementation.

Perhaps the most important aspect of the proposed management strategy is the development of a comprehensive, centrally administered prehistoric resource conservation plan. A rational framework must guide management decisions, whether they relate to assessing the significance of particular remains, formulating National Register nominations, evaluating the impact of a proposed project, choosing appropriate mitigation procedures for threatened sites, or choosing representative sites for preservation.

Although the predicted density of prehistoric remains is not so high as to prohibit coastal zone development, so little archeological work has been done in Maryland that any loss of remains at present must be viewed as a critical loss. We know little about the kinds and quantities of extant prehistoric remains; we do not know precisely what is being lost or how that relates to what is left. For effective management, biases and omissions in the current data bank on Maryland prehistory must be rectified, especially as coastal zone development continues. As Dunnell and Fuller (1975:2) observe: with a comprehensive understanding of a region's archeological resources, it is possible to rank sites in terms of their significance, and to predict their occurrence...The impact of development upon resources can thus be minimized by avoiding them where possible and feasible, by conserving critical sites, by incorporating salvage operations in project plans and budgets where avoidance is not possible, therefore making siting decisions that weigh their archeological cost."

Plan formulation depends on two stages of data gathering, one oriented toward information about the nature, distribution, and condition of the resource and the other oriented toward planning and management mechanisms.

Implementing a management strategy such as the one suggested here has numerous advantages. In general, the proposed conservation plan provides coherence and direction to conservation efforts within the state and hence aids all agencies to better fulfill legal responsibilities regarding the identification and protection of prehistoric resources. Greater flexibility will result for those who plan and regulate land use, as well as for those who respond to rules and regulations concerning land use. Further, avoiding salvage as the primary response to potential impact increases efficiency, lessens redundancy, and insures a better product for each dollar spent. An innovative approach to education will heighten public and governmental awareness and sensitivity, and, if correctly designed and executed, will provide tangible and enriching returns in the form of exhibits, films, lectures, museum displays, etc. The interim use of existing programs should insure the most economical approach. Finally, using the management strategy suggested here will achieve the primary goal of preserving a representative sample of the state's prehistoric remains.

Current State Programs: Division of Archeology

Existing mechanisms, either specifically mandated or potentially capable of serving prehistoric resource conservation, are diagrammed in Fig. 6-2. Cultural resources -- prehistoric and historic remains -- specifically concern two state agencies, the Division of Archeology (DOA) and the Maryland Historical Trust (MHT). Figure 6-3 presents a simplified organization chart for these agencies.

The Division of Archeology is concerned with prehistoric resources. DOA is linked administratively with the Maryland Geological Survey (MGS), a branch of the Department of Natural Resources (DNR) (see Fig. 6-3); DOA was created by the Maryland Archeological Resources Act of 1968 (NR Title 2, Subtitle 3, revised 1973, see Appendix B). Section 2-304 of this act provides for an Advisory Committee on Archeology, to be appointed by the MGS Director. This committee advises MGS on archeological matters and proposes rules and regulations for archeological materials.

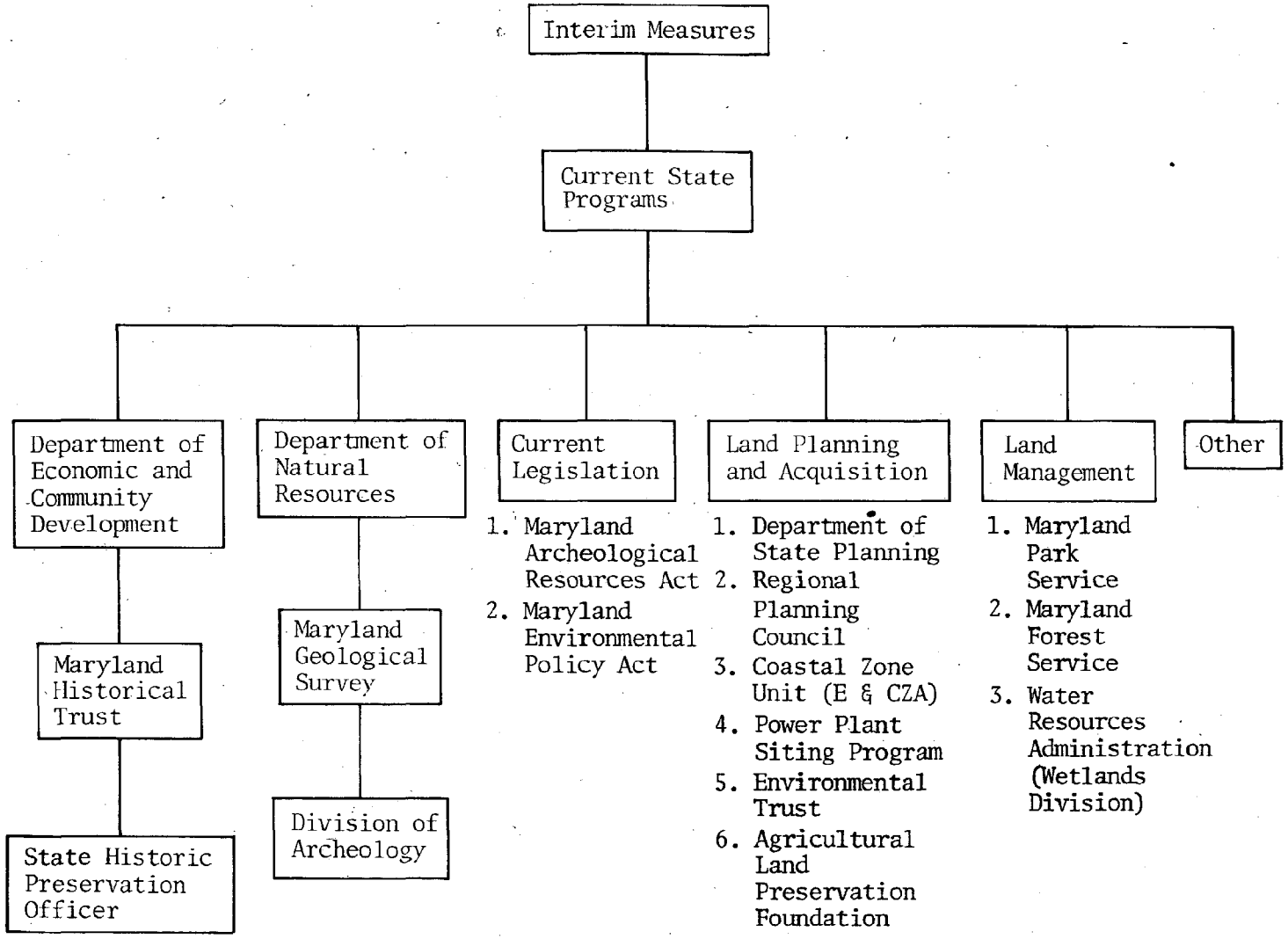


Fig. 6-2a State agencies and programs potentially useful to prehistoric resource conservation

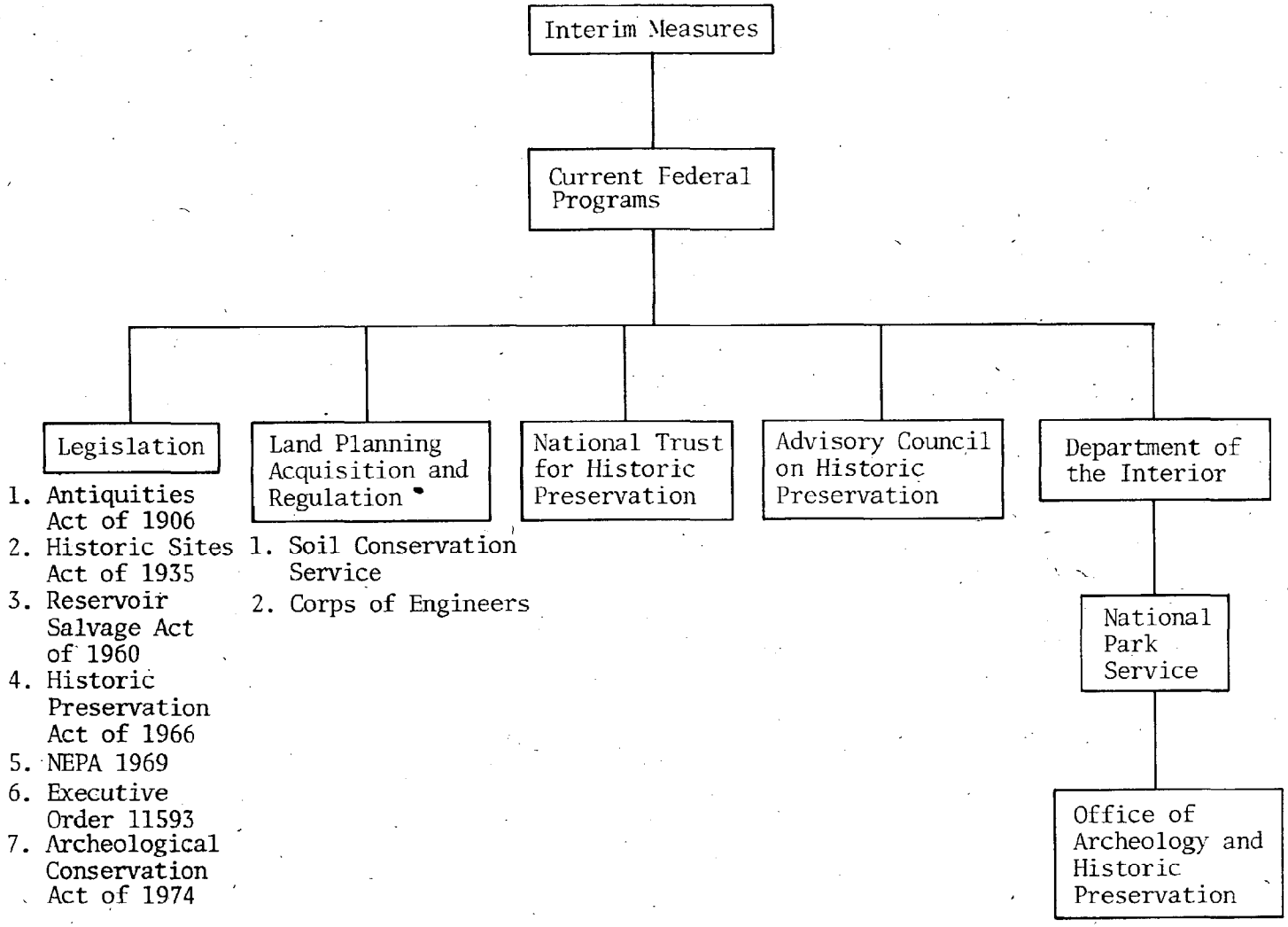


Fig. 6-2b Federal agencies and programs potentially useful to prehistoric resource conservation

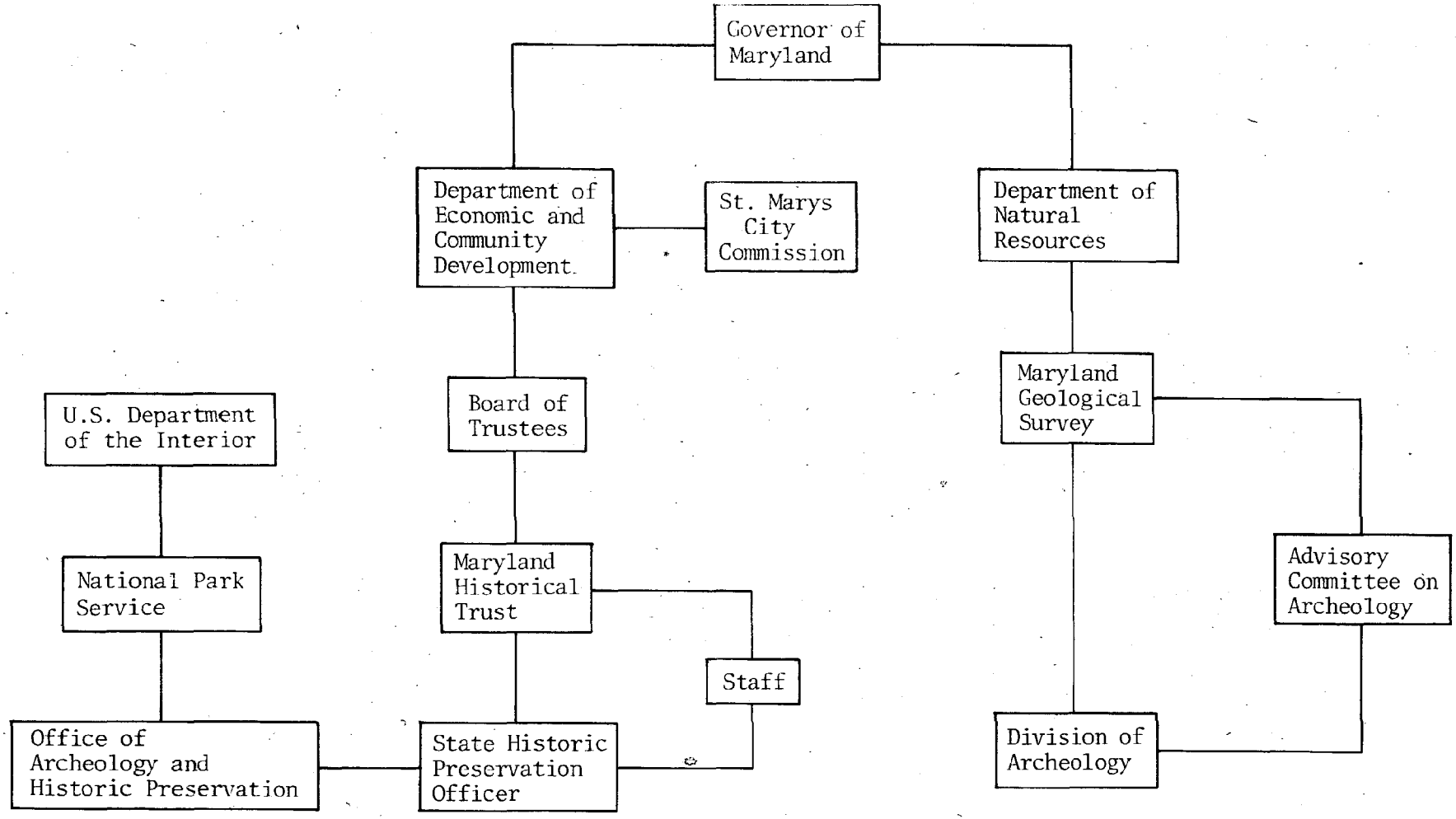


Fig. 6-3 Simplified organizational chart of the Division of Archeology and Maryland Historical Trust

DOA staff is composed of the State Archeologist and other support personnel appointed by the MGS Director. In addition to the State Archeologist, DOA currently has one full time employee; two other employees are retained by yearly contract, one with the State Highway Administration and the other with the Capital Programs Office of DNR. Part time employees are occasionally engaged as funding permits. Presently receiving an appropriation of $41,000 (fy 1977), DOA is located on the campus of the Johns Hopkins University in Baltimore.

DOA's purpose is "to increase and diffuse understanding of Maryland's prehistorical and historical archeology" (Bastian 1971:1), through a program of research, preservation, publication, public education, and coordination. Legislatively assigned duties (NR Title 2, Subtitle 3, Section 303) include:

1) encourage, coordinate, and engage in fundamental research
2) cooperate with other state units in archeological excavations
3) work for the preservation of archeological sites on private lands
4) curate archeological objects discovered during construction in the state
5) cooperate with and assist other organizations in preserving archeological materials
6) make archeological materials for demonstration available to organizations in the state
7) make archeological exhibits available to schools and assist in instruction
8) cooperate with agencies of other states for archeological preservation; prevent them from exploiting the state's archeological materials
9) make available information on archeology
10) enforce the state's antiquities law.

Although these duties accurately reflect the goals of DOA programs at the time they were issued and updated, recent years have seen an increasing emphasis on the management of cultural resources, an emphasis partly reflected in the Rules and Regulations Governing Archeological Resources (Maryland Geological Survey 1976).

In fulfilling its duties, DOA has undertaken a great many activities; for example, inventorying prehistoric sites in the state and maintaining

records on them, surveying major construction areas, salvaging some sites threatened by destruction through the coordination of volunteers, recording and preserving private artifact collections, publishing information on Maryland archeology for professionals and the public, assisting in the preparation of archeological displays, coordinating archeological research in the state, and developing public awareness of the need for archeological conservation. In addition, DOA sponsors and engages in research with special projects such as investigating Paleo-Indian artifacts, coastal settlements, Archaic chronology, Late Woodland culture, and contact period archeology (Bastian 1971).

Both the State Archeologist and an assistant (who combines secretarial and technical skills) have been discharging these duties since 1970. Because their time has been diffused over the numerous tasks required to meet the many DOA responsibilities, few duties have been done thoroughly, few tasks have been kept up to date, and few projects have been followed up. For example, only one of DOA's publication series has appeared; no comprehensive popular works have been issued, and newsletters and reports from the office have been extremely late. As McGimsey has pointed out in his discussion of public archeology, "a single archeologist can expect to do little more than keep a partial record of what is being destroyed" (1972:28). Without funds to hire adequate help, the State Archeologist must undertake tasks that minimally trained personnel might handle at far less cost; without time to provide leadership, the State Archeologist is unable to acquire and administer public and private funds that might greatly supplement DOA programs.

One important area where DOA has interfaced with other government agencies and the public is as a repository for records on Maryland prehistoric resources. DOA maintains records on all sites reported in the state through the activities of amateur and professional archeologists as well as through the non-archeological activities of citizens and agencies who discover sites. In addition, DOA uses archival research and field investigations to discover prehistoric sites.

Private and public agency developers often ask DOA for information on

prehistoric resources in various areas. Unfortunately, DOA records were not intended for prehistoric resource management uses; therefore, these records are not reliable indicators of potential prehistoric resources. The only information this record supplies is that sites have been found in a limited number of locations.

DOA records include only those sites reported to the office; thus, only a fraction of the sites known to the public are included. Many landowners and farmers who are aware of prehistoric sites on their property do not file reports -- perhaps not recognizing the importance of doing so, not understanding the mechanics of filing, or not wishing to bring on potential restrictions on land use. Some may fear that public knowledge of sites on their property will lead to trespassing by relic collectors. Relic collectors themselves usually do not report sites they discover, because of a proprietary attitude toward them.

Since DOA records do not contain much information, they are of limited use in indicating site significance. That site locations do not result from systematic discovery procedures means that information almost never appears on areas where people have not looked for prehistoric remains, areas where no artifacts were found, or areas where biases may have masked the presence of some kinds of remains thereby increasing the apparent frequency of others. For example, the State Archeologist has noted that any reports from relic collectors usually are "strongly biased toward sites that are relatively lucrative for surface collecting (or digging)" (Bastian, personal communication).

A map of all reported sites in Maryland would undoubtedly show concentrations of sites in certain areas. Such a map could mistakenly be interpreted to reflect prehistoric land use patterns; but the map would probably represent only areas in which amateur and professional archeologists have worked. When they have consistently found sites in particular environmental situations, relic collectors and archeologists often expend great effort seeking similar locations. Such efforts create a very biased sample of the sites in the area. In short, the biases inherent in unsystematic site lists are very different to account for or to control.

Relying on DOA site lists and records for land use planning and resource evaluation puts additional, unnecessary stress on the remaining resources as the actual variability and distributions of prehistoric resources go unrecognized. Although a professional archeologist with local experience might use current DOA records to predict where examples of some kinds of prehistoric resources might be found, it would be difficult to make assessments of significance or to propose optimal mitigation procedures for specific projects because no regional framework exists upon which such decisions might be based. Although this negative view of site lists is not meant to deny their need and utility, it does however emphasize their inadequacy and the potential danger of relying on them when assessing and evaluating prehistoric resources.

DOA's Ten Year Plan (Bastian 1971) was drafted just prior to the rapid nationwide increase in emphasis on cultural resource management. It therefore does not advance a particular management strategy or preservation plan; nor does it address many issues confronting the archeological and land use planning-regulatory communities today.

The Ten Year Plan does contain budget projections for fiscal years 1973 - 1981, shown in Table 6-1. DOA budgets have fallen steadily behind the minimal needs expressed in 1971; the gap widens further when inflation is taken into account. Personnel levels also have fallen behind projected minimal needs. Interstate comparisons of funding levels are made frequently. Expenditures are ranked and compared with those of other states with similar sizes or populations. But such factors as size and character of resource base; past, current, and projected land use; and level of understanding of the area's prehistory all reduce the meaning of interstate comparisons. Certainly prehistoric remains are not distributed according to modern political boundaries. Thus, a more relevant index of funding levels is whether the programs they support are meeting legal responsibilities and providing effective conservation management of prehistoric resources. Given Maryland's extensive and attractive coasts, their proximity to a large metropolitan corridor, and a history of low professional archeological activity, the conclusion seems inescapable -- increased funding is needed for a management effort to meet conservation responsibilities.

Table 6-1 Projected Division of Archeology Budgets and Personnel Requirements from 1973 Through 1981 (Adapted from Bastian 1976:5 and Bastian 1971:23)

Fiscal Year	Projected in 1971	Actual Appropriation	Percent of 1971 Projection	Personnel Additions	Yes/No
1973	$30,000	$30,000	100%	archeological aide	Yes
1974	$45,000	$36,000	80%	historic sites archeologist	No
1975	$56,000	$39,000	69%	clerk/typist	No
1976	$72,000	$41,000	56.9%	archeologist	No
1977	$83,000	$41,000	49.4%	laboratory technician	No
1978	$84,000				
1979	$85,000				
1980	$100,000				
1981	$100,000				

Emphasis within DOA has been shifting: "salvage, field surveys and examination of private collections have almost ceased in favor of coordinating and administrative responsibilities" (Bastian 1976:1). These new responsibilities include reviews of environmental impact statements, increases in archival and curatorial activities, and responses to inquiries for information on the presence and significance of prehistoric resources. Unable to accomplish its originally mandated tasks, DOA also cannot provide active leadership and direction in prehistoric resource management with its present staff and funding.

Staff and funding levels for an effective program can be specified by adapting to Maryland the successful model of the Arkansas Archeological Survey (McGimsey 1972). A two-stage increase in staff and funding would allow DOA to discharge its mandated obligations and increase its effectiveness in the area of resource management.

Thus, the first stage of budget increase should provide for a strong

central office adequately staffed and equipped to meet current responsibilities as well as new demands for curatorial work, storage, and other functions. Table 6-2 lists proposed central office staff and their duties. Bringing DOA staff to this level, along with providing necessary equipment, supplies, and transportation, would require an initial budget of $100,000 ($17,000 more than the 1971 projected budget figure for fy 1977).

The DOA's new central office would house the Director, who also may be the State Archeologist. The Director's duties would include full time administration, setting DOA policy, coordinating activities, providing liaison with the legislature, and promoting outside funding. As Dincauze and Meyer point out, significant federal funding is available for prehistoric preservation; however, these funds must be pursued vigorously (Dincauze and Meyer 1975:43).

Enlarging DOA's central office will make it possible to evaluate the need for regional offices, the second stage in increased budgetary support. Regional offices, staffed by an archeologist and a technician with duties outlined in Table 6-2, might oversee the acquisition of baseline information on prehistoric resources, even before a comprehensive management plan has been implemented. Federal matching grants for site surveys then would help defray costs to the state. Or, these offices might be instituted after the conservation plan has been formulated, in order to implement its policies.

Table 6-3 divides coastal Maryland into four hypothetical regions. Each region has a high degree of internal consistency, in terms of environmental composition and current patterns of development. Ultimately, each region would employ a management program suited to its own circumstances. Thus, one regional archeologist and one full time assistant would be based in the central office, serving the northern Western Shore. Other regional staff might be housed in existing state field offices, education or research institutions, or other suitable places.

To help support its regional offices, the Arkansas Archeological Survey has a mutual arrangement with Arkansas institutions of higher education to provide a percentage of the regional archeologist's salary (on a nine month basis) and office-laboratory space. In return, the

Table 6-2

Suggested Division of Archeology Personnel

Position	Duties
Central Office	
Director (who may be State Archeologist)	- sets policy - interacts with state and federal agencies - interacts with state legislature - promotes prehistoric conservation through public lectures and lobbying - raises funds - oversees development of master conservation plan
State Archeologist (if not director)	- directs central office - coordinates activities of regional archeologists - oversees National Register nominations of prehistoric sites - directs acquisition of baseline data on prehistoric resources
Editor	- edits reports and publications - writes educational popular brochures in conjunction with Division staff - produces Division publications
Technician	- photographs sites and artifacts - processes photographs - drafts maps, etc.
Technician	- curates artifacts - catalogues artifact and site information

Table 6-2 (continued)

Position	Duties
Secretary-bookeeper	- manages Division paper work - orders supplies
Typist	- types central office materials
Part-time help	- as needed for fieldwork and archival research
Regional Offices	
Archeologist	- reviews impact statements and provides field checks for sites - forms liaison with local public and private agencies for land use regulation - gives public lectures - produces information on region's prehistory - helps amateur groups to design exhibits - directs salvage archeology - coordinates research with professional and amateur groups
Technician	- curates artifacts - catalogues artifact and site information - performs archival research - types regional office materials

Table 6-3 Suggested Maryland coastal regions for Division of Archeology field offices

Region	Counties
Northern Eastern Shore	Cecil, Kent, Queen Annes, Talbot, Caroline
Southern Eastern Shore	Dorchester, Somerset, Wicomico, Worcester
Northern Western Shore	Harford, Baltimore, Anne Arundel
Southern Maryland	Prince Georges, Charles, St. Marys, Calvert

regional archeologist teaches one or two courses each year. These courses, involving curatorial work and research, complement survey duties. Other courses could include such topics as local prehistory, field methods, or cultural resource management. At present, none of Maryland's state supported educational institutions is heavily involved in local prehistory. Most local prehistoric research is being conducted by archeologists from other areas or from American University or Catholic University in Washington, D.C. Attempts should be made to encourage state supported institutions to become involved in local prehistory, without threatening established programs or traditional concepts of academic freedom; for example, a new faculty position, funded partly by federal matching monies, may be acceptable to administrators and faculty alike.

DOA's present understaffed office can neither monitor closely development throughout the state nor check for compliance with current archeological legislation. It appears that the interests of conserving prehistoric resources may be better served by the regional offices than by the infrequent and brief visits of the State Archeologist. Regional offices provide several advantages over the current structure and regional archeologists will be familiar with the character of development patterns in their regions and be acquainted with the administrative personnel who partly control development; contact with the public will increase, educational goals can be tailored to the local setting, and a firmer grasp

of the magnitude and character of prehistoric resources within the region can be achieved. Most important, the comprehensive management plan will be better implemented and antiquities legislation better enforced.

In short, the present financial and staff resources of DOA do not match its responsibilities, which have increased in number and complexity far beyond those originally envisioned by the enabling legislation. Therefore, the needs of prehistoric resource conservation are not being adequately met at present. DOA needs to be strengthened and its resources used effectively in the interim. Public visibility should be increased, and financial and administrative support for an expanded program pursued aggressively.

Current State Programs: Maryland Historical Trust

The Maryland Historical Trust (MHT), established in 1961 and located in Annapolis, functions within the Department of Economic and Community Development. Currently employing 24 persons, the agency receives approximately $158,000 in state funds annually. An almost equal amount comes from federal matching monies, although not all these funds support MHT's main activities. Since it represents the state's primary link with federal preservation programs and funding, MHT must be sensitive to the nature and abundance of Maryland's prehistoric resources. MHT's enabling legislation is however ambiguous concerning its role in the conservation of prehistoric archeological resources, describing its purpose as:

> Acquiring, preserving and maintaining historical, aesthetic and cultural properties, buildings, fixtures, furnishings and appurtenances pertaining in any way to the province and State of Maryland from earliest times, to encourage others to do so and to promote interest in and study of such matters (Art. 41, Sec. 181A).

"From earliest times" is an ambiguous term. Does it refer to age of the province or to age of all human habitation?

This enabling legislation also made the Maryland Inventory of Historic Sites the official catalogue for sites having historic, architectural, archeological, or cultural merit. In addition, this legislation

made the Maryland Landmark List the official list of historic sites of particular merit, including National Register properties, national historic landmarks, and state, county, and municipal historic preservation districts. At present, these lists reflect a strong bias toward historic sites as Table 6-4 shows:

Table 6-4 Trends in National Register Entries for Maryland

Date	Total Sites on National Register	Number of Prehistoric Sites	Percent Prehistoric Sites
July 1975	309	14	4.5%
November 1976	414	19	4.0%
November 1977	432	19	4.0%

Although the purpose and use of the National Register of Historic Places has been much discussed, it is generally agreed to recognize districts, structures, sites, and objects of significance, ranging from local to national, in history, architecture, archeology, or culture (Utley 1973: 63). Recognition, of course, does not guarantee perpetual preservation. Unfortunately, state and local planning agencies and developers have increasingly come to use the National Register as the main tool for assessing project impacts on prehistoric resources.

As noted above, Table 6-4 shows that the sites registered for Maryland emphasize historic rather than prehistoric significance. In comparison to the 19 prehistoric sites registered, more than 2160 prehistoric sites have been reported in the study area and more than 6500 prehistoric sites are predicted to occur in the study area coastal zone alone. Thus, at present the National Register does not reflect the abundance and diversity of Maryland's prehistoric remains.

The under-representation of prehistoric sites probably reflects not only conditions in Maryland and the lack of extensive professional activity, but also regional trends. For example, 205 cases of expenditures

related to cultural resource conservation show a similar imbalance in terms of funds expended (Iroquois Research Institute 1977). The earlier settled northeastern part of the United States tends to expend more resources on activities related to historic places and structures; other parts of the nation expend relatively more funds on prehistoric resources.

National Register nominations usually have not resulted from systematic prehistoric studies of areas. Instead, these entries often represent unique sites noted for a special feature such as exceptional size, age, or number of burials. The resulting list is biased, not representing the complete range of remains. Although small clusters of artifacts may not be so striking as large cemetaries or villages, the information they contain is equally important. Carried to an extreme, selectively preserving unique or special sites can lead to innaccurate conslusions and confused public impressions about past cultures. Site nominations showing the systemic relationships among sites should be encouraged, in order to preserve meaningful samples of the prehistoric record. Only systematic studies can reduce the omissions and redundancies that might otherwise occur in the National Register.

Because planners often assume that no registered sites in an area means that no significant sites exist, relying on the National Register can produce stress on prehistoric resources. Planners may encourage development in areas where important prehistoric resources could be damaged. For example, a recent draft environmental impact report for a coastal residential development in Anne Arundel County examined the National Register and concluded that there were no properties listed or eligible for listing that would be effected by the development. Thus, no particular recommendations were set forth regarding prehistoric resources. However, a shoreline inspection of part of this project during the present study revealed three prehistoric sites, two of considerable extent. Because the area is densely wooded, it is unlikely to have undergone extensive disturbance during modern times. This fact, coupled with the loss of other prehistoric resources in Anne Arundel County from shoreline development, means that these three sites could be locally or regionally significant.

Uncritical use of the National Register, like uncritical use of DOA records, can thus create a false sense of security in users. Prehistoric resources usually do not provide the highly visible, readily identifiable, and easily comprehended profiles that historic structures do.

Perhaps the greatest factor affecting the nomination of Maryland prehistoric sites to the National Register is the lack of adequate background information on which to make defensible and intelligent nominations. Until this situation is remedied, Maryland will not be able to enjoy the potential protection afforded its prehistoric resources, were a representative sample recognized by inclusion on the National Register. Efforts should be made immediately, then, by both DOA and MHT, to expand the numbers of prehistoric sites nominated to the National Register and to insure that these nominations reflect the diversity of prehistoric resources found in the Maryland coastal zone.

As can be seen in the following passage, MHT's enabling legislation makes its role in conserving Maryland's cultural resources explicit (Art. 41, Section 18E):

> (g) To contract for service with, cooperate with and otherwise assist, insofar as practicable any agency of the State of Maryland or any of its political subdivisions, and any private agency or person in furtherance of the purpose of the Trust and to encourage individual and community plans and zoning ordinances relating to the restoration, preservation, alteration and or development of designated sites and areas...

To date, MHT has been particularly active in sponsoring county committees, forming historic district zones, conducting county historic site surveys, and holding public information seminars on topics related to preservation. Most of these activities have been directed primarily to structures and sites resulting from Maryland's colonial period and later.

An important area of MHT operations concerns the review of environmental effects reports and impact statements forwarded by the Maryland State Clearinghouse and other agencies. Both the National Environmental Policy Act of 1969 and the Maryland Environmental Policy Act of 1973 require that cultural resources be included in assessing environmental effects or the impact of proposed projects.

As the primary review agency for cultural resources with regard to A-95 Clearinghouse documents, MHT is in a lead position to monitor the nature, location and rate of development as it may affect prehistoric resources. Chapter Five points out numerous potential sources of stress on prehistoric resources; however, no statistical information exists regarding actual damage annually or regionally. Therefore, MHT ought to investigate the potential benefits of monitoring stress on prehistoric resources. For example, a sampling plan might field check randomly projects of different sizes and types. Such a stress-monitoring study could produce valuable management information by cross tabulating kinds of projects for size, location, and possible effects on prehistoric remains. Critical localities and sources of stress could then be identified and appropriate shifts in educational, permit-monitoring, and other programs made.

Although DOA has the state's mandate for the care and protection of prehistoric resources, MHT participates in federal National Register and Historic Preservation Grants-in-Aid programs and is thus responsible to the federal government for preserving both historic and prehistoric cultural resources. Responsibility is held by the office of the State Historic Preservation Officer (SHPO), who is appointed by the governor and housed within MHT. The SHPO is charged with updating the National Register of Historic Places with cultural resources of local, state, and national significance. In addition, the SHPO administers the federal matching fund program instituted under the Historic Preservation Act of 1966 (P.L. 89-665). Under this program the SHPO receives federal matching funds for surveying the state's cultural resources, establishing a state preservation plan, and acquiring and maintaining significant properties for preservation. In addition, the SHPO has other duties and responsibilities that relate to compliance with the federal act and subsequent rules and regulations.

Federal rules and regulations require that each state establish a historic preservation plan as one of the conditions for participating in the National Register and Grants-in-Aid programs. The goals and criteria of the Maryland Historical Preservation Plan were first articulated in

1970 (Raymond et al. 1970), prior to the publication of federal criteria for state plans. In this document, prehistoric resources are defined as "areas that contain or are thought to contain archeological and ethnographic remains, especially regions of prehistoric, Indian, and early colonial culture" (Raymont et al. 1970:13). Prehistoric sites are placed in an open space category and are explicitly recognized as being composed of various kinds of remains (for example, villages, campgrounds, burial grounds, etc.); however, prehistoric sites are not treated in detail as historic sites and structures are.

The Plan does promote consideration of cultural resources in the planning process and advocates a change from an older, more defensive position. Most of the goals promoted by the Plan are consequent with current approaches to the problem of managing prehistoric resources, although this document does not supplant the need for a prehistoric resource conservation plan.

Another condition for participating in National Register and Grants-in-Aid programs is the maintenance of a full time professional staff responsible to the SHPO. This staff must be qualified in whatever fields -- history, archeology, architecture, planning -- may be necessary. Relatively little effort and little funding were expended by MHT on prehistoric resources until 1975, when to meet the above requirement MHT added a prehistoric archeologist to its staff. Since that time both funding and efforts on behalf of prehistoric resources have increased.

The relationship and division of duties between DOA and MHT have been discussed, with some suggesting that DOA's administration within MGS may inhibit its growth (Bastian 1971, 1976 discusses this problem) and that efforts on behalf of prehistoric resource conservation may be unnecessarily duplicated. Indeed, there is a dichotomy in handling the state's prehistoric resources, with the federal mandate and the administration of most financial support for preservation efforts resting with MHT, while both MHT and DOA have received the state mandate for conserving prehistoric resources, with DOA having the primary responsibility.

MHT has a large staff and an extensive organization coordinated at

the county level; MHT also has higher public visibility and direct, regular ties to federal and private preservation agencies and their programs. MHT reviews projects for potential impacts on prehistoric resources and administers the National Register of Historic Places, including the review process by which sites are added to the National Register. Finally, MHT has recently become involved in supporting surveys across the state to identify prehistoric resources.

In contrast, DOA is a smaller organization with relatively low public visibility which maintains archival records as well as engages in conservation efforts for prehistoric resources. Interaction between DOA and MHT accompanies their shared review of environmental impact statements, National Register nominations, and research proposals. DOA attempts to articulate the needs of prehistoric resource conservation with funds available through MHT for prehistoric resource surveys. Evolving from this relationship is a cooperative system in which projects are carried out by DOA and funds administered by MHT, which also reviews project results. In summary, most of the financial resources and federal responsibilities for prehistoric resource preservation lie with MHT; the state mandate, records, and primary expertise on prehistoric resources are found in DOA. This split plan differs from the centralized organizations adopted by many states.

Clearly, it is desirable to maximize the effectiveness of both these agencies for prehistoric resource management. A review of alternative organizational schemes, to evalaute whether or not other approaches might improve their effectiveness, would be helpful. For example, current trends suggest that MHT might assume an administrative role while DOA, with the support of MHT administered funds, might assume an implementation role, developing and executing a program for the acquisition of baseline data in addition to continuing its archival and curatorial functions.

Areas of potential overlap between the two agencies might then be clarified, in order to avoid duplication of effort in educating the public, improving legislation, seeking outside funding, acquiring baseline information, implementing interim management measures, and providing leadership for formulating a comprehensive management plan.

Useful Legislation for Prehistoric Resource Conservation

In addition to the Maryland Archeological Resources Act, the Maryland Environmental Policy Act (NR 1-301 to 305), enacted in 1973, requires consideration of prehistoric resources at the state level. This act establishes the necessity for protecting, preserving, and enhancing the state's diverse environment. Historic values are included among those that make up a quality environment which must be taken into consideration for an optimum balance between economic development and environmental quality. The act requires that state agencies consider environmental amenities and values along with economic and technical considerations in planning and decision-making, and that studies or environmental effects reports be undertaken to "develop and describe appropriate alternatives to present policies, programs, and procedures that involve significant adverse environmental effects or unresolved conflicts concerning uses of available resources" for each proposed state action significantly affecting the natural, socio-economic, and historic environment. Section 4, Adverse and Beneficial Environmental Effects, of the MEPA Guidelines, lists "Archeological Considerations." A more extensive checklist is available also, listing several kinds of archeological remains to be inventoried (Section J). Since its enactment, MEPA has been amended to include "historic resources" or those resources included on the Maryland Inventory of Historic Sites.

The DNR is responsible for issuing guidelines to assist state agencies in preparing environmental effects reports. To use MEPA most effectively in preserving prehistoric resources, it is necessary to assure that its wording include both prehistoric and historic archeological sites along with other cultural resources such as historic and architectural structures. Restricting historic resources to those located on the Maryland Inventory of Historic sites is detrimental to archeological sites, both prehistoric and historic, because few of these sites now are found on the Inventory. This site by site, piecemeal approach to site registration may suffice for historic structures that can easily be perceived and evaluated; but this approach will prove prohibitively expensive and ineffective for prehistoric resources that are generally not susceptible to easy discovery

or understanding.

Since MEPA calls for environmental effects reports to include a consideration of prehistoric resources, DNR should assure that prehistoric resources are regularly discussed. The archeological portions of these reports should be endorsed by persons with recognized qualifications. To facilitate consideration or prehistoric resources, DNR might issue a brochure explaining what these resources are, why they are important, how to identify them, and how they should be treated in environmental effects reports.

Article 6613, Sections 8.01-8.04 of the Maryland Code provides for Historic Area Zoning. The purpose of this legislation is to safeguard the heritage of a county or municipal corporation by preserving a district reflecting elements of its cultural, social, economic, political, or architectural history. Historic districts also will stabilize and improve local property values, foster civic beauty, strengthen the economy, and promote the education, welfare, and pleasure of the residents. As it is used, "structure" includes natural land formations. Local governments are authorized to create historic district commissions for establishing historic districts; this commission may designate MHT to study and make recommendations concerning preservation within the local area.

Historic area zoning could be used to preserve prehistoric resources. Developing local areas with ongoing excavations of specific prehistoric sites and constructing small museums and roadside interpretive signs could further local tourism, improve property values, and promote the education and pleasure of local residents and transient visitors alike. This might necessitate clarification of the enabling legislation to specify the consideration of prehistoric resources and eventual coordination with the prehistoric conservation plan.

Finally, Article 81, Section 12E of the Maryland Code specifies that up to 50% tax credit may be given to landowners for designating open space, open areas, or preservation easements. Such tax credits, if extended to citizens for the protection and preservation of prehistoric sites, could aid in lowering the cost of prehistoric resource conservation.

Tax credits could be offered to owners of agricultural lands who hold prehistoric sites out of cultivation or who limit land use to cultivation only. The taxation of land according to use, not value of highest possible use, also might encourage the preservation of forests, wildlands, and other forms of low impact land use.

Land Use Planning: Department of State Planning

Several planning and environmental assessment groups have been established in Maryland to guide development. In addition to developing a state land use plan and other duties, the Department of State Planning (DSP) gathers basic planning information, partially funds and reviews county planning efforts, and administers the state's A-95 Clearinghouse, which attempts to make the federal grant-in-aid system responsive to state and local government management decisions.

At present, consideration of documents by the A-95 Clearinghouse is accomplished under a policy of "lead agency review." MHT is the lead agency for A-95 documents regarding cultural resources, including materials from state agencies. The importance of the A-95 review process cannot be overstated, since it provides the contact point for monitoring development within the state. Of course, the value of such a review program depends in part on the quality of information submitted in environmental effects reports, impact statements, and development plans, and in part on the quality of information on prehistoric resources available to those reviewing the documents.

Thus, sensitizing agencies that submit materials to the A-95 Clearinghouse can improve their consideration of prehistoric resources. Agencies should be made familiar with the nature and extent of the current data bank on prehistoric resources, as well as provided with suggestions on how best to consider these resources when preparing initial impact assessment forms. Field inspection by professional archeologists should be encouraged. Seminars for personnel from agencies which submit large numbers of A-95 Clearinghouse documents might be held, familiarizing them

with procedures; informative brochures might be made available.

DSP also can designate areas of Critical State Concern (Art. 88C, Sec. 2(b)(3)(1975 Supp.)), based on recommendations from local governments. Critical areas located in the coastal zone automatically become Geographic Areas of Particular Concern under the Coastal Zone Management Program.

Along with other biological, scenic, and cultural resources, prehistoric resources may be used to nominate Resource Protection Areas, including tidal wetlands, upland natural areas, prime recreation areas or agricultural land, areas of historic and prehistoric importance, aquatic critical areas, high risk shore erosion and floor hazard areas. Although a tendency might exist to nominate individual prehistoric resources as critical areas following the precedent set by the National Register of Historical Places, this approach is inefficient in prehistoric resource conservation. Instead, areas containing representative samples of all kinds of prehistoric land use, including interior areas, should be preserved under the critical areas program. In regard to this program, DSP and DOA should cooperate to encourage counties to consider prehistoric resources in critical area nominations. Guidance and suggestions on potential critical prehistoric resource areas could be obtained from DOA and MHT.

Finally, DSP has developed the Maryland Automated Geographic Information System (MAGI). The MAGI system was developed to provide geographic information to aid in preparing the state land use plan and was expected to be useful to other regional planning efforts. The potential utility of entering information on prehistoric resources in the MAGI system should be investigated by DOA and MHT. Data on prehisforic resources could be entered into the system to provide users with information on the known presence or absence of resources, available studies, or other relevant data. The 91.2 acre grid cell used by the system would provide a compromise between providing the specific location of prehistoric resources which could endanger them and providing no locational information at all. Unfortunately, investigator biases prevent current information on Maryland's prehistoric resources from reflecting the prehistoric record adequately, hence decreasing the utility of MAGI applications.

Land Use Planning: Regional Planning Council

Article 78D of the Maryland Code creates a regional planning council for Anne Arundel, Baltimore, Carroll, Harford, and Howard counties, so that special planning attention can be given this fast-growing area and conflicts in land use can be minimized. Because of its fast development, this area is one of exceptional stress to prehistoric resources. Consideration of these resources should be included in work by the planning council. In addition, the regional baseline studies discussed later in this chapter should include areas of high stress, such as parts of these counties. DOA and MHT should conduct an information meeting with this group to explain the need for considering prehistoric resources and to find ways of implementing this concern.

Land Use Planning: Coastal Zone Management Program

In 1972 the federal government enacted the Coastal Zone Management Act P.L. 92-583) recognizing the irretrievable loss and damage occurring in the coastal zone to important cultural and historic resources, among others. A primary objective of the Act was to encourage cooperation between government agencies in coordinating their activities in the coastal zone and in devising ways of managing uses that often are in conflict. To accomplish this end, the Act established a federal grants program (Section 305) and offered technical assistance to states to develop coastal zone management programs.

The stated policy of the Act is for program development to give "full consideration to ecological, cultural, historic, and aesthetic values, as well as to needs for economic development." Although encouraging maximum use of extant data banks, the rules and regulations developed to guide Program Development Grant application procedures clearly recognize the need for acquiring field data, for example via "resource surveys" and "inventories."

In addition to encouraging the wise use of all coastal resources,

the Act provides specific mechanisms that are potentially important to prehistoric resource conservation. The Act requires "an inventory and designation of areas of particular concern." Among the eight criteria provided for designating such areas are "areas of unique, scarce, fragile or vulnerable habitat, physical feature, historical significance, cultural value and scenic importance." Prehistoric resources are an important criterion in designating such areas and therefore ought to be regularly considered. Information developed by regional baseline studies should enhance the quality of nominations for Geographic Areas of Particular Concern. It should be noted that the Draft Coastal Zone Management Program for Maryland explicitly recognizes prehistoric resources as a factor in determining these critical areas.

Another opportunity for prehistoric resource preservation provided by the act is the Estuarine Sanctuary Program. This program authorizes grants of up to 50% for the acquiring, developing, and operating estuarine sanctuaries, designed to provide field laboratories for studying "natural and human processes within estuaries of the coastal zone." As already noted, prehistoric remains often are associated with estuaries and contain information on natural and human history; thus, they should be considered as a criterion for selecting sites for this program. Although inclusion in this program may require eventual destruction via excavation or other study, this use of the resource could be a benefit, were studies interdisciplinary in scope and designed to address questions relevant to resource management or baseline information needs.

The Coastal Zone Management Unit of the Energy and Coastal Zone Administration is the primary point of interface between the State of Maryland and the Coastal Zone Management Act, administered by the National Oceanic and Atmospheric Administration. Maryland has been awarded three Section 305 Program Development Grants; with this funding the Coastal Zone Unit has completed the final draft of Maryland's proposed Coastal Zone Management Program. The unit now awaits final approval of the plan before applying for Section 306 Administrative Grants.

At this time, Maryland stands out among coastal states in incorpora-

ting a consideration of prehistoric resources in its Coastal Zone Management Program. This momentum should not be lost and, as the primary agency for planning and information development within the coastal zone, the Coastal Zone Unit should remain involved in prehistoric resource conservation matters. This involvement could take several forms, including co-sponsoring prehistoric resource information sessions and management seminars for state and local agencies and planners, investigating the use of Section 306 Matching Grants for regional baseline studies, promoting prehistoric resource conservation via news releases, films and suggested legislation, and nominating Geographic Areas of Particular Concern.

Land Use Planning: Center for Environmental and Estuarine Studies

One of the primary duties of the Center for Environmental and Estuarine Studies, a branch of the University of Maryland, is to develop and apply predictive information on ecology to improve and preserve Maryland's physical environment (NR 3-403). This goal is to be accomplished through a program of research, public service, and education. Since they frequently contain information on changes through time in the biological and physical environment of an area, prehistoric resources can provide an important (and often missing) time depth to ecological studies. In addition, the successful acquisition and interpretation of regional baseline information on prehistoric resources will require an understanding of paleoenvironmental changes in the Bay area. Thus, DOA and MHT should approach the Center to explore avenues of cooperation and mutual assistance.

Land Use Planning: Power Plant Siting Program

In 1971 the Maryland Legislature passed enabling legislation for the Maryland Power Plant Siting Program (PPSP) as part of the DNR. This legislation provides the program with funding and authority to guide the development of power plant sites within the state. To date, numerous sites have been considered for acquisition by PPSP as potential power plant sites,

including the Elms site, St. Marys County, the Still Pond Neck site, Kent County, and the Bainbridge Naval Training Center site, Cecil County. The present procedure involves issuing reports based on preliminary studies of the suitability of a site for development; detailed investigations are planned for sites selected for purchase.

Preliminary site evaluation reports issued on the above properties conclude that no, or only minimal, impact on cultural resources would occur from the development of the plant sites and transmission corridors. Documentation and supportive evidence for these conclusions however are minimal. (Further investigation is explicitly recommended only for the Elms site.)

The consideration of cultural resources should be an integral part of PPSP's preliminary investigation. Such consideration should involve field inspection in addition to the review of such lists as the National Register of Historic Places and DOA records. This procedure appears to be especially prudent because coastal locations are frequently favored for new power plant development.

Considerable ground disturbance accompanies the construction of power plants, including plant site and transmission oriented construction, the placement of intake and outfall structures, and possible canal construction for moving heavy plant components. If located in rural areas, plant construction also can be accompanied by a considerable secondary impact on prehistoric resources. However, PPSP results from forward-looking legislation which, when combined with adequate information on prehistoric resources, can insure compatibility between use of the coastal zone and conservation of its resources.

Land Use Studies and Plans

Numerous recent studies have dealt with public land planning and acquisition in Maryland, including the Maryland Department of State Planning Catalog of Natural Areas in Maryland (1968), the Smithsonian Institution Natural Areas of the Chesapeake Bay Region (1974), the three volume Maryland Outdoor Recreation and Open Space Comprehensive Plan (Raymond,

Parish, Pine, and Plavnick 1974; Urban Research and Development Corporation 1971, 1972), the Maryland Chesapeake Bay Study (Wallace et al. 1972), the seven volume Chesapeake Bay Existing Conditions Report (U.S. Army Corps of Engineers 1973), and the three volume Maryland Uplands Natural Areas Study (Rogers and Golden 1976). Unfortunately, most of these studies do not include a consideration of prehistoric resources. Both the DSP and Smithsonian Institution studies, however, are forward looking in giving some consideration to prehistoric resources in their discussions of prospective natural areas.

Although planning can modify land disturbance and contribute to conserving prehistoric resources, planning processes have yet to effectively incorporate a concern for their importance and sensitivity. There appear to be two major reasons for this failure, one stemming from neglect or ignorance and the other from a lack of adequate information on which to base planning decisions. Natural area inventory and assessment studies should include systematically inventoried cultural resources in their schemes, because such resources are totally irreplaceable and, in that sense, similar to non-regenerative natural resources. As discussed earlier, prehistoric sites are the repositories not only of the residue of various cultural processes, but also they contain evidence for changes in the natural system which may or may not have been caused by humans. Perhaps most important is the fact that when prehistoric resources are included as one of the criteria for designating or recommending natural areas for acquisition, the relative cost of preservation decreases because it is incorporated with other concerns. A prehistoric preservation program based on site-by-site piecemeal acquisition is far less efficient and economical.

As more data become available on Maryland's prehistoric resources, natural region studies will be able to include a more effective consideration of them. Information on them is being produced by MHT surveys aimed at identifying properties eligible for the National Register of Historic Places (see, for example, the authors' study on the archeological resources of western Kent County, Wilke and Thompson 1977). In addition, DOA can provide information relevant to some prehistoric resources in specific areas.

To preserve prehistoric resources effectively, land planning and acquisition projects and the studies upon which they are based must consider prehistoric resources carefully. Therefore, state agencies should encourage the use of prehistoric resources in planning studies and as a criterion for determining priorities in acquiring lands for ecological preservation areas. In this way prehistoric resources can become a routine part of the study, assessment, and evaluation of such activities.

County soils survey reports produced by the U.S.D.A. Soil Conservation Service are used increasingly as primary data sources in formulating county land use plans, with such soils parameters as slope, drainage, and fertility used to guide the nature and distribution of future development. As discussed in Chapter Two, prehistoric use of the landscape also was partly determined by the distribution of soils and the vegetation and fauna they supported.

The recent Charles County soils survey (Hall and Matthews 1974) recognizes the extensive distribution -- perhaps more than 800 acres -- of Indian Kitchen Midden soils in the county. These culturally affected soils are a mixture of whole and fragmented oyster shell in a fine, black, organically rich matrix of moderate alkalinity. The discussion of these areas concludes:

> Although these areas have little value for crops limitations are likely to be few for most nonfarm uses (1974:23; emphasis added).

This conclusion does not take into consideration the value of these areas as cultural resources, nor does it recommend informing DOA about them before extensive land disturbance takes place. Omitting these concerns misleads planners, who base land use projects partly on this information. These omissions also mislead individual farmers and other landowners who use the reports to guide the development and use of their lands. The handling of cultural soils in future county soil reports should be discussed with DOA and MHT. Topics to be covered should include recommendations for notifying DOA prior to disturbance of known cultural soils, use recommendations, and site mapping.

The Department of State Planning Catalogue of Natural Areas in Maryland in-

ventories natural areas of presumed statewide significance. Consideration is extended to areas with unique historical, geological, or ecological aspects. Throughout the state, 184 areas are included, totaling nearly 472,000 acres of which fifty-seven percent were privately owned at the time of this study.

Prehistoric resources are considered in discussing the Zekiah Swamp area and are the primary attraction listed for two other areas, the Port Tobacco and Pisctaway Creek Indian Villages. The latter two sites have been quite well known for some time. No reasons or criteria are presented for including these sites and excluding countless other sites, possibly more significant or endangered. Nothing in the report suggests that prehistoric resources were considered in a systematic fashion. Therefore, it is recommended that further studies of this nature include input from DOA and MHT prior to initiating field studies.

The Smithsonian Institution sponsored report Natural Areas of the Chesapeake Bay Region (Smithsonian Inst.1974)includes a scheme under which 232 sites in Maryland and Virginia are ranked and 64 prime natural areas are recommended for procurement. Of the 232 sites, 124 are located in Maryland with 29 considered prime. The report introduction states that "strictly archeological sites were not included in this study" (p. 42), although in the numerical ranking system the presence of prehistoric features in a natural area is accorded one point per occurrence within each study area. For example, Zekiah Swamp is rated as follows:

Data	Points Awarded
Zekiah Swamp	
Maryland	
Charles County	
5,385 hectares in size	4
Private ownership	
Hardwood swamp forest	1
Good stands of Ilex opaca, Quercus palustris, and Liquidambar styraciflua. Mature Timber	
High diversity of plant species.	2
Populaous heterophylla, southern outlier	1
Beaver, mink (commercial species)	1
Osprey (depleted), heronry (seasonal breeders)	3

Data	Points Awarded
Wilson's snipe and wood duck (overwintering)	1
Concentration of migrating birds	1
Southern Bald Eagle nest (endangered)	4
Rare animals: red bellied woodpecker, Maryland Diamondback Terrapin, Allocapania Zekiah Stonefly	4
One of the largest of Maryland's remaining undisturbed swamps	2
Rating Total	24

Zekiah Swamp was rated the highest of all 232 study areas examined. Left out of the rating were 27 currently known prehistoric sites all recorded by DOA. Undoubtedly many more sites could be added if the area were subjected to a thorough and systematic prehistoric survey. Nine -- over 36% -- of the 29 prime natural areas in Maryland occur partly or completely within Charles County. Seven of the nine Charles County areas are marked by the presence of numerous known prehistoric sites. The relative sizes in hectares and the number of recorded prehistoric sites associated with these features are as follows:

Area	Size (in hectares)	Number of Reported Prehistoric Sites
Zekiah Swamp	5385.3	27
Patuxent River	--	4*
Nanjemoy Creek-Wards Run	1010.0	34
Cedar Pt. Neck	2020.0	13
Lloyd Creek	16.2	0
Perry Branch	76.8	0
Maryland Neck	1018.3	2
Mattawoman Creek	1559.4	17
Chicamuxen Creek	270.7	1

*Charles County portion

Systematic inclusion of prehistoric resources into the report's ranking scheme would have produced a far different order than has been achieved without their inclusion. By suggesting that prehistoric resources are not used as a criterion, and then mentioning them in ranking, the report gives the unfortunate impression that these resources do not

figure prominently in any of the study areas.

The failure of recreation, natural areas, and open space plans to consider the nature and distribution of prehistoric resources poses immediate threats to these resources and diminishes local and regional educational and interpretive possibilities as well. As Fig. 5-12 shows, a surprisingly small proportion of the Maryland shoreline is devoted to public recreation, open space, or other conservation needs. The three volume proposed Maryland Outdoor Recreation and Open Space Comprehensive Plan (Urban Research and Development Corporation 1971, 1972; Raymond, Parish, Pine and Plavnick 1974) emphasizes the need for locating limited use and conservation areas along the shorelines and waterways of the state (Urban Research and Development Corporation 1972:49).

This plan further recognizes the aquatic orientation of historical sites: "it is interesting that many of these historic sites relate closely to one basic natural feature: water" (1972:22). Unfortunately, the plan does not distinguish prehistoric sites as a kind of resource separate from "historic structures and sites." The Maryland Outdoor Recreation and Open Space Comprehensive Plan does however include several suggested statewide policies and recommendations that pertain directly to cultural resources:

1. preserve historic structures and sites (Urban Research and Development Corporation 1972:45)
2. control land uses adjacent to parks and major scenic or historic sites to prevent urban encroachment (Urban Research and Development Corporation 1972:45)
3. incorporate irreplaceable historic sites and structures into an open space system (Urban Research and Development Corporation 1972:46)
4. develop a system of scenic roads incorporating historic, cultural, and unusual geologic features of the state (Urban Research and Development Corporation 1972:47)
5. develop information programs to further the appreciation and understanding of Maryland's natural, cultural and historic resources (Raymond, Parish, Pine, and Plavnick 1974:8)
6. promote tourism connected with recreation, scenic, historic, and

natural areas (Raymond, Parish, Pine and Plavnick 1974:9)

7. emphasize the location of recreation areas at water resource sites and areas of historic, geologic and ecologic interest (Raymond, Parish, Pine and Plavnick 1974:9)

These and other guidelines could aid in efficient management of prehistoric resources, were their nature and distribution taken into consideration.

Failure to consider these guidelines will reduce the effectiveness of the plan in aiding in low cost preservation of a representative sample of the state's coastal prehistoric resources. For example, in Charles County the Popes Creek area is proposed as a conservation area, with the main attraction centered on a geologic scarp and the general scenery. This area also has long been well known as the site of an extremely large coastal shell midden. The site complex was first mentioned by Reynolds (1883) and later was extensively described by Holmes (1907:118), who observed:

> it is stated on the authority of residents of the neighborhood that, at the outer margin of the terrace, the shells had accumulated to a depth of nearly twenty feet. The greatest depth observed in the portions that now remain is about five feet.... The terrace...has a surficial area of about four acres.

On the south side of the creek, Holmes described similar extensive deposits which had attained depths of several feet, covering more than twenty acres.

Although this site has been greatly diminished during historic occupation, any plans for developing the recreation or open space potential for the area should incorporate an awareness of the intensive prehistoric use of the area. The opportunity for protecting any undisturbed prehistoric remains and interpreting them must not be lost by oversight or belated consideration of prehistoric resources.

The works of Hickey (1970) and Looker and Tidwell (1963), as well as DOA records, suggest that Zekiah Swamp and its associated uplands in Charles County were intensely exploited by prehistoric populations. The recreation plan however does not recognize prehistoric remains as part of the area's critical resources to be evaluated and incorporated in the

natural area that is proposed for Zekiah Swamp.

Another example of recreational land planning that could create potentially serious impacts on prehistoric resources is the Fairlee Point Activity Center proposed for the mouth of Fairlee Creek in Kent County. This point of land long has been known for its extensive prehistoric deposits. Mayre (1938:128) describes the extent of this deposit as follows:

> this shell-heap covers a neck between the Bay and the first cove of the southern side of Fairlee Creek, extending around the head of this cove and up the creek, around several points or bends, a distance, in all, of not less than three quarters of a mile. The number of acres covered could not be determined but it is very considerable...Near the mouth of Fairlee Creek...the shellbank attains a depth of fifty-four inches.

Radio-carbon dating of a sample of oyster shell collected from the base of the shell deposit at Fairlee Point (locally known as Shell Point) yielded a date of 5563 radiocarbon years Before Present one of the oldest dated prehistoric sites known in Maryland's coastal zone.

The recreation and open space plan is, of course, projecting an ideal plan, which must be balanced with other needs of area residents. Several areas have been disturbed already beyond the level suggested within the plan.

Clearly, the requirements of preservation and good management can be achieved at the lowest cost only when all resources to be managed are considered at the time of initial planning. Therefore, policies for conserving prehistoric resources should be incorporated in these plans. Potential conflicts in land use can be minimized, allowing conservation and preservation of areas based in part on prehistoric resources. Serious consideration of these resources has been lacking in current state and local land use plans, and this lack should be remedied by requiring such consideration in document revisions and new plans. To this end, county planning departments should require county planning consultants to include a consideration of prehistoric resources in comprehensive plans and other planning documents.

State agencies are frequently called upon to provide information or

cooperate with federal and other studies which result in primary planning documents. Such opportunities to provide information and to state policy on prehistoric resource conservation ought not be overlooked. Failing to voice such concern contributes to the neglect of prehistoric resources. It is thus important that interchange occur between sponsoring agencies and DOA and MHT, to insure the most effective inclusion of prehistoric resources.

Whenever possible, information should be included from DOA and MHT systematic surveys of regional prehistoric resources. In this way, all relevant prehistoric resources can be considered in natural area planning, instead of the few widely publicized prehistoric sites whose significance in relationship to other local prehistoric resources has not yet been established.

As discussed above, Zekiah Swamp is often rated highly as a natural area; many Archaic tradition prehistoric resources are found along this natural feature. Thus, its natural and prehistoric resources could be preserved together, providing more efficient and economical preservation than if each were considered separately. Prehistoric resources also may be located adjacent to, instead of within, certain natural areas, as is the case with Zekiah Swamp; special procedures may be necessary to include them. In the case of Zekiah Swamp, preservation easements to control land use of parts of the adjacent uplands would be necessary to ensure the preservation of the prehistoric resources associated with the swamp.

Although incorporating prehistoric resources into public lands can increase their vulnerability to destruction through vandalism, prehistoric sites can be protected by safeguarding information on precise location and by planting protective vegetation. When resources in a natural or recreation area have been protected as much as possible, interpretive exhibits giving information on prehistoric use of the area can increase public interest and enjoyment in visiting these areas. Whether or not prehistoric resources are used as one criterion in selecting parcels for public acquisition, they should be taken into account before developing these lands, so that mitigation procedures can be used to ensure their maximum conservation.

Public Land Acquisition and Regulation

Current Maryland programs that might be used in preserving the state's prehistoric resources are reviewed here in order to maximize the possibility for low cost resource conservation. The goal of preserving a variety of ages and kinds of prehistoric resources can be aided by incorporating them in natural area preservation programs. Setting aside tracts of land that include diverse local environments would increase the likelihood of preserving a representative sample of the remains of all prehistoric cultures. Because different natural settings were often utilized by prehistoric groups for different activities and activities changed through time, preserving a variety of natural settings helps preserve a variety of prehistoric resources. Easily included in this type of preservation of prehistoric resources could be aspects of the natural environment, including scenic attractions, geological resources, plants, and animals.

The stated purpose of the Maryland Environmental Trust (NR 3-201) is to "conserve, improve, stimulate and perpetuate the aesthetic, natural, health and welfare, scenic and cultural qualities of the environment." This concern is to be expressed through education and other means. As part of their duties, trustees of the Environmental Trust are empowered to undertake research and education programs pertaining in part to cultural qualities of the state environment. Grants may be made for consulting and other services, and culturally significant properties may be acquired and held.

DOA and MHT staff members should make presentations to the trustees of the Environmental Trust to enlist support and cooperation in exploring ways in which the Environmental Trust can respond to the need for prehistoric resource conservation in the state. Because the Trust's mandate and goals are clearly compatible with cultural resource conservation, assistance should be possible in providing matching funds for federal grants, sponsoring public education programs, and purchasing important prehistoric sites.

Another group, the Maryland Agricultural Land Preservation Foundation, has been established (AG 2-501) to preserve agricultural and woodland

areas to provide sources of agricultural products, to control urban expansion, and to protect open-space. The primary method of reaching these objectives is by acquiring easements over agricultural lands in order to restrict their use. The merits of a similar scheme, coupled with appropriate inducements, might be investigated as a means of aiding prehistoric resource conservation.

The Scenic Rivers Act (NR 8-410 to 8-807) is a land management program that could be used to aid in prehistoric resource conservation. This act proposes to protect water quality and conserve resources. It sets aside certain rivers and related adjacent land areas that possess outstanding scenic, fish, wildlife, and other recreation values. Development is limited to such activities as fishing, hunting, hiking, horseback riding, natural and geological interpretation, scenic appreciation, and other programs. Current scenic rivers include the Anacostia, Deer Creek (Harford County), Monocacy, Patuxent, Pocomoke, Potomac (Montgomery and Frederick counties) Severn, Wicomico (Charles County), and Youghiogheny.

Using prehistoric resources as a criterion for establishing scenic or wild river systems would provide low cost conservation for prehistoric sites because related adjacent lands are encompassed by the act. To assure that sites remain undisturbed, guidelines should control soil disturbance within a setback of at least 200 feet of the shoreline, until a qualified person can certify that prehistoric resources will not be disturbed by specific construction projects.

The introduction to the Forests and Parks legislation (NR 5-101) encourages use of the state's natural resources to improve local economy, preserve natural beauty, and promote recreational and leisure interest throughout the state. Collectively, this legislation provides for the setting aside of areas to preserve their character and resources for the use and enjoyment of the state's population, with minimal modification. By considering prehistoric resources along with other criteria for determining which areas to set aside, low cost conservation could result. Conservation would be enhanced further if data from regional baseline studies were available to assure the preservation of a representative sample of

the diversity of prehistoric resources. Wildlands often are located in mountainous or otherwise primitive areas, although various coastal zone areas could be included.

The Wildland and Open Areas Act (NR 5-1201 to 1207) is composed of two parts. Part I, Open Space or Open Areas allows for the acquisition of lands for open areas, including areas characterized by great natural scenic beauty or where existing openness, natural condition, and present use enchance surrounding developed areas or conserve natural or scenic resources.

Part II, Wildland Areas, attempts to assure that expanding settlement does not modify all areas within the state. It establishes a state policy of securing an enduring resource of state wildlands by establishing a state wildlands preservation system composed of designated wildland areas.

In classifying wildlands, the act defines their importance as lying in their outstanding value for education, research, and appreciation of natural processes. Since they contain information on various aspects of past environments and may contain unique kinds of data or the only information for certain time periods, prehistoric resources may be important to ecologists studying past natural processes or interactions between cultural and environmental systems. Thus, it could be advantageous to consider prehistoric resources as one of the criteria for establishing wildlands. The prehistoric resources in question ought to have been little disturbed, and compatible land use (such as open space, recreation, or possibly agriculture) ought to be designated to ensure continued preservation.

Conservation of Woodland Areas legislation (NR 5-301 to 5-308) determines that DNR will formulate a program of forest conservation and management to encourage the public to keep or develop lands for productive woodland purposes, including providing open and wooded areas. Such legislation could aid in the conservation of prehistoric resources by including them as a criterion for ranking woodland areas suggested for conservation.

Land acquisition procedures under these programs are detailed in Program Open Space legislation (NR 5-901 to 5-909). This legislation is concerned with the use of federal and state funds as well as with admini-

strative procedures for land acquisition. As with other existing legislation, incorporating prehistoric resources as a criterion for judging land acquisition alternatives would result in low cost conservation of prehistoric resources.

The Wetlands and Riparian Rights Act (NR 9-102 to 9-310) provides for the preservation of wetlands and attempts to prevent their disturbance and destruction. The act requires a license for dredging and filling all state wetlands, except for approved dredging associated with seafood and seaweed harvesting, mosquito control, wildlife habitat improvement, and agricultural drainage ditches.

In addition, some other activities are governed by specific DNR regulations, and permits may be required by the Wetlands Unit. The permit obtained from the Wetlands Unit of the Water Resources Administration requires that detailed descriptions and maps of the proposed activity be presented for review primarily of biological and engineering aspects. At times such proposals are reviewed by MHT through the A-95 Clearinghouse process.

Prehistoric resource conservation easily could be included in wetlands legislation if parts of adjacent related lands were subject to the same controls as wetlands themselves. Here a setback provision to prevent soil disturbance inland from wetlands boundaries and other current or former shorelines could assist prehistoric resource conservation. Applications for permits or licenses to alter private or state wetlands under the Wetlands Act should comment on potential impact on prehistoric resources in wetlands and on adjacent uplands.

Another area in which DNR controls land alteration is in reviewing local sedimentation control plans (NR 8-1101 to 8-1105). In particular, Section 8-1104 requires local soil conservation district approval before land alterations for controlling erosion and siltation. As soil is the matrix in which prehistoric resources are found, any soil disturbance has the potential for disturbing prehistoric remains present. Therefore, consideration should be given to the ways in which this act might be used to aid prehistoric resource conservation; for example, inspection for

prehistoric resources could be required for all projects of certain sizes or types.

There are 24 soil conservation districts in Maryland, usually corresponding to county boundaries. The duties of state soil conservation district supervisors include both research and regulatory activities (AG 8-306); however, particular emphasis is placed on educational and planning objectives. At minimum, brochures about prehistoric resources should be available for developers, construction companies, and excavation contractors. Each soil conservation district office ought to provide information on the need for resource conservation as well as on specific procedures to be followed when these resources are encountered in soils disturbing projects. Personnel from DOA and MHT should meet with conservation district officials to explore the ways in which prehistoric resources might be conserved along with the state's soils.

In addition to the activities outlined above, DNR oversees permits and loan applications for numerous other programs. Included are the administration of permits under the Coastal Facilities Review Act (NR 6-501 et seq. (1975 Supp.)), dredge and fill permits for the Maryland Port Administration, permits under the Surface Mining Act (NR 7-6A01 et seq. (1975 Supp.)) and applications for loans and grants under the Shore Erosion Control Construction Fund (NR 8-1001 et seq. (1974)) and the Waterways Improvement Fund (NR 8-707 to 8-723 (1974)). DNR also reviews some federal projects as well as some private projects licensed by federal agencies. Under the Watershed Protection and Flood Prevention Act (P.L. 83-566), DNR staff members undertake biological field reconnaissance of proposed project areas for the Soil Conservation Service, as well as review the proposals for potential conflicts with state policies and management plans. Finally, DNR, DSP, and the Department of Health and Mental Hygiene review local government comprehensive water and sewage plans and issue permits, grants, and loans for sewage treatment plants and other construction (Art. 43, Sec. 387c (1975 Supp.)).

All these DNR programs and regulations provide potential points for monitoring possible disturbance to prehistoric resources. The review of these documents through the A-95 Clearinghouse will be greatly enhanced

when baseline information on prehistoric resources becomes available. Until that time, DOA and MHT should review agency procedures to see if initial consideration of prehistoric resources is limited to the insepction of lists such as the National Register or if these resources are inspected in the field. Information from lists and DOA records is not enough. On-site inspection prior to permit or application submission should be considered for those programs or projects identified as frequently involving large areas or considerable disturbance. Field inspections for biological and engineering factors relating to a permit application often are undertaken. In such instances, concurrent inspection for prehistoric resources would greatly enhance resource conservation. Treatment of prehistoric resources might be improved were agencies requiring statements and permits to make brochures on these resources available to the public. Such informational brochures might discuss how to recognize prehistoric materials and how to avoid disturbing them.

Federal Laws and Programs

Federal legislation first expressed its concern for prehistoric resources in 1906 and preserving the country's national heritage in science, history, and prehistory has been of increasing concern over the years. This concern for national heritage has increased as the public and governing officials have become interested in providing a quality environment for ourselves and for future generations. As awareness of prehistoric resource destruction has grown, so have the companion desires to preserve and conserve or salvage the tangible remains of our national heritage.

Several themes unite legislation about prehistoric resources. The earliest legislation established the principle that the government acted for the people in protecting sites and objects located on federally owned

lands. Since 1906, legislative intent has included private lands. Along with the protecting remains, improper treatment has been discouraged with penalties set for disturbing them on federal lands and a permit system to regulate their study. The National Park Service administers these federally controlled resources.

Another legislative principle establishes the desirability of and intention to preserve sites and areas of historical and prehistoric interest. In addition, funds are provided for salvaging remains threatened with destruction by federal projects and for surveys aimed at adding sites both historic and prehistoric, to the National Register of Historic Places. Finally, legislation has required that impact on prehistoric resources be assessed. Disturbing important sites is to be avoided when feasible alternatives exist, should federal funds be involved in a project. Scovill (1974:2) has summed the intent of governmental legislation suggesting that this legislation attempts to provide for a balanced environment, "not total development, and not total conservation."

The Office of Archeology and Historic Preservation (National Park Service), the Advisory Council on Historic Preservation, and the National Trust for Historic Preservation are the principal agencies presently guiding and supporting the federal effort in cultural resource management. Of particular importance are the National Register and Historic Sites Survey programs of the Office of Archeology and Historic Preservation. As discussed above, these programs recognize important sites and grant matching funds to allow survey programs to identify potential National Register nominations.

In addition, several Federal laws relate to prehistoric resources on Federal lands or on lands affected by Federal projects. Copies of these laws are included in Appendix B and their provisions are briefly reviewed here.

The Antiquities Act of 1906 (P.L. 34-209; 34 Stat. 225) was the first legislation establishing that the Federal government should protect cul-

tural resources and work for their preservation and availability to the public. This law prohibits disturbance of historic or prehistoric sites on Federal lands without a permit from the government agency controlling the appropriate lands; a penalty is established for violating this provision. In addition, the act provides for establishing national monuments of historic or prehistoric materials located on Federally owned property. Federal enforcement of this legislation should be encouraged by DOA, to prevent unauthorized exploitation of prehistoric resources on the large tracts of military land in the Maryland coastal zone.

The Historic Sites Act of 1935 (P.L. 74-292; 40 Stat. 666) establishes a national policy of preserving historic (including prehistoric) sites and objects of national significance. The National Park Service is authorized to do research under this law, thus providing for the development of this agency's archeological work.

The Reservoir Salvage Act of 1960 (P.L. 86-523; 74 Stat. 220) provides for the salvage of historic or prehistoric objects and information threatened by Federal or Federally licensed construction of dams exceeding 5000 acre feet or 40 surface acres in capacity. Many salvage programs have occurred in U.S. Army Corps of Engineers and Bureau of Reclamation reservoirs because of this law. This act has been amended and superceded by the Archeological Conservation Act of 1974 (discussed below).

The Historic Preservation Act of 1966 (P.L. 89-665; 80 Stat. 915) provides for an expanded National Register of Historic Places, which includes cultural resources of local, state, regional, and national significance. It establishes a program of matching funds to state agencies to make surveys of state resources, formulate a state preservation plan, and acquire and maintain significant prehistoric or historic properties. The act also establishes the Advisory Council on Historic Preservation.

Funds to match the monies made available for historic and prehistoric preservation through this legislation should be aggressively sought by Maryland agencies, not only through MHT for historic preservation, but also through DOA for prehistoric preservation. Although the piecemeal approach to prehistoric resource recognition seen in the National Register

is inefficient, it will have to suffice until better approaches are developed. Districts may be nominated to the National Register of Historic places, an encouraging provision for prehistoric resources.

The National Environmental Policy Act of 1969 (P.L. 91-190; 83 Stat. 852) continues the Federal policy of preserving historic, cultural, and natural aspects of the national heritage. It directs Federal agencies to evaluate the effects of major Federal activities on the natural and cultural environment by preparing environmental impact statements to consider alterations resulting from programs of Federal agencies. Agencies are to use an interdisciplinary approach to insure an integrated use of natural and social sciences and to use the environmental design arts in planning and making decisions that may impact the environment in Federally sponsored or licensed projects. In addition to requiring that historic (including prehistoric) values be considered in assessing possible impacts of Federal projects, mitigation procedures must be undertaken to assure the preservation of resources or the recovery of scientific data.

Executive Order 11593 (1971) directs Federal agencies to preserve, restore, and maintain the historic and cultural environment of the nation; Federal plans and programs also should contribute to preserving and enhancing non-Federally owned sites. Agencies must inventory prehistoric and historic resources under their control or affected by their programs, consider them during planning, and protect them or recover information if disturbance cannot be avoided. Cultural resources are expected to be preserved at professional standards with some sites nominated to the National Register of Historic Places.

The Archeological Conservation Act of 1974 (P. L. 93-291; 74 Stat. 220) amends the Reservoir Salvage Act of 1960 by directing all Federal agencies to salvage information from cultural resources before Federally funded or permitted projects or those involving Federal lands can disturb the resources. Again, this legislation is directed at salvage rather than at preservation. It does provide that up to one percent of the funds for construction can be transferred by Federal agencies to the National

Park Service for archeological salvage.

The Department of Transportation (49 U.S.C. 1651; 23 U.S.C. 138; and 23 U.S.C. 305) provides for a Highway Archaeological Salvage Program that mainly has been used in regard to Federally aided highway projects and the interstate highway system. State highway departments are to consult all relevant agencies such as DOA before submitting a program to the Bureau of Public Roads. The legislation provides for salvaging prehistoric resources affected by construction. Matching funds for archeological research carried out by or under State Highway Department contract on a highway right-of-way are provided by the Department of Transportation.

Department of Housing and Urban Development legislation makes funds available on a matching basis for acquiring and maintaining significant sites. In addition, surveys may be conducted, which can include prehistoric resources; however, McGimsey (1972:118) observes that historic rather than prehistoric sites are usually involved. Provisions of this legislation can be applied in both urban and rural areas.

Two other Federal agencies whose programs are relevant to prehistoric resource conservation in Maryland are the National Trust for Historic Preservation and the Advisory Council on Historic Preservation. The National Trust for Historic Preservation was chartered by Congress in 1949 to oversee loan and grant programs for evaluating and acquiring historic properties. Other activities include educational and advisory programs aimed at encouraging public and private involvement in historic preservation.

The Advisory Council on Historic Preservation was established by the Historic Preservation Act of 1966. The Council is composed of seven departmental secretaries and administrators in addition to ten appointees from outside the Federal government. In addition to advising the President and the Congress on historic preservation, the Council recommends measures for coordinating intergovernmental historic preservation activities and assists state and local governments with drafting preservation oriented legislation. Both of these agencies should be consulted by DOA and MHT regarding education and legislative measures as well as formula-

ting a resource conservation plan.

In addition to funding and regulatory programs, the Federal government is involved in various studies and information gathering activities designed to provide basic information for land use planners, developers, and other groups (e.g., preservation guides, county soil surveys, and natural area studies). Thus, several Federal mechanisms exist to aid in conserving prehistoric resources, but state support is required to implement them most effectively. State participation will require explicit policies and professional administration, including support services and funds for planning, data acquisition, and preservation.

Federal agencies whose projects frequently affect the Maryland coastal zone include the Soil Conservation Service, U. S. Army Corps of Engineers, military installations located in the state, the Department of Transportation, and the Department of Housing and Urban Development. Each of these agencies has established guidelines for dealing with cultural resources in various ways. For example, the Baltimore District office of the Corps of Engineers has a staff archeologist, assigned to the Planning Division's Environmental Analysis Branch, who reviews Corps projects.

The Regulatory Functions Branch of the Operations Division handles private and public permits; environmental impact statements are usually limited to cases involving large sums of money, extensive areas, or much publicity. Review of environmental impact statements by this division is restricted primarily to biological and engineering concerns. The Corps, however, forwards permits for projects in navigable waters to DNR and MHT and these applications are returned for amendment if DNR withholds state approval of wetlands permits or water quality certificates.

Conclusions

This review of current state and Federal programs indicates that numerous potential sources of funding and other support for education, acquisition of baseline information, and assistance in monitoring and

regulating prehistoric resources already exist. In existing programs, concerns for these resources vary from explicit and active to passive or neglectful. It is difficult to use most existing mechanisms to the fullest extent because no predictive information is currently available to assist applicants in filling out impact statements. Nor does a regional interpretive framework exist against which reviewers can assess the impact of a given project. The lack of information also limits the range of reviewer responses and potential mitigation suggestions.

In the absence of a conservation plan with supporting baseline information, the effective management of prehistoric resources requires the active participation and cooperation of numerous groups. All state and local government agencies need to cooperate with DOA and MHT to conserve prehistoric resources, making a concern for conserving these resources explicit policy. DOA and MHT need to make these agencies aware of the nature of prehistoric resource conservation problems and seek ways by which the needs and legal obligations of each agency can best be met. For example, mechanisms must be developed to aid agencies that require information on site locations, but these agencies need also to be made sensitive to the problems of releasing specific information on site locations to the public. Further, the use of extant mechanisms, such as the inventory provisions of Executive Order 11593, should be encouraged.

Situations Requiring Special Management Attention

Certain locations clearly are sensitive areas requiring particular attention from planners and prehistoric resource managers. Continuing land disturbance, has greatly reduced the reservoir of intact prehistoric resources. Sites that are still intact automatically assume particular significance. As King, Moratto, and Leonard (ms.) have pointed out, areas where development will involve previously undisturbed or minimally disturbed land should be closely inspected for prehistoric resources. This need is especially critical in environments predicted to contain high

densities of prehistoric resources, although predictive information of this nature can be made available only as a result of regional baseline studies of prehistoric resources. Until this information is available, areas scheduled for development will have to be assessed individually. Well preserved examples of low density prehistoric resources are equally important to conserve. Additional areas that deserve particular management attention include those where prehistoric resources would be expected but where they are invisible on the ground surface owing, for example, to forested conditions. Also, sites or areas whose prehistoric significance is not yet understood should receive close attention.

It is important to recognize that prehistoric remains most often are found in a soil matrix; some soils even result from past cultural activities. Therefore, soil reports that recognize soils resulting from these activities should suggest that DOA be notified, especially before the soils are disturbed.

Prehistoric materials such as bone and other organic remains would not be expected to occur in highly acid soils. However, such items often are found in shell middens because of their extreme alkalinity. Thus, the determiants of preservation greatly limit the range of items that can be expected at given locations. Special preservation environments -- locations characterized by wet-acid conditions, strongly alkaline conditions, or very dry conditions -- present opportunities for the preservation of materials not normally found in the prehistoric record. It is important to monitor development in such areas as marshes or shell middens very closely.

Observations made during the fieldwork for this study indicate that high densities of prehistoric resources are found along the shorelines of present and former embayments in some areas of Chesapeake Bay. Undoubtedly, certain kinds of resources will be found in these areas that differ from the resources of present shorelines. Until more information can be made available on the prehistoric resources of former shorelines, they should be managed by the same programs used in present shorelines. As the amount of former shorelines is limited, development along them

should be monitored closely. Field investigation results also indicate that where present shorelines are close to ancestral river channels, older and more varied prehistoric resources may be preserved. These areas are shown in Fig. 6-4.

Areas with relatively higher relief in the marshy coastal zone of Dorchester, Somerset, and Wicomico counties should be monitored, since these areas are likely to contain prehistoric resources. In all cases, areas closest to present and former shorelines should be monitored. The density of prehistoric resources and thus the potential for disturbing them increases as proximity to the shorelines increases.

National attention is increasingly being focused on the need for protecting underwater historic and prehistoric resources. The sea level history of Chesapeake Bay (see Chapter Two) suggests that large numbers of prehistoric resources could be found beneath Bay waters (resulting from the migrations of coastal peoples as transgressing waters inundated their territories). Underwater dredging can therefore be expected to pose a threat to submerged prehistoric resources.

Without information on the nature and distribution of submerged prehistoric resources, only general guidelines can be offered for their conservation, pointing to the need for assessing the feasibility of recovering data from these remains as well as assessing the usefulness of the data. Submerged prehistoric remains could include relatively well preserved sites that have not been subject to relic collecting, agricultural activities, and other terrestrial dusturbance.

As a result of sea level rise, prehistoric resources resulting from earlier coastal activities will be located beneath deeper waters, frequently under thick accumulations of sediment. If not completely impractical, finding and investigating these remains certainly will be difficult and expensive. Prehistoric resources resulting from more recent coastal oriented activities will be confined to shallower areas with less sediment accumulation, making them easier and cheaper to locate and investigate. It is possible, however, that the information contained in more recent resources may be redundant to that contained in unsubmerged

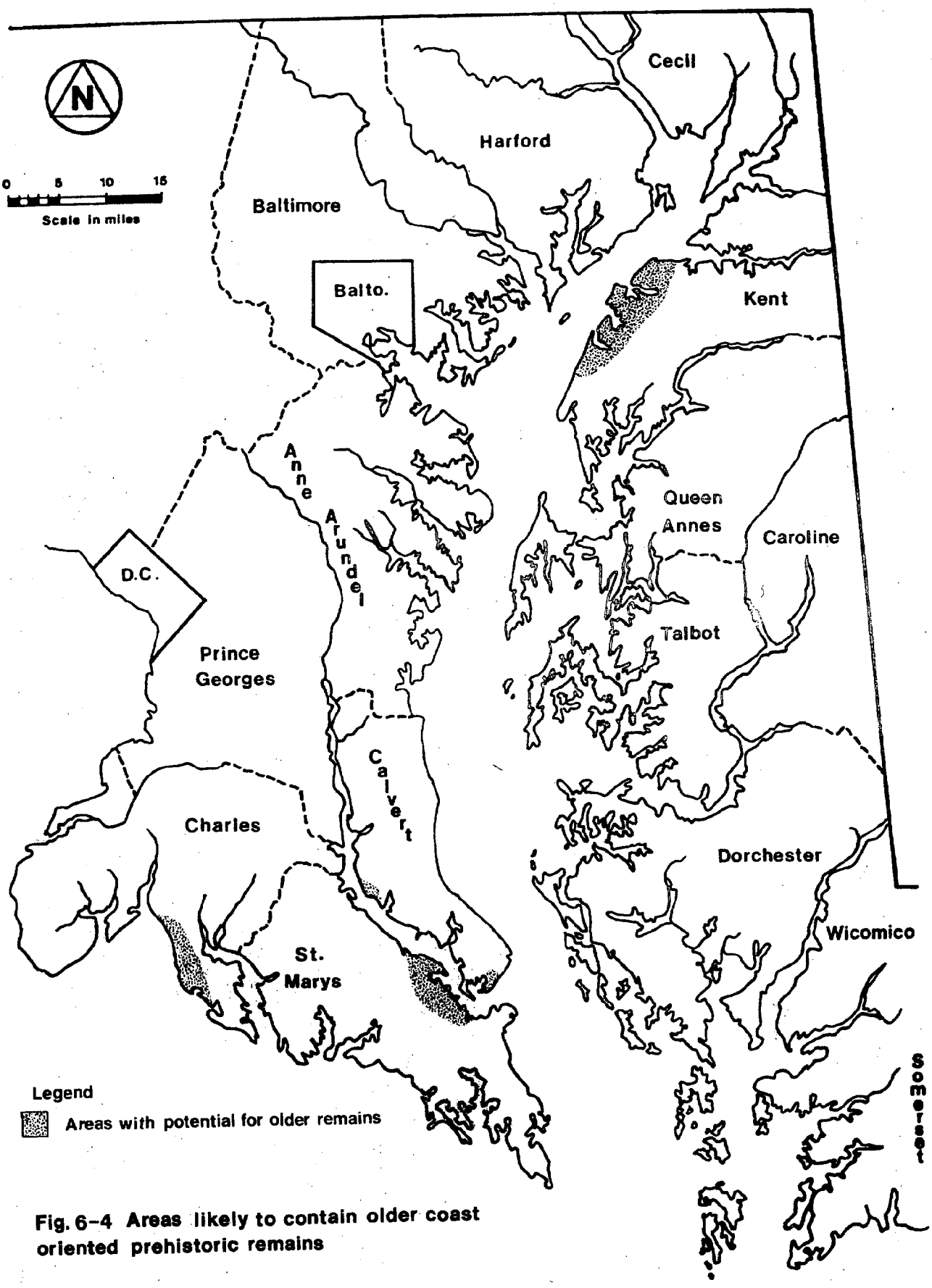


Fig. 6-4 Areas likely to contain older coast oriented prehistoric remains

sites.

Until an appreciation of submerged prehistoric resources can be gained, dredging activities located near the banks of ancestral river channels should be closely monitored. High densities of prehistoric resources, as well as early examples, are likely to be associated with ancestral channels. Monitoring may involve inspecting samples of dredged materials, exploratory drilling, or methods yet to be devised.

Interim Management Suggestions for Study Area Counties

The following sections suggest where interim management efforts might best be focused until information from regional baseline studies becomes available and a state conservation plan has been formulated. The number and character of specific suggestions which can be provided here, as well as the rationale behind such suggestions, are limited. As regional baseline data and other information become available and input widened, the nature of management priorities doubtless will change. Existing information and data developed by this study, however, provide guidelines for county planners and agency personnel with limited time and funding who wish to concentrate on preservation and conservation efforts in the interim. Areas not indicated as priority ones on individual county maps should <u>not</u> be construed as having unimportant resources as most areas are essentially unknown at this time.

These interim efforts may involve limited prehistoric site surveys, consultation with DOA, inspection requirements, and so on. Of course, until adequate information is made available, all prehistoric remains must be considered significant and treated accordingly. A loss of any material at this time represents a loss of an unknown quantity.

Certain management practices are applicable to all counties. First, a concern for prehistoric resources should be made explicit in planning documents and reflected in policies such as zoning ordinances, county environmental review procedures, park development, sedimentation control

plans, open space designations, and building permits. In addition, indirect effects of development should be considered by county planning and regulatory bodies. Local governments should make prehistoric resources one criterion for recommendations to Geographic Areas of Particular Concern. By allowing tax deductions for donations of open space and forest conservation properties, local governments may stimulate the preservation of selected areas containing prehistoric remains. Adopting county antiquities laws or other forms of protection, such as setback requirements for shoreline construction, also should be considered (see Appendix B). Federal sources of matching funds to support county level archeological activities should be investigated with the assistance of MHT personnel.

Individual counties should consult DOA in considering the advantages of developing select prehistoric resources. Such professionally guided developments ought to align with the state conservation plan. Rather than consuming the resource, these developments might involve only the establishment of roadside interpretive exhibits and information signs. Finally, county landowners with important resources ought to be sought out and their cooperation secured for protecting the land.

Anne Arundel County

Anne Arundel County is characterized by a high degree of shoreline development; few large tracts of land remain where undisturbed prehistoric remains might exist. Figure 6-5 indicates areas where the shoreline appears to have been modified the least, according to airphoto analysis. In these areas the shoreline is often owned by relatively few individuals, an advantage when considering preservation schemes for large areas. Preservation of prehistoric resources should be based on their representativeness in the area's prehistory and on other factors. The work of Wright (1973) and Cameron (1976) provides some indication of what kinds of prehistoric resources might be found along this county's shoreline.

If the areas indicated on Fig. 6-5 were surveyed for their prehistoric resources and artifacts were collected so that the remains could

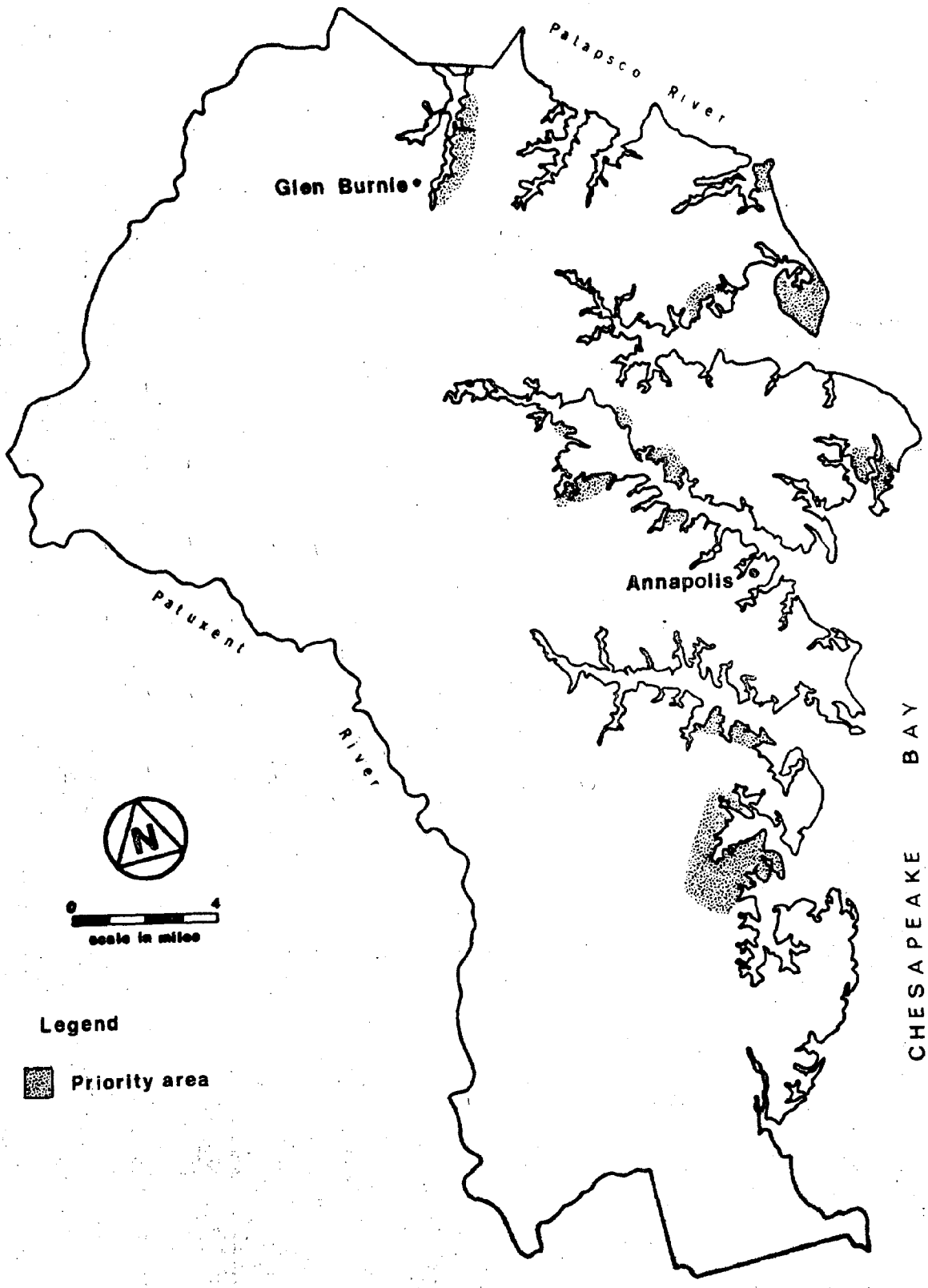


Fig. 6-5 Suggested priority areas for archeological resource conservation in Anne Arundel County

be identified and correlated with the models of Wright (1973) and Cameron (1976), an interim scheme could be worked out to guide the kinds of resources or sections of shorelines that should be preserved and how the management of prehistoric resources should proceed. Recently an Adena occupation, remains of which are rarely found in the Maryland coastal zone, has been identified (Ford 1976). Examples of these and other prehistoric resources should be preserved. Because more than 39% of its shoreline has already been modified by bulkheading or other development and significant increases in population have been forecast for the county, threats of destruction and disturbance to prehistoric resources are immediate and pervasive in Anne Arundel County.

Baltimore County

Few coastal areas in Baltimore County have escaped industrial or residential development. Areas characterized by less intense development are indicated in Fig. 6-6. Pressure on these areas should remain intense, owing to their proximity to metropolitan Baltimore, but such areas are believed to be those most likely to contain intact prehistoric remains. Most of the areas indicated in Fig. 6-6 have been designated as "critical areas" according to the Baltimore County Comprehensive Plan (1975, p. 24). Prehistoric resources should be of concern in these acknowledged critical areas and the effects of future development on these resources should be reviewed along with other environmental considerations.

Although historical sites are mentioned in the Plan as assets worth preserving (pp. 22-23), prehistoric resources are not mentioned specifically. The Plan, however, advances an ambitious park and natural area program. Provided baseline data exist, such parks are ideally suited to concurrently preserve prehistoric resources. Baseline data could be gathered in concert with DOA and the county's "Natural Resource Inventory" program, as discussed in the Plan (p. 23). Certainly, prehistoric resources should be considered in basic data acquisition programs. Matching fund programs administered by MHT might aid in funding the prehistoric

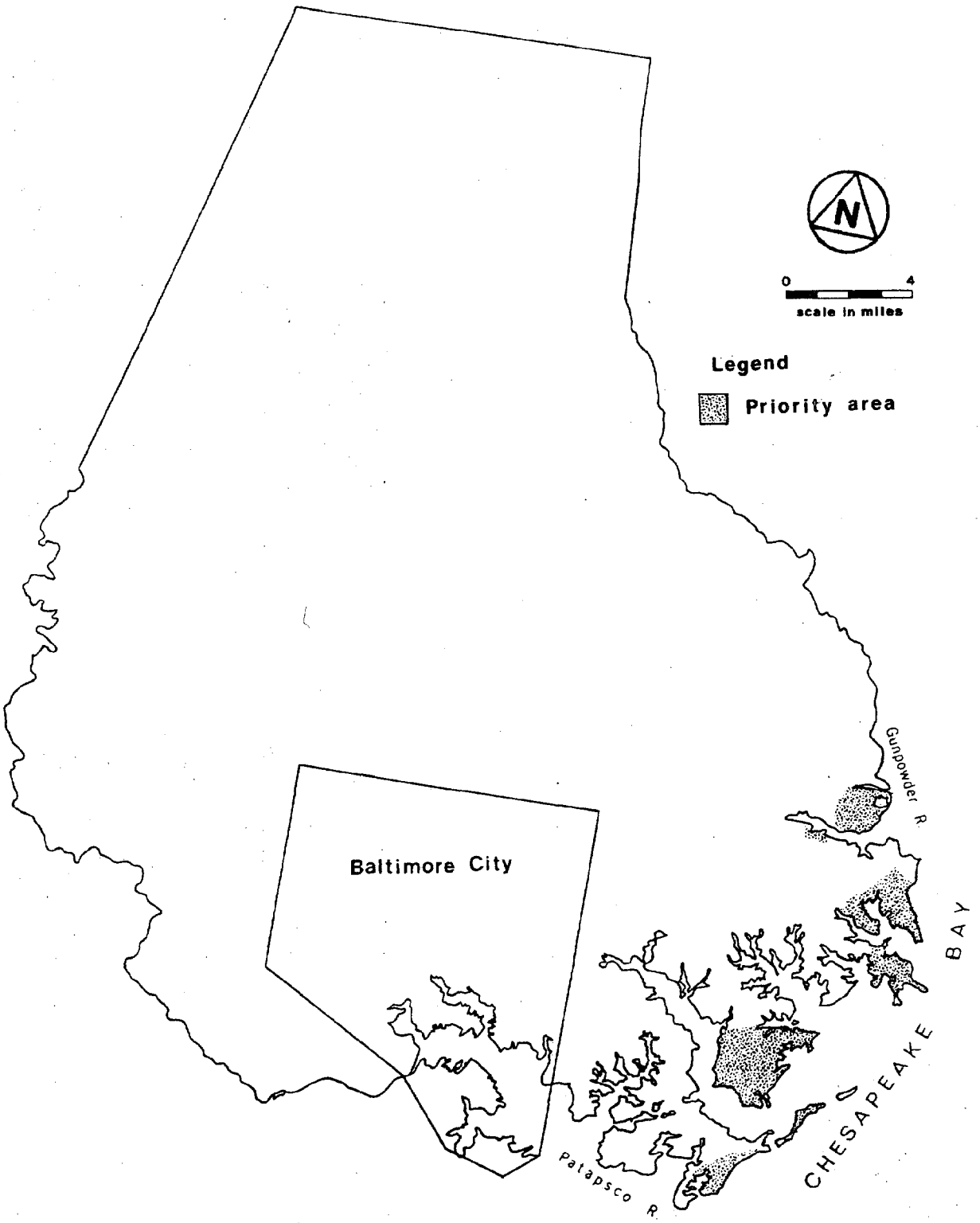


Fig.6-6 **Suggested priority areas for archeological resource conservation in Baltimore County**

sections of such resource surveys.

Calvert County

Initial conservation efforts in Calvert County should be directed at the Bay shore (Fig. 6-7), with special attention to its few coastal lagoons. These features are rare; most have already been disturbed by marina and suburban development. Immediate survey for prehistoric resources and conservation efforts should be directed at such areas as Parkers Creek.

Because almost no information is available about prehistoric occupation of Calvert County's Bay shore and because few sites have been reported for the area, all sites that may be discovered ought to be considered for preservation. Where disturbance or destruction is unavoidable, prehistoric sites should be investigated thoroughly before being disturbed.

Although the shoreline along the two large sand spits at Cove Point and Flag Pond was not surveyed by the present study, these areas present special environments that could contain unique prehistoric resources. Therefore, the complex spit, marsh, and pond landforms in these areas warrant investigation. In addition, the former shoreline along the upland against which the bars formed requires investigation; it may contain examples of older coastal prehistoric resources that have been protected from the erosion affecting almost all of Calvert County's Bay shore. Developments in these areas should give careful consideration to prehistoric resources.

The Solomons-Olivet-Appeal area of southern Calvert County is expected to undergo growth in the near future (see Fig. 5-25). In addition, prehistoric resources on the opposite shore of the Patuxent River in this area may already have been disturbed by development of the Patuxent Naval Air Station. Because both sides of the Patuxent River mouth are similar environmentally, they originally may have contained similar kinds and quantities of prehistoric resources; only those in Calvert County can be considered to be more or less intact. Thus, these resources also should

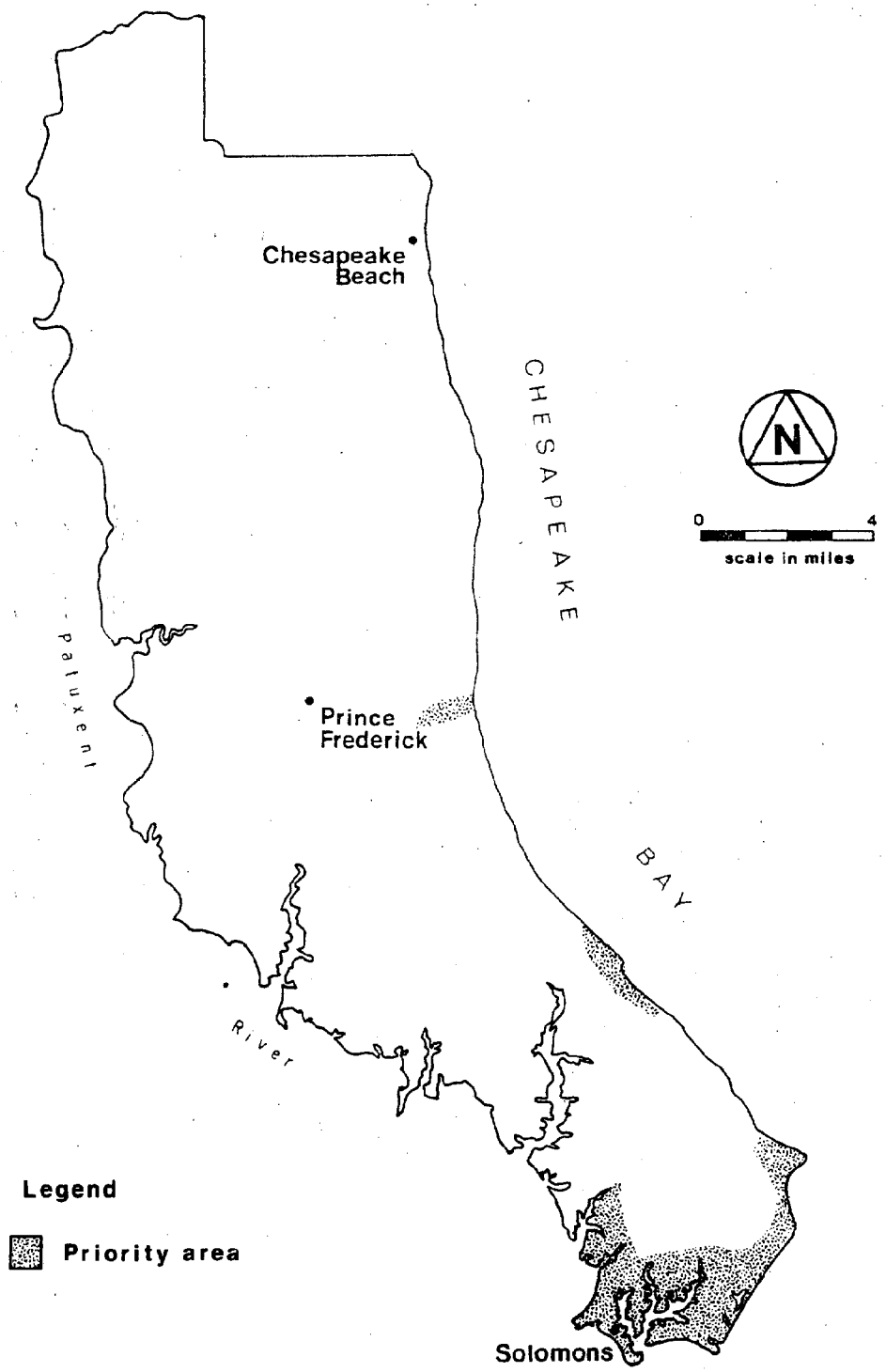


Fig. 6-7 Suggested priority areas for archeological resource conservation in Calvert County

be given management priority.

An early map by Captain John Smith (Fig. 3-2) indicates that at least eight native settlements were located along the Patuxent River shoreline of Calvert County during the early 1600's. Extensive prehistoric resources could be expected along this shoreline, and until baseline information is available to guide their conservation, extensive developments should conduct surveys and obtain information on resources through surface collection and test excavations. Any resources found to be undisturbed should receive particular attention for preservation.

Caroline County

Because Caroline County's shoreline is highly agricultural, its prehistoric resources are undergoing relatively little destruction. Information on the area's prehistoric remains and their interpretation is required before a framework can be developed to guide conservation management. Until this information can be made available, the entire shoreline of the county must be considered of equal priority for the conservation of prehistoric resources.

Cecil County

The Cecil County Comprehensive Plan reiterates (pp. 2-7, 5-4, and 6-8) the desirability of protecting the county's historic structures and localities; the importance of identifying and documenting historic properties is also acknowledged. Such baseline information is of course fundamental to deciding what to preserve, but these concerns also apply to the prehistoric resources not specifically mentioned in the Plan.

In terms of existing land use and zoning, the greatest future stress appears likely to occur north of Elk River. This area also contains considerable public land in Elk Neck State Park and Forest. Given the potential for disturbance in nearby areas of the county and the problems associated with the environmentally similar area occupied by the Aberdeen

Proving Ground, the Elk Neck public properties should attempt to conserve prehistoric resources.

Another area where interim attention should be focused is depicted in Fig. 6-8. Here important sites associated with the juncture of the Bay and the Susquehanna River might be expected to occur. Finally, further expansion of marina facilities along the Bohemia and Sassafras Rivers should be monitored for potential effects on prehistoric resources.

In presenting information on developable land (Map 11) and the General Plan (Map 13) the Plan emphasizes the sensitivity of stream valleys, flood plains, coastal beaches, and tidal marshes. Such a concern can help preserve prehistoric resources if setback requirements are integrated into land use regulations. Prehistoric resources are frequently found in high density along banks overlooking ravines, small stream valleys, and other waterways. Planners and administrators should therefore take such factors into account when permitting or planning development along the margins of active or intermittent waterways.

Charles County

Although great developmental pressure is not anticipated in Charles County's coastal zone at present, prehistoric resources are undoubtedly being disturbed or destroyed by such agents as small developments, relic collecting, agricultural practices, and erosion. While the county's Comprehensive Plan (Greenhorne and O'Mara, Inc. 1974) gives some consideration to preserving historic properties, no detailed consideration of prehistoric remains is included.

The Plan suggests that waterfront areas present ideal places for cluster developments of second or retirement homes. The prehistoric resources of such areas should be evaluated before developments are established. Future transportation inprovements, especially in the northwestern and southern parts of the county, will endanger waterfront areas by increasing their accessibility from metropolitan Washington, D.C.. In ad-

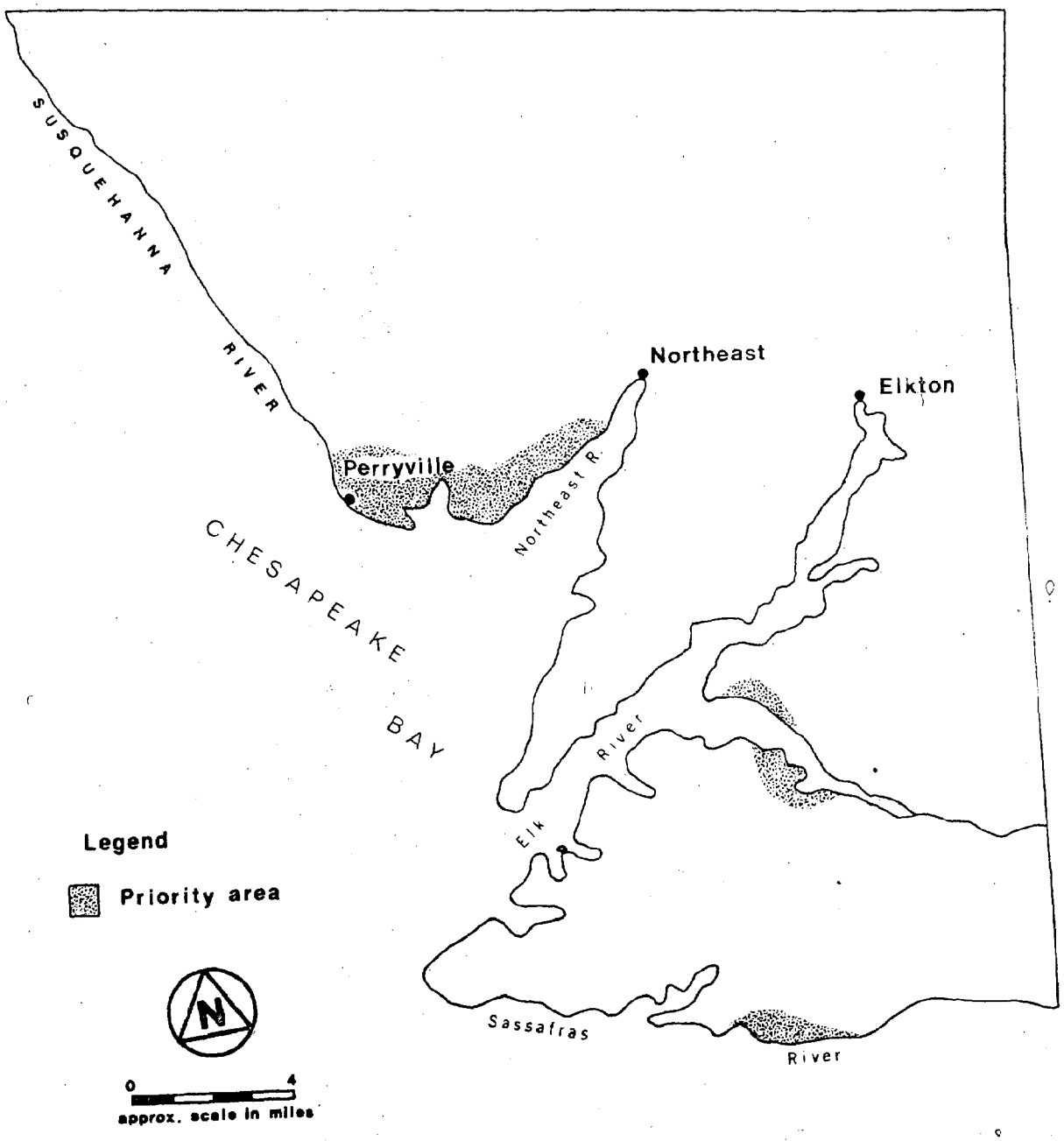


Fig.6-8 Suggested priority areas for archeological resource conservation in Cecil County

dition, the Plan suggests that artificial lakes be constructed in stream valleys to retain water and provide recreation (Greenhorne and O'Mara, Inc. 1974:I-16). Before lakes are constructed, areas affected should be surveyed for prehistoric resources.

Large tracts of land in Charles County are devoted to public forests, open space, and parks; however, few of these areas are located along the Potomac River, where they might help preserve coastal prehistoric resources. In the future, prehistoric resources should be used as one criterion for acquiring land for public use. The uplands along Zekiah Swamp, for example, are known to contain many prehistoric resources (Hickey 1970; Looker and Tidwell 1963). Thus, the maximum preservation of natural and cultural resources would result from combining parts of the bordering uplands with Zekiah Swamp, if part of the area is acquired for public use.

Other areas where interim efforts to manage prehistoric resources should be focused are shown in Fig. 6-9. In addition to the Zekiah and Gilbert swamp areas, parts of the upper Wicomico and Port Tobacco rivers are indicated. These areas are noted for the presence of prehistoric ossuaries (Ubelaker 1976) as well as for other kinds of prehistoric resources. Also, many prehistoric resources are known to occur between the Swan Point area and Loyola Retreat, one of the few areas where the ancestral channel of the Potomac River lies close to the present shoreline. This geographic situation makes it likely that resources representing earlier prehistoric coastal exploitation still are preserved today. The remnants of the famous Popes Creek shell midden are located in this area, along with many sites explored by McNett, who developed a tentative model for relationships among prehistoric sites in this region. The model (McNett and Gardner ms.), could be used to guide additional fieldwork which would define management stretegy for this area.

Military installations at Blossom Point and along Mattawoman Creek should be encouraged to comply with Federal regulations governing prehistoric resources, including the provisions for inventorying prehistoric resources outlined in Executive Order 11593. Many prehistoric resources are known to occur on these facilities and they should be incorporated

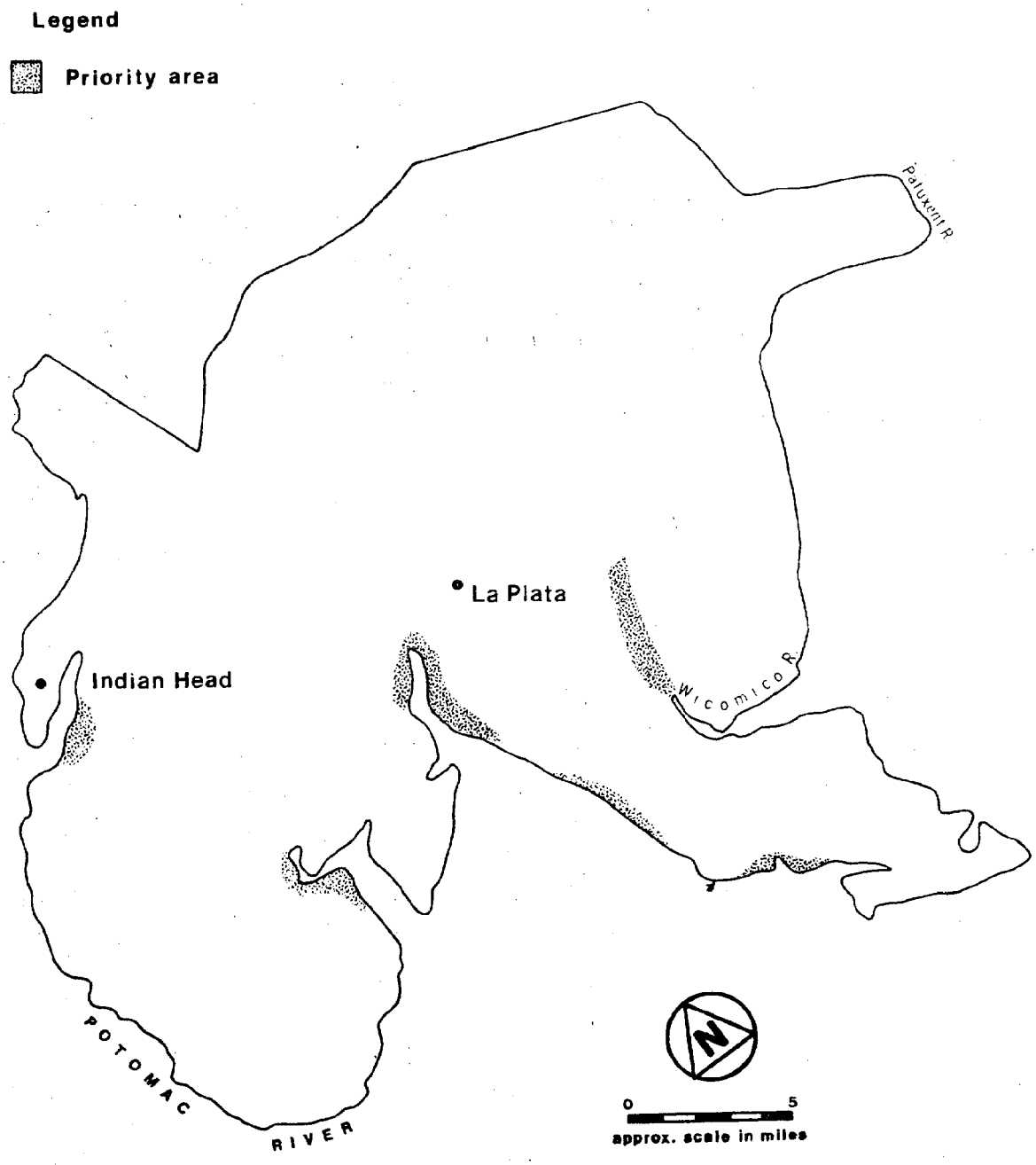


Fig.6-9 Suggested priority areas for archeological resource conservation in Charles County

into management schemes whenever possible.

Dorchester County

Like most study area counties, Dorchester County has little available information on which to base specific management priority suggestions. At present the abundant wetlands that form most of its coastline are controlled by the State Wetlands Act of 1970. A total of 33,521 acres in Dorchester County is under protection as wildlife refuges, parks, and so on.

The Smithsonian Institution and the Chesapeake Bay Foundation have proposed that an additional 16,703 acres be set aside in 10 potential wildlife management areas. Areas currently protected and those adopted in the future would make effective prehistoric preserves, if these resources were specifically mentioned in rules governing use of the areas. Land disturbance would have to be minimal and controlled, relic collecting prohibited, and the public educated about the protection of various kinds of resources in these management areas.

In view of the large portion of the Dorchester County coastal zone now afforded some degree of regulation and protection, immediate management efforts could be directed to the areas indicated in Fig. 6-10. Since Cambridge, Secretary, Vienna, and other towns are scheduled to receive additional population growth, these areas should be evaluated early for prehistoric resources. Prehistoric ossuaries have been reported from the Cambridge area (Ubelaker 1976), and further discoveries should be considered for preservation in order to eliminate the continued depletion of those sites already known. Areas outside the wetlands (principally along the Choptank and Little Choptank rivers) should receive attention until a comprehensive conservation program has been established.

The Dorchester County Comprehensive Plan (Urban Pathfinders, Inc. 1974) generally takes a cautious attitude toward altering the county's abundant natural resources, specifying the need for studies before aspects of the natural environment are unreclaimably altered, especially in

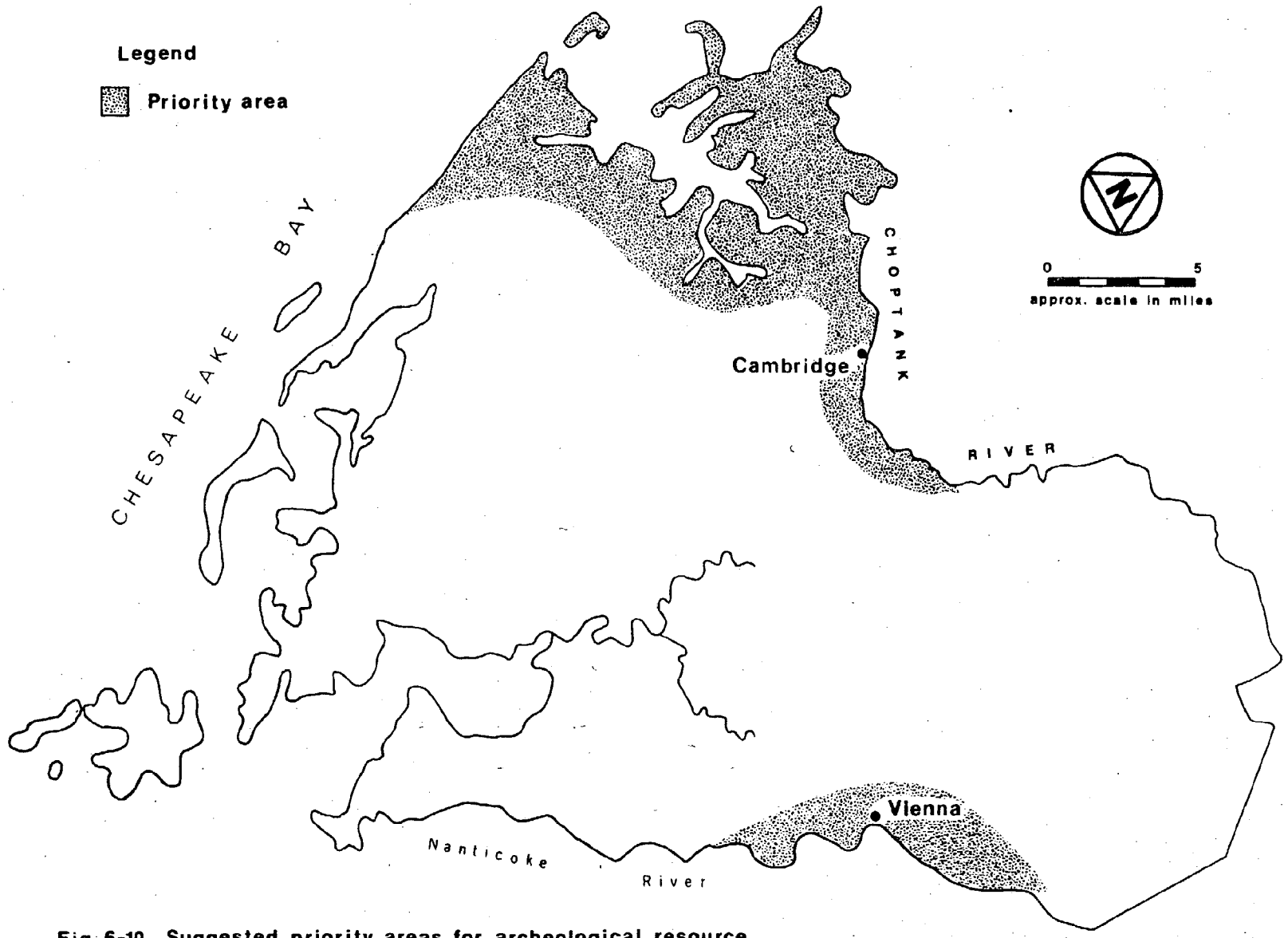


Fig. 6-10 Suggested priority areas for archeological resource conservation in Dorchester County

designated conservation areas. Prehistoric resources should be considered in studies made prior to land alterations, both in the designated growth areas and in county conservation areas.

In regard to prehistoric resources, the greatest shortcoming in the Plan is failure to mention concerns for conserving county prehistoric resources. Mainly through inundation and erosion, these resources are being and will continue to be lost. The Plan does, however, call for an updated inventory of significant historic, architectural and cultural features within the county. Suggested programs include establishing a county museum and actively identifying and soliciting materials to be preserved. The conservation of prehistoric resources can be a consequence of such activities. The active program of funding acquisition suggested by the Plan (p. 70) could be used to match Federal funds for prehistoric resource surveys.

Another program discussed in the Plan uses conservation easements to insure preserving natural resources. Such easements may involve scenic views or recreational access to property that otherwise retains private rights. For example, Article 81, Section 12E(d) of the Maryland Annotated Code allows tax credits to 50% and occasionally to 100% for owners who preserve the natural character of their land. Such easements also could be used to protect specific prehistoric sites or areas containing sites. The Plan also suggests enacting a program to insure preservation of the county's historic features. Article 81, Section 12G, of the Code allows counties and towns to grant tax credits up to 10% of the cost of historic renovation in historic zones. Again, tax credits could be granted for protecting prehistoric sites or for reimbursing the expenses of salvage excavation for sites which must be destroyed. Finally, designating conservation areas in the county where no or minor development is permitted should benefit the conservation of prehistoric resources (Urban Pathfinders, Inc. 1974:6). Discouraging development in present open space areas likewise benefits these resources.

Harford County

The Harford County Comprehensive Master Plan (Harford County Planning Office 1974) designates water areas of the county as natural feature protection areas to be preserved for public use. Pressure on these areas for residential, industrial, commercial, and service construction will be great in the near future, speeding the rate of disturbance to coastal zone prehistoric resources. The projected rapid population increase, the construction of new residences in the southern part of the county, the preferential selection of the waterfront for residence construction, and the limited amount of waterfront available in the county, all will affect the extent and rate of disturbance to coastal prehistoric resources.

The Plan discusses several methods for protecting land in the county. By taking them into account, these methods also could be used to conserve prehistoric resources. Cluster zoning of housing, in which certain areas are set aside for open space, exemplifies such a method, while other examples include private land trusts, government acquisition of land for open space using compensation and easements, and historic district zoning (Harford County Planning Office 1974:178-179). If prehistoric resources are used as one criterion whenever one of these methods is used to conserve land, low cost conservation of these resources can result.

In addition, the Plan recommends that no further development take place in such critical resource areas as wetlands, sand and gravel deposits, and primary agricultural lands. This recommendation also could enhance the conservation of prehistoric resources (Harford County Planning Office 1974:7).

Goal #8 of the Plan provides for the preservation of historic sites and structures in the county (Harford County Planning Office 1974:20). Although this goal represents a first step toward conserving cultural resources, the Plan does not designate measures to aid in preservation; nor does it specifically recognize that prehistoric resources should be included in preservation efforts.

Suggested priority areas for management attention are shown in Fig.

6-11. Only limited areas of relatively undeveloped land lie outside the boundaries of the Aberdeen Proving Ground complex, and the disturbance and contamination of the Aberdeen complex increases the importance of remaining coastal lands. Initial efforts at managing prehistoric resources should be directed to the undisturbed areas in the southern part of the county, where the fastest rate of growth is being experienced.

The area immediately southwest of Havre de Grace lies near the mouth of the Susquehanna River, an important corridor for prehistoric trade and communication. Also near the conjunction of several natural features -- the Bay, the Susquehanna River, and the coastal plain-Piedmont interface -- this area may have been of particular importance in the region's prehistory. Located along a freshwater portion of the Bay when most Bay shoreline fronts on brackish to saline waters, this area contains information on prehistoric exploitation of relatively freshwater areas and the highly productive Susquehanna flats area. In fact, this information is available only in portions of Harford and Cecil counties.

Finally, authorities at Aberdeen Proving Ground should be encouraged to comply with all federal regulations regarding cultural resources, particularly the inventory provisions of Executive Order 11593. Constructing, testing, and disposal activities at the complex continue to diminish the number, condition, and accessability of area prehistoric resources.

Kent County

The Kent County Comprehensive Plan (Johnson 1974) promotes preserving the natural beauty of the county for its role in tourism and travel. Thus, the historic district in Chestertown, along with other historic aspects of the county attractive to visitors, are considered important. Prehistoric resources should be added to concerns for the county's natural beauty and historic features.

Owing to its geomorphic setting and its rural character, Kent County's abundant coastal prehistoric resources remain relatively intact. These prehistoric resources are important on a regional scale, for they include

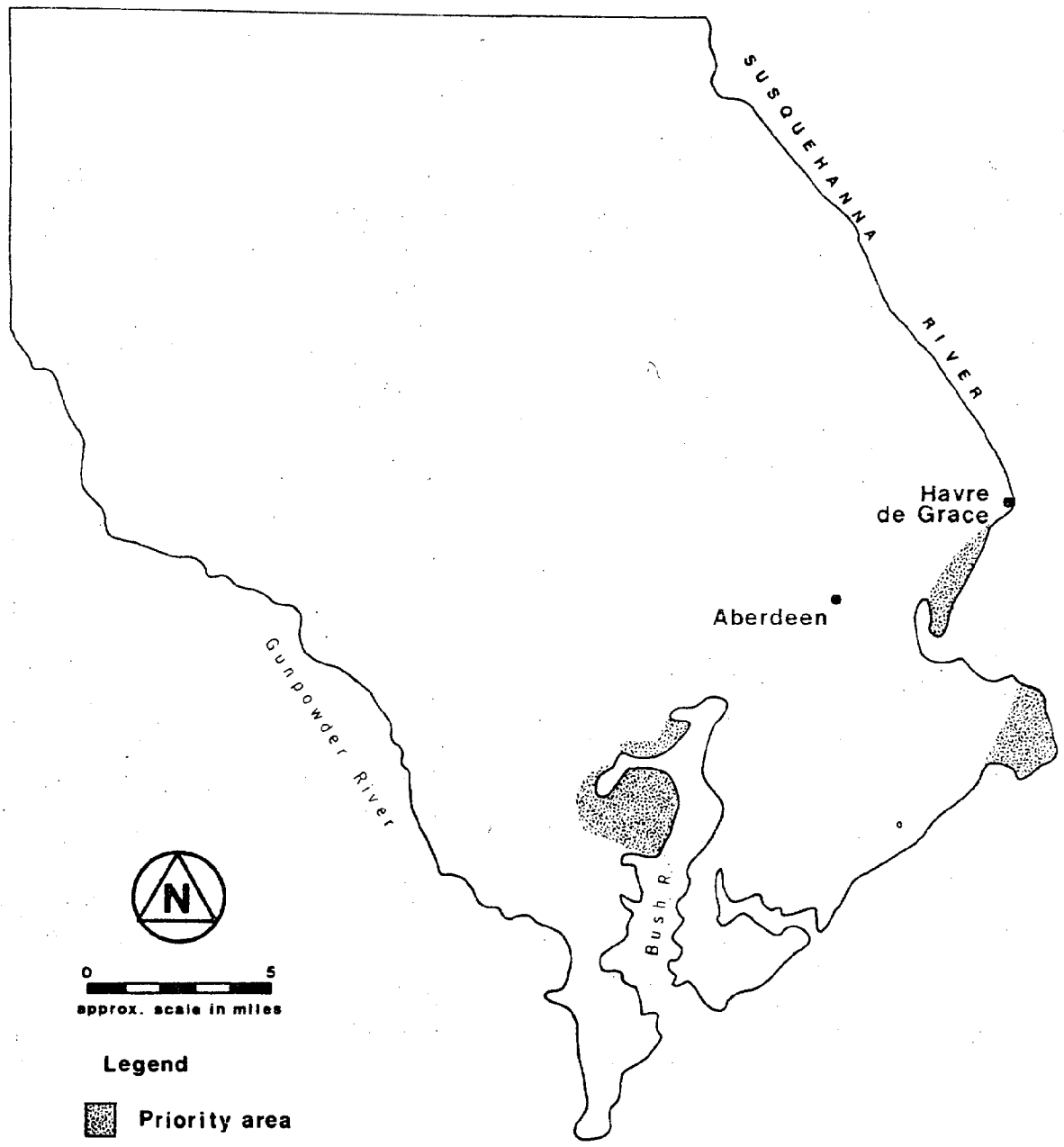


Fig. 6-11 Suggested priority areas for archeological resource conservation in Harford County

the oldest known coastal-oriented prehistoric sites in the central portion of the mid-Atlantic region. In fact, few localities in the Bay area are expected to contain well-preserved examples of earlier remains. The areas indicated in Fig. 6-12 therefore should receive careful interim attention because they contain a large number of relatively well preserved prehistoric sites. Numerous sites also are found along the Sassafras and Chester Rivers, however, further study is required before specific conservation measures can be proposed for them.

With few exceptions, the 1985 land use plan presented in Plate 6 of the Plan (Johnson 1974) shows shoreline land use varying from rural agricultural to rural residential. Low density land use is compatible with prehistoric resource conservation, providing that setback provisions or other measures are instituted to control shoreline modifications. Field experience in the county indicates a high density of prehistoric resources along the shore and on the flat ridges forming necks of land between waterbodies. Developments in such locations should be evaluated before earth disturbance takes place.

Prince Georges County

The comprehensive plans for subregions V and VI of Prince Georges County (Maryland-National Capital Park and Planning Commission 1973, 1974) attempt to determine lands "that should not be developed for various ecological and economic reasons" (1973:6). If the county planning board finds that a proposed development plan does not meet county regulations or would adversely affect an area, the board can disapprove the plan in order to prevent undesirable development (Metzgar 1973:VI-18). Criteria for areas not to be developed include flood plain soils, steep slopes, and high water tables. In addition, the guidelines for protecting the natural environment state that historic sites should be protected even if it is necessary for local governments to acquire them. Cultural resources are listed among the areas to be given priority in public acquisition for open space (Maryland-National Capital Park and Planning Com-

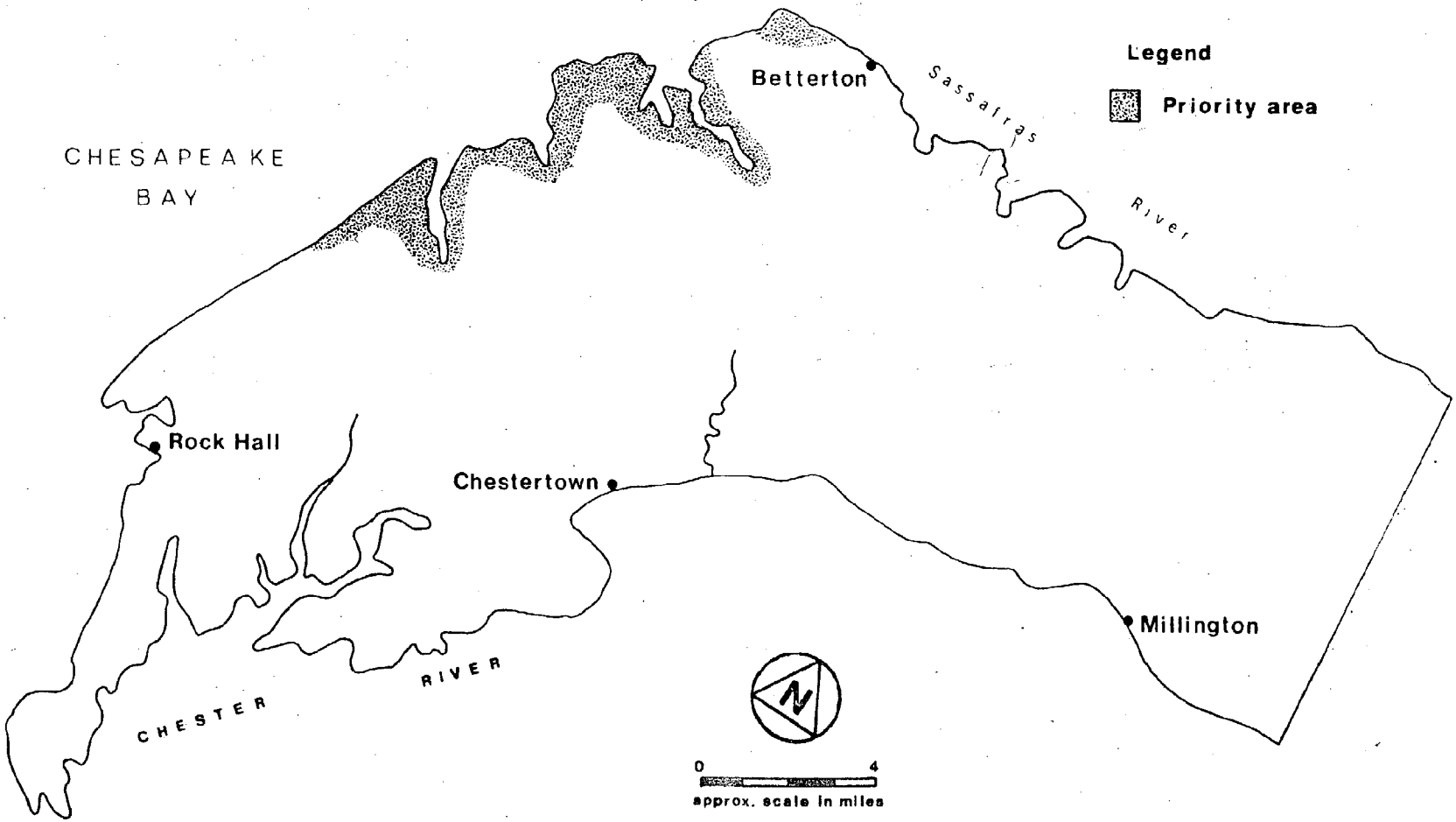


Fig. 6-12 Suggested priority area for archeological resource conservation in Kent County

mission (1976:6). Although they were included in the planning maps for subregions V and VI, prehistoric sites were not considered specifically for preservation, beyond the guidelines quoted. Criteria for determining which lands should not be developed and for designating open space areas, as well as for protecting specific locations, should include prehistoric resources.

Areas of Prince Georges County to be developed should be evaluated for their prehistoric resources and samples of these resources should be preserved. Cluster developments, neighborhood activity areas, new towns, transportation improvements, employment areas, and the construction of artificial lakes are a few of the kinds of developments proposed by the plans for subregions V and VI (Maryland-National Capital Park and Planning Commission 1973,1974). Information from prehistoric resource evaluations could be included in museums and interpretive displays in neighborhood activity areas and new towns.

The plans for subregions V and VI discuss county or state acquisition of lands to assure preservation of such natural features as flood plains and stream valleys. Figure V (Maryland-National Capital Park and Planning Commission 1973:5) illustrates compatible land uses in the form of cluster development along a stream valley park. This study has found the uplands adjacent to stream valleys to be likely locations for prehistoric resources. Including some upland area within each park or open space would therefore be desirable. Thus, the boundaries of Mattawoman State Park and the Patuxent River Watershed Park should include setback bands of adjacent uplands, in order to assure the preservation of prehistoric resources.

A Prince Georges County ordinance enables the granting of special tax credits to landowners who preserve open space land as scenic easements. This legislation could be used to protect known prehistoric resources and to insure compatible development.

The plans propose extensive parklands or flood plain restrictions along the Patuxent River, Mattawoman Creek, and the southern shore of Piscataway Creek. If these zones are established and development within

them is prohibited or carefully regulated, the potential for disturbing a major portion of the county's coastal prehistoric resources will be greatly reduced.

An analysis of aerial photographs of the area, including the north bank of Piscataway Creek and the Potomac shoreline to the District of Columbia border, shows several locations with substantial development. Because this area is close to major commuter arterials, continued growth can be expected. Development on the Virginia shoreline of the Potomac, which is similar environmentally, has been even more extensive. Thus, the area indicated on Fig. 6-13 needs special interim management attention. This area, along with others in similar locations, should be incorporated into projects designed to acquire baseline data on prehistoric resources, allowing survey emphasis in areas most threatened by disturbance.

Queen Annes County

Although prehistoric resources are not specifically mentioned, the Queen Annes County Comprehensive Plan (Tarrant 1965) does discuss historic resources:

> Further development of the tourist industry in the county will involve the participation of the Historical Society and other interested groups. A well organized systematic program of site preservation, restoration where necessary, marking, visitation, advertising, and other promotional activities, involving the cooperation of private owners, the State and County Road Departments, and many others, can achieve important objectives with very little expenditure of public funds (Tarrant 1965:17).

An inventory compiled from such sources as the county library, county histories, and knowledgeable persons, lists 27 historic sites, mainly extant buildings. Concerning preservation efforts for these sites, the Plan comments:

> In the Master County Plan, consideration has been given to the preservation of these historic sites by avoiding them in laying out new roads and in designating areas for new commercial or industrial developments, subdivisions, and the like, and by suitable

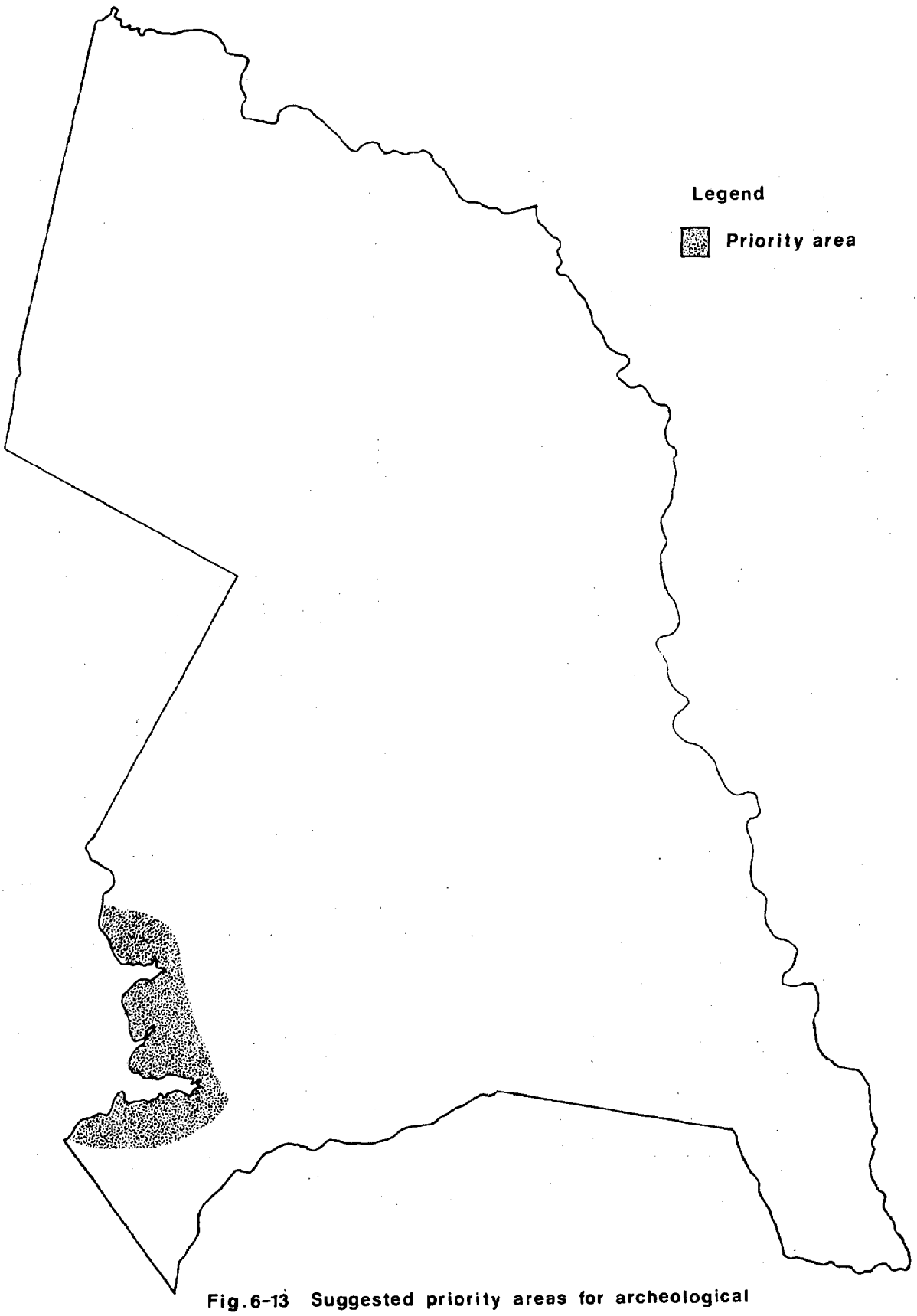


Fig.6-13 Suggested priority areas for archeological resource conservation in Prince George's County

> zoning. Recommendations are made also for the acquisition of certain sites for public use and preservation, as recreation or conservation areas or for other suitable purposes (Tarrant 1965:32).

Planning efforts in Queen Annes County, like those in other Maryland coastal zone counties, should consider prehistoric resources for conservation as actively as they do historic places.

Queen Annes County has comparatively few parks and recreation areas, as the Plan notes; only 187 acres are available in comparison to the 20,830 acres proposed. Not only would additional park, recreation, and wildlife protection areas enhance the quality of life for county residents and visitors, but also such areas could serve the important function of low-cost preservation of prehistoric resources. The nature and abundance of prehistoric resources in areas proposed for parks could be used as a selection criterion.

Until a conservation plan has been established for Maryland prehistoric resources, planners should note particularly large scale residential and commercial developments that could alter the overall land use character of the Chester River shoreline. At present this area contains large estates surrounded by agricultural land, and disturbance to prehistoric resources has been minimal. Figure 6-14 indicates priority areas where prehistoric resources should receive interim management attention. Areas experiencing relatively rapid growth in residences and recreation facilities are shown.

St. Marys County

The St. Marys County Comprehensive Plan (Demetriou 1974) lacks specific consideration of prehistoric resources, aside from mentioning that the Smithsonian Center for Natural Area Studies uses prehistoric resources as a criterion in designating potential natural areas. Prehistoric resources should be used in forming the Waterfront Protection Zones discussed in the Plan (Demetriou 1974:100,147). Preferred for development, waterfront areas are characterized by increasing numbers of marinas and first and second homes. Waterfront Protection Zones would balance development with environ-

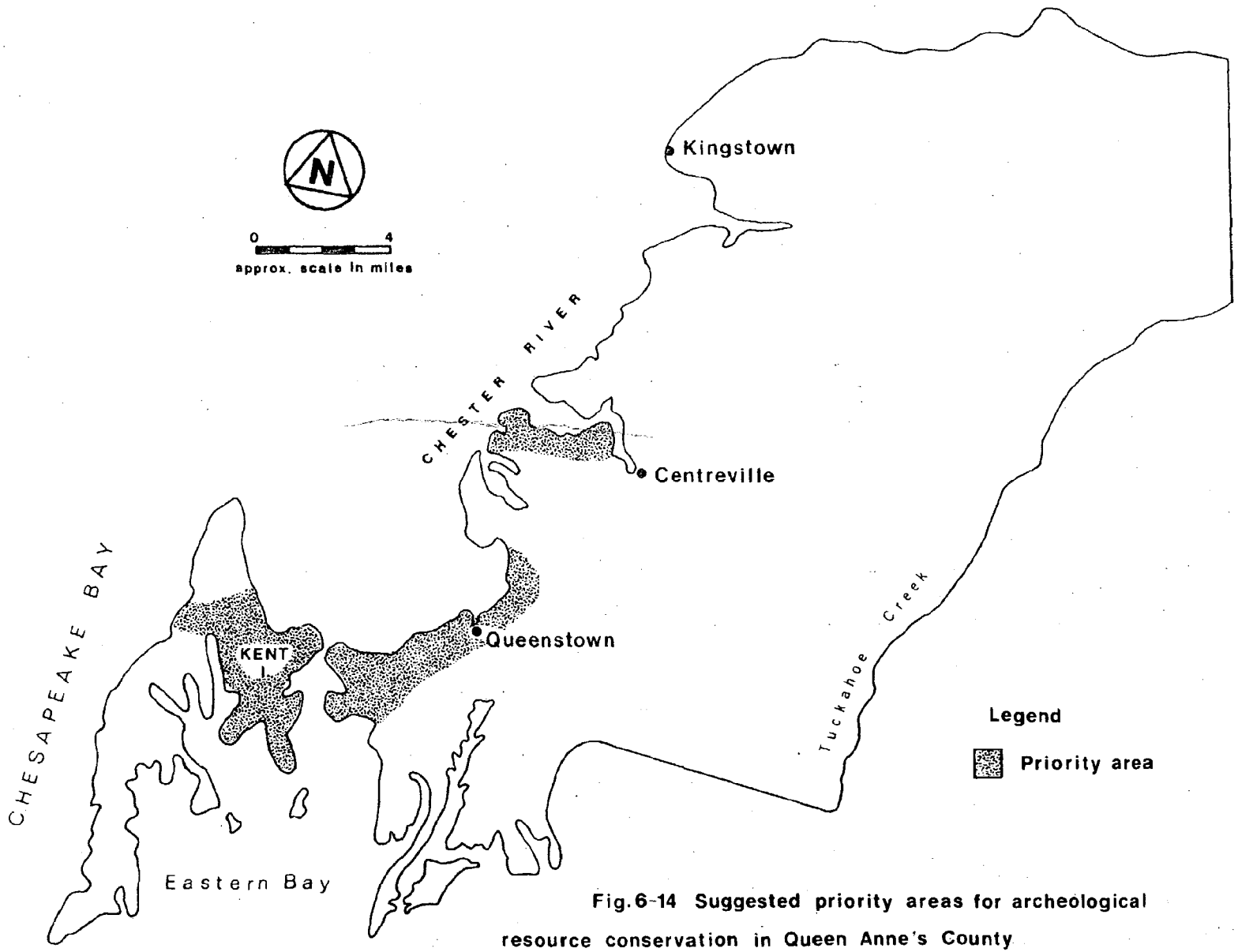


Fig. 6-14 Suggested priority areas for archeological resource conservation in Queen Anne's County

mental considerations, allowing development of suitable areas and preventing development of unsuitable areas. Unfortunately, the conservation of prehistoric resources is not mentioned in the summary of areas for environmental concern (Demetriou 1974:134). Mechanisms for protecting prehistoric resources in various environmental areas should be included in the policies presented.

Development policies for inland as well as for waterfront areas should take prehistoric resources into consideration. Development policies are presented for stream valleys, drainage courses, flood zones, wetlands, flood plains, steep slopes, plateau areas, and for such activities as shoreline modification, marina location, and bulkheading, dredging, and filling. All these land disturbing activities could adversely affect prehistoric resources in both inland and coastal areas. Including prehistoric resources in development guidelines could provide an inexpensive aid to conservation efforts.

The Plan indicates many areas along the coast that might be preserved for open space and recreation (Demetriou 1974:130). These preserves also could aid in conserving prehistoric resources, if these resources are taken into consideration when alternate areas are evaluated and if a representative sample of the county's prehistoric remains are preserved.

Effective consideration of prehistoric resources for natural areas requires data generated by regional baseline studies of prehistoric resources. Until this information is available, prehistoric resources should be conserved on the basis of their representation in the county's various environments, both inland and coastal. For example, Captain John Smith noted many villages during an early voyage in the region (see Fig. 3-2). Such information could be used in conjunction with field data, in order to include examples of these sites in proposed natural area preserves.

In addition, the areas shown in Fig. 6-15 should be considered for the interim management of prehistoric resources on a priority basis. The southeastern portion of this county's coastal zone contains many prehistoric sites, some apparently of Archaic age. In view of the unusually large number of prehistoric sites along Chesapeake Bay, this area may be

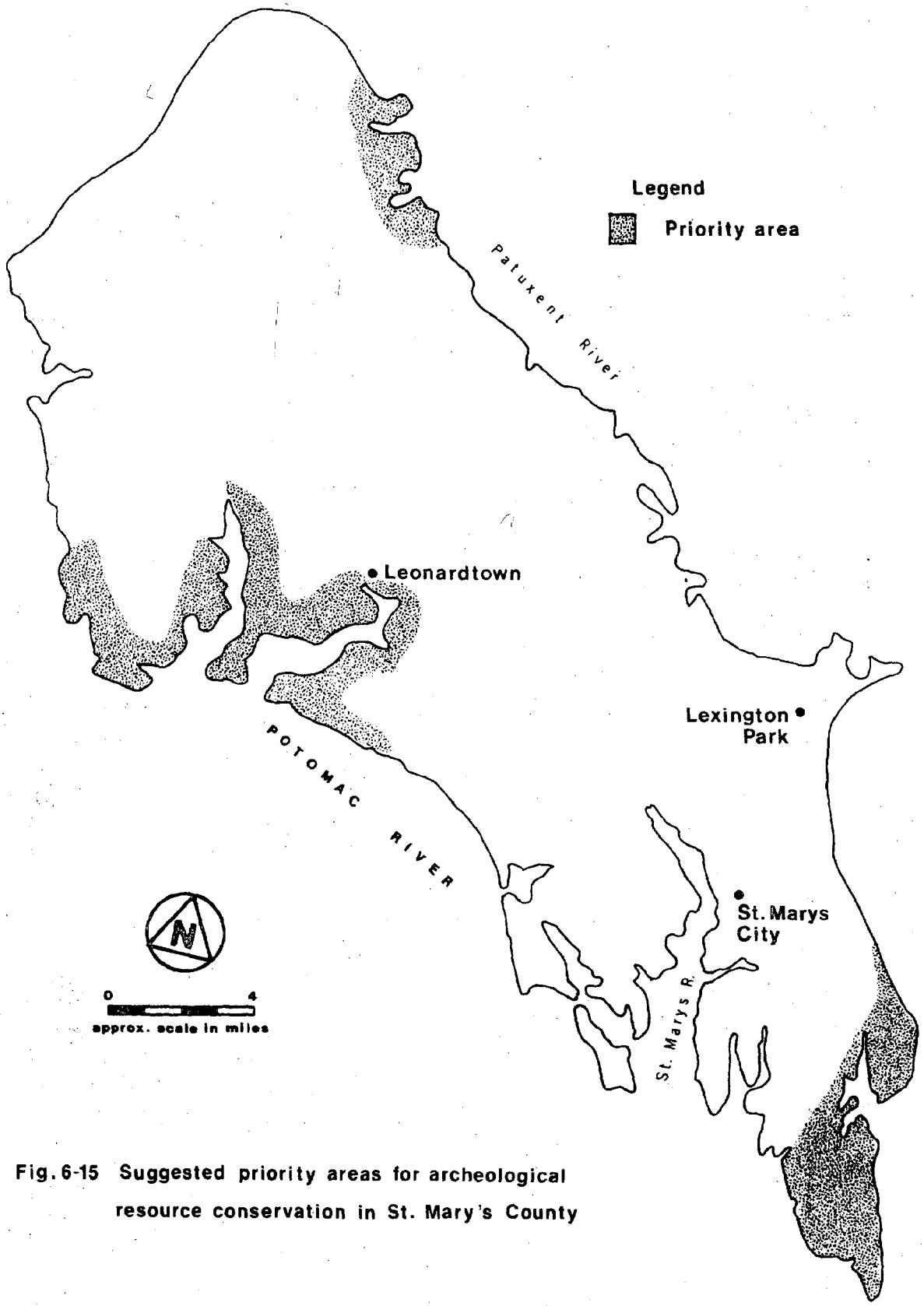


Fig. 6-15 Suggested priority areas for archeological resource conservation in St. Mary's County

of regional prehistoric significance.

Other areas indicated on Fig. 6-15 include portions of St. Marys County where the population is expected to increase significantly during the next 25 years (Demetriou 1974:104). The Plan promotes continued urban expansion along a corridor connecting Leonardtown with Lexington Park, which is anticipated to remain the center of population. The Lexington Park area is dominated by the county's largest single employer, the Patuxent Naval Air Test Center. Although this area has been extensively disturbed by base construction activities, the provisions of Executive Order 11593 calling for inventories of cultural resources should be carried out.

Finally, several areas have been indicated along the Patuxent River in Fig. 6-15 where the ancestral river channel lies close to the present shore because higher site densities and older sites may be found as a result of this proximity.

Although great efforts have been undertaken at St. Marys City to study the historic archeology of Maryland's first capital, this work should not be confused with prehistoric archeological studies which are infrequently undertaken in the county. While a greater understanding of the county's historic archeology is being made, there is almost no understanding of its prehistory, although the St. Marys City Commission is recovering prehistoric remains when they are encountered. Prehistoric studies in the county would be of great interest, partly because they would outline the cultural development of the native inhabitants who interacted with Maryland's first European settlers. The St. Marys City Commission should be encouraged to maximize interpretive and educational opportunities relating to Native American remains whenever possible.

Somerset County

The majority of Somerset County's shoreline is composed of wetlands now protected by state legislation. The Somerset County Plan (Stottler Stagg and Associates 1975) proposes coastal development compatible with

the marshy shoreline. Crisfield is anticipated to remain the major employer and industrial area. Because future coastal development is likely to emanate from this area, it is a priority area for the interim management of prehistoric resources (Fig. 6-16). Also of importance are areas of higher relief within or adjacent to wetlands because such areas may contain readily identifiable prehistoric remains relating to coastal and noncoastal activities. Although the fringing marshes are now protected, a setback corridor to control development on the fast ground bordering the marshes may be desirable, in order to control potential disturbance of prehistoric resources.

The Plan lists one objective dealing with the need to identify and restore historic and cultural buildings and sites (Stottler Stagg and Associates 1975:2-3). To this objective should be added a consideration of prehistoric resources.

Talbot County

The Talbot County Comprehensive Plan (Urban Pathfinders, Inc. 1973: 13) recognizes as a primary goal the preservation of the county's rich cultural and historic heritage as well as the need to develop a mechanism for preserving historic places and architectural features (Urban Pathfinders, Inc. 1973:20). Like other counties, Talbot County needs to consider its abundant prehistoric resources.

Several major nodes of population expansion are shown in the Plan (Urban Pathfinders, Inc. 1973:62A) and the desirability of insuring lower density development in the western half of the county, where most of the shoreline lies, is indicated. Prior to the acquisition of detailed baseline information on prehistoric resources and until a conservation plan is formulated for their management, the areas indicated in Fig. 6-17 should be closely monitored. Increasing demands for waterfront housing and the increasing popularity of aquatic recreation activities will continue to disturb prehistoric resources. The area around the mouth of the Choptank River has been marked for interim management of prehistoric

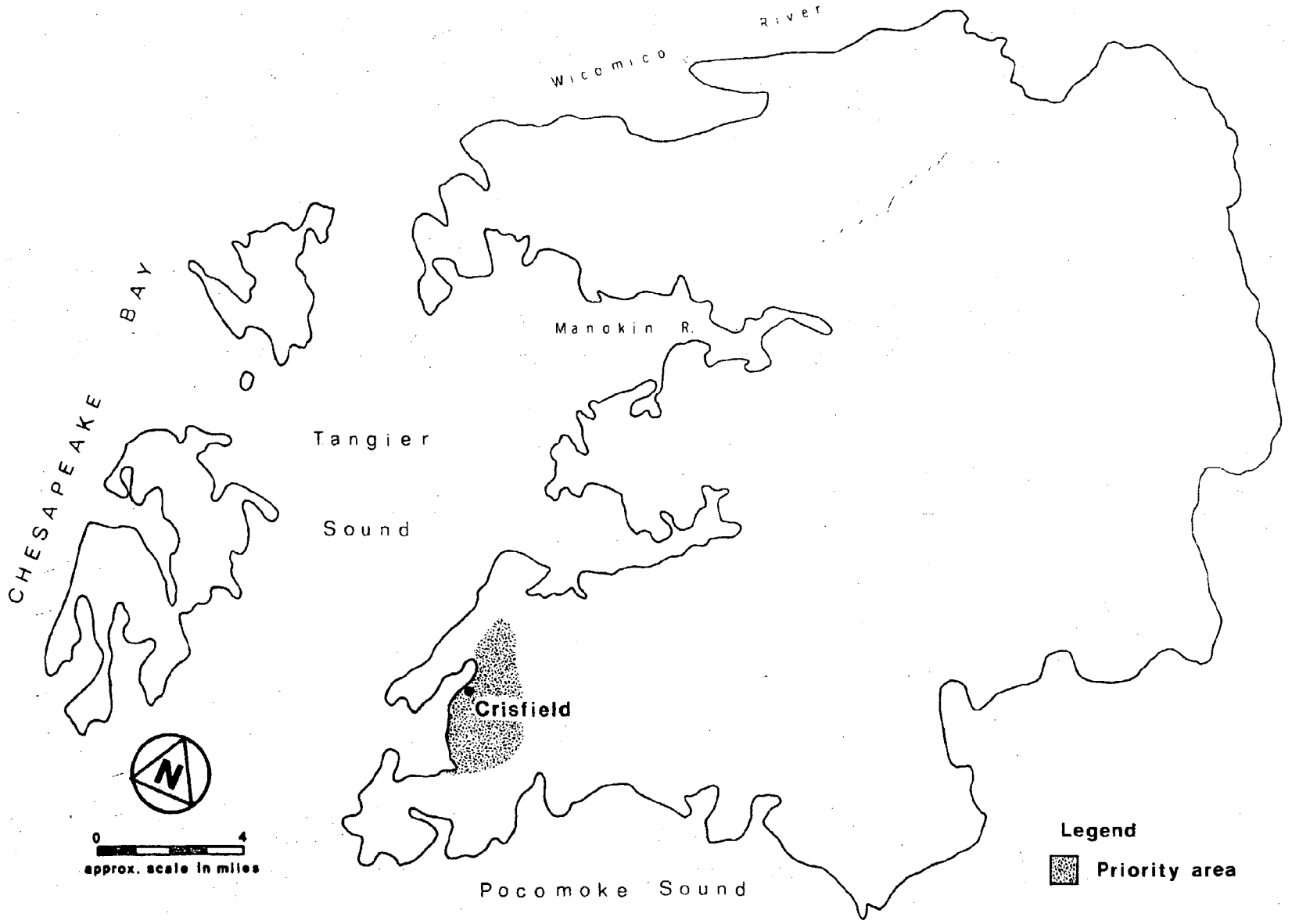


Fig. 6-16 Suggested priority areas for archeological resource conservation in Somerset County

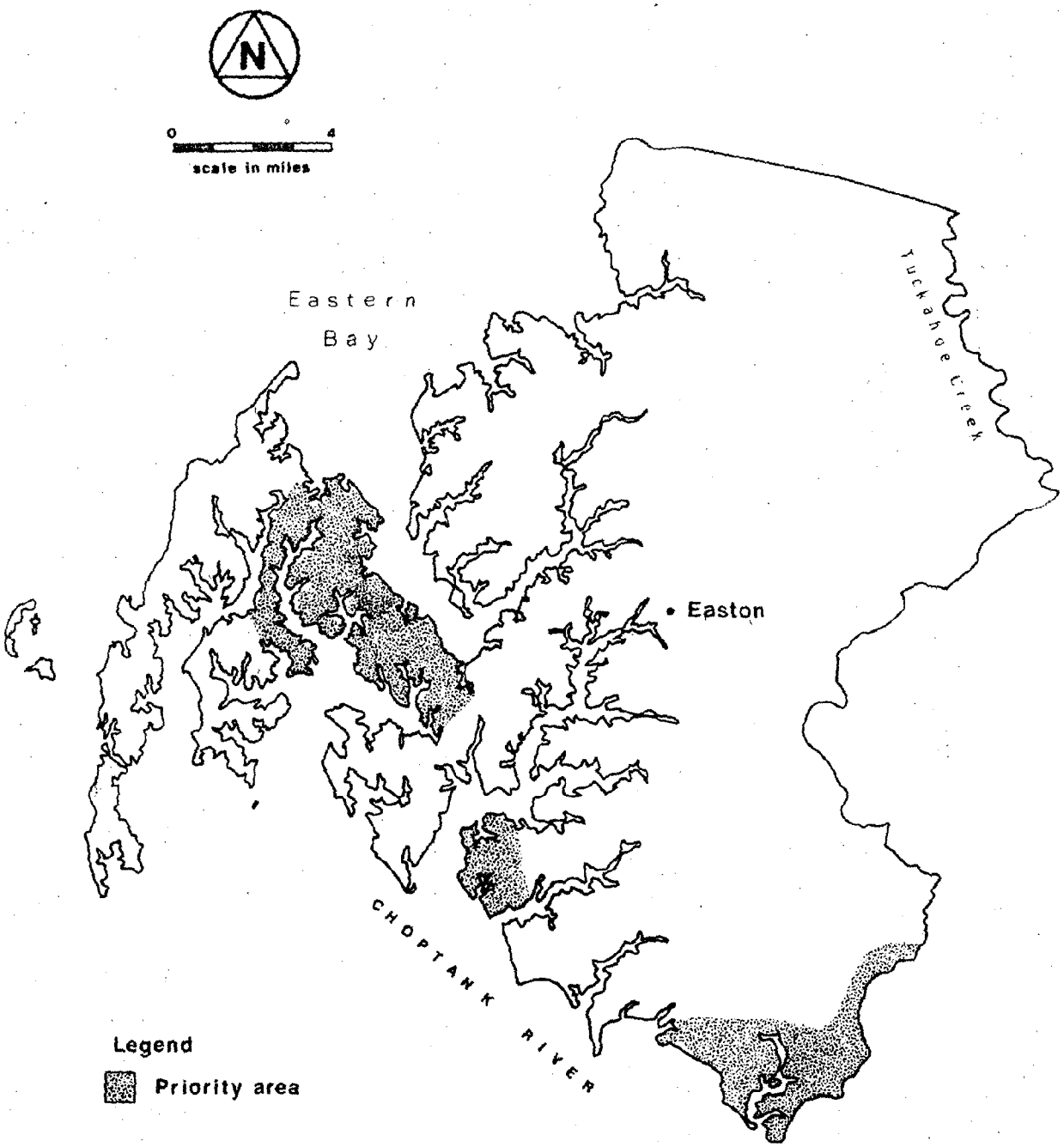


Fig. 6-17 Suggested priority areas for archeological resource conservation in Talbot County

resources, partly because of the relatively high density of prehistoric resources discovered there during the field investigation described in Chapter Four.

The Plan recognizes the need for measures to protect the waterfront and suggests setbacks be required to control the amount of development there. If this suggestion is made a regulation, it could aid greatly in minimizing disturbance to coastal prehistoric resources.

Finally, the Plan recognizes the need to assure the preservation of historically significant places and architectural features. It recommends setting up an administrative body to inventory these features, determine their significance, and establish review procedures to designate significant resources for preservation. The Plan contains the necessary elements to a strategy for conserving prehistoric resources, however, a concern for these resources should be made explicit and an active liason with DOA and MHT should be established to explore approaches to funding and technical assistance.

Wicomico County

Of the county plans reviewed for this study, only that of Wicomico County specifically addresses the problem of conserving prehistoric resources. This plan (Salisbury-Wicomico County Planning and Zoning Commission 1976) recommends two policies, one calling for land development regulations and public programs to provide for the protection and preservation of historically and archeologically significant sites, and the other encouraging efforts towards public sensitization about the value of cultural resources.

Until these suggestions can be incorporated into county programs, the areas indicated in Fig. 6-18 are suggested for priority interim management of prehistoric resources. Most of Wicomico County's shoreline is characterized by fringing marshes that already receive some protection from development. The areas indicated in Fig. 6-18 are adjacent to planned growth areas or where soil conditions could support increased nonagri-

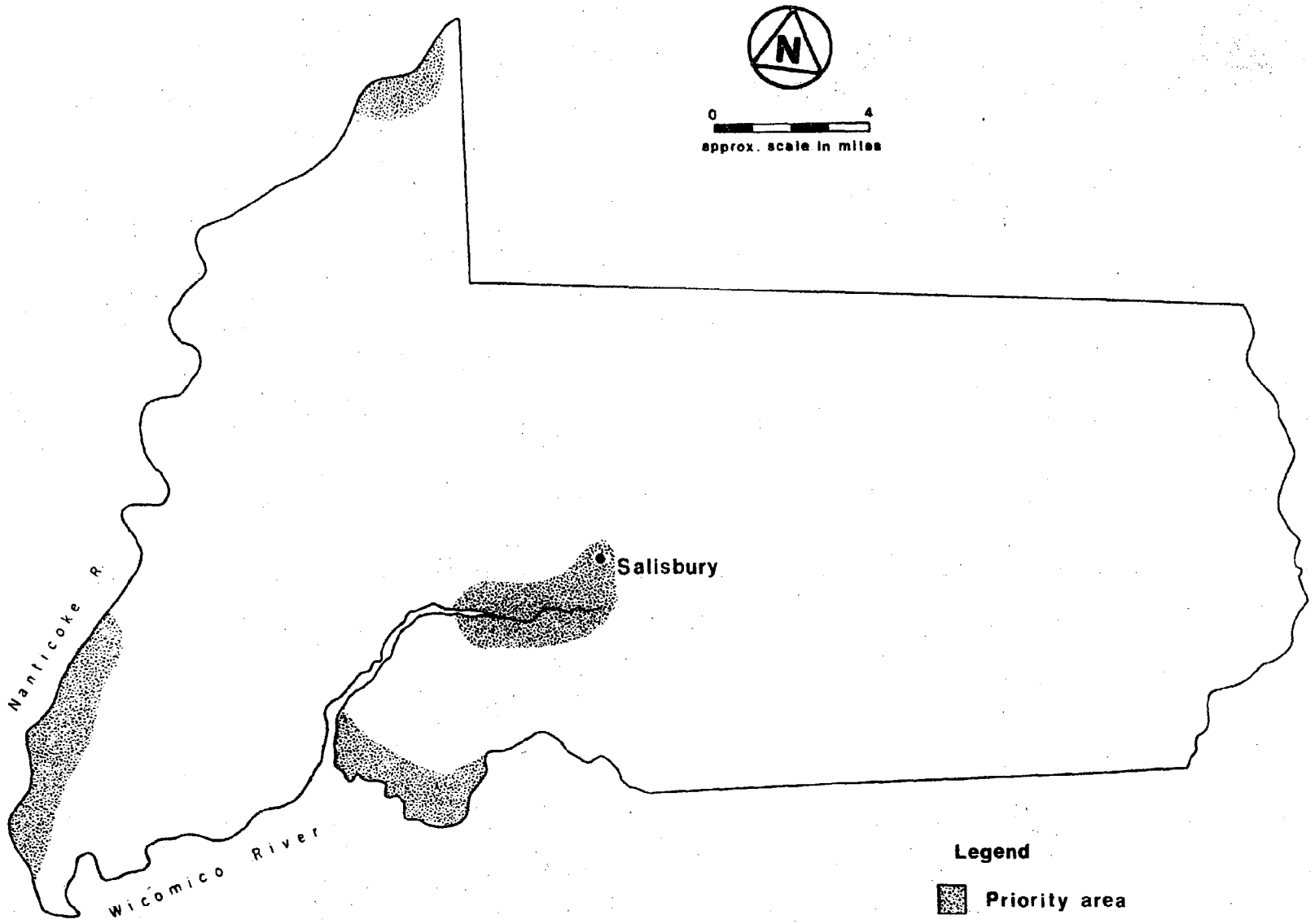


Fig. 6-18 Suggested priority areas for archeological resource conservation in Wicomico County

cultural uses. Like Dorchester and Somerset counties, large tracts of land are already in the public domain or under public control. When further information on area prehistoric resources is available, a specific conservation plan can be developed. Again, care will have to be taken in considering the potential for prehistoric resources in the fast ground component of the coastal zone.

Management Strategy: Education Program

In recent years, the greatest stress on prehistoric resources has resulted from almost universal oversights and misunderstandings about their existence, nature, and value. When they have been recognized, prehistoric remains usually have been viewed as curios or relics rather than fragile and irreplaceable pieces of scientific information. Because the effectiveness of any management strategy depends on the political and economic support of citizens and their governing bodies, people need to understand the nature and importance of prehistoric resources and the need to conserve them. Business and government leaders as well as average citizens need to learn how the conservation of prehistoric resources can provide future cultural, educational, and economic benefits. A strong education program is essential in the coastal zone, because of its overwhelming control by private landowners who would be affected by the regulation of prehistoric resources.

Public awareness of prehistoric resources needs to be increased and improved by an innovative program of education. DOA and MHT are the appropriate agencies for transmitting information on prehistoric resources and their conservation to the public and to other state agencies. One of their most important goals ought to be acquainting the public with the value of prehistoric resources. An education program should be initiated now and integrated into the conservation plan. Such a program must be developed carefully, however, providing constructive outlets for people who want to own prehistoric artifacts or do fieldwork. Materials and activities must be provided that maintain interest and at the same time

reinforce the idea that conserving prehistoric resources is an important concern that produces tangible benefits.

DOA can direct information to specific segments of the public. For example, pamphlets and lectures at society meetings could alert amateur archeologists and relic collectors to the detrimental effects of unsupervised surface collection and excavation. Local amateurs and relic collectors are one of the most important targets for education since their activities remove and deplete prehistoric resources.

Until recently, professional archeologists had been concerned primarily with the damage caused by unsupervised excavation. As new problems have been suggested for study, new techniques have been derived for studying them, and the preponderance of plowzone or thin prehistoric sites in the Maryland coastal zone has been recognized, continued surface collection of artifacts has come to be seen as a serious stress on the resource base. Alternate, constructive ways for hobbyists to pursue their interests must be devised and communicated. Locating prehistoric remains instead of recovering them might be emphasized for those who wish to do fieldwork. Also, attempts should be made to involve amateur groups in the development of a state resource conservation plan. The reservoir of local knowledge and experience represented by amateur archeologists should be tapped whenever possible. Perhaps some groups could be integrated into regional baseline data acquisition activities.

To date, DOA educational and information dissemination efforts have been oriented toward amateur archeological groups. To this very important but restricted audience must be added programs for the general public. Information on prehistoric resource conservation could be disseminated through the media, brochures and pamphlets, and public lectures. To this end, a general education program is suggested below and outlined in Fig. 6-19.

Suggestions for an Education Program

Public service announcements on television and radio, feature articles

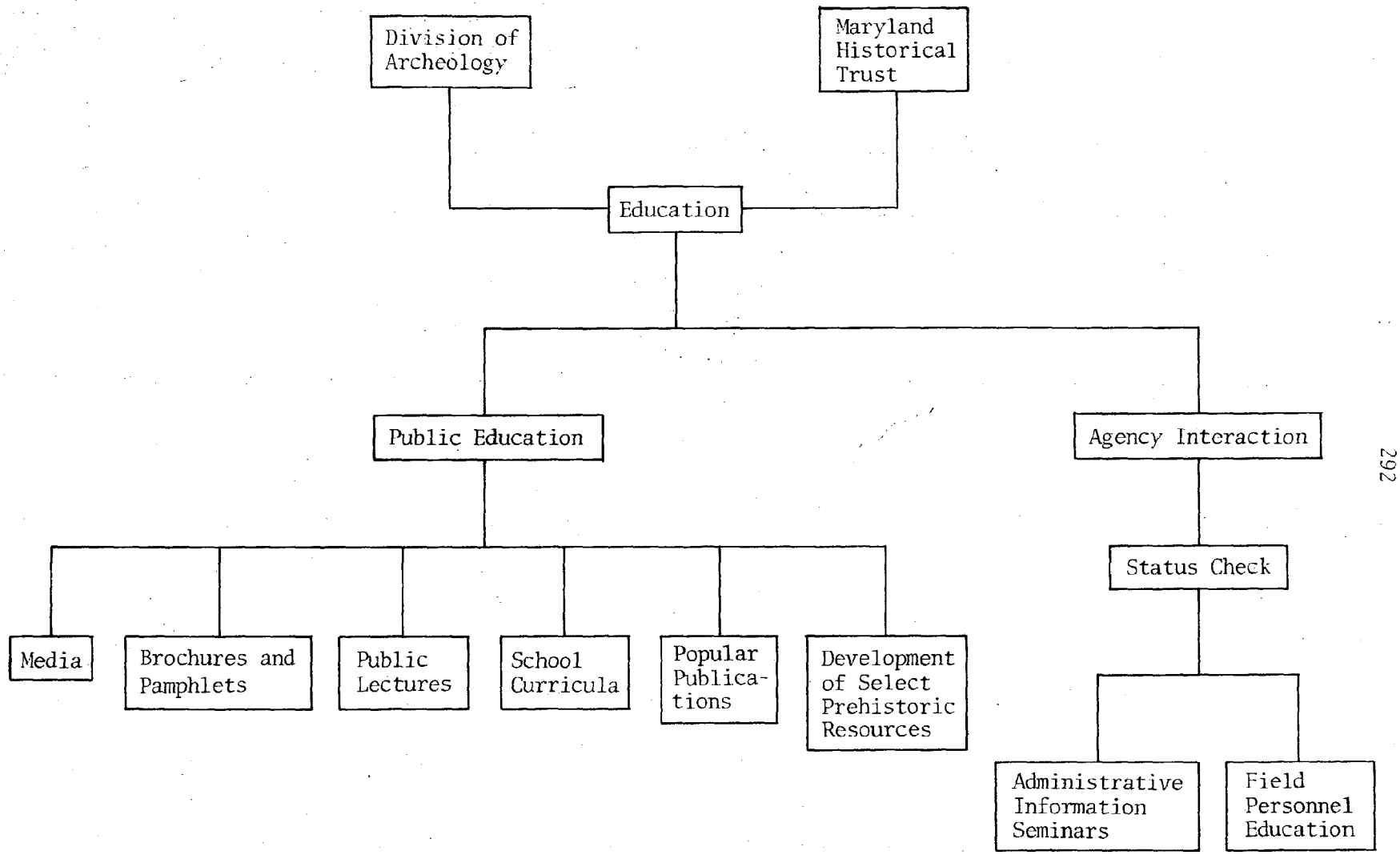


Fig. 6-19 Suggested prehistoric resource education program

in conservation magazines, newspapers, and agency newsletters, and messages on billboards all could be used to convey results of publically sponsored projects and to promote the conservation of prehistoric resources. Documentary films, along with articles on conservation and prehistory topics, are additional ways to inform the public.

Brochures and pamphlets describing prehistoric resource conservation could be placed in the offices of all agencies that interface with people involved in soil disturbing activities (e.g., the Soil Conservation Service, Corps of Engineers, Water Resources Administration, and building permit offices). This material could take a form such as "Guidelines for Subdivision Developers," and include information about the nature and importance of prehistoric resources as well as legal responsibilities and measures for mitigating impact. Table 6-5 gives eight examples of brochures and pamphlets designed to help in the conservation of prehistoric resources.

Frequent community lectures could deal with timely research topics and answer questions about the prehistory of the local area and about conservation problems in general. Lectures of this sort are popular when illustrated with slides, films, and exhibits of artifacts. In addition to general audience lectures, programs could be taken to special audiences such as county historical societies and conservation groups.

Public schools are an especially suitable place to teach prehistoric resource conservation, particularly at the primary level. Courses of study could be designed to heighten awareness of the environment in relation to prehistoric, historic, and present land use. Children frequently appreciate remains from past cultures in our environment and Native American prehistory is usually of special interest. Traveling display kits of prehistoric artifacts, along with examples from various prehistoric cultures, could provide tangible materials for use in education programs. For example, many museums operate successful programs in local school districts by preparing and circulating kits of artifacts and teacher manuals. Such a program could be operated or coordinated by DOA. Seattle's Pacific Science Center, for example, working with local schools,

Table 6-5

Examples of Popular Brochures Dealing with Prehistoric Resource Conservation

Brochure Title	Purpose	Sponsoring Organization
Archeology and Archeological Resources -- A Guide for Those Planning to Use, Affect, or Alter the Land's Surface	To acquaint developers with the nature of prehistoric resources, their current destruction, and the need for impact mitigation. Includes current federal legislation.	Society for American Archeology, n.d.
Archeology on the Pacific Coast of North America	To acquaint the public with prehistoric resources and their current destruction.	Society for California Archeology, n.d.
Death of the Past	To acquaint the public with current destruction of California's prehistoric resources.	Society for California Archeology, 1970
Preserving British Columbia's Prehistory	To acquaint the public with British Columbia's recent Archaeological and Historic Sites Protection Act.	British Columbia Archeological Sites Advisory Board, 1973
The Relic Collector and the Law in British Columbia	To acquaint relic collectors with the Archaeological and Historic Sites Preservation Act.	British Columbia Archaeological Sites Advisory Board, n.d.
The Status of California Archeology	Presents information on the status of prehistoric resource conservation in the state.	Society for California Archeology, 1973
Stewards of the Past	To acquaint landowners and farmers with the nature of prehistoric resources, their destruction and the need for preservation. How to report sites.	University of Missouri Extension Service, n.d.
You Can Help Save California's Past	To acquaint the public with prehistoric resources, their destruction, and the need for preservation.	Society for California Archeology, n.d.

recently has developed a teaching game oriented to prehistoric research and conservation. Accompanied by a handbook describing the area's prehistory, the game covers such topics as survey and excavation strategy, interpretation of artifacts, and resource conservation. Presented in a game format with a board and cards, the device gives students a variety of choices in dealing with prehistoric resources, and each choice has consequences. Thus, students grasp the methods and results in prehistoric research as they learn about the need for conserving prehistoric resources. Such teaching materials could easily be adapted to the Maryland setting.

In addition to DOA's series of technical research publications, a series of popular publications on Maryland prehistory could be issued. These publications could be updated regularly to keep the public informed about Maryland's prehistory and the need to conserve it. Because effective programs in cultural resource management require substantial public support, communicating the results of prehistoric research would encourage financial contributions. In short, DOA and MHT must maintain a high degree of visibility in the area of public education and information programs.

Selected prehistoric resources might be developed to improve education and recreation opportunities, improve community pride, and provide new economic stimulus. People are interested in learning about prehistoric lifeways, as shown by high attendance at prehistoric and historic excavations, parks, monuments, and museums. Courses in schools and colleges that deal with anthropological and archeological topics also are well attended, and there is widespread interest in television documentaries and films dealing with prehistoric and historic archeological subjects. For example, 10,000 people visited the Island Field prehistoric site exhibit in South Bowers, Delaware, in 1974. In 1975 and 1976, attendance exceeded 11,000, with averages of 400 visitors per week for the summer months (D. R. Griffith, personal communication).

State and local agencies, such as the State Highway Administration, Maryland Forest Service, and Maryland Park Service, should enlist the cooperation of DOA and MHT in planning and constructing interpretative

exhibits, roadside points of interest, and regional museum-parks. Interpretive exhibits on local prehistory also could be displayed in state and local agency offices and developments, in parks, power plants, roadside rest areas, natural areas and in game preserves. At very low cost, these interpretative exhibits could provide information on prehistory and prehistoric resource conservation. Such exhibits should give information on the local environment and on known prehistoric use of the area. Maps, text, and casts of artifacts should be displayed, along with a message on the need to conserve prehistoric resources. Traveling exhibits could be assembled to circulate to county libraries and historical society museums.

Information on prehistory is easy to incorporate into roadside points of interest. Visitors can inspect a series of environmental settings used by particular cultures with stops displaying artifacts or replicas found at sites located in that setting. Diagrams and other interpretive aids present information on present and past environments and on the use of these environments by prehistoric, historic, and present day peoples. With appropriate safety and security measures, some sites could be left partially excavated. Using pamphlets or voice recorded systems, all locations could be self-guiding. Such roadside exhibits might be integrated with a scenic road system. In various parts of the state, then, roadside exhibits could acquaint the public with examples of the range of prehistoric remains peculiar to that region.

Exhibits could allow visitors within short drives to recreate prehistoric economic cycles, such as the seasonal hunting and gathering pattern. These tours could expose visitors to discussions of the natural environment and culture history at each point of interest, while comparisons of the artifacts of each location could clarify the nature and variety of tools used at each prehistoric resource procurement station. In addition, time differences between sites at different stops could be shown by discussions of stylistic differences. Thus, visitors could learn through graphic examples how archeologists arrive at their conclusions. Heightening interest in prehistoric resources, expecially when they emphasize the dynamic nature of environmental and cultural changes,

these displays instill a sense of responsibility toward prehistoric resources. For example, a proposal has been made to establish an archeological park at a locally well-known prehistoric site in California (Dixon 1971:63-66). The many benefits discussed by this proposal include establishing a public park where ongoing prehistoric fieldwork can be viewed, along with creating outdoor village exhibits and a museum focusing on features of the local environment. By limiting excavations necessary for construction and coordinating them with archeological fieldwork, such park developments aid in preserving and protecting prehistoric materials beneath the ground surface. The surface can then be landscaped to protect prehistoric artifacts and structures. Financed by research grants, longterm prehistoric studies attract the public; parts of the site can be excavated and then refilled, with some of the discoveries left for permanent public viewing like those at the Island Field site in Delaware. Thus, the activities of archeologists are visible, and signs, exhibits, and tours acquaint the public with their work.

For the benefit of local schools and the general public, permanent prehistoric exhibits could be designed to recreate Native American lifeways. Exhibits might include reconstructions of prehistoric houses with artifacts and activities shown in dioramas, along with illustrations of archeological excavation and analysis techniques. Burial and other ceremonial deposits could be left in place to demonstrate religious life. A botanical garden could present the natural vegetation at the time of prehistoric occupation, showing food plants from local and nonlocal environments and explaining how they were prepared and used. Ramps and stairways might allow visitors to view geological deposits and deposit changes at various levels during prehistoric times. A museum of local ecology and a visitor center could house display collections from the site, including all aspects of the environment and the interaction of humans with the environment through time (Dixon 1971:63-66). In this way, prehistoric resource conservation could be incorporated into community recreation and education.

The success of developing selected prehistoric remains as interpretive and educational centers depends partly on solving problems of site

security and partly on instilling values of conservation in the general public. Developing particular prehistoric resources would depend on the goals of a state conservation plan. Any development of prehistoric resources that involves physical disturbance consumes the resource; thus, educational and other benefits must be weighed against the cost of disturbance. On a broad scale, educational efforts must be designed carefully in order to provide constructive outlets for newly awakened curiosity about prehistoric remains.

Management Strategy: Sensitizing Government Agencies

Federal, state, and local governmental agencies operating in Maryland need to be familiarized with the status of prehistoric resource conservation in the state, particularly in the coastal zone. A status report should be prepared for planning, regulatory, and funding agencies affecting prehistoric resources with their activities. This report should apprise agencies of the nature and limitations of current knowledge about prehistoric resources in the coastal zone, along with the current requirements, programs, and activities that relate to managing these resources. Likewise, DOA should ask these agencies for information about the current status of activities and procedures that might affect prehistoric resources. Although most agencies are required to consider prehistoric resources in planning, permitting, or funding projects, implementing these requirements depends on how each agency interprets them.

Agencies with long term involvement in coastal zone development, whether from a regulatory, funding, or use standpoint, should be identified. These agencies ought to be involved in gathering baseline information on prehistoric resources and in formulating a conservation plan for managing them. Federal agencies that operate in the coastal zone can be identified and encouraged to comply with the provisions for prehistoric resource inventory under Executive Order 11593. When coordinated through DOA, E. O. 11593 inventories could be incorporated into baseline data. In addition, administrative seminars, tailored to individual

agencies or groups of agencies, can suggest how to become more responsive to the problems and needs of prehistoric resource conservation, especially in light of regional conditions.

Soil survey and other Soil Conservation Service activities would provide an excellent contact point for educating local landholders in the importance of conserving prehistoric resources. With training, soil conservation personnel could gather information on prehistoric resources during field investigations and interviews with farmers, thus, economically combining this concern with their normal activities. Routine questions and observations could provide valuable input for the data bank on prehistoric resources and help the agency to meet legal responsibilities.

Drainage associations and county conservation districts also should be asked to distribute educational materials and to seek support for prehistoric resource conservation. Likewise, county agricultural agents who are involved in planning and implementing local and regional erosion control and preparing new agricultural land, could provide a point of contact. Liaison with local governments should be made a priority for DOA and MHT because of the importance of acquainting local governments with the nature and distribution of prehistoric resources and the need for their conservation. The management strategy should maximize opportunities for input from local residents and for control by local authorities such as zoning boards and planning departments.

Further, all state field personnel should be trained to recognize prehistoric remains as well as instructed to report them to DOA and see that they are not disturbed. State and local agency enforcement personnel should become acquainted with the Maryland Archeological Resources Act of 1968 and enforce the provisions that prevent the exploitation of prehistoric resources on state owned or controlled lands.

Unaware of the provisions against relic collecting on state and federal lands, state personnel generally do not enforce these laws. A few state game wardens and park custodians themselves are relic collectors. Relic collecting by state employees should be discouraged, and these

employees should be urged to join archeological and historic societies in order to pursue their interests.

Finally, although concern for cultural resources is evident in all comprehensive plans for Maryland coastal counties, this concern is biased toward historic resources. Therefore, DOA and MHT ought to cooperate with the information programs of the Energy and Coastal Zone Administration to sponsor regional information seminars or sessions with county planners and other agencies, familiarizing them with the need for prehistoric resource conservation and with current management programs.

Management Strategy: Developing a Prehistoric Resource Conservation Plan

Because so little is known, Maryland's prehistoric resources resemble plant or animal resources that need managing but lack ecological studies. Management decisions affecting prehistoric rdsources require information about nature, abundance, distribution, and condition. Unhappily, prehistoric data currently available for coastal Maryland do not adequately reflect its diverse and complex prehistoric record.

As Dunnell and Fuller (1975) have pointed out, all remains must be considered important and significant in poorly known areas, while in well known areas, some remains will be more important than others. Doubtless some areas are similar in content, too, making the resources they contain nonunique. Were development mistakenly to assume an area to be well known, however, all the remains could be lost. Until major deficiencies in knowledge are remedied to permit the assessment of smaller scale projects, all coastal areas must be considered poorly known.

Thus, an adequate data base must be assembled for planning. Simply responding to inquiries about the presence of prehistoric materials at particular locations is not enough. The development of a centrally coordinated prehistoric resource conservation plan will require considerable time and funding, with efforts aimed at assembling information and balancing divergent views and interests. A simplified schematic of plan develop-

ment is presented in Fig. 6-20. Responsibility for developing a plan lies with DOA and MHT, although the primary responsibility should reside with one agency or the other.

Two broad categories of data are required as input in the plan formulation process. Because no interpretive framework exists for the region, systematically collected regional data on prehistoric resources is essential. The resulting prehistoric data bank must be an accurate reflection of the prehistoric record, responsive to management needs. Likewise, considerable information must be gathered from archeological, planning and regulatory communities, including suggestions for education programs, legislation, permit requirements, priorities, funding, and interagency cooperation.

The Maryland archeological community also should be consulted. Responsible in large part for the current data bank and thus familiar with the current status of Maryland prehistory, this group is a reservoir of local expertise with interests in the future status of Maryland prehistory. Federal agencies like the National Park Service and the Advisory Council on Historic Preservation can provide expertise in federal programs and prehistoric resource planning. The archeological community could provide input on regional baseline survey priorities, design specifications, research problems integration, report standards, permit systems, procedures for defining critical areas, legislative suggestions, funding, and mitigation strategies. Input from this group would be important to the design and execution of regional baseline studies and to the development of administrative aspects of the prehistoric resource conservation plan.

The expertise of land planning and regulatory agencies also should be tapped for ideas on how best to articulate needs, and mechanisms. Input from these agencies should also help in designing implementation mechanisms, including legislation and regulations. Their involvement should increase along with their awareness of prehistoric resource conservation problems, perhaps making them more active in conservation.

Information could be acquired from these groups through a series of meetings with varying composition and topics, perhaps co-sponsored by

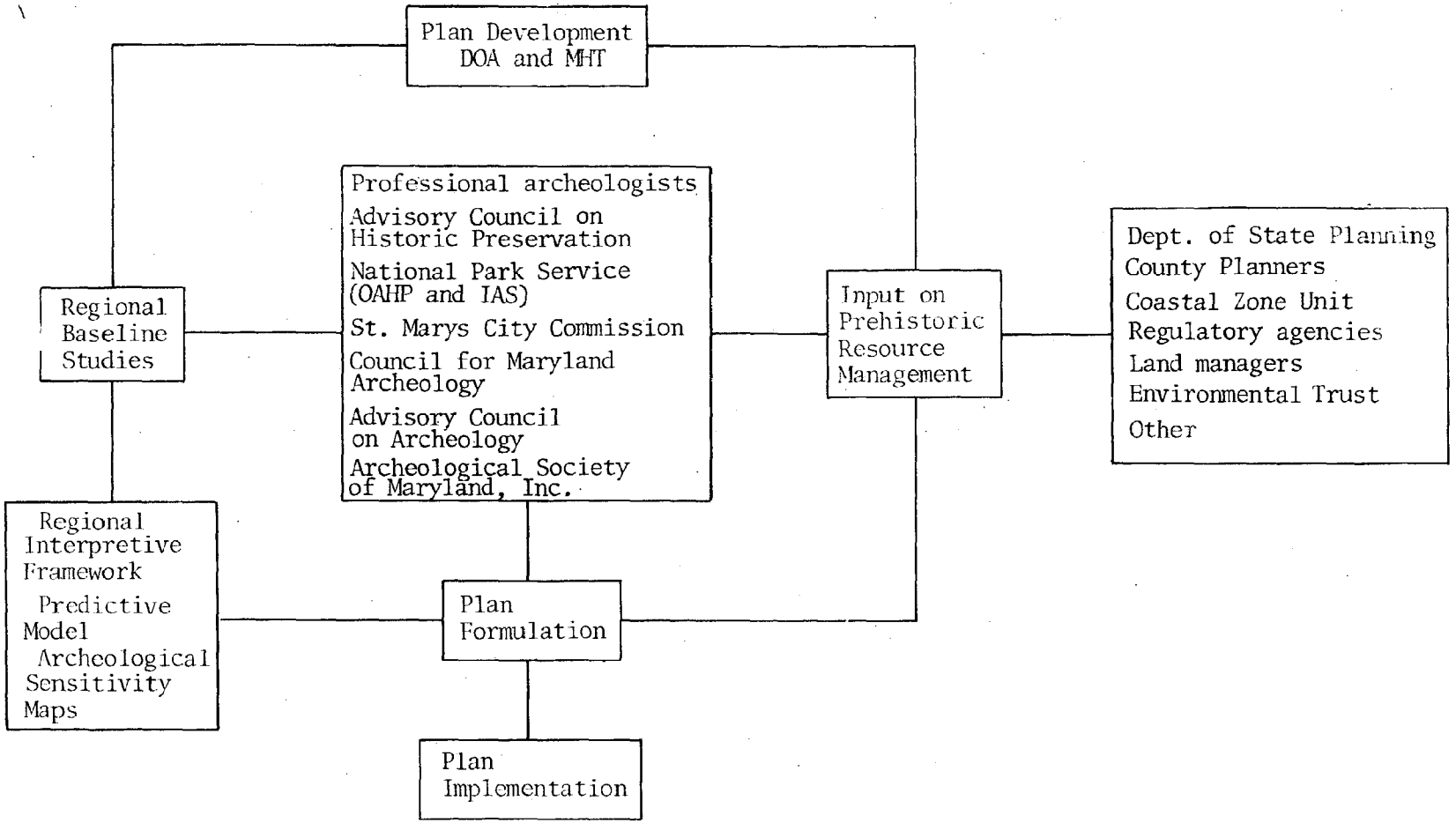


Fig. 6-20a Schematic diagram of prehistoric resource conservation plan development and implementation

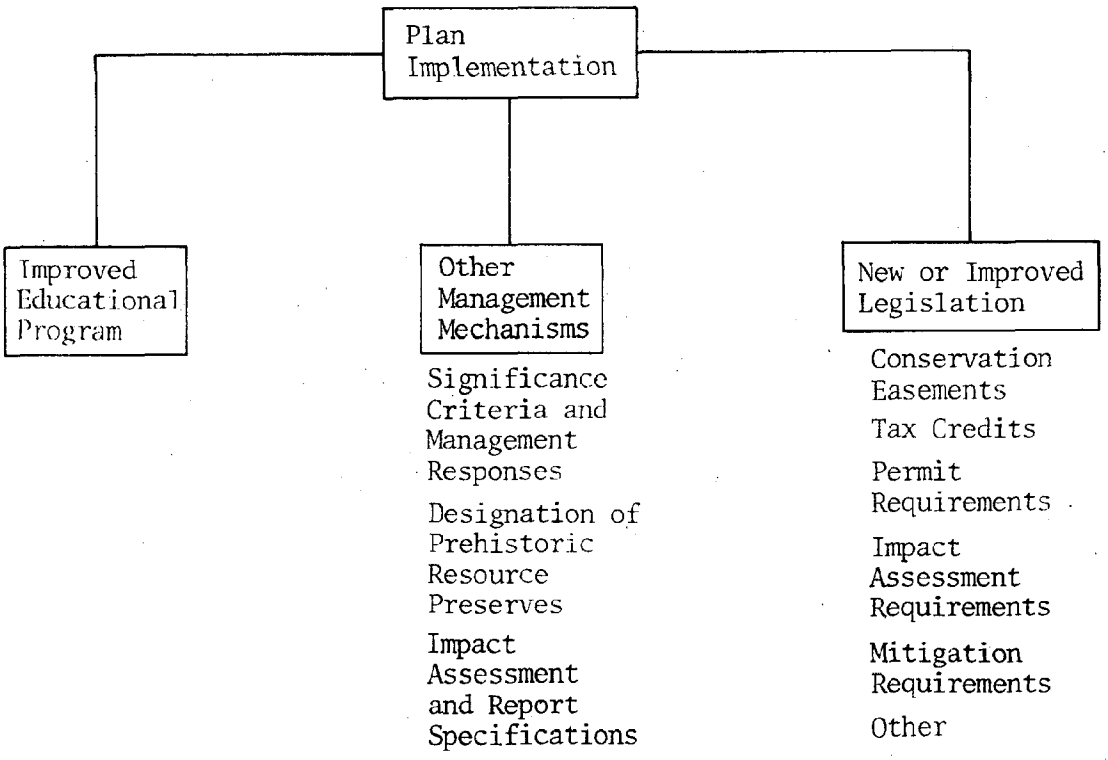


Fig. 6-20b Schematic diagram of prehistoric resource conservation plan development and implementation

primary managing and planning agencies (i.e., DOA, MHT, DSP, and the Energy and Coastal Zone Administration). Information could be shared and progress could be communicated to the parties involved through a short, irregular newsletter.

As noted above, the prime prerequisite to developing a resource conservation program is the acquisition of baseline information on prehistoric resources. To manage Maryland's wetlands, for example, it is necessary to know "the relative abundance of various wetland types, the values of various wetland types for various uses, and the distribution and magnitude of development pressures throughout the coastal zone" (Maryland Water Resources Administration 1974:38). Likewise, in setting up the Power Plant Siting Program it was recognized that general biological and ecological baseline studies would be an essential part of the siting environmental research program.

To determine the potential impact on prehistoric resources of any development project, several kinds of information must be known through baseline studies of prehistoric resources:

1) the kinds of remains that occur in the area according to culture, age, and function
2) the numbers in which each category of remains are found and their environmental distribution
3) the current condition of these remains (have most of them been disturbed or destroyed, or are they relatively undisturbed?)

Information already available, such as the culture sequence outlined for the Potomac River (McNett and Gardner ms.) and the settlement models presented by Wright (1973) and Cameron (1976) provide an initial understanding of the prehistoric remains in some Maryland areas, but these interpretations were not developed for resource management.

The present study is a first step toward providing information for the management of Maryland's coastal prehistoric resources, however, it provides only a small part of the information needed for efficient management. Because prehistoric remains result from complex economic systems often comprising several activities spaced over various environments, individual remains cannot be understood in isolation. Instead, they must

be understood in terms of the historical and functional relationships that link them through the areas in which they are found. Naturally, not every nuance of prehistoric land use must be understood before the resource can be managed effectively.

To date, most archeological research in the Chesapeake Bay area has investigated chronological problems. The regional approach suggested here adds a concern for the spatial variability in prehistoric remains, involving among others, problems of artifact density, site definition, and function. We do not understand the range of diversity among prehistoric remains in the Chesapeake Bay area, and therefore no regional interpretive framework exists for assessing site significance or allowing suggestions about optimal mitigation procedures. Acquiring regional baseline information on prehistoric resources must be considered of the highest priority.

Regional baseline studies are distributional studies based on environmentally controlled and systematically collected data obtained from a coherent geographic area by an explicit sampling design. Although they are expensive, in the long run these studies are more economical than the salvage operations presently used. Data acquisition surveys should be designed to expand the current data base and include areas where prehistoric resources are already threatened.

Regional baseline studies or site surveys are enabled by the Maryland Archeological Resources Act, the Historic Preservation Act of 1966, Executive Order 11593, and the Archeological Conservation Act of 1974. In addition, the need for baseline data is recognized in the Coastal Zone Management Act of 1972. Although this latter act emphasizes the use of extant data banks, no data exist for Maryland's coastal zone adequate to meet management needs.

Some funding is now available for surveys through federal matching funds granted to states for historic preservation. The National Park Service (1977) and MHT (ms.) both have published lists of sources for preservation funding. The Archeological Conservation Act of 1974 authorizes agencies to conduct necessary data recovery studies in con-

junction with federally executed or assisted construction projects. For these cases, federal agencies may use existing funds, seek appropriations, or seek to have transferred up to 1% of project funds to the Secretary of the Interior.

Other ideas for funding might follow the example of Washington State, where personalized automobile license plates are available at extra cost to provide revenues for wild bird conservation activities. Similar innovative approaches to funding might include a state tax on development under which land changed from less to more intensive use might be taxed at a higher rate. Further, those responsible for secondary impacts might be required to provide some funding for education, regional salvage, or baseline surveys.

Agencies with a long term interest in regulating or developing specific areas also could be approached for funding. These agencies might see quickly the overall advantage of a coordinated planning approach over a project-by-project, piecemeal salvaging of information on prehistoric resources. Certainly, expensive salvage operations are recommended more frequently than necessary, were adequate data available for assessing representativeness and significance in specific prehistoric resources. With baseline information and advanced planning, impact mitigation need not always be expensive; in most cases, such mitigation can be turned into positive advantages to the community. Information from project inventories or regional prehistoric surveys could be incorporated into a community museum, county library or school display, thus providing interpretive and educational benefits.

Acquiring regional baseline data on prehistoric resources should be designed to address management needs and (whenever possible) research questions. Devised by MHT and DOA with input by the Advisory Committee on Archeology and the Maryland Council on Archeology, survey design should coordinate the problems, research goals, and expressed needs of resource planners and regional archeologists.

Regional study areas should be defined in order to guide surveys into local environments of manageable size. When dividing the Chesapeake Bay

area into regional units, environmental, development, and survey conditions should all be considered. Data acquisition strategies will have to suit local conditions as well as build on existing data, relate to local research problems, take local development trends into account, and involve local planning, regulatory, and funding bodies, not to mention local amateur archeologists. Varying land ownership patterns and ground visibility conditions are further inducements to subdividing the region into internally homogeneous study areas.

To inventory all prehistoric resources in the coastal zone would be impossible as well as costly and redundant. Because a large percentage of the coastal zone has seen a variety of prehistoric activities, it is equally impossible for modern development to avoid disturbing prehistoric sites. Therefore, regional surveys should be guided by a sampling design that insures equivalent and redundant coverage of selected sampling units. Using such procedures assures that differences in land use in various parts of the coastal zone will be represented, and allows data to be collected as economically as possible. Interior areas also must be included, because prehistoric land use systems were active in both coastal and interior areas. Baseline surveys should utilize comparable sampling strata and locational procedures for each region, including comparable inspectional methods, whenever possible.

Because they represent the most effective and efficient means of acquiring data from regions, the field techniques of surface survey and artifact collection should be emphasized. Likewise, remote sensing techniques should be employed when feasible. Owing to its higher cost, the local nature of resulting information, and its greater destructiveness, excavation should be minimized. When possible, surface inspection should take advantage of the ground visibility afforded by agricultural fields. Surveys should, however, be conducted under an environmental sampling scheme; thus, surveys should not be restricted solely to high visibility ground conditions or limited to areas known to have or suspected of having high densities of prehistoric resources.

The results of the present study indicate that baseline surveys must go beyond noting the presence or absence of prehistoric resources. Funds

must be budgeted for artifact acquisition and analysis sufficient to determine period of occupation and to characterize the activities represented in each artifact cluster. Although they will be expensive, these projects will provide the necessary effective management tools. As Dunnell and Fuller (1975:1) point out, more important than knowing where prehistoric resources exist is whether they are significant to understanding the local prehistoric record. Only when this information is available can the resources be managed effectively.

Figure 6-21 illustrates one way in which the Chesapeake Bay area might be divided into local study environments. Regardless of how study area boundaries are drawn, they must be selected for their potential relevance to prehistoric occupation, and the possibility of related prehistoric use among various study areas must be kept in mind.

In the suggested scheme, Area I includes the Potomac River shoreline and adjacent interior, providing an environmental cross-section from brackish water coastal plain to freshwater Piedmont. This corridor has long been recognized as an important prehistoric communication route. The Patuxent River drainage basin comprises Area II, while Area III includes the Bay shoreline of Calvert County, an area that is characterized by a retreating cliff shoreline rarely broken by Bay tributaries. Its dense forest cover requires special survey techniques in order to maximize the chance for finding prehistoric resources.

The highly indented and extensively developed shorelines of Anne Arundel and Baltimore counties comprise Area IV. This area also will require special survey techniques for finding prehistoric resources where the shoreline has been greatly modified, but the area must be surveyed in a way comparable to that used in agricultural areas. Like Area III, agricultural land use in Area IV is infrequent and there are few areas where the ground surface is exposed to view. While ground visibility is not a serious problem in finding prehistoric shell middens, sites composed of lithic or ceramic remains are much less obvious, especially when the soil is covered by grass or other vegetation.

A pilot project assessing the prehistoric potential of Area IV is

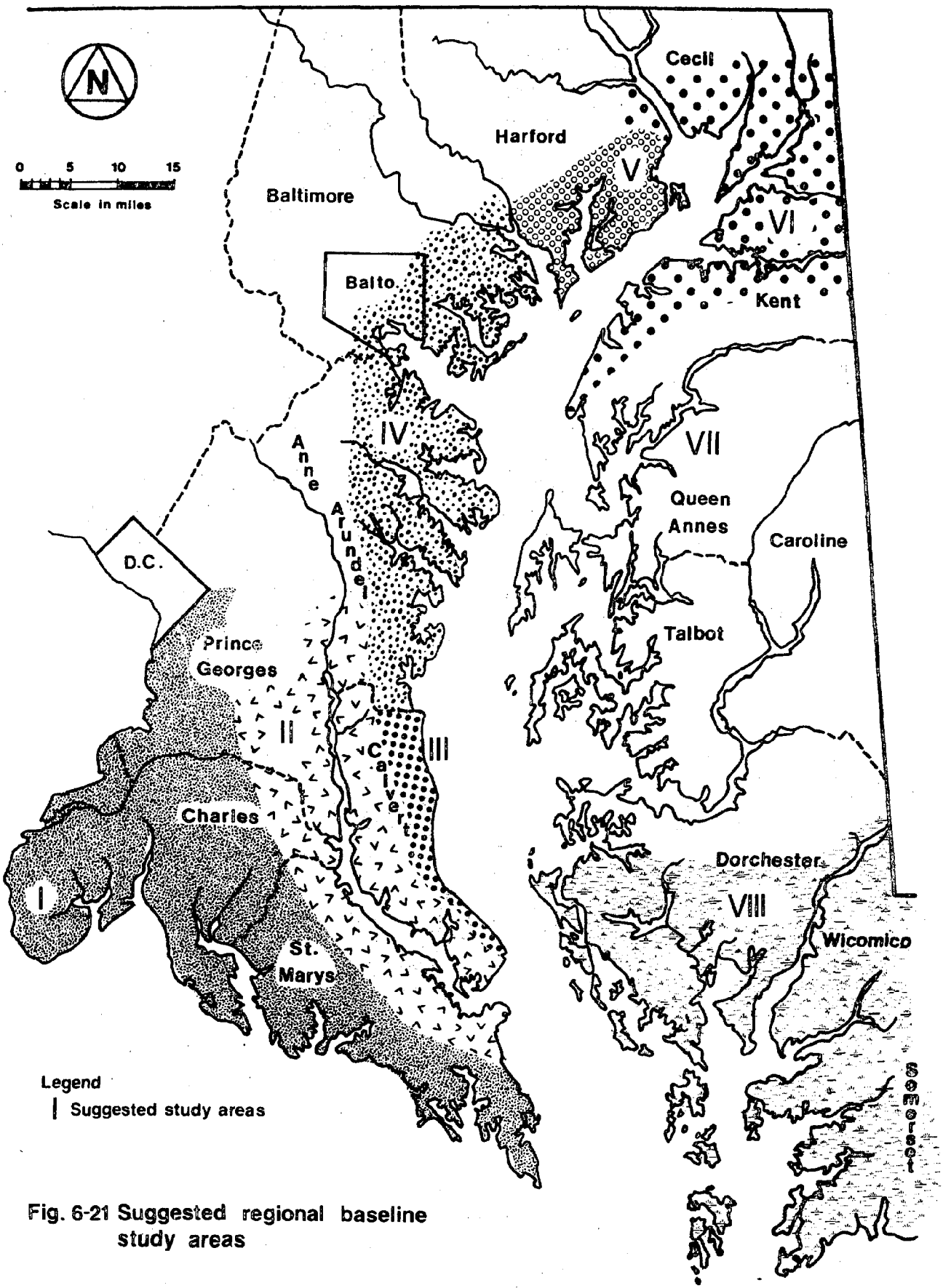


Fig. 6-21 Suggested regional baseline study areas

highly desirable. Although the Anne Arundel and Baltimore County shorelines usually are regarded as having few surviving prehistoric resources, no data have been collected systematically to allow an evaluation of the nature and extent of disturbance to prehistoric resources in the area or to inventory the age, kind, condition, and number of surviving resources. Representative samples of this area should be inspected in order to evaluate results from a cost-benefit perspective. Fieldwork in highly developed areas will be slow and costly, owing to the large number of permissions needed to trespass and problems of ground inspection and coordination. Local informational meetings held prior to the survey might elicit cooperation; if the fieldwork were accompanied by an innovative effort to educate local landowners, the experience should increase citizen awareness of and sensitivity to prehistoric resources.

Areas V and VI are similar environmentally, in that they are located at the conjunction of Chesapeake Bay and the Susquehanna River, incorporating the transition from brackish waters capable of supporting oysters to fresher waters where oysters cannot survive. These areas are close to the Piedmont and have moderately indented shorelines. Area V is distinguished from Area VI because the shoreline is almost completely controlled by the Federal government. Land here has been modified extensively; much of it has been contaminated by munitions and most is forested. These conditions require a special survey strategy, and support for such work might be obtained from the Federal government's need to fulfill some of its responsibilities for inventorying and protecting prehistoric resources as required by Executive Order 11593.

Area VI contrasts with Area V in that its land is privately owned and in agricultural use. In addition, four river basins make this area an important nursery for many fish species. Survey and development conditions are similar throughout the area, although the northern part is characterized by somewhat more development and forest cover.

Although the highly indented shoreline in Area VII appears to mirror that found in Area IV, substantial differences result from Area VII's lack of topographic relief and from extensive coastal agricultural land use.

Nor does Area VII adjoin the Piedmont, as Area IV does. As a result of extensive agricultural lands and lack of development, survey conditions are almost ideal in this area.

Area VIII includes the broad marshy shorelines of most of Dorchester, Wicomico, and Somerset counties, creating similar environmental conditions which inhibit development. Natural stresses such as erosion and inundation are the most important factors affecting prehistoric resources here. Like Areas III and IV, special survey techniques are required for finding prehistoric resources in the marshy shoreline of Area VIII. It might be argued that this area receives some protection from wetlands legislation; but this protection cannot extend to damage from natural forces, and these forces continue to diminish prehistoric resources. Because few data on the area's prehistoric resources have been systematically gathered, little is understood about their nature and distribution. The continuing destruction increases the importance of evaluating them, despite their protection from development. Further, artifacts eroding from marshes are accesible to relic collectors by boat. Enforcing antiquities legislation is a problem in such a large area requiring water patrol.

Finally, Area IX is comprised of the shoreline of Worcester County, where the Atlantic coast with back bay marshes and bay-mouth barriers make it unique among Maryland's coastal counties.

In addition to defining survey areas, appropriate sampling strata must be selected. Depending upon how the sampling strata are selected, unique prehistoric resources might be found in some strata, while some resources may be distributed redundantly through other strata and some strata may contain no resources. Biological and physical or geomorphic parameters are important criteria for a sampling scheme; experimentation will suggest specific variables. For example, data developed by the present study could be used in a small pilot project designed to formulate environmental sampling strata useful for predicting the distribution of prehistoric resources. A sample could be drawn from the tracts investigated by this study, and the sites revisited to collect artifacts for analysis. Experiments then could be made to seek correlations between various

environmental variables and the kinds of prehistoric resources, according to ages and activities represented in them.

Divergent geomorphic areas in the coastal zone always must be recognized and taken into account in distribution studies of prehistoric resources. The dominant processes affecting the shoreline, sea level rise and shore erosion, operate on quite different landforms throughout the Bay area (for example, the cliffs of Calvert County and the low bank of Dorchester County). Older shorelines are retained in some parts of the Bay, while in other parts, even recent shorelines are lost.

Selecting and implementing environmental criteria to stratify the coastal zone will require a multi-disciplinary understanding of the history of coastal evolution in each area. Dominant processes and surfaces of various ages must be identified and surveyed, and prehistoric remains interpreted. This information also will help in understanding what prehistoric resources are missing from the archeological record. Ultimately, successfully predicting prehistoric resource distribution in the coastal zone will depend on an understanding of coastal geomorphic history.

Another decision to be made for regional baseline studies is whether or not survey work should be carried out or emphasized in areas where prehistoric resources are under the most stress from disturbance. Because resources in such areas are likely to represent fragments of the prehistoric recourd, it may be preferable to carry out baseline studies in other areas where modern disturbance to resources is minimal. This plan opts for a more complete prehistoric record but fails to salvage fragmented prehistoric resources before they are finally lost. This decision requires input from planners as well as archeologists, along with reviews of current development trends and the state of information on prehistoric resources in each study area.

It will be important, of course, to preserve prehistoric resources in a variety of environmental settings, some of which are presently undergoing intense development. Therefore, coastal areas with well drained soils and other conditions that make them attractive to future development should be incorporated into area surveys on a priority basis. Likewise, areas of

high erosion and inundation also should be incorporated whenever possible, because these processes constantly reduce the number of prehistoric resources -- very rapidly in some cases.

Also affecting the design of regional baseline surveys and the analysis of resulting data are the scale and attributes chosen to typify prehistoric remains. In the past, archeologists and others have tended to use the concept "archeological site" to mean a discrete, high density cluster of artifacts. Prehistoric land use, however, was almost continuous across the landscape, varying only in nature and intensity.

Recently, the concept of "siteless survey" has been introduced by Dancey (1974) and Dunnell and Dancey (ms.), and successfully employed in Kent County by Wilke and Thompson (1977). Figure 6-22 shows a portion of the Kent County coastal zone that was extensively surveyed; this figure illustrates the continuous nature of prehistoric land use. The area was gridded into 30m x 30m units and all artifacts were collected and provenienced. The artifact density map shows the distribution of artifacts by unit. Note that the entire area contains prehistoric remains in densities that vary with proximity to the coast. This presentation quickly reveals the arbitrary nature of site designation or boundary determination in such a setting. Thus, low density artifact scatters are an integral and important part of the prehistoric record that must be considered.

Stylistic and functional studies of artifacts segregate the kinds and ages of prehistoric activities represented by the artifact distributions shown. If an area like the one shown were scheduled for development, it would be difficult to assess the significance of prehistoric land use represented by the numerous artifact clusters and lower density scatters without comparative baseline information. This in turn limits the range of mitigation options that could be selected.

Management Strategy: Formulating the Plan

Formulating a conservation plan and incorporating into development plans a concern for prehistoric resources will affect siting and other

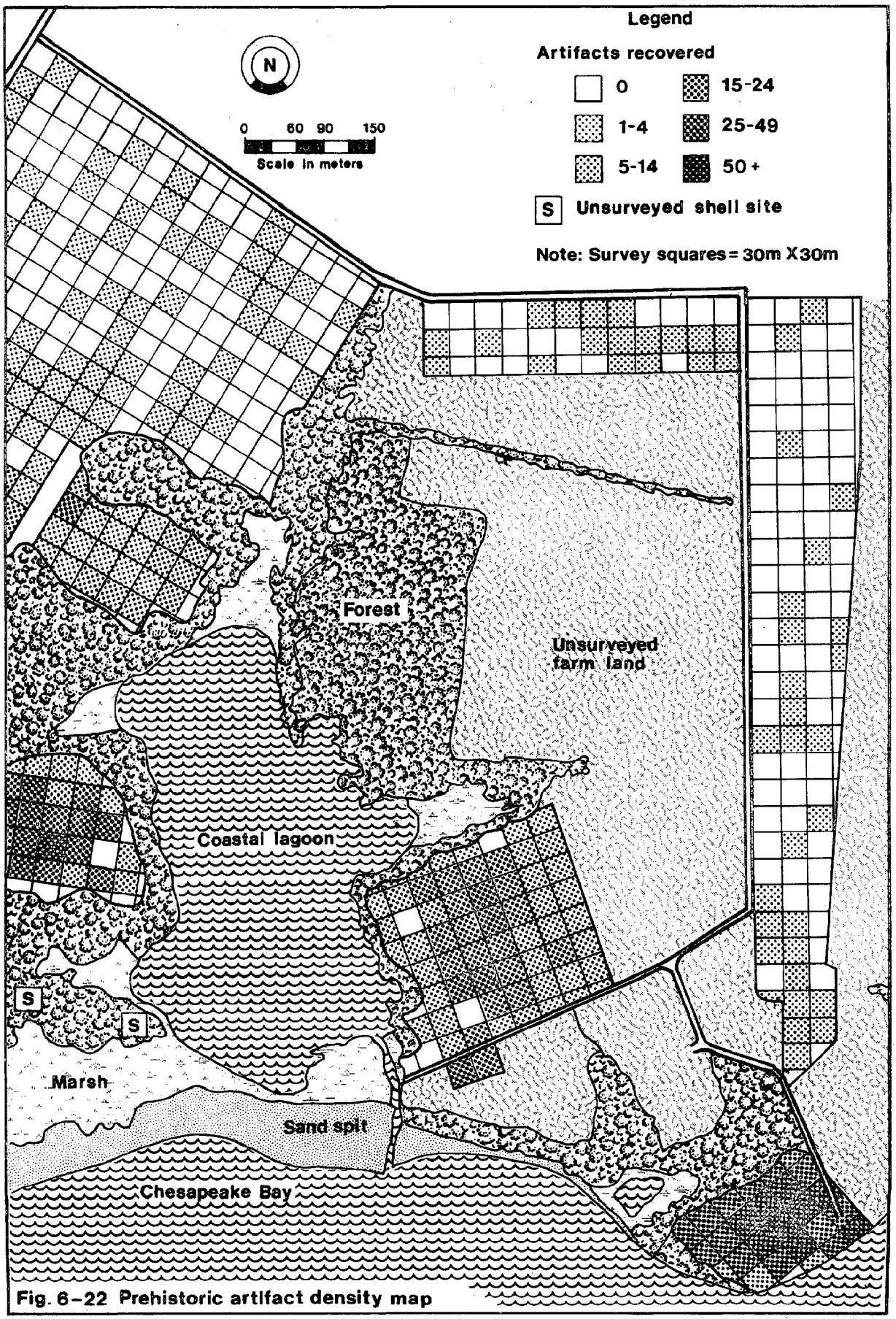


Fig. 6-22 Prehistoric artifact density map

development decisions, control or modify resource disturbance or destruction rates, and recover scientific information from resources scheduled for disturbance or destruction. Creating such a plan involves synthesizing regional baseline and administrative information. Certainly, parts of this process should begin before regional baseline surveys have been completed; however, final plans will require the active participation of the archeological community, especially in assessing regional survey results and designing conservation mechanisms and priorities.

It is difficult to estimate the cost and time needed to accomplish this program of data acquisition. Many variables affect such estimates -- local, state, and Federal administrative and monetary support, availability and interest of professional archeologists, political considerations, data acquisition specifications (e.g. sample size). Although the area under consideration is large, a carefully designed survey that emphasizes a sampling approach should balance the tasks to be done with the means that can be made available.

Several factors, some peculiar to the Maryland setting, directly affect the design and implementation of any conservation plan. As discussed in Chapter Three, contact period aboriginal populations were forced out of the area, decimated by diseases, or completely acculturated. Therefore, few direct descendants of aboriginal peoples remain in the state and a deep interest in their prehistory has developed. In contrast, there is a great deal of interest in Maryland's long and well documented history. Marylanders take pride in tracing their ancestry to early colonial roots and spend large sums of public and private monies for the restoration and upkeep of early structures. As Jordan (1975:73) has noted for New England, "minimal public (therefore political) knowledge and interest in prehistory must compete with and overcome enormous historic interest." A common cultural background allows people to relate more readily to structures and other historic remains than to stone artifacts and shell scatters, the remains of prehistory.

In general, the layman's knowledge of aboriginal peoples in Maryland is limited to the contact period; most people are not aware of the long

time depth of Maryland prehistory. Maryland shares similarities to the New England setting outlined by Jordan (1975:73), including the fact that the most of the population is oriented to urban and suburban residence: "the majority of the population has no contact with the majority of the land." In addition, most of the Maryland coastal zone is privately owned and most landowners resist land use controls.

Prehistoric sites in the coastal zone tend to be thin, mixed, and most have been disturbed by plowing at some time. Owing to extensive agricultural land use, prehistoric remains are visible to the practiced observer and hence susceptible to relic collection. Usually covering small areas and confined to the plow zone, these remains can be depleted quickly. At the same time, coastal zone sites lack above ground remains; to the unpracticed eye these sites are indistinguishable from areas not containing prehistoric remains (save for areas marked by scatters of shell debris) and can be disturbed unwittingly.

Only a small group of amateur and professional archeologists presently is committed to the study and conservation of Maryland's coastal prehistoric resources. The primary emphasis of local university research programs in recent years has been directed outside the coastal plain or outside Maryland.

Other factors affecting the design of a conservation plan relate to the nature of stresses on the resources. As discussed in Chapter Five, these stresses generally come from diverse sources. Lacking central planning and coordination, these stresses appear small scale in individual instances, but they are significant cumulatively. Finally, many of the current land management and acquisition programs emphasize areas, whereas prehistoric resources have tended to be recognized on an individual basis. The fact that prehistoric land use was essentially continuous across the landscape suggests that a more effective approach to conservation might be to emphasize areas or regions and the spatial variability of prehistoric remains therein.

Several legislative approaches could be used to further prehistoric resource conservation, and these should be considered when formulating a

conservation plan. Most of these measures are currently being used in various state and local governments; thus, they have passed the test of legislative scrutiny. However, because of their recent enactment, their practical utility has not yet been evaluated.

Some of these measures encourage private prehistoric conservation by giving tax credits for preserved sites and by making trespass for relic collecting a misdemeanor. These measures specify how to acquire prehistoric sites or easements to them, how to zone for site preservation, or how to require setbacks for soil disturbance near shorelines. Various legislative measures are discussed in the following paragraphs.

Some local governments prohibit the disturbance of prehistoric sites without allowing time for preservation, relocation, or salvage of the remains. Funds are sometimes provided to carry out such activities. Other local governments use eminent domain procedures to protect sites. Finally, government restrictions on the possession of prehistoric artifacts might be considered as a conservation measure.

For example, some governmental units in California and Hawaii have enacted legislation to protect prehistoric resources on public and private property from unauthorized disturbance. The California Environmental Quality Act shows legislative intent to "preserve for future generations... examples of the major periods of California history" (Pub. Res. Code Sect. 21001c, quoted in King, Moratto, and Leonard ms.). In court decisions this law has been applied to private property as well as to public property. Humboldt County, California (Board of Supervisors Resolution No. 71-14; Appendix B), protects Native American burials and ceremonial sites by withholding approval from projects in which the county is involved until preservation or relocation of these materials is guaranteed.

Inyo County, California (Ordinance No. 146j; Appendix B), specifies that

> No publicly or private sponsored project or action shall be expressly permitted by the county planning commission...or any other county agency where the commission finds that any archeological, paleontological, and historic features, or Native California Indian burial sites may be disturbed in any way by

> the project or action; provided, the commission may conditionally expressly permit the project or action if the project or action sponsor takes responsibility for preservation, protection, or relocation of the features or sites in accordance with a specific plan for preservation, protection, or relocation that shall be reviewed and approved by the commission after a public hearing.

Marin County, California (Ordinance 1589, Appendix B), requires that a permit be issued from the county's department of public works before a prehistoric site can be disturbed. Liaison agencies, including colleges and archeological societies, are asked to comment on significance, with the provision that 60 days be allowed for the study of significant sites. Unfortunately, this legislation may not prove effective for prehistoric resource conservation as the cost of site evaluation and salvage apparently must be carried by the liaison agency and such costs probably will become too expensive for the liaison agencies.

The City of Irvine, California (Appendix B), has adopted a policy requiring that prehistoric sites be taken into consideration in planning projects and be discussed in impact statements. These sites must be assessed, then preserved or salvaged. Further, this policy encourages the development of interpretive and educational programs utilizing archeological sites.

In Hawaii (see Appendix B), sites are listed on tax maps. If they are threatened by disturbance, 90 days notice must be given by private agencies. According to McGimsey (1972:77), "state agencies are required to expend up to one percent of construction funds to recover archeological and historical remains affected" (Hawaii Act 216 of 1969).

While it is essential that time be made available for studying threatened prehistoric resources, it is even more important to make funds available for such studies. Although the City of Irvine and Humboldt and Inyo counties require that the developer sponsor salvage studies, the legislation is recent and its practicality has not yet been demonstrated.

North Carolina, Ohio, and the Canadian province of British Columbia have provided for condemnation or eminent domain procedures to save important archeological sites from destruction. The British Columbia

Archeological and Historical Sites Protection Act of 1972 provides that:

> 2. (1) Where, in the opinion of the minister, land is of exceptional archeological or historic significance, he may, by order, designate it as an archeological site or as an historic site.
>
> (2) Where, in the opinion of the minister, an object is of exceptional archeological or historic significance, he may, by order, designate it as an archeological or as an historic object.
>
> (3) Where land is designated under this section and it is shown that the value of the land is diminished by reason of the designation, the minister shall pay to the owner an amount to be determined by the Lieutenant-Governor in Council.
>
> 7. (2) Where, in the opinion of the minister, land contains a site that is likely to be altered, damaged, or destroyed by reason of commercial, industrial, agricultural, residential, or other development or activity, or is likely to depreciate or become dilapidated, he may
>
> (a) order a site survey and, if he considers it necessary, a site investigation; and
>
> (b) order the owner or person responsible for the development or activity to provide sufficient funds for the site survey and, if required, the site investigation; and
>
> (c) order that the development or activity be suspended in whole or in part until the site survey and, if necessary, the site investigation, have been completed.

Another legislative approach might be to restrict possession of prehistoric artifacts, although the usefulness of such legislation to prehistoric resource conservation is not now known. Alabama has declared state ownership of all archeological materials (McGimsey 1972:29), but the constitutionality of this legislation has not yet been tested in court.

Because they are endangered nonrenewable resources, artifacts might be included in legislation similar to the Federal Endangered Species Act of 1973 (P.L. 93-205, 87 Stat. 884) and in the Maryland Endangered Wildlife Act (Art. NR 10-2A05). A measure like this could make it illegal to possess artifacts without a permit for educational display or scientific study. Likewise, the possession or sale of artifacts collected from state or Federal lands without a permit could be made illegal. Although it would

be designed to control relic collecting, such legislation might alienate people who collect artifacts out of a genuine interest in prehistory.

Local governments could use performance zoning to specify the qualifications that a prehistoric site must meet in order to be zoned for preservation. This type of zoning already has been used in Washington County, Maryland, for historic preservation. The major drawback to performance zoning is that it may be challenged and fail in court tests. As "spot zoning," it can be argued to be the antithesis of planned zoning.

Many kinds or prehistoric resources are located along waterways such as the Chesapeake Bay and its tributaries. In addition, the greatest densities of artifacts are found close to the water's edge, with lesser densities of artifacts found the further away from the water's edge one looks. Thus, zoning regulations could specify a certain setback for soil disturbance. Using this requirement, the soil within a certain proximity to the water's edge could not be disturbed unless it were demonstrated to be free of prehistoric resources. Washington State, for example, requires a permit for development within 200 feet of its shorelines. Florida requires a 50 foot setback for construction or excavation near the ocean.

To be most effective in preserving prehistoric resources, setbacks in Maryland should be applied to both present and former shorelines, including the state's wetlands. Such setbacks would not only lessen the effects of direct disturbance to prehistoric resources, but also they would provide a buffer zone protecting both the sites and waterways.

Tax credits could provide a powerful tool for encouraging landowners to preserve prehistoric resources, especially when coupled with state programs such as open space and scenic rivers. Advance planning could establish criteria for judging the eligibility of prehistoric resources for tax reduction. New Mexico, Virginia, and Wisconsin have provided for this type of prehistoric resource preservation (McGimsey 1972:98). Current Maryland legislation (Art. 81, Sec. 12e) that provides up to 50% tax credit to landowners for designating open space, open areas, or preservation easements, could be modified to include designated prehistoric resources.

Conserving prehistoric resources requires citizen cooperation. Some states request citizens, landowners, and state agencies to cooperate in preserving prehistoric resources by asking them to report these resources, protect them, and to permit only investigations carried out by recognized educational or scientific institutions. Georgia, for example, provides a "finder's fee" or reward for those who report prehistoric resources to the state, although the practicality of this measure has not yet been tested.

Other states (for example, Alabama, Arkansas, Michigan, North Dakota, and Tennessee) make it an act of trespass to enter private property to collect prehistoric materials. McGimsey (1972:98) notes that making this activity a misdemeanor better enables landowners to protect their sites.

State and local governments could preserve specific prehistoric resources by making them landmarks, parks, or museums or by using them as a criterion in establishing natural areas or interpretive centers (such as the Remington Farms self-guiding nature tour in Kent County). Examples of prehistoric resources used as state museums or parks include Delaware's Island Field prehistoric museum, Illinois' Cahokia Mounds museum and park, and some of Ohio's prehistoric parks such as the Newark Mound group and the Flint Ridge stone quarry area.

According to McGimsey (1972:97), eight states now allow prehistoric landmarks or zones (groups of sites) to be established by the agreement of landowners. Depending on wording, the state may forbid their disturbance without permission. States with these agreements include Arkansas, Colorado, Idaho, Massachusetts, Mississippi, New Mexico, Tennessee, and Texas.

Two states, Iowa and Illinois, provide for the consideration of prehistoric resources in the acquisition of land for recreation (McGimsey 1972:97). Lipe (1975) envisions using prehistoric resources as a criterion for establishing natural areas or other land to be protected from disturbance.

One of the most important steps that Maryland could take would be to make explicit a policy of prehistoric resource conservation, perhaps as a General Assembly resolution, and administer it vigorously. Senate

Bill 320, vetoed in 1975, is an example of good legislative treatment of cultural resources. A bill of this type should be enacted.

New proposals for legislation should be based on information from regional baseline studies, consultation with interested professionals, and reference to a conservation plan. In addition, similar legislation established in other jurisdictions should be reviewed in terms of its effectiveness and ability to withstand court tests.

DOA and MHT need to maintain an active dialogue with legislators. Legislators should be provided with the opportunity to become familiar with the nature of prehistoric resources and the problem of conserving them, perhaps by means of short, illustrated informational meetings and field trips emphasizing the scientific necessity and the practical benefits of prehistoric conservation.

That the property rights of citizens seem increasingly regulated by environmental legislation, suggests that any additional constraints imposed by prehistoric resource conservation legislation might not be favorably received. Therefore, new legislation, regulations, and ordinances relating to prehistoric resources should, where appropriate, present alternatives and choices to compliance. A good education program, especially one that brings the results of prehistoric research to the local level, will help enlist cooperation with prehistoric legislation.

Some basic elements of a prehistoric resource conservation plan can be specified at this time (Fig 6-23). Foremost, the plan should be based on a philosophy of conservation or "wise use" of the prehistoric resources found in the coastal zone. An integral part of this conservation philosophy should be the preservation of a substantial representative sample of what resources originally were deposited. This sample will insure that such resources will be available for use (interpretation, study, or display) at a future time. This guarantee is especially important as new techniques are developed for studying prehistoric remains and new questions are asked of the data. In general, the plan should continue and improve an education program as well as give a framework for management decisions and day to day administration. Finally, the plan should pro-

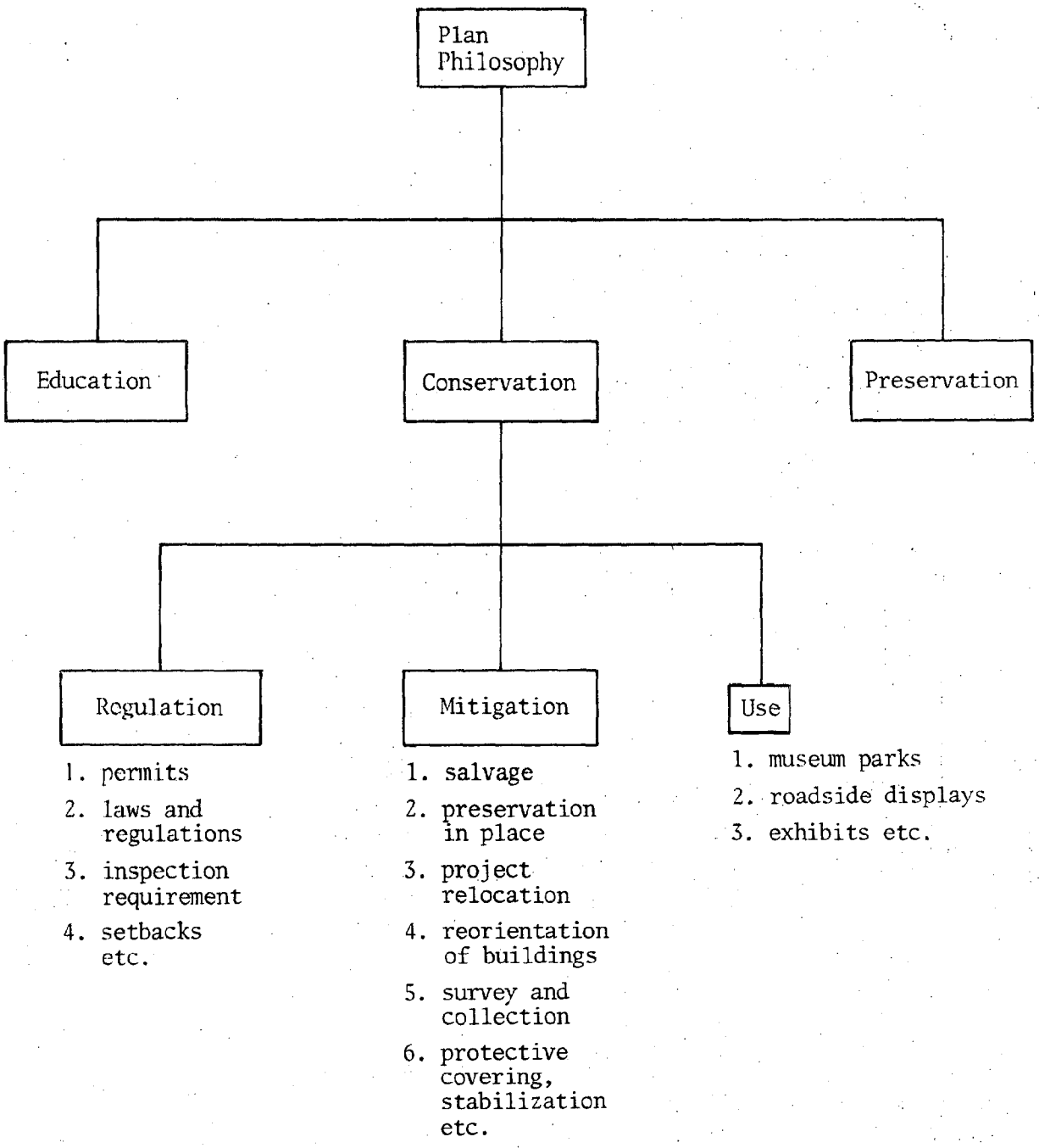


Fig. 6-23 Elements of a suggested prehistoric resource conservation plan

vide a blueprint for preservation efforts for a representative sample of the area's prehistoric resources.

Management Strategy: Implementing the Plan

Implementing a prehistoric resource conservation plan will involve many mechanisms including legislative, educational, administrative, and other measures. Of particular importance will be the use of a regional interpretive framework for guiding key management decisions. Several ways in which regional baseline data can help serve this requirement are discussed below.

Regional baseline studies of prehistoric resources will produce information on the kinds of resources present, their relative abundance, and their participation in prehistoric cultural systems. Using specific predictive models, other results will include refined rules of prehistoric resource distribution. Study results will provide a regional interpretive context that does not now exist for the area and would determine which areas would require no further surveys and thus are "safe" for unrestricted development. In addition, regional baseline studies will allow more representative and defensible National Register nominations. In areas where prehistoric resources are common and need to be conserved, information from baseline studies can aid in determining optimal setback of ground disturbing activities from the shorelines. Finally, this information will aid in improving the effectiveness of existing legislation or in designing new legislation, rules, and regulations to aid in conservation.

By relating the predicted distribution of various kinds of prehistoric resources to current land use, narrow estimates of the potential reservoir of prehistoric resources by damage and disturbance categories can be provided. Additionally, incompatible land use practices can be identified on a regional basis, resulting in redirecting or redesigning education or other management efforts to the particular local situation.

Regional baseline study results would give direction to mitigation

and conservation strategies for particular areas. Sensitive areas in which development should not take place and clear zones where development might proceed could be identified. In addition, the local and regional syntheses resulting from detailed artifact analyses, coupled with information on the relative abundance of prehistoric resources, would provide a yardstick by which the significance of individual prehistoric resources could be measured and ways of mitigating disturbance could be selected.

Perhaps the most important type of information resulting from regional baseline studies of prehistoric resources concerns the significance of individual resources. When certain kinds of resources become well known through these studies or when they are found to be relatively abundant, less exhaustive mitigation procedures can be followed. In contrast, little known or poorly represented types of resources could be protected from disturbance or information salvaged before they are destroyed.

Regional baseline studies can provide a basis for determining the significance of the prehistoric resources of any given area. Simply, the procedure would involve correlating the nature and location of a proposed development with the number of undisturbed resources predicted to occur in that environmental setting. This information could be used to produce sensitivity maps of prehistoric resources (see King and Hickman 1973), showing areas likely to contain the most prehistoric resources or the least abundant kinds of resources. Sensitivity maps can be of great value in managing areas where development is extensive at present or predicted to be extensive in the future.

Land disturbance presents the most serious threat to prehistoric resources. Although planning can modify land disturbance to conserve these resources, planning processes have yet to incorporate a concern for prehistoric resources effectively. For example, in discussing present conditions and future problems in the Bay area, recent major inventory and planning reports -- including those by Wallace et al. (1972) and the U. S. Army Corps of Engineers (1973) -- fail to recognize the

extent and fragile nature of prehistoric resources. In many cases, planners have no adequate information on these resources to incorporate.

Regional baseline studies will provide primary data that might be used in planning by various agencies and groups concerned with land use alteration. This is, of course, the primary place for concern about prehistoric resources. Early consideration maximizes the opportunity for preservation by guiding further project-specific site inventories and the selection of optimal mitigation procedures. Cost and time estimates for prehistoric resource studies can be integrated into the budgets and time tables, insuring that consideration will not cause costly delays in construction. Planning consideration also provides time to deal with the indirect effects of developments on local prehistoric resources.

Regional baseline information will give planners and developers a better understanding of the condition of prehistoric resources, permitting the advance preparation of mitigation or preservation strategies. For example, when disturbance cannot be prevented, salvage investigations of varying proportions might be recommended. Surface collecting might be recommended when an abundant type of prehistoric resource is involved; partial to complete excavations might be recommended if poorly represented or otherwise significant resources were involved. Whenever possible, prehistoric resources should be preserved rather than salvaged. Excavation will, however, be unavoidable in some circumstances and even desirable in others, because of lack of information on many kinds of prehistoric resources. Early planning avoids unfavorable publicity and public reaction to the destruction of prehistoric resources, as well as the costly delays that frequently accompany last minute salvage efforts. Regional baseline information should permit planners to recognize various categories of shoreline for management, including shoreline that requires no further attention to prehistoric resources (such as environmental settings containing no prehistoric sites, those that contain redundant or adequately preserved samples, or those from which the recovery of information is impractical). Environmental settings containing unique or poorly represented sites will present fewer options for alternative uses. In these situations, prehistoric resources must be preserved or infor-

mation salvaged. Undoubtedly, some areas will require more study, with project-specific inventories needed to identify kinds of resources or the remaining numbers of resources.

Finally, information developed by regional baseline studies will provide a basis on which prehistoric resource preserves could be established. These preserves would be designed to contain examples of the full range of kinds and ages of prehistoric resources found in an area. In the past, prehistoric resource parks and monuments have often been established around a few impressive prehistoric sites such as large mounds or cliff dwellings. Certainly these sites provide spectacular views for the public and examples ought to be preserved. Spectacular sites, however, usually do not provide areas for research on various types of prehistoric problems or for viewing various kinds of prehistoric resources.

Prehistoric land use involved many kinds of activities -- procuring and processing foods, quarrying raw materials, burials, and other ceremonies -- these activities deposited many kinds of artifacts in varying densities almost continuously across the landscape. Thus, a more efficient approach to preserving prehistoric resources might lie in setting aside tracts of land containing examples of all kinds of locally found resources. This type of preservation is similar to setting aside wildlife preserves such as feeding habitats and nesting areas for birds and spawning grounds for fish. The difference is that we know much more about the nature of plant and animal resources than we know about prehistoric resources.

The advantages of this type of preservation lie in the economic combination of a variety of resources including geological and topographic aspects, plant, animal, and prehistoric resources in contrast to the expensive piecemeal treatment of these resources. In addition, this method of preservation allows prehistoric resources to be studied in relation to their environments.

Prehistoric preserves should be designated for local areas such as parts of river systems, and should focus on lands where only minimal

damage to prehistoric resources has taken place. Forested lands and perhaps also agricultural lands would be preferred. Programs such as the state critical areas, estuarine sanctuaries, natural areas and scenic rivers, could include prehistoric resources. Regional baseline studies should guide decisions concerning placement for the most representative preservation. In the interim, environmental parameters can be used to guide placement.

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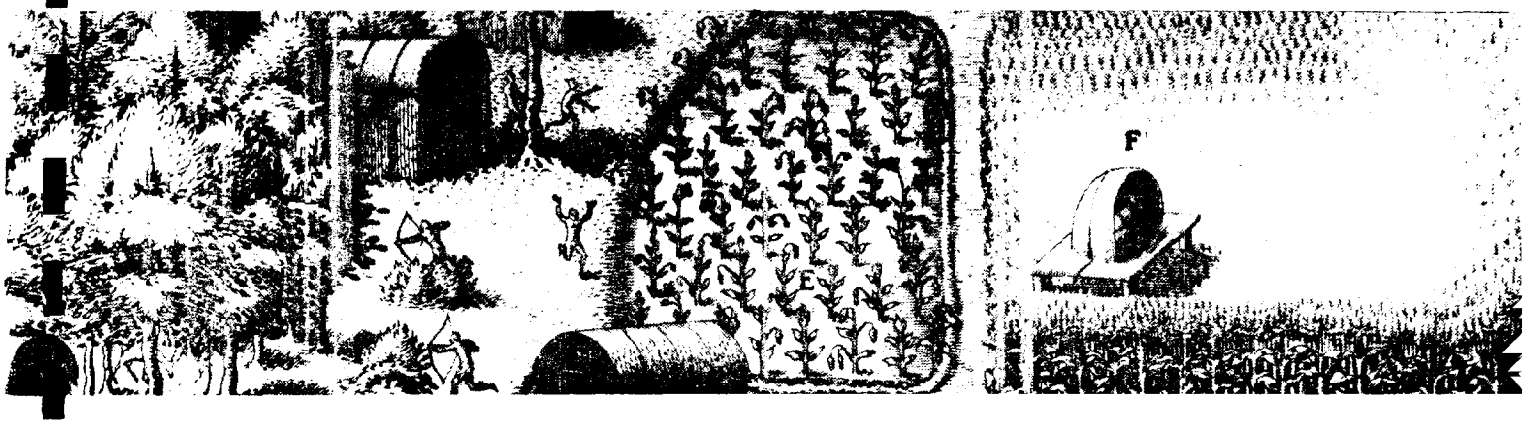

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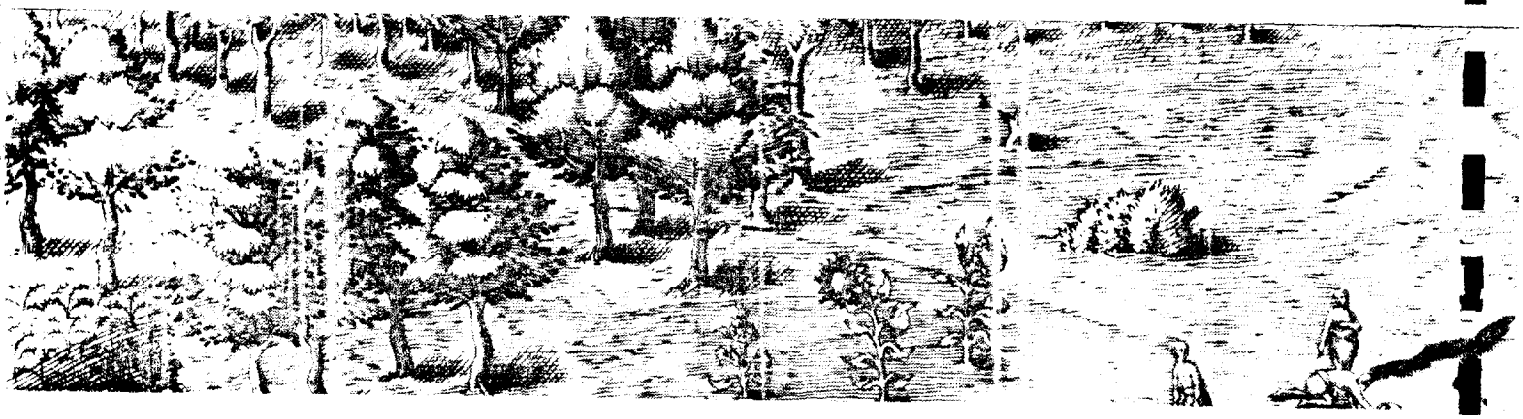


Appendix A

Table A-1 Survey Results for Anne Arundel (AA-) County
(For survey tract locations, see Fig. A-1.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
A	South River	25	1.36	0	2
		26	.04	0	0
B	Deale	15	.49	1	0
C	Annapolis, S. River	11	.19	0	0
		21	.68	0	0
D	South River	26	1.52	3	0
		36	.15	0	0
E	Gibson Island	11	.08	0	0
		21	1.06	0	0
F	Gibson Island	11	.30	0	0
		21	.64	0	0
G	Gibson Island, Annapolis	16	.04	0	0
		21	.49	0	0
		26	.91	0	0
H	Annapolis	21	1.89	2	0
		26	.11	0	0
I	Gibson Island	14	.08	0	0
		24	.91	3	0
		25	1.40	0	0
		26	.57	0	0
J	Round Bay	26	.15	0	0
		36	.68	0	0
K	Round Bay	34	.38	0	0
L	Round Bay	34	.11	0	0
		36	.15	0	0
M	Deale	15	.34	0	0
		25	.04	0	0
N	Deale	26	.98	4	1
O	Deale	25	.11	0	0
		26	.99	9	0
P	Deale	26	1.02	0	0
Q	Deale	16	.38	0	0
		26	.68	0	0

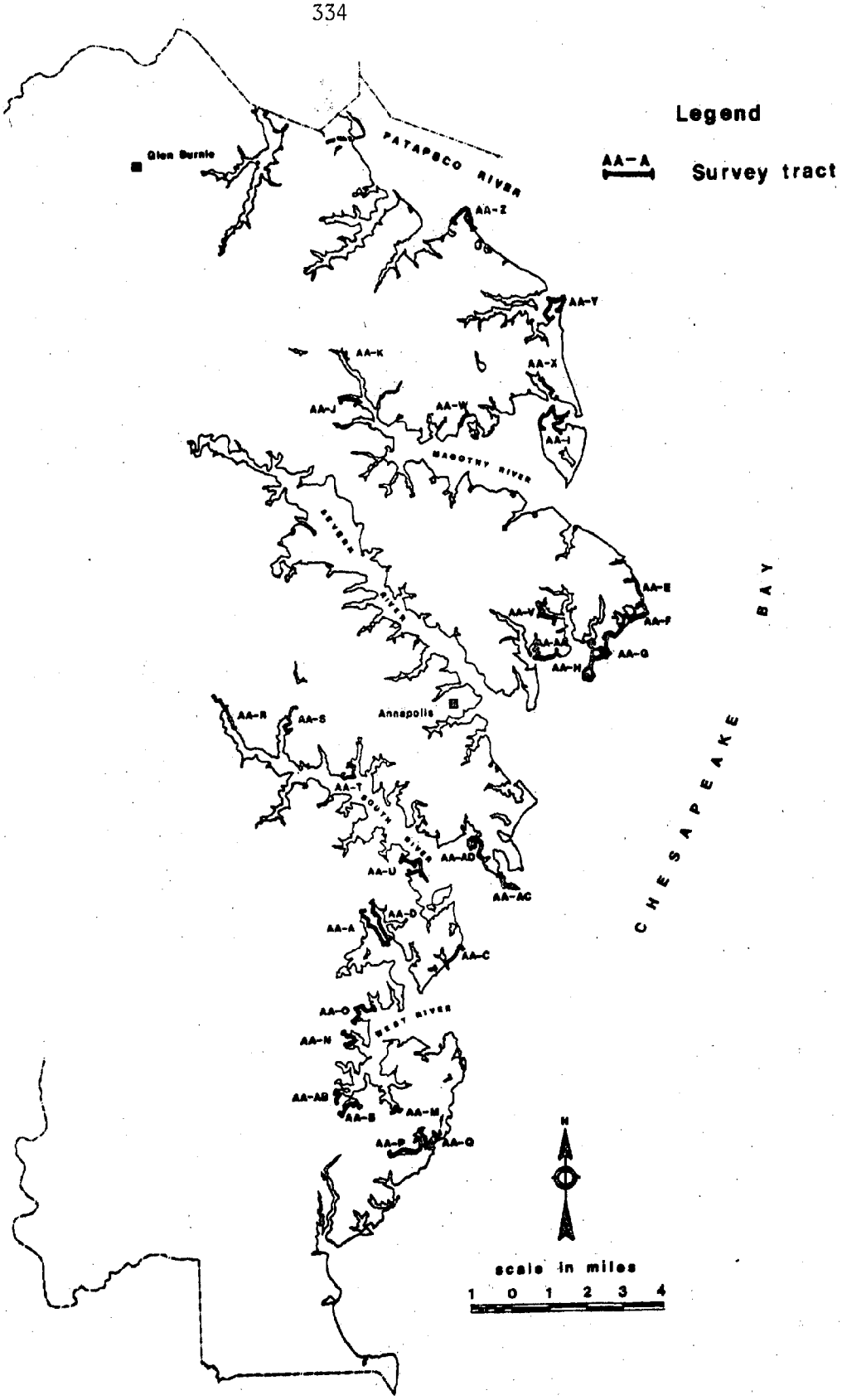


Fig. A-1

Anne Arundel County survey tract locations

Table A-1 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
R	South River	34	.26	0	0
S	South River	26	.38	0	0
		36	.23	0	0
T	South River	24	.38	1	0
		26	.42	2	0
U	South River	14	.26	0	0
		15	.34	0	0
		16	.23	0	0
		24	.23	0	0
		25	.11	0	0
		26	.34	0	0
		34	.30	0	0
		36	.26	0	0
V	Gibson Island	16	.04	0	0
		26	1.32	0	0
		36	.15	0	0
W	Gibson Island	26	.49	0	0
		36	.15	1	0
X	Gibson Island	26	.53	0	0
Y	Sparrows Point, Gibson Island	21	.98	1	0
		25	.64	2	0
		31	.04	0	0
Z	Sparrows Point	11	.15	0	0
		13	.23	0	0
		23	.64	0	0
		26	.42	0	0
AA	Annapolis, Gibson Island	21	.76	3	0
		25	.04	0	0
		26	.11	0	0
		35	.11	1	0
		36	.04	1	0
AB	Deale	26	.26	2	0
AC	Annapolis	14	.19	0	0
		15	.19	0	0
		16	.19	0	0
		24	.64	2	0
		25	.34	0	0
		26	.15	0	0

Table A-1 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
AD	Annapolis	15	.26	0	0
		16	.57	0	0
		24	.19	0	0
		25	.19	0	0
		26	.91	0	0
Total			33.58	38	3

Table A-2 Survey Results for Baltimore (BA-) County
(For tract locations, see Fig. A-2.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
A	Gunpowder Neck	23	.04	0	0
		33	.76	0	0
B	Gunpowder Neck	25	.42	0	0
		26	.42	0	0
C	Gunpowder Neck	11	.23	0	0
		13	.57	0	0
		15	.30	0	1
		23	.15	0	0
		25	.42	0	3
D	Gunpowder Neck	11	1.06	0	1
		21	.23	0	0
E	Gunpowder Neck	25	2.61	0	0
F	Gunpowder Neck	26	.38	0	0
		31	.38	0	0
		33	.45	0	0
Total			8.42	0	5

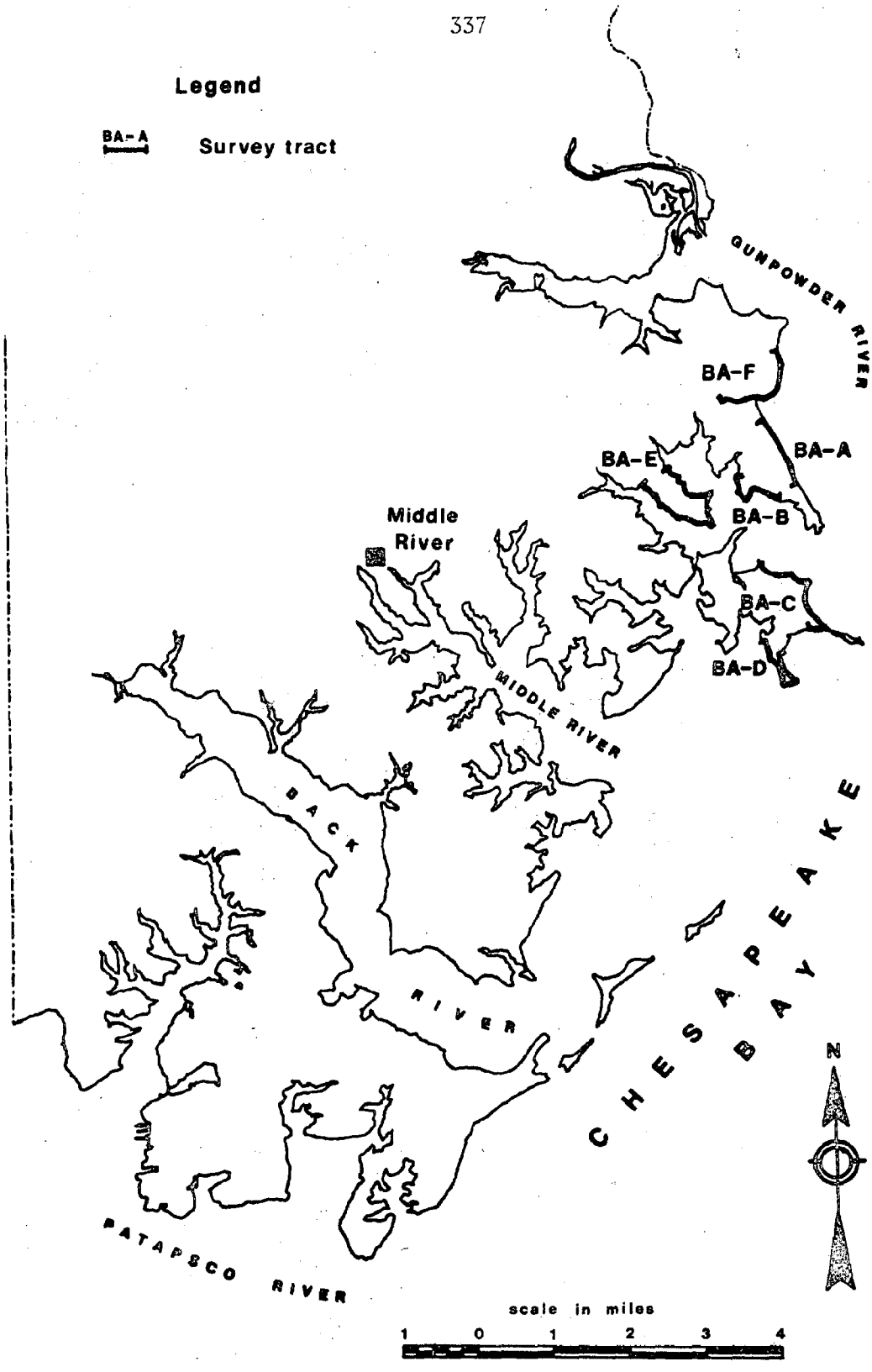


Fig. A-2

Baltimore County survey tract locations

Table A-3 Survey Results for Calvert (CL-) County
(For survey tract locations, see Fig. A-3.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
A	Prince	11	.26	0	0
	Frederick,	21	.76	0	0
	North Beach	31	1.70	0	0
B	Broomes Island,	11	.23	0	0
	Prince	21	2.27	0	0
	Frederick	31	5.26	0	0
C	Broomes Island,	21	.19	0	0
	Cove Point	31	2.42	0	0
Total			13.09	0	0

Table A-4 Survey Results for Caroline (CA-) County
(For survey tract locations, see Fig. A-4.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
A	Fowling Creek	25	.68	0	2
		26	.64	0	1
		35	.26	0	1
B	Hobbs,	22	.38	0	1
	Fowling Creek	32	1.55	0	4
		35	.15	0	1
C	Hobbs	22	.38	0	2
		26	.30	0	1
		32	.30	0	0
		36	2.01	0	2
D	Hobbs,	22	.76	0	1
	Denton	32	.79	0	3
		36	.95	0	5
E	Preston	22	.95	0	0
		26	1.93	0	0
		36	1.82	0	0
Total			13.85	0	24

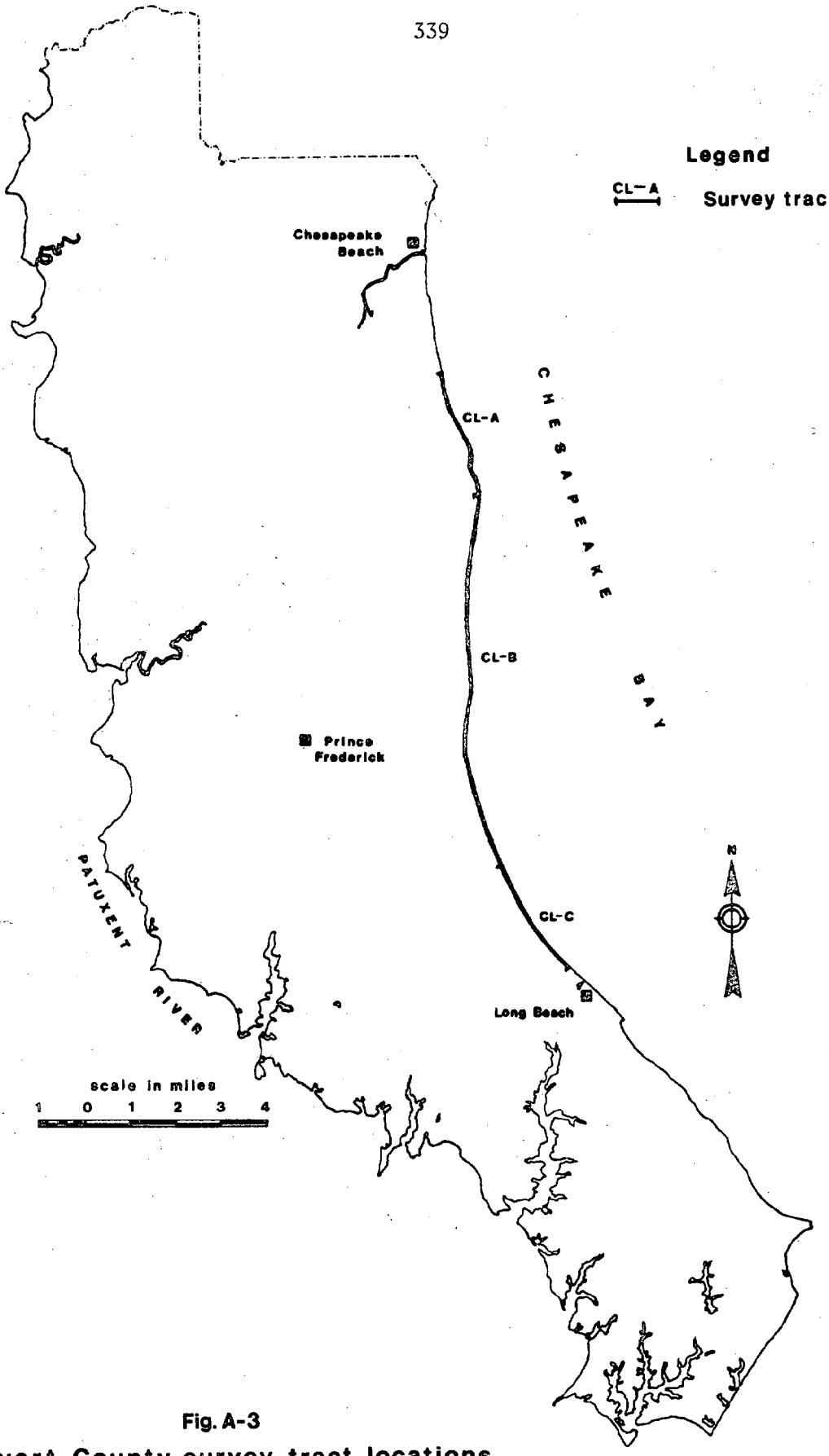


Fig. A-3

Calvert County survey tract locations

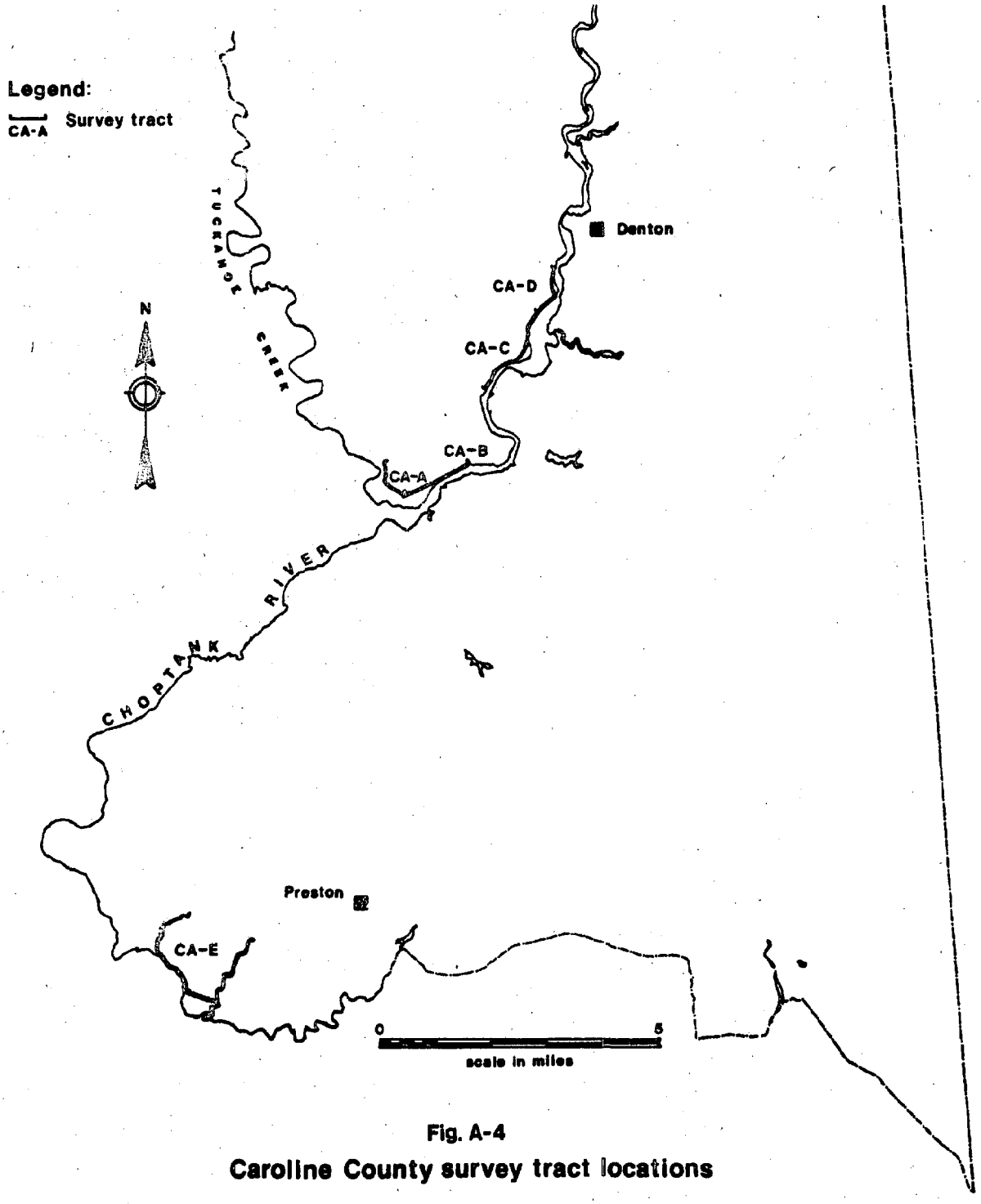


Fig. A-4
Caroline County survey tract locations

Table A-5 Survey Results for Cecil (CE-) County
(For survey tract locations, see Fig. A-5.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
Cecil County (CE-)					
A	Spesutie	11	.04	0	0
		21	.26	0	0
		31	.23	0	0
B	Spesutie	24	.04	0	0
		26	.64	0	0
		31	.11	0	0
		34	.26	0	0
		36	1.29	0	0
C	Spesutie	24	.19	0	0
		34	.19	0	0
		36	2.20	0	2
D	Earleville	25	.04	0	0
		35	.83	0	1
		36	.53	0	0
E	Earleville	25	.49	0	0
		26	.53	0	2
		36	.38	0	0
F	Earleville	24	.64	0	0
		34	.23	0	1
G	Earleville	24	.38	0	0
		34	.49	0	1
H	Earleville	15	.42	0	0
		25	.45	0	0
		35	.64	0	0
I	Earleville	25	.08	0	0
		34	.23	0	0
		35	.26	0	0
J	Earleville	24	.49	0	0
		34	.19	0	2
K	Cecilton	25	.04	0	0
		34	.11	0	1
		35	.34	0	1
		36	.19	0	0
L	Cecilton	25	.19	0	1
		26	.53	0	0
		35	.15	0	0

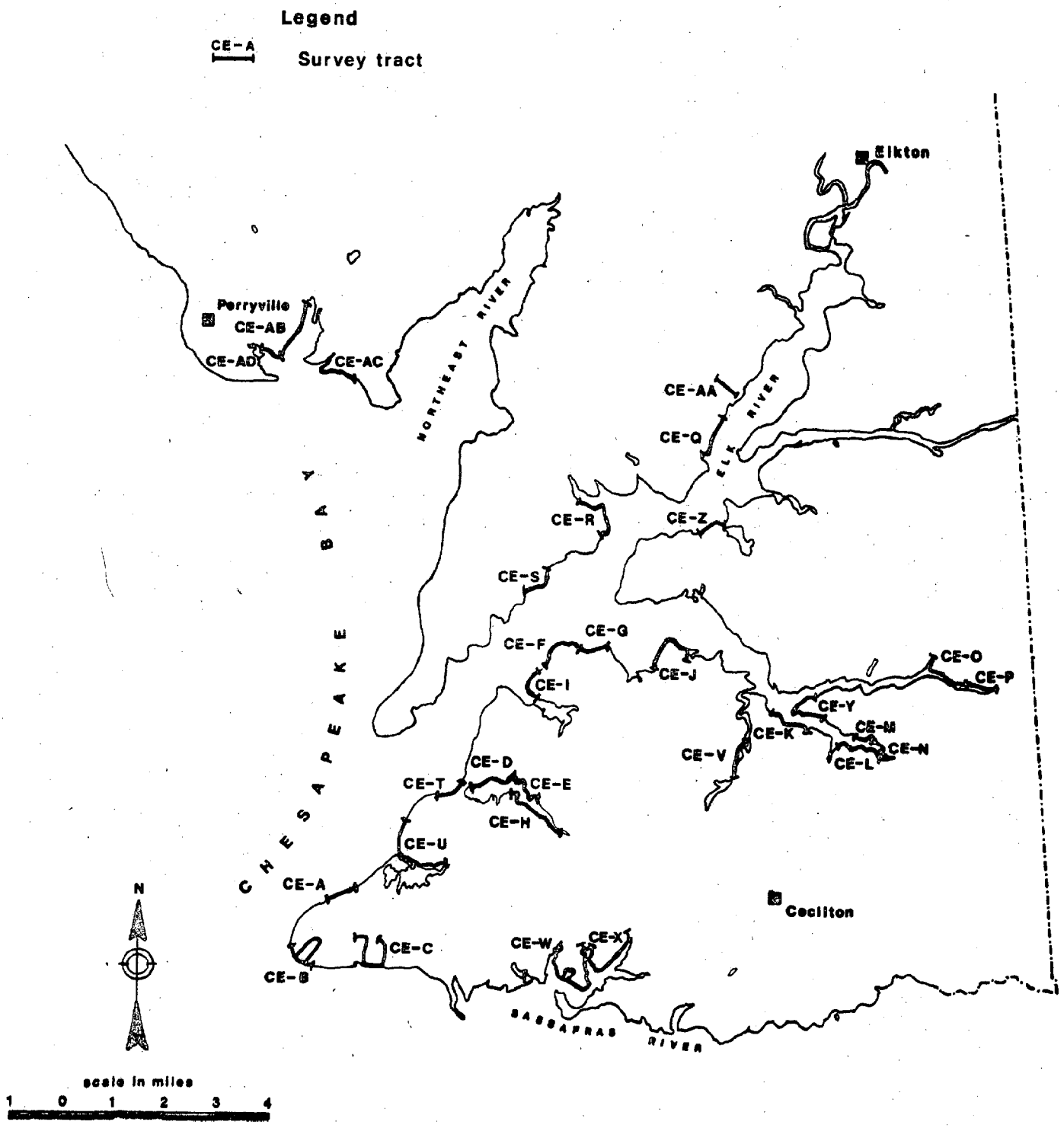


Fig. A-5

Cecil County survey tract locations

Table A-5 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
M	Cecilton	25	.45	0	0
		26	.53	0	1
N	Cecilton	26	.64	0	1
O	Cecilton	25	.80	0	2
		26	.26	0	2
P	Cecilton	25	1.06	0	0
		26	.23	0	0
		36	.30	0	0
Q	North East	24	.76	0	1
R	North East	26	.15	0	0
		34	.19	0	0
		35	.49	0	0
		36	.34	0	0
S	Earleville	24	.08	0	0
		26	.08	0	0
		34	.45	0	0
		36	.23	0	1
T	Earleville	14	.49	0	1
U	Earleville,	16	.08	0	0
	Spesutie	26	1.51	0	3
		36	.08	0	0
V	Earleville	26	.08	0	0
		36	1.21	0	0
W	Earleville	15	.08	0	0
		25	.45	0	1
		26	.91	0	2
		36	1.82	0	5
X	Earleville	25	.53	0	3
		26	.37	0	0
		35	.72	0	4
		36	.30	0	1
Y	Cecilton	25	1.29	0	6
		26	.23	0	0
		35	.23	0	1
		36	.23	0	0
Z	North East	24	.19	0	0
		34	.19	0	0
		36	.30	0	0

Table A-5 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
AB	Havre de Grace	35	.64	0	1
		36	.38	0	0
AC	Havre de Grace	31	.83	0	2
		36	.49	0	3
AD	Havre de Grace	25	.04	0	0
		35	.19	0	1
		36	.34	0	1
Total			35.54	0	55

Table A-6 Survey Results for Charles (CH-) County
(For survey tract locations, see Fig. A-6.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
A	Mount Vernon	26	1.74	0	3
B	Mount Vernon	26	.91	0	1
		36	1.55	0	3
C	Indian Head, Port Tobacco	15	.19	0	4
		22	.11	0	0
		24	7.61	0	9
		26	.53	0	1
		35	1.17	0	2
D	Widewater	22	1.82	0	1
		26	1.40	0	1
E	Widewater	22	.95	0	0
		32	.11	0	0
F	Widewater	12	.04	0	0
		22	1.48	0	0
G	Widewater, Nanjemoy	12	.19	0	0
		22	.91	0	2
		26	1.14	0	0
H	Mathias Point	25	3.30	0	1
I	Mathias Point	24	1.06	4	0

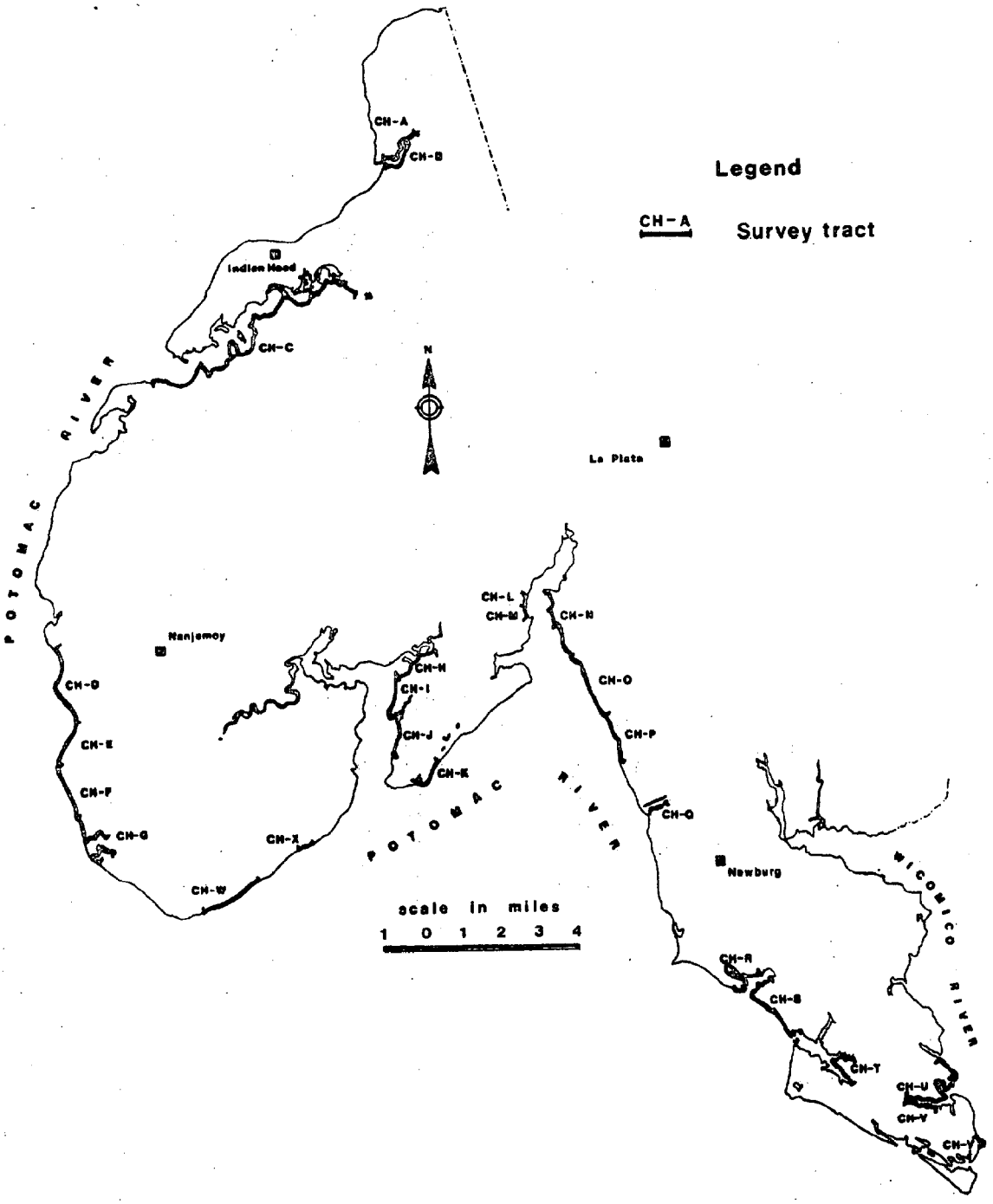


Fig. A-6

Charles County survey tract locations

Table A-6 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in miles	Number of Shell Sites	Number of Nonshell Sites
J	Mathias Point	24	.68	2	0
		26	1.14	0	0
K	Mathias Point	22	.61	2	1
		26	.45	0	3
L	Mathias Point	24	.38	0	1
		34	.30	0	0
M	Combined with L				
N	Mathias Point	24	2.04	6	0
O	Mathias Point	22	.45	2	0
		24	.87	5	0
		26	.53	0	0
		32	.34	1	0
		34	.15	2	0
P	Mathias Point	12	.11	0	0
		22	.23	1	0
		26	.26	0	0
		32	.42	3	0
		36	1.06	1	0
Q	Popes Creek	26	.95	0	0
		36	2.04	2	0
R	Morgantown	22	.98	4	1
		26	2.08	6	0
S	Colonial Beach North	22	1.33	4	0
		26	1.36	4	0
T	Colonial Beach North	25	.83	0	0
		26	.68	0	0
U	Rock Point	13	.11	0	0
		16	.30	0	0
		23	.57	5	0
		26	2.23	10	2
V	Rock Point	23	.91	0	1
		26	1.55	4	0
W	King George	12	.19	0	0
		22	1.17	2	0
		32	.76	2	1
X	Nanjemoy	12	.04	0	0
		32	.53	1	3
Total			54.84	73	41

Table A-7 Survey Results for Dorchester (DO-) County
(For survey tract locations, see Fig. A-7.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
A	Sharps Island	21	3.33	0	0
	Tilghman	25	.38	0	0
B	Church Creek,	21	1.70	0	0
	Oxford,	26	.76	0	0
	Tilghman				
C	Preston	22	.42	0	0
		25	.64	0	0
		26	.11	0	0
Total			7.34	0	0

Table A-8 Survey Results for Harford (HA-) County
(For survey tract location, see Fig. A-8.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
A	Perryman	14	.42	0	0
		24	.91	0	3
B	Spesutie	15	.11	0	1
		25	2.04	0	4
C	Spesutie,	35	1.52	0	8
	Perryman	36	.19	0	1
D	Perryman	25	1.36	0	2
E	Spesutie	21	.83	0	0
F	Gunpowder Neck	23	.49	0	0
G	Not inspected				
H	Havre de Grace,	15	.11	0	0
	Spesutie	31	1.06	0	8
		35	.38	0	4
I	Havre de Grace	21	.53	0	0
		31	.98	0	5
J	Aberdeen	36	1.10	0	0

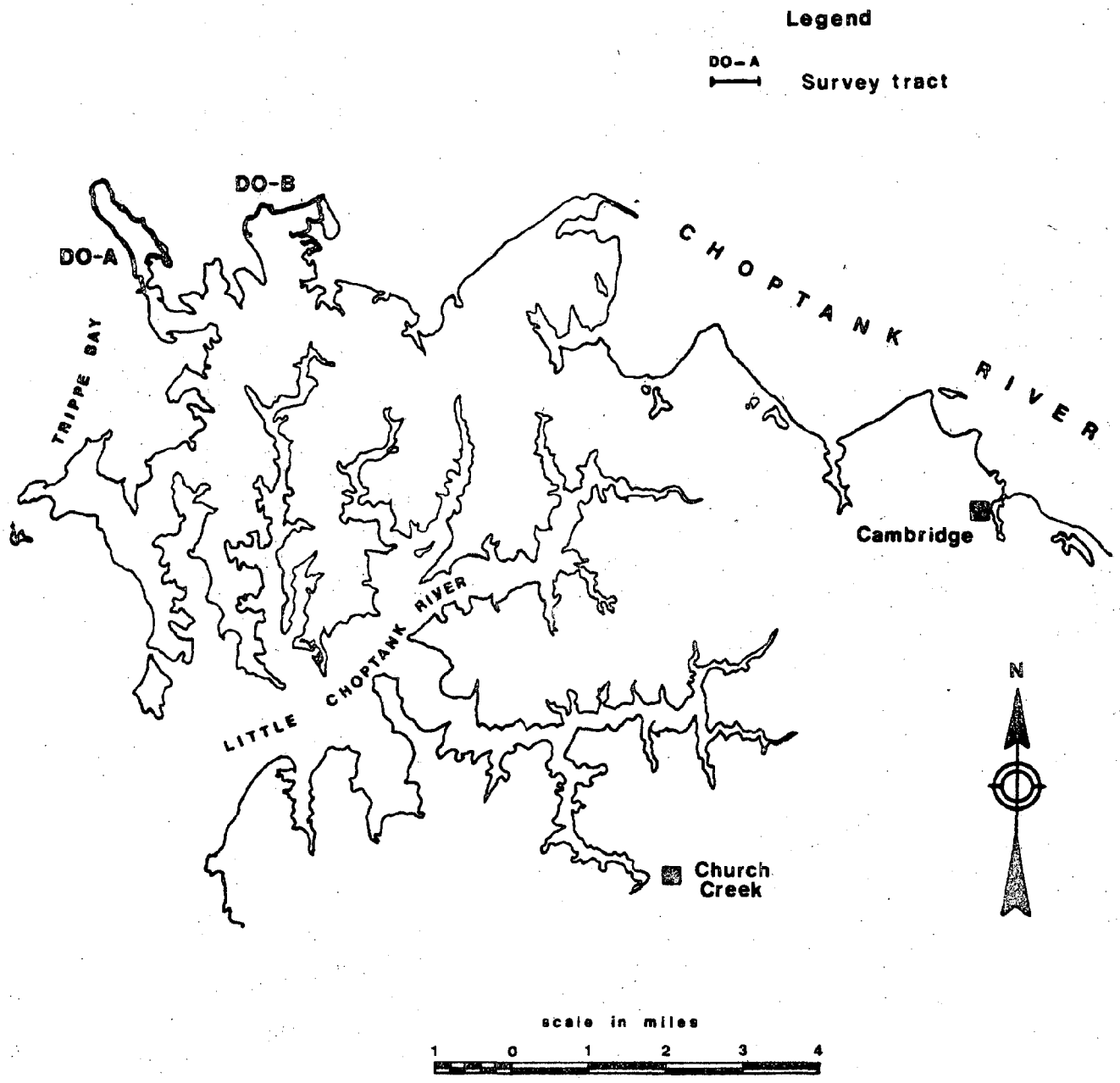


Fig. A-7

Dorchester County survey tract locations

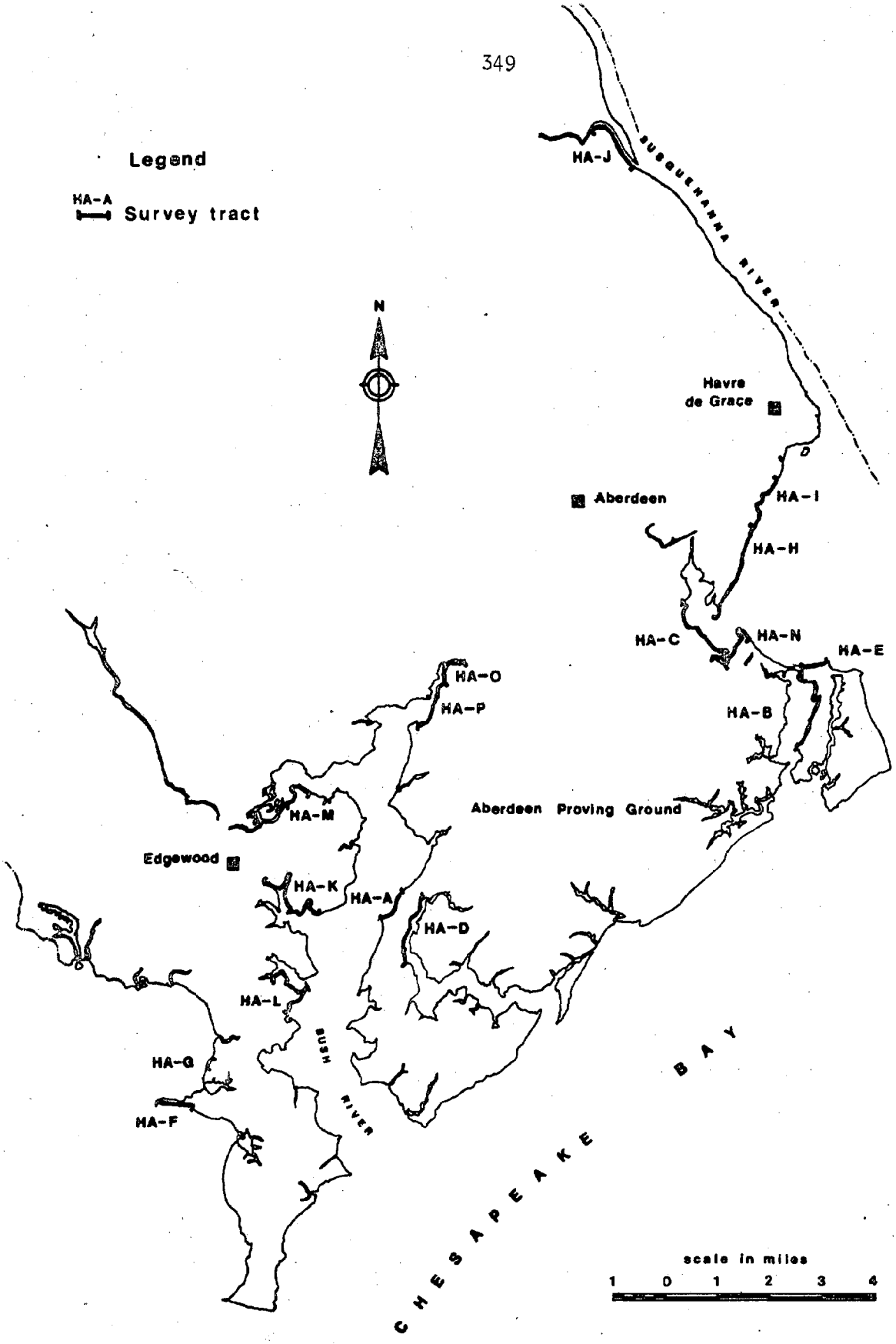


Fig. A-8

Harford County survey tract locations

Table A-8 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
K	Edgewood	24	.15	0	0
		25	.64	0	0
		26	2.84	0	1
L	Edgewood	14	.45	0	2
		24	.15	0	1
		26	.95	0	3
M	Edgewood	25	.68	0	2
		26	.80	0	3
N	Spesutie	31	.23	0	0
		35	.49	0	0
		36	.26	0	1
O	Perryman	24	.30	0	2
		26	.57	0	0
		34	.11	0	0
		36	.23	0	0
P	Perryman	24	.57	0	0
		34	.23	0	1
Total			21.68	0	52

Table A-9 Survey Results for Kent (KE-) County
(For survey tract locations, see Fig. A-9.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
A	Betterton	26	.19	0	0
		34	.49	0	2
		35	.38	0	0
		36	3.79	0	6
B	Betterton, Galena	14	.23	0	0
		24	.26	0	1
		26	.26	0	2
		34	.11	0	0
		36	1.48	0	6

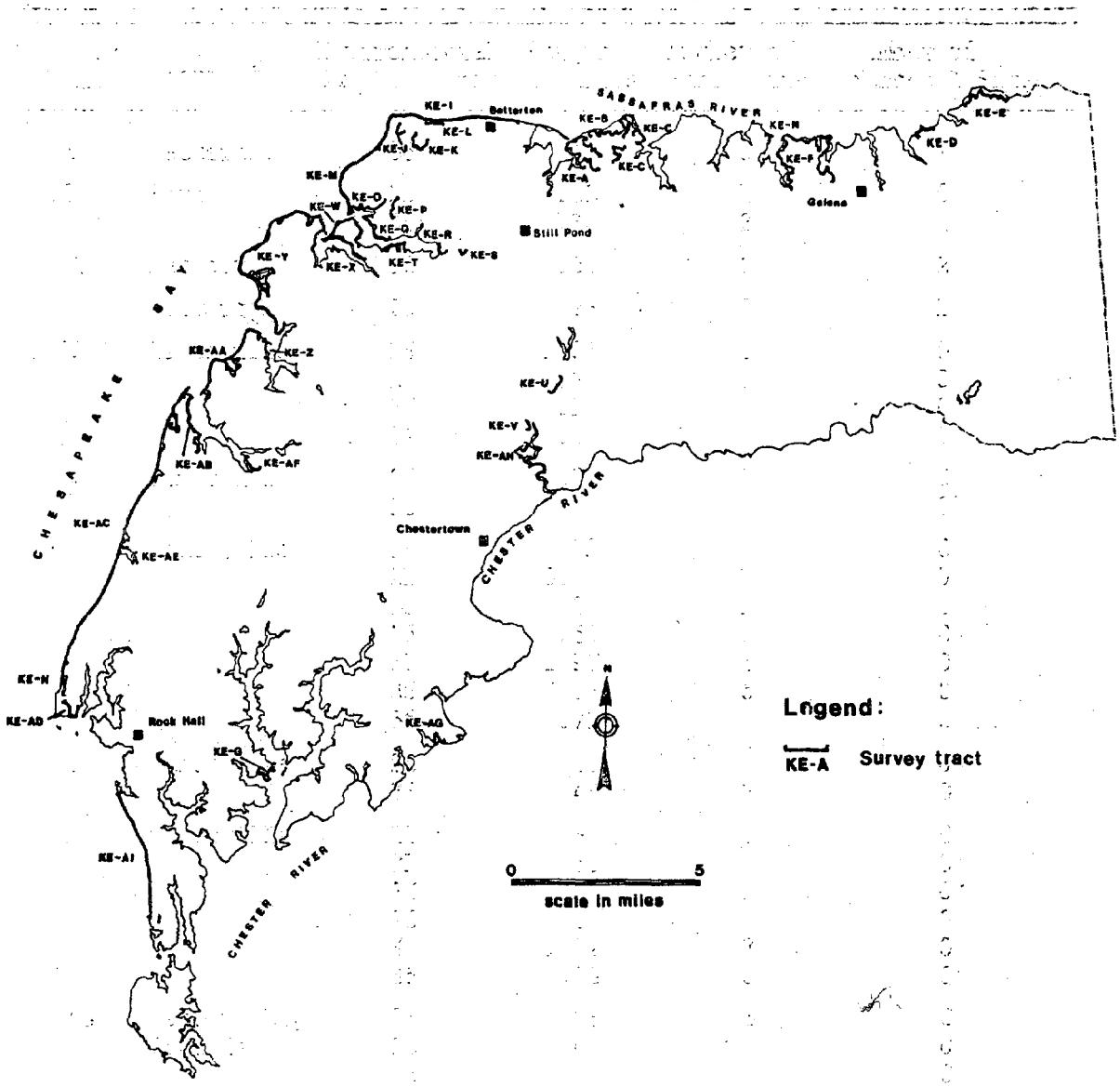


Fig. A-9
Kent County survey tract locations

Table A-9 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
C	Galena	24	.68	0	2
		26	.19	0	0
		36	1.55	0	6
D	Millington	34	.64	0	0
		36	.19	0	0
E	Cecilton,	24	.19	0	0
	Millington	26	.11	0	1
		34	1.89	0	7
		36	.76	0	2
F	Galena	26	.45	0	0
		34	.83	0	1
		36	5.34	0	5
G	Rock Hall	25	.68	3	0
		26	.26	0	0
H	Swan Point	21	.61	0	0
		36	.95	0	0
I	Betterton	11	.64	0	0
		14	.23	0	0
		24	2.73	0	0
		34	.45	0	0
J	Betterton	36	.45	2	0
K	Betterton	35	.38	0	2
		36	.76	0	2
L	Betterton	34	.61	0	1
M	Betterton,	11	.04	0	0
	Hanesville	21	1.52	1	0
		31	1.52	2	0
N	Betterton	34	.19	0	1
		36	.15	0	0
O	Betterton,	26	.04	0	0
	Hanesville	36	1.55	6	0
P	Betterton	36	1.36	0	1
Q	Betterton,	35	1.36	6	0
	Hanesville	36	.34	1	0
R	Betterton	25	.26	0	1

Table A-9 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
S	Betterton	36	.19	0	1
T	Betterton	25	.83	1	0
		35	.30	2	1
U	Betterton	26	.61	0	2
V	Betterton	26	.23	0	1
W	Hanesville	25	1.06	3	0
		26	.76	0	0
		35	1.10	4	0
		36	.49	0	0
X	Hanesville	26	.11	1	0
		36	.04	0	0
Y	Hanesville	15	.19	0	0
		21	3.86	2	0
		25	.23	1	0
		26	2.69	6	0
		31	1.97	3	0
		35	2.12	6	0
		36	.72	0	0
Z	Hanesville	25	.08	0	0
		35	.45	2	0
AA	Hanesville	11	.38	0	0
		21	.68	0	0
		25	.30	1	0
		26	2.84	4	0
		31	1.52	2	0
		36	.08	0	0
AB	Hanesville, Rock Hall	25	.95	3	0
		26	.08	2	0
		35	.68	4	0
		36	.64	1	0
AC	Hanesville, Rock Hall, Swan Point	11	1.21	0	0
		21	5.26	5	0
		26	1.63	0	0
		31	4.24	7	0
		36	.15	0	0
AD	Swan Point	21	.57	2	0
		26	.23	1	0
AE	Rock Hall	36	.30	0	1

Table A-9 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
AF	Rock Hall	25	.11	0	2
		35	.26	0	0
AG	Chestertown	22	.11	1	0
		26	.76	1	0
AH	Chestertown	26	.08	0	0
		36	.53	0	1
AI	Langford Creek	21	2.65	0	0
		26	.26	2	0
		31	1.02	0	0
Total			82.64	88	58

Table A-10 Survey Results for Queen Annes (QA-) County
(For survey tract locations, see Fig. A-10.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
A	Queenstown	21	2.69	1	4
B	Love Point,	11	.34	0	0
	Kent Island	21	2.65	5	0
		26	.83	0	0
		31	.95	0	0
C	Kent Island	11	.53	0	0
		21	2.80	0	0
		31	.08	0	0
D	Kent Island	11	.08	0	0
		21	2.92	0	0
E	Kent Island	11	.53	0	0
	Clairborne	16	.19	0	0
		21	2.92	0	0
Total			17.51	6	4

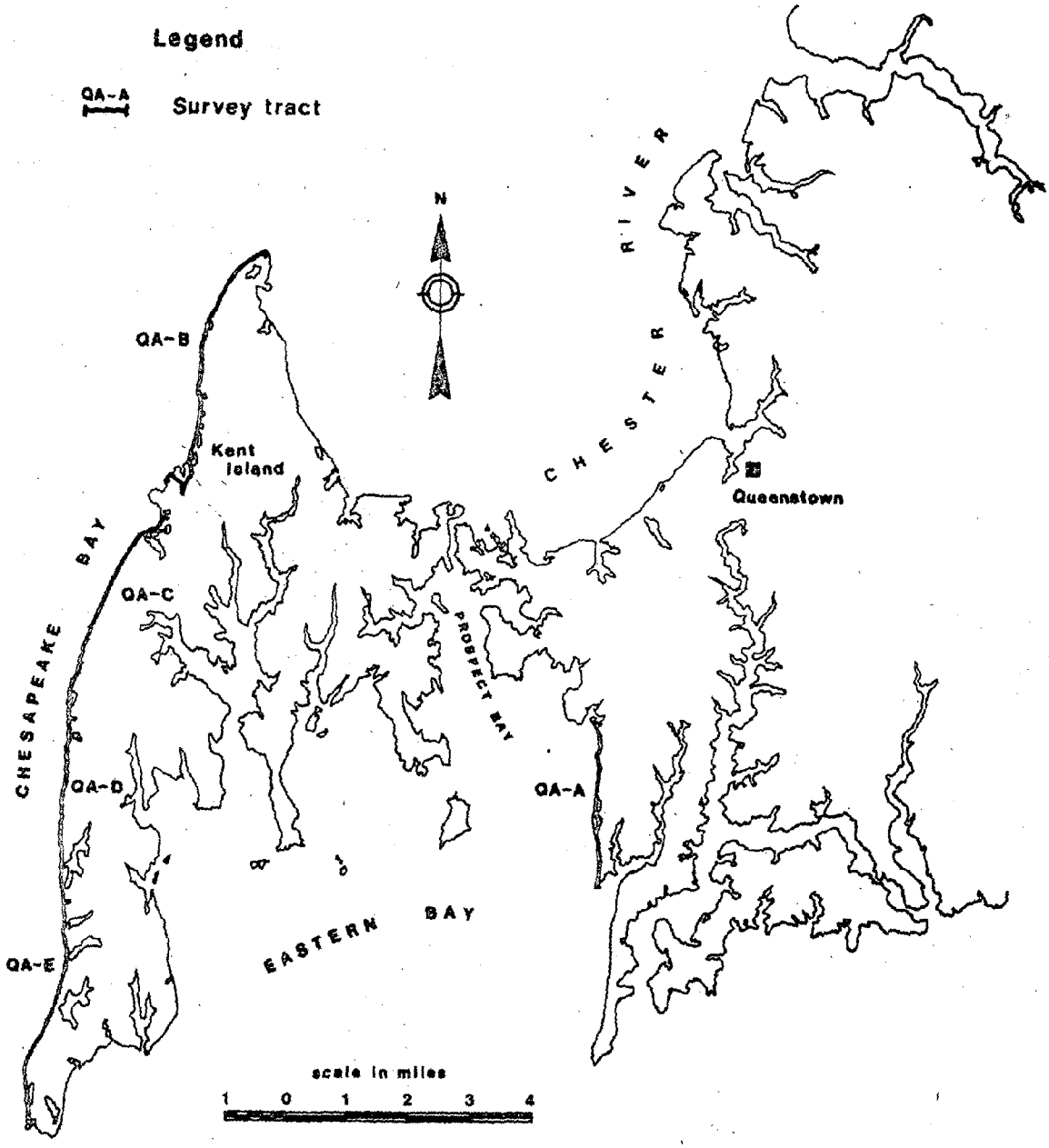


Fig. A-10

Queen Annes County survey tract locations

Table A-11 Survey Results for St. Marys (SM-) County
(For survey tract locations, see Fig. A-11.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
A	Rock Point	23	.15	1	0
		25	.42	0	0
		26	.26	0	0
		33	.61	4	0
		35	.80	4	0
		36	1.40	3	0
B	Rock Point	25	.91	1	1
		26	.15	0	1
		35	.91	2	2
C	Leonardtown	24	.76	2	0
		34	.61	5	0
D	Leonardtown	24	.61	2	1
		26	.80	1	0
E	St. Clements, Leonardtown	24	1.21	6	2
		26	.34	0	0
F	St. Clements	22	.87	1	0
		24	1.33	3	0
		26	.61	3	0
G	Leonardtown	24	2.27	7	0
		34	.42	3	0
H	St. Clements	22	1.48	2	1
		26	1.10	1	1
I	St. Clements	22	.57	1	1
		26	2.16	0	9
J	St. Clements, Piney Point	26	.91	2	0
K	Piney Point	26	2.24	4	0
L	Piney Point	25	1.02	3	0
		26	.68	1	0
M	St. Marys City	15	.61	0	0
		25	.11	0	0
N	St. Marys City	14	.04	1	0
		24	1.40	10	0
		26	.64	1	0
O	St. Marys City	24	.30	1	0
		25	.76	2	1
		26	.49	2	0

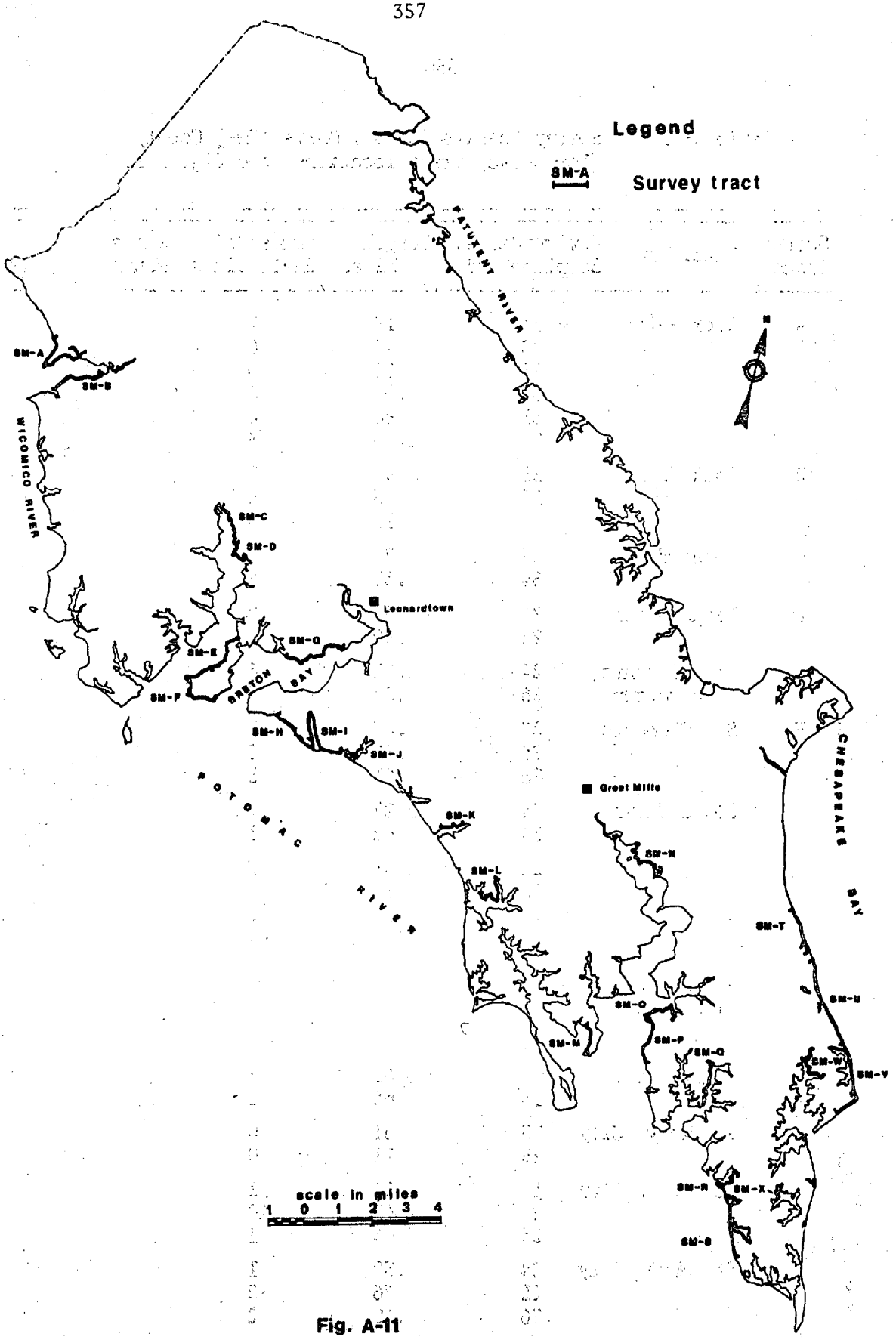


Fig. A-11
St. Mary's County survey tract locations

Table A-11 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
P	St. Marys City	14	.45	0	0
		24	1.33	0	0
Q	St. Marys City, St. Georges Island	25	1.63	14	0
		26	.30	5	0
R	St. Georges Island Point Lookout	22	.98	0	0
		26	2.31	3	0
S	Point Lookout	22	.72	2	0
		26	1.78	2	3
T	Point No Point, St. Marys City	11	.08	0	0
		21	1.59	2	2
U	Point No Point	11	.57	0	1
		21	1.93	2	4
V	Point No Point	11	.98	0	0
		21	1.10	1	0
		26	.95	2	1
W	Point No Point	25	.72	6	0
		26	.91	5	0
X	Point Lookout	26	.98	2	0
Total			49.26	125	31

Table A-12 Survey Results for Talbot (TA-) County
(For survey tract locations, see Fig. A-12.)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
A	Trappe, Oxford	22	1.21	3	1
		25	.38	0	2
		26	2.39	6	0
B	Oxford	21	.45	0	0
		25	.83	2	0
		26	2.08	12	0

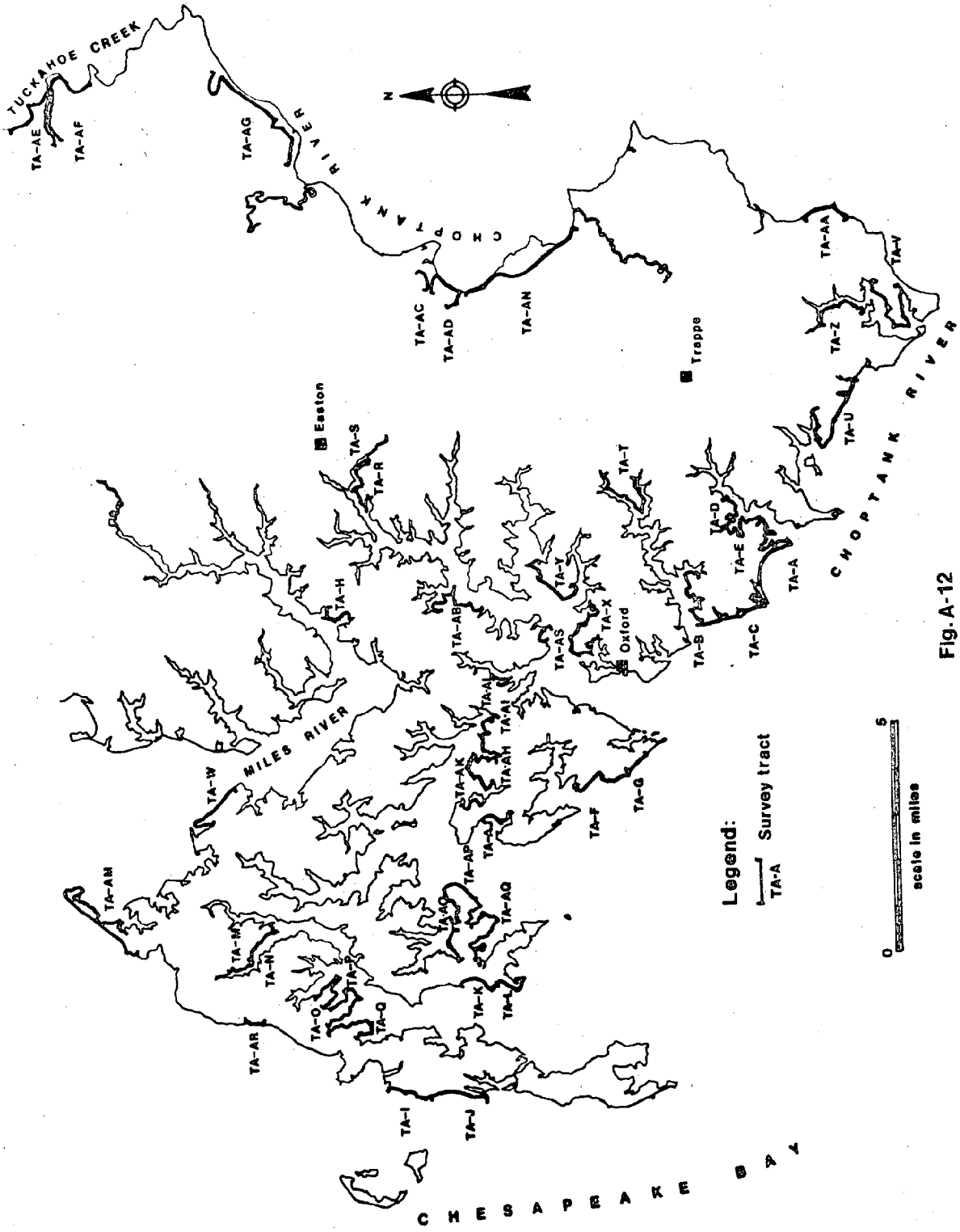


Fig.A-12

Talbot County survey tract locations

Table A-12 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
C	Oxford	21	.76	1	0
		26	2.65	0	6
D	Trappe	25	.45	0	0
		26	.98	1	0
E	Trappe	25	.49	2	1
		26	1.63	1	1
F	Oxford	21	1.06	0	0
		25	.19	0	0
		26	.61	0	0
G	Oxford	21	.57	0	0
H	St. Michaels	24	.38	1	0
		26	1.10	5	0
I	Tilghman, Claiborne	11	1.14	2	0
		16	.26	0	0
		21	.19	0	0
		26	.49	1	0
J	Tilghman	11	.26	0	0
		21	.76	0	0
K	Tilghman	11	.15	1	0
		24	.80	1	0
L	Tilghman	11	.19	0	0
		16	.26	1	0
		21	.64	1	0
		26	.23	0	0
M	Claiborne	24	1.63	0	2
N	Claiborne	24	.98	1	0
O	Claiborne	24	.19	0	0
		26	2.01	0	0
P	Claiborne	16	.91	0	0
		24	.38	3	0
		26	1.59	1	4
Q	Claiborne	16	1.78	0	0
		26	1.52	0	0
R	Easton	24	1.14	0	2
		26	.34	0	1
S	Easton	24	.76	0	1

Table A-12 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number of Nonshell Sites
T	Trappe	25	1.29	0	2
		26	1.40	3	0
U	Cambridge	22	1.67	5	1
		26	1.44	2	0
V	Cambridge	25	1.52	6	0
		26	2.12	2	2
W	St. Michaels	24	1.14	1	0
		26	.45	1	0
X	Oxford	24	.91	1	0
		26	2.04	5	0
Y	Oxford	24	.68	4	0
		25	1.40	2	0
		26	.15	0	0
Z	Cambridge	25	1.17	0	0
		26	.38	0	0
AA	East New Market	22	.72	6	0
		32	.76	7	0
AB	Oxford	24	1.33	1	0
		26	1.21	1	0
AC	Trappe	26	.38	0	2
		36	.45	0	1
AD	Trappe	32	.45	0	3
		36	.91	0	3
AE	Fowling Creek	25	.11	0	0
		35	.87	0	5
		36	3.26	0	0
AF	Fowling Creek	35	.68	0	0
		36	1.97	0	1
AG	Fowling Creek	22	1.40	0	2
		26	.57	0	0
		32	.76	0	2
		36	6.10	0	3
AH	Oxford	25	.38	0	0
		26	1.74	0	2
AI	Oxford	25	1.02	1	0
		26	1.55	2	0

Table A-12 (continued)

Survey Tract	Quad. Map	Environmental Sampling Unit	Length in Miles	Number of Shell Sites	Number Nonshell Sites
AJ	Oxford	26	1.17	4	0
AK	Oxford	26	.38	0	0
AL	Oxford	25	.80	0	4
		26	.80	0	4
AM	Claiborne	11	.30	1	0
		21	4.05	7	1
AN	Trappe, Preston	22	1.97	0	0
		26	.83	1	2
		32	.26	0	0
		36	2.88	1	0
AO	Tilghman	15	.26	0	0
		16	.19	0	0
		25	.83	0	1
		26	1.44	0	0
AP	Tilghman	24	2.16	1	0
		25	1.10	0	0
		26	.80	0	0
AQ	Tilghman	24	.42	0	0
		25	1.40	0	0
		26	1.67	0	0
AR	Claiborne	21	.57	0	0
AS	Oxford	24	.38	1	0
		26	.11	0	0
Total			105.96	112	62
Total (all counties)			443.7		

Table A-13 Chi-Square Test for the Uniform Distribution of Systematically Discovered Shell Sites in the Shell Area (See Fig. 4-8 for limits of the shell area.)

Environmental Sampling Unit	Percent Surveyed	Observed (O) Shell Sites	Expected (E) Shell Sites	(O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
11	3.1	4	14	-10	100	7.14
12	.1	0	0	0	0	0.00
13	.3	0	1	- 1	1	1.00
14	.7	1	3	- 2	4	1.30
15	.9	1	4	- 3	9	2.30
16	1.7	1	8	- 7	49	6.10
21	17.9	36	79	-43	1849	23.40
22	4.8	36	21	+15	225	10.70
23	.9	6	4	+ 2	4	1.00
24	10.5	69	46	+23	529	11.50
25	12.1	53	54	- 1	1	0.00
26	29.7	143	131	+12	144	1.10
31	6.4	14	28	-14	196	7.00
32	1.0	14	4	+10	100	25.00
33	.6	4	3	+ 1	1	.30
34	1.1	10	5	+ 5	25	5.00
35	2.6	31	12	+19	361	30.10
36	5.6	19	25	- 6	36	1.40
Total	100.0	442	442	0		134.30[1]

[1] With seventeen degrees of freedom at the .010 level of significance chi-square = 33.4. Therefore, the hypothesis that sites are distributed uniformly among environments must be rejected.

Table A-14 Chi-Square Test for the Uniform Distribution of Systematically Discovered Nonshell Sites in the Shell Area (See Fig. 4-8 for limits of the shell area.)

Environmental Sampling Unit	Percent Surveyed	Observed (O) Nonshell Sites	Expected (E) Nonshell Sites	(O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
11	3.1	2	4	- 2	4	1.0
12	.1	0	1	- 1	1	1.0
13	.3	0	1	- 1	1	1.0
14	.7	2	1	+ 1	1	1.0
15	.9	1	1	0	0	0.0
16	1.7	0	2	- 2	4	2.0
21	17.9	11	23	-12	144	6.3
22	4.8	6	6	0	0	0.0
23	.9	1	1	0	0	0.0
24	10.5	13	14	- 1	1	.1
25	12.1	25	16	+ 9	81	5.1
26	29.7	53	39	+14	196	5.0
31	6.4	0	8	- 8	64	8.0
32	1.0	4	1	+ 3	9	9.0
33	.6	0	1	- 1	1	1.0
34	1.1	1	1	0	0	0.0
35	2.6	5	3	+ 2	4	1.3
36	5.6	6	7	- 1	1	.1
Total	100.0	130	130	0		41.9[1]

[1]With seventeen degrees of freedom at the .010 level of significance chi-square = 33.4. Therefore the hypothesis that sites are distributed uniformly among environments must be rejected.

Table A-15 Chi-Square Test for the Uniform Distribution of Nonshell Sites in the Nonshell Area (See Fig. 4-8 for limits of the nonshell area.)

Environmental Sampling Unit	Percent Surveyed	Observed (O) Nonshell Sites	Expected (E) Nonshell Sites	(O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
11	.1	0	0	0	0	0
12	.2	0	0	0	0	0
13	--	-	-	-	-	-
14	.6	1	1	0	0	0
15	.7	5	1	+4	16	16
16	.1	0	0	0	0	0
21	1.3	0	3	-3	9	3
22	7.5	9	15	-6	36	2.4
23	--	-	-	-	-	-
24	3.9	6	8	-2	4	.5
25	13.5	28	28	0	0	0
26	14.8	24	30	-6	36	1.2
31	2.8	15	6	+9	81	13.5
32	3.2	12	7	+5	25	3.6
33	--	-	-	-	-	-
34	5.8	17	12	+5	25	2.1
35	8.5	29	17	+12	144	8.5
36	36.9	56	76	-20	400	5.7
Total	100.0	205	204	-2		59.1[1]

[1]With fourteen degrees of freedom at the .010 level of significance chi-square = 29.14. Therefore the hypothesis that sizes are distributed uniformly among environments must be rejected.

Table A-16 Chi-Square Test for the Random Distribution of Shell Sites in the Shell Area (See Fig. 4-8 for limits of the shell area.)

Environmental Sampling Unit	Miles Observed	Observed Shell Sites	Observed (O) Miles for 1 Shell Site	Expected (E) Miles	(O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
11	9.92	4	2.48	1.31	+1.17	1.37	1.05
12	.34	0	-	-	-	-	-
13	.91	0	-	-	-	-	-
14	2.12	1	2.12	1.31	+ .81	.66	.50
15	2.99	1	2.99	1.31	+1.68	2.82	2.15
16	5.34	1	5.34	1.31	+4.03	16.24	12.40
21	57.80	36	1.61	1.31	+ .30	.09	.07
22	15.49	36	.43	1.31	- .88	.77	.59
23	2.95	6	.49	1.31	- .82	.67	.51
24	33.79	69	.49	1.31	- .82	.67	.51
25	39.20	53	.74	1.31	- .57	.32	.24
26	96.14	143	.67	1.31	- .64	.41	.31
31	20.72	14	1.48	1.31	+ .17	.03	.02
32	3.07	14	.22	1.31	-1.09	1.19	.91
33	1.82	4	.46	1.31	- .85	.72	.55
34	3.60	10	.36	1.31	- .95	.90	.69
35	8.48	31	.27	1.31	-1.04	1.08	.82
36	18.14	19	.95	1.31	- .36	.13	.10
Total	322.84	442		1.31	+ .14		21.42[1]

[1]With fifteen degrees of freedom at the .010 level of significance chi-square = 30.58. Therefore the hypothesis of random distribution among environments cannot be rejected.

Table A-17 Chi-Square Test for the Random Distribution of Nonshell Sites in the Shell Area (See Fig. 4-8 for limits of the shell area.)

Environmental Sampling Unit	Miles Observed	Observed (O) Nonshell Sites	Miles for 1 Nonshell Site	Expected(E) Miles	(O-E)	(O-E)	$\frac{2(O-E)^2}{E}$
11	9.92	2	4.96	2.68	+2.28	5.20	1.94
12	.34	0	-	-	-	-	-
13	.91	0	-	-	-	-	-
14	2.12	2	1.06	2.68	-1.62	2.60	.97
15	2.99	1	2.99	2.68	+ .31	.10	.04
16	5.34	0	-	-	-	-	-
21	57.80	11	5.25	2.68	+2.57	6.60	2.46
22	15.49	6	2.58	2.68	- .10	.01	.01
23	2.95	1	2.95	2.68	+ .27	.07	.03
24	33.79	13	2.60	2.68	- .08	.01	.01
25	39.20	25	1.57	2.68	-1.11	1.23	.46
26	96.14	53	1.81	2.68	- .87	.76	.28
31	20.72	0	-	-	-	-	-
32	3.07	4	.77	2.68	+ .92	.85	.32
33	1.82	0	-	-	-	-	-
34	3.60	1	3.60	2.68	+ .92	.85	.32
35	8.48	5	1.70	2.68	+ .98	.96	.36
36	18.14	6	3.02	2.68	+ .34	.12	.04
Total	322.84	130		2.68			8.28[1]

[1]With twelve degrees of freedom at the .010 level of significance chi-square = 26.22. Therefore the hypothesis of random distribution among environments cannot be rejected.

Table A-18 Chi-Square Test for the Random Distribution of Nonshell Sites in the Nonshell Area (See Fig. 4-8 for limits of the nonshell area.)

Environmental Sampling Unit	Miles Observed	Observed Nonshell Sites	Observed (O) Miles for 1 Nonshell Site	Expected (E) Miles	(O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
11	.04	0	-	-	-	-	-
12	.23	0	-	-	-	-	-
13	-	-	-	-	-	-	-
14	.72	1	.72	.56	+.16	.03	.05
15	.91	5	.18	.56	-.38	.14	.25
16	.08	0	-	-	-	-	-
21	1.63	0	-	-	-	-	-
22	9.13	9	1.01	.56	+.45	.20	.36
23	-	-	-	-	-	-	-
24	4.77	6	.80	.56	+.24	.06	.11
25	16.36	28	.58	.56	+.02	.01	.02
26	18.03	24	.75	.56	+.19	.04	.07
31	3.45	15	.23	.56	-.33	.11	.20
32	3.98	12	.33	.56	-.23	.05	.09
33	-	-	-	-	-	-	-
34	7.05	17	.41	.56	-.15	.02	.04
35	10.27	29	.35	.56	-.21	.04	.07
36	44.81	56	.80	.56	+.24	.06	.11
Total	121.44	205		.56			1.37

[1]With ten degrees of freedom at the .010 level of significance chi-square = 23.2. Therefore the hypothesis of random distribution among environments cannot be rejected.

Appendix B

Principal Legislation Concerning Prehistoric Resources (after McGimsey 1972 and Lipe and Lindsay 1974)

Antiquities Act of 1906

An Act for the Preservation of American Antiquities, Approved June 8, 1906 (Public Law 59-209; 34 STAT. 225; 16 U.S.C. 431-433)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than ninety days, or shall suffer both fine and imprisonment, in the discretion of the court.

SECTION 2. That the President of the United States is hereby authorized, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and may reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the objects to be protected: Provided, That when such objects are situated upon a tract covered by a bona fide unperfected claim or held in private ownership, the tract, or so much thereof as may be necessary for the proper care and management of the object, may be relinquished to the Government, and the Secretary of the Interior is hereby authorized to accept the relinquishment of such tracts in behalf of the Government of the United States.

SECTION 3. That permits for the examination of ruins, the excavation of archaeological sites, and the gathering of objects of antiquity upon the lands under their respective jurisdictions may be granted by the Secretaries of the Interior, Agriculture, and War to institutions which they may deem properly qualified to conduct such examinations, excavation, or gathering, subject

to such rules and regulations as they may prescribe: Provided, That the examinations, excavations, and gatherings are undertaken for the benefit of reputable museums, universities, colleges, or other recognized scientific or educational institutions, with a view to increasing the knowledge of such objects, and that the gatherings shall be made for permanent preservation in public museums.

SECTION 4. That the Secretaries of the Departments aforesaid shall make and publish from time to time uniform rules and regulations for the purpose of carrying out the provisions of this Act.

Uniform Rules and Regulations Prescribed by the Secretaries of the Interior, Agriculture, and War To Carry Out the Provisions of the "Act for the Preservation of American Antiquities,"

1. Jurisdiction over ruins, archeological sites, historic, and prehistoric monuments and structures, objects of antiquity, historic landmarks, and other objects of historic or scientific interest, shall be exercised under the act by the respective Departments as follows:

By the Secretary of Agriculture over lands within the exterior limits of forest reserves, by the Secretary of War over lands within the exterior limits of military reservations, by the Secretary of the Interior over all other lands owned or controlled by the Government of the United States, provided the Secretaries of War and Agriculture may by agreement cooperate with the Secretary of the Interior in the supervision of such monuments and objects covered by the act of June 8, 1906, as may be located on lands near or adjacent to forest reserves and military reservations, respectively.

2. No permit for the removal of any ancient monument or structure which can be permanently preserved under the control of the United States in situ, and remain an object of interest, shall be granted.

3. Permits for the examination of ruins, the excavation of archeological sites, and the gathering of objects of antiquity will be granted, by the respective Secretaries having jurisdiction, to reputable museums, universities, colleges or other recognized scientific or educational institutions, or to their duly authorized agents.

4. No exclusive permits shall be granted for a larger area than the applicant can reasonably be expected to explore fully and systematically within the time limit named in the permit.

5. Each application for a permit should be filed with the Secretary having jurisdiction, and must be accompanied by a definite outline of the proposed work, indicating the name of the institution making the request, the date proposed for the beginning the field work, the length of time proposed to be devoted to it, and the person who will have immediate charge of the work. The application must also contain an exact statement of the character of the work, whether examination, excavation, or gathering, and the public museum in which the collections made under the permit are to be permanently preserved. The application must be accompanied by a sketch plan or description of the particular site or area to be examined, excavated, or searched, so definite that it can be located on the map with reasonable accuracy.

6. No permit will be granted for a period of more than three years, but if the work has been diligently prosecuted under the permit, the time may be extended for proper cause upon application.

7. Failure to begin work under a permit within six months after it is granted, or failure to diligently prosecute such work after it has been begun, shall make the permit void without any order or proceeding by the Secretary having jurisdiction.

8. Applications for permits shall be referred to the Smithsonian Institution for recommendation.

9. Every permit shall be in writing and copies shall be transmitted to the Smithsonian Institution and the field officer in charge of the land involved. The permittee will be furnished with a copy of these rules and regulations.

10. At the close of each season's field work the permittee shall report in duplicate to the Smithsonian Institution, in such form as its secretary may prescribe, and shall prepare in duplicate a catalogue of the collections and the photographs made during the season, indicating therein such material, if any, as may be available for exchange.

11. Institutions and persons receiving permits for excavation shall, after the completion of the work, restore the lands upon which they have worked to their customary condition, to the satisfaction of the field officer in charge.

12. All permits shall be terminable at the discretion of the Secretary having jurisdiction.

13. The field officer in charge of land owned or controlled

by the Government of the United States shall, from time to time, inquire and report as to the existence, on or near such lands, of ruins and archeological sites, historic or prehistoric ruins or monuments, objects or antiquity, historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest.

14. The field officer in charge may at all times examine the permit of any person or institution claiming privileges granted in accordance with the act and these rules and regulations, and may fully examine all work done under such permit.

15. All persons duly authorized by the Secretaries of Agriculture, War, and Interior may apprehend or cause to be arrested, as provided in the act of February 6, 1905 (33 Stat. 700), any person or persons who appropriate, excavate, injure, or destroy any historic or prehistoric ruin or monument, or any object of antiquity on lands under the supervision of the secretaries of Agriculture, War, and Interior, respectively.

16. Any object of antiquity taken, or collection made, on lands owned or controlled by the United States, without a permit, as prescribed by the act and these rules and regulations, or there taken or made, contrary to the terms of the permit, or contrary to the act and these rules and regulations, may be seized whenever found and at any time, by the proper field officer or by any person duly authorized by the Secretary having jurisdiction, and disposed of as the Secretary shall determine, by deposit in the proper national depository or otherwise.

17. Every collection made under the authority of the act and of these rules and regulations shall be preserved in the public museum designated in the permit and shall be accessible to the public. No such collection shall be removed from such public museum without the written authority of the Secretary of the Smithsonian Institution, and then only to another public museum, where it shall be accessible to the public; and when any public museum, which is a depository of any collection made under the provisions of the act and these rules and regulations, shall cease to exist, every such collection in such public museum shall thereupon revert to the national collections and be placed in the proper national depository.

Washington, D.C., December 28, 1906.

The foregoing rules and regulations are hereby approved in triplicate and, under authority conferred by law on the Secretaries of the Interior, Agriculture, and War, are hereby made and established, to take effect immediately. E.A. Hitchcock, Secretary of the Interior. James Wilson, Secretary of Agriculture. William H. Taft, Secretary of War.

Historic Sites Act of 1935

An Act To Provide for the Preservation of Historic American Sites, Buildings, Objects, and Antiquities of National Significance, and for Other Purposes, Approved August 21, 1935 (Public Law 74-292; 49 STAT. 666; 16 U.S.C. 461-467)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is hereby declared that it is a national policy to preserve for public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United States. (16 U.S.C. sec. 461.)

SECTION 2. The Secretary of the Interior (hereinafter referred to as the Secretary), through the National Park Service, for the purpose of effectuating the policy expressed in section 1 hereof, shall have the following powers and perform the following duties and functions:

(a) Secure, collate, and preserve drawings, plans, photographs, and other data of historic and archaeologic sites, buildings and objects.

(b) Make a survey of historic and archaeologic sites, buildings, and objects for the purpose of determining which possess exceptional value as commemorating or illustrating the history of the United States.

(c) Make necessary investigations and researches in the United States relating to particular sites, buildings, or objects to obtain true and accurate historical and archaeological facts and information concerning the same.

(d) For the purpose of this Act, acquire in the name of the United States by gift, purchase, or otherwise any property, personal or real, or any interest or estate therein, title to any real property to be satisfactory to the Secretary: Provided, That no such property which is owned by any religious or educational institution, or which is owned or administered for the benefit of the public shall be so acquired without the consent of the owner: Provided further, That no such property shall be acquired or contract or agreement for the acquisition thereof made which will obligate the general fund of the Treasury for the payment of such property, unless or until Congress has appropriated money which is available for that purpose.

(e) Contract and make cooperative agreements with States, municipal subdivisions, corporations, associations, or individuals, with proper bond where deemed advisable, to protect, preserve, maintain, or operate any historic or archaeologic

building, site, object, or property used in connection therewith for public use, regardless as to whether the title thereto is in the United States: Provided, That no contract or cooperative agreement shall be made or entered into which will obligate the general fund of the Treasury unless or until Congress has appropriated money for such purpose.

(f) Restore, reconstruct, rehabilitate, preserve, and maintain historic or prehistoric sites, buildings, objects, and properties of national historical or archaeological significance and where deemed desirable establish and maintain museums in connection therewith.

(g) Erect and maintain tablets to mark or commemorate historic or prehistoric places and events of national historical or archaeological significance.

(h) Operate and manage historic and archaeologic sites, buildings, and properties acquired under the provisions of this Act together with lands and subordinate buildings for the benefit of the public, such authority to include the power to charge reasonable visitation fees and grant concessions, leases, or permits for the use of land, building space, roads, or trails when necessary or desirable either to accommodate the public or to facilitate administration: Provided, That such concessions, leases, or permits, shall be let at competitive bidding, to the person making the highest and best bid.

(i) When the Secretary determines that it would be administratively burdensome to restore, reconstruct, operate, or maintain any particular historic or archaeologic site, building, or property donated to the United States through the National Park Service, he may cause the same to be done by organizing a corporation for that purpose under the laws of the District of Columbia or any State.

(j) Develop an education program and service for the purpose of making available to the public facts and information pertaining to American historic and archaeologic sites, buildings, and properties of national significance. Reasonable charges may be made for the dissemination of any such facts or information.

(k) Perform any and all acts, and make such rules and regulations not inconsistent with this Act as may be necessary and proper to carry out the provisions thereof. Any person violating any of the rules and regulations authorized by this Act shall be punished by a fine of not more than $500 and be adjudged to pay all cost of the proceedings. (16 U.S.C. sec. 462.)

SECTION 3. A general advisory board to be known as the "Advisory Board on National Parks, Historic Sites, Buildings, and Monuments" is hereby established, to be composed of not to exceed eleven persons, citizens of the United States, to include representatives competent in the fields of history, archaeology, architecture, and human geography, who shall be appointed by the Secretary and serve at his pleasure. The members of such board shall receive no salary but may be paid expenses incidental to travel engaged in discharging their duties as members.

It shall be the duty of such board to advise on any matters relating to national parks and to the administration of this Act submitted to it for consideration by the Secretary. It may also recommend policies to the Secretary from time to time pertaining to national parks and to the restoration, reconstruction, conservation, and general administration of historic and archaeologic sites, buildings, and properties. (16 U.S.C. sec. 463.)

SECTION 4. The Secretary, in administering this Act, is authorized to cooperate with and may seek and accept the assistance of any Federal, State, or municipal department or agency, or any educational or scientific institution, or any patriotic association, or any individual.

(b) When deemed necessary, technical advisory committees may be established to act in an advisory capacity in connection with the restoration or reconstruction of any historic or prehistoric building or structure.

(c) Such professional and technical assistance may be employed without regard to the civil-service laws, and such service may be established as may be required to accomplish the purposes of this Act and for which money may be appropriated by Congress or made available by gifts for such purpose. (16 U.S.C. sec. 464.)

SECTION 5. Nothing in this Act shall be held to deprive any State, or political subdivision thereof, of its civil and criminal jurisdiction in and over lands acquired by the United States under this Act. (16 U.S.C. sec. 465.)

SECTION 6. There is authorized to be appropriated for carrying out the purposes of this Act such sums as the Congress may from time to time determine. (16 U.S.C. sec. 466.)

SECTION 7. The provisions of this Act shall control if any of them are in conflict with any other Act or Acts relating to the same subject matter. (16 U.S.C. sec. 467.)

Reservoir Salvage Act of 1960

An ACT to Provide for the Preservation of Historical and Archaeological Data (including Relics and Specimens) which might Otherwise be Lost as the Result of the Construction of a Dam, Approved June 27, 1960 (Public Law 86-523; 74 STAT. 220; 16 U.S.C. 469-469c)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is the purpose of this Act to further the policy set forth in the Act entitled "An Act to provide for the preservation of historic American sites, buildings, objects, and antiquities of national significance, and for other purposes," approved August 21, 1935 (16 U.S.C. 461-467) by specifically providing for the preservation of historical and archaeological data (including relics and specimens) which might otherwise be irreparably lost or destroyed as the result of flooding, the building of access highways, and other alterations of the terrain caused by the construction of a dam by an agency of the United States, or by any private person or corporation holding a license issued by any such agency.

SECTION 2.

(a) Before any agency of the United States shall undertake the construction of a dam, or issue a license to any private individual or corporation for the construction of a dam, it shall give written notice to the Secretary of the Interior setting forth the site of the proposed dam and the approximate area to be flooded and otherwise changed if such construction is undertaken; Provided, with respect to any floodwater retarding dam which provides less than five thousand acre-feet of detention capacity and with respect to any other type of dam which creates a reservoir of less than forty surface acres the provisions of this section shall apply only when the constructing agency, in his preliminary surveys, finds, or is presented with evidence that historical or archaeological materials exist or may be present in the proposed reservoir area.

(b) Upon receipt of any notice, as provided in subsection (a), the Secretary of the Interior (hereinafter referred to as the "Secretary"), shall cause a survey to be made of the area proposed to be flooded to ascertain whether such area contains historical and archaeological data (including relics and specimens) which should be preserved in the public interest. Any such survey shall be conducted as expeditiously as possible. If, as a result of any such survey, the Secretary shall determine (1) that such data exists in such area, (2) that such data has exceptional historical or archaeological significance, and should be collected and preserved in the public interest, and

(3) that it is feasible to collect and preserve such data, he shall cause the necessary work to be performed in such area to collect and preserve such data. All such work shall be performed as expeditiously as possible.

(c) The Secretary shall keep the instigating agency notified at all times of the progress of any survey made under this Act, or of any work undertaken as a result of such survey, in order that there will be as little disruption or delay as possible in the carrying out of the functions of such agency.

(d) A survey similar to that provided for by section (b) of this section and the work required to be performed as a result thereof shall so far as practicable also be undertaken in connection with any dam the construction of which has been heretofore authorized by any agency of the United States, or by any such private person or corporation holding a license issued by any such agency.

(e) The Secretary shall consult with any interested Federal and State agencies, educational and scientific organizations, and private institutions and qualified individuals, with a view to determining the ownership of and the most appropriate repository for any relics and specimens recovered as a result of any work performed as provided for in this section.

SECTION 3. In the administration of this Act, the Secretary may

1. enter into contracts or make cooperative agreements with any Federal or State agency, any educational or scientific organization, or any institution, corporation, association, or qualified individual; and

2. procure the temporary or intermittent services of experts or consultants or organizations thereof as provided in Section 15 of the Act of August 2, 1946 (5U.S.C.55a); and

3. accept and utilize funds made available for salvage archaeological purposes by any private person or corporation holding a license issued by an agency of the United States for the construction of a dam or other type of water or power control project.

SECTION 4. There are hereby authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act.

Historic Preservation Act of 1966

An Act to Establish a Program for the Preservation of Additional Historic Properties Throughout the Nation, and for Other Purposes, Approved October 15, 1966 (Public Law 89-665; 80 STAT.915; 16 U.S.C. 470)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Congress finds and declares -

(a) That the spirit and direction of the Nation are founded upon and reflected in its historic past;

(b) That the historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people;

(c) That, in the face of ever-increasing extensions of urban centers, highways, and residential, commercial, and industrial developments, the present governmental and nongovernmental historic preservation programs and activities are inadequate to insure future generations a genuine opportunity to appreciate and enjoy the rich heritage of our Nation; and

(d) That, although the major burdens of historic preservation have been borne and major efforts initiated by private agencies and individuals, and both should continue to play a vital role it is nevertheless necessary and appropriate for the Federal Government to accelerate its historic preservation programs and activities, to give maximum encouragement to agencies and individuals undertaking preservation by private means, and to assist State and local governments and the National Trust for Historic Preservation in the United States to expand and accelerate their preservation programs and activities.

Title I

SECTION 101.

(a) The Secretary of the Interior is authorized -

1. to expand and maintain a national register of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, and culture, hereinafter referred to as the National Register, and to grant funds to States for the purpose of preparing comprehensive statewide historic surveys and plans, in accordance with criteria established by the Secretary, for the preservation, acquisition,

and development of such properties;

2. to establish a program of matching grants-in-aid to States for projects having as their purpose the preservation for public benefit of properties that are significant in American history, architecture, archeology, and culture; and

3. to establish a program of matching grant-in-aid to the National Trust for Historic Preservation in the United States, chartered by act of Congress approved October 26, 1949 (63 Stat. 927), as amended, for the purpose of carrying out the responsibilities of the National Trust.

(b) As used in this Act -

1. The term "State" includes, in addition to the several States of the Union, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, and American Samoa.

2. The term "project" means programs of State and local governments and other public bodies and private organizations and individuals for the acquisition of title or interest in, and for the development of, any district, site, building, structure, or object that is significant in American history, architecture, archeology, and culture, or property used in connection therewith, and for its development in order to assure the preservation for public benefit of any such historical properties.

3. The term "historic preservation" includes the protection, rehabilitation, restoration, and reconstruction of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, or culture.

4. The term "Secretary" means the Secretary of the Interior.

SECTION 102.

(a) No grant may be made under this Act -

1. unless application therefor is submitted to the Secretary in accordance with regulations and procedures prescribed by him;

2. unless the application is in accordance with the comprehensive statewide historic preservation plan which has been approved by the Secretary after considering its relationship to the comprehensive statewide outdoor recreation plan prepared pursuant to the Land and Water Conservation Fund Act of 1965 (78 Stat. 897);

3. for more than 50 per centum of the total cost involved, as determined by the Secretary and his determination shall be

final;

4. unless the grantee has agreed to make such reports, in such form and containing such information as the Secretary may from time to tome require;

5. unless the grantee has agreed to assume, after completion of the project, the total cost of the continued maintenance, repair, and administration of the property in a manner satisfactory to the Secretary; and

6. until the grantee has complied with such further terms and conditions as the Secretary may deem necessary or advisable.

(b) The Secretary may in his discretion waive the requirements of subsection (a), paragraphs 2. and 5. of this section for any grant under this Act to the National Trust for Historic Preservation in the United States, in which case a grant to the National Trust may include funds for the maintenance, repair, and administration of the property in a manner satisfactory to the Secretary.

(c) No State shall be permitted to utilize the value of real property obtained before the date of approval of this Act in meeting the remaining cost of a project for which a grant is made under this Act.

SECTION 103.

(a) The amounts appropriated and made available for grants to the State for comprehensive statewide historic surveys and plans under this Act shall be apportioned among the States by the Secretary on the basis of needs as determined by him: Provided, however, That the amount granted to any one State shall not exceed 50 per centum of the total cost of the comprehensive statewide historic survey and plan for that State, as determined by the Secretary.

(b) The amounts appropriated and made available for grants to the States for projects under this Act for each fiscal year shall be apportioned among the States by the Secretary in accordance with needs as disclosed in approved statewide historic preservation plans.

The Secretary shall notify each State of its apportionment, and the amounts thereof shall be available thereafter for payment to such State for projects in accordance with the provisions of this Act. Any amount of any apportionment that has not been paid or obligated by the Secretary during the fiscal year in which such notification is given, and for two fiscal years thereafter, shall be reapportioned by the Secretary in accordance with this subsection.

SECTION 104.

(a) No grant may be made by the Secretary for or on account of any survey or project under this Act with respect to which financial assistance has been given or promised under any other Federal program or activity, and no financial assistance may be given under any other Federal program or activity for or on account of any survey or project with respect to which assistance has been given or promised under this Act.

(b) In order to assure consistency in policies and actions under this Act with other related Federal programs and activities, and to assure coordination of the planning, acquisition, and development assistance to States under this Act with other related Federal programs and activities, the President may issue such regulations with respect thereto as he deems desirable, and such assistance may be provided only in accordance with such regulations.

SECTION 105. The beneficiary of assistance under this Act shall keep such records as the Secretary shall prescribe, including records which fully disclose the disposition by the beneficiary of the proceeds of such assistance, the total cost of the project or undertaking in connection with which such assistance is given or used, and the amount and nature of that portion of the cost of the project or undertaking supplied by other sources, and such other records as will facilitate an effective audit.

SECTION 106. The head of any Federal Agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building structure, or object that is included in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under title II of this Act a reasonable opportunity to comment with regard to such undertaking.

SECTION 107. Nothing in this Act shall be construed to be applicable to the White House and its grounds, the Supreme Court building and its grounds, or the United States Capitol and its related buildings and grounds.

SECTION 108. There are authorized to be appropriated not to exceed $2,000,000 to carry out the provisions of this Act for the fiscal year 1967, and not more than $10,000,000 for each

of the three succeeding fiscal years. Such appropriations shall be available for the financial assistance authorized by this title and for the administrative expenses of the Secretary in connection therewith, and shall remain available until expended.

Title II

SECTION 201.

(a) There is established an Advisory Council on Historic Preservation (hereinafter referred to as the "Council") which shall be composed of seventeen members as follows:

1. The Secretary of the Interior.

2. The Secretary of Housing and Urban Development

3. The Secretary of Commerce.

4. The Administrator of the General Services Administration.

5. The Secretary of the Treasury

6. The Attorney General.

7. The Chairman of the National Trust for Historic Preservation.

8. Ten appointed by the President from outside the Federal Government. In making these appointments, the President shall give due consideration to the selection of officers of State and local governments and individuals who are significantly interested and experienced in the matters to be considered by the Council.

(b) Each member of the Council specified in paragraphs 1. through 6. of subsection (a) may designate another officer of his department or agency to serve on the Council in his stead.

(c) Each member of the Council appointed under paragraph 8. of subsection (a) shall serve for a term of five years from the expiration of his predecessor's term; except that the members first appointed under that paragraph shall serve for terms of from one to five years, as designated by the President at the time of appointment, in such manner as to insure that the terms of not less than one nor more than two of them will expire in any one year.

(d) A vacancy in the Council shall not affect its powers,

but shall be filled in the same manner as the original appointment (and for the balance of the unexpired term).

(e) The Chairman of the Council shall be designated by the President.

(f) Eight members of the Council shall constitute a quorum.

SECTION 202.

(a) The Council shall -

1. advise the President and the Congress on matters relating to historic preservation; recommend measures to coordinate activities of Federal, State, and local agencies and private institutions and individuals relating to historic preservation; and advise on the dissemination of information pertaining to such activities;

2. encourage, in cooperation with the National Trust for Historic Preservation and appropriate private agencies, public interest and participation in historic preservation;

3. recommend the conduct of studies in such areas as the adequacy of legislative and administrative statutes and regulations pertaining to historic preservation activities of State and local governments and the effects of tax policies at all levels of government on historic preservation;

4. advise as to guidelines for the assistance of State and local governments in drafting legislation relating to historic preservation; and

5. encourage, in cooperation with appropriate public and private agencies and institutions, training and education in the field of historic preservation.

(b) The council shall submit annually a comprehensive report of its activities and the results of its studies to the President and the Congress and shall from time to time submit such additional and special reports as it deems advisable. Each report shall propose such legislative enactments and other actions as, in the judgment of the Council, are necessary and appropriate to carry out its recommendations.

SECTION 203. The Council is authorized to secure directly from any department, bureau, agency, board, commission, office, independent establishment or instrumentality of the executive branch of the Federal Government information, suggestions, estimates, and statistics for the purpose of this title; and each such department, bureau, agency, board, commission, office, independent establishment or instrumentality is authorized to

furnish such information, suggestions, estimates, and statistics to the extent permitted by law and within available funds.

SECTION 204. The members of the Council specified in paragraphs 1. through 7. of section 201 (a) shall serve without additional compensation. The members of the Council appointed under paragraph 8. of section 201 (a) shall receive $100 per diem when engaged in the performances of the duties of the Council. All members of the Cuncil shall receive reimbursement for necessary traveling and subsistence expenses incurred by them in the performance of the duties of the Council.

SECTION 205.

(a) The Director of the National Park Service or his designee shall be the Executive Director of the Council. Financial and administrative services (including those related to budgeting, accounting, financial reporting, personnel and procurement) shall be provided the Council by the Department of the Interior, for which payments shall be made in advance, or by reimbursement, from funds of the Council in such amounts as may be agreed upon by the Chairman of the Council and the Secretary of the Interior: Provided, That the regulations of the Department of the Interior for the collection of indebtedness of personnel resulting from erroneous payments (5 U.S.C. 46e) shall apply to the collection of erroneous payments made to or on behalf of a Council employee, and regulations of said Secretary for the administrative control of funds (31 U.S.C. 665.(g)) shall apply to appropriations of the Council: And provided further, That the Council shall not be required to prescribe such regulations.

(b) The Council shall have power to appoint and fix the compensation of such additional personnel as may be necessary to carry out its duties, without regard to the provisions of the civil service laws and the Classification Act of 1949.

(c) The Council may also procure, without regard to the civil service laws and the Classification Act of 1949, temporary and intermittent services to the same extent as is authorized for the executive departments by section 15 of the Administrative Expenses Act of 1946 (5 U.S.C. 55a), but at rates not to exceed $50 per diem for individuals.

(d) The members of the Council specified in paragraphs 1. through 6. of section 210 (a) shall provide the Council, on a reimbursable basis, with such facilities and services under their jurisdiction and control as may be needed by the Council to carry out its duties, to the extent that such facilities and services are requested by the Council and are otherwise available for that purpose. To the extend of available appropriations, the

Council may obtain, by purchase, rental, donation, or otherwise, such additional property, facilities, and services as may be needed to carry out its duties.

National Environmental Policy Act of 1969

An Act to establish a National policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes, Approved January 1, 1970 (Public Law 91-190; 91 STAT. 852; 42 U.S.C. 4321-4347)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Environmental Policy Act of 1969".

Purpose

SECTION 2. The purposes of this Act are: to declare a national policy which will encourage production and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

Title I

Declaration of National Environmental Policy

SECTION 101. (a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is

the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

SECTION 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall --

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultations with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for

legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5., United States Code, and shall accompany the proposal through the existing agency review processes;

(D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(E) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(F) make available to States, countries, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(G) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(H) assist the Council on Environmental Quality established by title II of this Act.

SECTION 103. All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

SECTION 104. Nothing in Section 102 or 103 shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

SECTION 105. The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

Title II

Council On Environmental Quality

SECTION 201. The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

SECTION 202. There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred

to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

SECTION 203. The Council may employ such officers and employees as may be necessary for the carrying out of its functions under this Act, in accordance may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

SECTION 204. It shall be the duty and function of the Council --

(1) to assist and advise the President in the preparation of the Environmental Quality Report required by section 201;

(2) to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

(3) to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;

(4) to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;

(5) to conduct investigations, studies, surveys, research, and analysis relating to ecological systems and environmental quality;

(6) to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

(7) to report at least once each year to the President on the state and condition of the environment; and

(8) to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

SECTION 205. In exercising its powers, functions, and duties under this Act, the Council shall

(1) consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order numbered 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and

(2) utilize, to the fullest extent possible, the services, facilities, and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

SECTION 206. Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates (5 U.S.C. 5313). The other members of the Council shall be compensated at the rate provided for Level IV of the Executive Schedule Pay Rates (5 U.S.C. 5315).

SECTION 207. There are authorized to be appropriated to carry out the provisions of this Act not to exceed $300,000 for fiscal year 1970, $700,000 for fiscal year 1971, and $1,000,000 for each fiscal year thereafter.

Executive Order No. 11593

Protection and Enhancement of the Cultural Environment, May 15, 1971, 36 F.R. 8921.

By virtue of the authority vested in me as President of the United States and in furtherance of the purposes and policies of the National Environmental Policy Act of 1969 (83 Stat. 852, 42 U.S.C.

4321 et seq.), 58 the National Historic Preservation Act of 1966 (80 Stat. 915, 16 U.S.C. 470 et seq.), 59 the Historic Sites Act of 1935 (49 Stat. 666, 16 U.S.C. 461 et seq.), 60 and the Antiquities Act of 1906 (34 Stat. 225, 16 U.S.C. 431 et seq.), 61 it is ordered as follows:

Policy

SECTION 1. The Federal Government shall provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation. Agencies of the executive branch of the Government (hereinafter referred to as "Federal agencies") shall (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, (2) initiate measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored and maintained for the inspiration and benefit of the people, and (3) in consultation with the Advisory Council on Historic Preservation (16 U.S.C. 470i), institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures and objects of historical, architectural or archaeological significance.

Responsibilities of Federal Agencies

SECTION 2. Consonant with the provisions of the acts cited in the first paragraph of this order, the heads of Federal agencies shall:

(a) no later than July 1, 1973, with the advice of the Secretary of the Interior, and in cooperation with the liaison officer for historic preservation for the State or territory involved, locate, inventory, and nominate to the Secretary of the Interior all sites, buildings, districts, and objects under their jurisdiction or control that appear to qualify for listing on the National Register of Historic Places.

(b) exercise caution during the interim period until inventories and evaluations required by subsection (a) are completed to assure that any federally owned property that might qualify for nomination is not inadvertently transferred, sold, demolished or substantially altered. The agency head shall refer any questionable actions to the Secretary of the Interior for an opinion respecting the property's eligibility for inclusion on the National Register of Historic Places. The Secretary shall consult with the liaison officer for historic preservation for the State or territory involved in arriving at his opinion. Where, after a reasonable period in which to review and evaluate the property,

the Secretary determines that the property is likely to meet the criteria prescribed for listing on the National Register of Historic Places, the Federal agency head shall reconsider the proposal in light of national environmental and preservation policy. Where, after such reconsideration, the Federal agency head proposes to transfer, sell, demolish or substantially alter the property, he shall not act with respect to the property until the Advisory Council on Historic Preservation shall have been provided an opportunity to comment on the proposal.

(c) initiate measures to assure that where as a result of Federal action or assistance a property listed on the National Register of Historic Places is to be substantially altered or demolished, timely steps be taken to make or have made records, including measured drawings, photographs and maps, of the property, and that copy of such records then be deposited in the Library of Congress as part of the Historic American Buildings Survey or Historic American Engineering Record for future use and reference. Agencies may call on the Department of the Interior for advice and technical assistance in the completion of the above records.

(d) initiate measures and procedures to provide for the maintenance, through preservation, rehabilitation, or restoration, of federally owned and registered sites at professional standards prescribed by the Secretary of the Interior.

(e) submit procedures required pursuant to subsection (d) to the Secretary of the Interior and to the Advisory Council on Historic Preservation no later than January 1, 1972, and annually thereafter, for review and comment.

(f) cooperate with purchasers and transferees of a property listed on the National Register of Historic Places in the development of viable plans to use such property in a manner compatible with preservation objectives and which does not result in an unreasonable economic burden to public or private interests.

Responsibilities of the Secretary of the Interior

SECTION 3. The Secretary of the Interior shall:

(a) encourage State and local historic preservation officials to evaluate and survey federally owned historic properties and, where appropriate, to nominate such properties for listing on the National Register of Historic Places.

(b) develop criteria and procedures to be applied by Federal agencies in the reviews and nominations required by section 2 (a). Such criteria and procedures shall be developed in consultation with the affected agencies.

(c) expedite action upon nominations to the National Register of Historic Places concerning federally owned properties proposed for sale, transfer, demolition or substantial alteration appropriated expressly for this purpose conduct, with the consent of
(d) encourage State and Territorial liaison officers for historic preservation to furnish information upon request to Federal agencies regarding their properties which have been evaluated with respect to historical, archeological, architectural or cultural significance and which as a result of such evaluations have not been found suitable for listing on the National Register of Historic Places.
lays in construction or as a result of the temporary loss of the
(e) develop and make available to Federal agencies and State and local governments information concerning professional methods and techniques for preserving, improving, restoring and maintaining historic properties
gency or appropriate historical or archeological authority that scientific, prehistorical, historical, or
(f) advise Federal agencies in the evaluation, identification, preservation, improvement, restoration and maintenance of historic properties
ject, gram, shall, if he determines that such data is significant and is being or may be irrevocably lost or destroyed
(g) review and evaluate the plans of transferees of surplus Federal properties transferred for historic monument purposes
funding to assure that the historical character of such properties is preserved in rehabilitation, restoration, improvement, maintenance and repairs of such properties
data which, in his opinion, are not being, but should be, recovered and preserved in the public
(h) review and comment upon Federal agency procedures submitted pursuant to section 2 (e) of this order.

(b) No survey or recovery work shall be required pursuant to this section which, in the determination of the head of the responsible agency, would impede Federal or federally assisted projects or activities undertaken in connection with any emergency, including projects or activities undertaken in anticipation of, or as a result of, a natural disaster.

(c) The Secretary shall initiate the survey or recovery effort within sixty days after notification to him pursuant to subsection (a) of this section or within such time as may be agreed upon with the head of the agency responsible for funding or licensing the project, activity or program in all other cases.

(d) The Secretary shall, unless otherwise mutually agreed to in writing, compensate any person, association or public entity damaged as a result of delays in construction or as a result of the temporary loss or use of private or non-federally owned lands.

THE WHITE HOUSE RICHARD NIXON
May 13, 1971

Archaeological Conservation Act of 1974
Amending Reservoir Salvage Act of 1960

An Act to provide for the preservation of historical and archaeological data (including relics and specimens) which might otherwise be lost as the result of the construction of a dam.

May 6, 1974 (Public Law 93-291; 74 Stat. 220)

(d) The Secretary shall notify the agency responsible for the construction of any dam of
this Act, or of any work undertaken as a result of such survey, in order that there will be as little disruption or delay as possible in carrying out of

That it is the purpose of this Act to further the policy set forth in the Act entitled "An Act to provide for the preservation of historic American sites, buildings, objects, and antiquities of national significance, and for other purposes", approved August 21, 1935 (16 U.S.C. 461-467), by specifically providing for the preservation of historical and archeological data (including relics and specimens) which might otherwise be irreparably lost or destroyed as the result of (1) flooding, the building of access roads, the erection of workmen's communities, the relocation of railroads and highways, and other alterations of the terrain caused by the construction of a dam by any agency of the United States, or by any private person or corporation holding a license issued by any such agency or (2) any alteration of the terrain caused as a result of any Federal construction project or Federally licensed project, activity or program.

SECTION 2. Before any agency of the United States shall undertake the construction of a dam, or issue a license to any private individual or corporation for the construction of a dam, it shall give written notice to the Secretary of the Interior (hereafter referred to as the "Secretary") setting forth the site of the proposed dam and the approximate area to be flooded and otherwise changed if such construction is undertaken: Provided, That with respect to any floodwater retarding dam which provides less than five thousand acre-feet of detention capacity and with respect to any other type of dam which creates a reservoir of less than forty surface acres the provisions of this section shall apply only when the constructing agency, in its preliminary surveys, finds, or is presented with evidence that historical or archeological materials exist or may be present in the proposed reservoir area.

SECTION 3. (a) Whenever any Federal agency finds, or is notified, in writing, by an appropriate historical or archeological authority, that its activities in connection with any Federal construction project or federally licensed project, activity, or program may cause irreparable loss or destruction of significant scientific, prehistorical, historical, or archeological data, such agency shall notify the Secretary, in writing, and shall provide the Secretary with appropriate information concerning the project, program, or activity. Such agency may request the Secretary to undertake the recovery, protection, and preservation of such data (including preliminary survey, or other investigation as needed, and analysis and publication of the reports resulting from such investigation), or it may, with funds appropriated for such project, program, or activity, undertake such activities. Copies of reports of any investigations made pursuant to this section shall be submitted to the Secretary, who shall make them available to the public for inspection and review.

(b) Whenever any Federal agency provides financial assistance by loan, grant, or otherwise to any private person, association, or

public entity, the Secretary, if he determines that significant scientific, prehistorical, historical, or archaeological data might be irrevocably lost or destroyed, may with funds appropriated expressly for this purpose conduct, with the consent of all persons, associations or public entities having a legal interest in the property involved, a survey of the affected site and undertake the recovery, protection and preservation of such data (including analysis and publication). The Secretary shall, unless otherwise mutually agreed to in writing, compensate any person, association or public entity damaged as a result of delays in construction or as a result of the temporary loss of the use of private or any non-federally owned lands.

SECTION 4. (a) The Secretary, upon notification, in writing, by any Federal or State agency or appropriate historical or archeological authority that scientific, prehistorical, historical, or archeological data is being or may be irrevocably lost or destroyed by any Federal or federally assisted or licensed project, activity, or program, shall, if he determines that such data is significant and is being or may be irrevocably lost or destroyed and after reasonable notice to the agency responsible for funding or licensing such project, activity, or program, conduct or cause to be conducted a survey and other investigation of the areas which are or may be affected and recover and preserve such data (including analysis and publication) which, in his opinion, are not being, but should be, recovered and preserved in the public interest.

(b) No survey or recovery work shall be required pursuant to this section which, in the determination of the head of the responsible agency, would impede Federal or federally assisted projects or activities undertaken in connection with any emergency, including projects or activities undertaken in anticipation of, or as a result of, a natural disaster.

(c) The Secretary shall initiate the survey or recovery effort within sixty days after notification to him pursuant to subsection (a) of this section or within such time as may be agreed upon with the head of the agency responsible for funding or licensing the project, activity or program in all other cases.

(d) The Secretary shall, unless otherwise mutually agreed to in writing, compensate any person, association, or public entity damaged as a result of delays in construction or as a result of the temporary loss of the use of private or non-federally owned lands.

SECTION 5. (a) The Secretary shall keep the agency responsible for funding or licensing the project notified at all times of the progress of any survey made under this Act, or of any work undertaken as a result of such survey, in order that there will be as little disruption or delay as possible in carrying out of

the functions of such agency and the survey and recovery programs shall terminate at a time mutually agreed upon by the Secretary and the head of such agency unless extended by mutual agreement.

(b) The Secretary shall consult with any interested Federal and State agencies, educational and scientific organizations, and private institutions and qualified individuals, with a view to determining the ownership of and the most appropriate repository for any relics and specimens recovered as a result of any work performed as provided for in this section.

(c) The Secretary shall coordinate all Federal survey and recovery activities authorized under this Act and shall submit an annual report at the end of each fiscal year to the Interior and Insular Affairs Committees of the United States Congress indicating the scope and effectiveness of the program, the specific projects surveyed and the results produced, and the costs incurred by the Federal Government as a result thereof.

SECTION 6. In the administration of this Act, the Secretary may:

(1) enter into contracts or make cooperative agreements with any Federal or State agency, any educational or scientific organization, or any institution, corporation, association, or qualified individual; and

(2) obtain the services of experts and consultants or organizations thereof in accordance with section 3109 of title 5, United States Code; and

(3) accept and utilize funds made available for salvage archeological purposes by any private person or corporation or transferred to him by any Federal agency.

SECTION 7. (a) To carry out the purposes of this Act, any Federal agency responsible for a construction project may assist the Secretary and/or it may transfer to him such funds as may be agreed upon, but not more than one per centum of the total amount authorized to be appropriated for such project, except that the one per centum limitation of this section shall not apply in the event that the project involves $50,000 or less: Provided, That the costs of such survey, recovery, analysis, and publication shall be considered nonreimbursable project costs.

(b) For the purposes of subsection 3 (b), there are authorized to be appropriated such sums as may be necessary, but not more than $500,000 in fiscal year 1974; $1,000,000 in fiscal year 1975; $1,500,000 in fiscal year 1976; $1,500,000 in fiscal year 1977; and $1,500,000 in fiscal year 1978.

(c) For the purposes of subsection 4 (a), there are authorized to be appropriated not more than $2,000,000 in fiscal year 1974; $2,000,000 in fiscal year 1975; $3,000,000 in fiscal year 1976; $3,000,000 in fiscal year 1977; and $3,000,000 in fiscal year 1978.

Excerpts from Department of Transportation Legislation

49 U.S.C. 1651. Congressional Declaration of Purpose

(a) The Congress hereby declares that the general welfare, the economic growth and stability of the Nation and its security require the development of national transportation policies and programs conducive to the provision of fast, safe, efficient, and convenient transportation at the lowest cost consistent therewith and with other national objectives, including the efficient utilization and conservation of the Nation's resources.

(b) (1) The Congress therefore finds that the establishment of a Department of Transportation is necessary in the public interest and to assure the coordinated, effective administration of the transportation program to the Federal Government; to facilitate the development and improvement of coordinated transportation service, to be provided by private enterprise to the maximum extent feasible; to encourage cooperation of Federal, State, and local governments, carriers, labor, and other interested parties toward the achievement of national transportation objectives; to stimulate technological advances in transportation; to provide general leadership in the identification and solution of transportation problems; and to develop and recommend to the President and the Congress for approval of national transportation policies and programs to accomplish these objectives with full and appropriate consideration of the needs of the public, users, carriers, industry, labor, and the national defense.

(2) It is hereby declared to be the national policy that special effort should be made to preserve the natural beauty of the countryside and public park and recreational lands, wildlife and waterfowl refuges, and historic sites.

23 U.S.C. 138. Preservation of Park Lands

It is hereby declared to be the national policy that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. The Secretary of Transportation

shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of the lands traversed. After the effective date of the Federal-Aid Highway Act of 1968 [August 23, 1968], the Secretary shall not approve any program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife or waterfowl refuge of national, State, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land and historic site of national, state, or local significance as so determined by such officials unless (1) there is no feasible and prudent alternative to the use of such lands, and (2) such program includes all possible planning to minimize harm to such park, recreational area, wildlife, and waterfowl refuge, or historic site resulting from such use.

23 U.S.C. 305. Archeological and Paleontological Salvage

Funds authorized to be appropriated to carry out this title to the extent approved as necessary by the highway department of any State, may be used for archeological and paleontological salvage in that State in compliance with the Act entitled "An Act for the preservation of American antiquities," approved June 8, 1906 (34 Stat. 225), and State laws where applicable.

Excerpts from Department of Housing and Urban Development Legislation

40 U.S.C. 461 Comprehensive planning

. . . . . .

(h) Grants for Surveys of historic structures. In addition to the other grants authorized by this section, the Secretary is authorized to make grants to assist any city, other municipality, or county in making a survey of the structures and sites in such locality which are determined by its appropriate authorities to be of historic or architectural value. Any such survey shall be designed to identify the historic structures and sites in the locality, determine the cost of their rehabilitation or restoration, and provide such other information as may be necessary or appropriate to serve as a foundation for a balanced and effective program of historic preservation in such locality. The aspects of any such survey which relate to the indentification of historic and architectural values shall be conducted in accordance

with criteria found by the Secretary to be comparable to those used in establishing the national register maintained by the Secretary of the Interior under other provisions of law; and the results of each such survey shall be made available to the Secretary of the Interior. A grant under this subsection shall not exceed two-thirds of the cost of the survey for which it is made, and shall be made to the appropriate agency or entity specified in paragraphs (1) through (11) of subsection (a) [basically, those listed are federal, state, regional, and certain local planning and development agencies] for [sic], if there is no such agency or entity which is qualified and willing to receive the grant and provide for its utilization in accordance with this subsection, directly to the city, other municipality, or county involved.

42 U.S.C. 1460. Definitions

. . . . . .

(c) "Urban renewal project" or "project" may include undertakings and activities of a local public agency in an urban renewal area for the elimination and for the prevention of the development of spread of slums and blight, and may involve slum clearance and redevelopment in an ruban renewal area, or rehabilitation or conservation in an urban renewal area, or any combination or part thereof, in accordance with such urban renewal plan. Such undertakings and activities may include -- . . . (6) acquisition of any other property in the urban renewal area where necessary to eliminate unhealthful, insanitary or unsafe conditions, lessen density, eliminate obsolete or other uses detrimental to the public welfare, or otherwise to remove or prevent the spread of blight or deterioration, to promote historic and architectural preservation, or to provide land for needed public facilities; . . . (9) relocation within or outside the project area of structures which will be restored and maintained for architectural or historic purposes; and . . . (10) restoration of acquired properties of historic or architectural value.

Notwithstanding any other provision of this subchapter, (A) no contract shall be entered into for any law or capital grant under this subchapter for any project which provides for demolition and removal of buildings and improvements unless the Secretary determines that the objectives of the urban renewal plan could not be achieved through rehabilitation of the project area, . . .

. . . . . .

(d) "Local grants-in-aids" shall mean assistance by a State, municipality, or other public body, or (in the case of cash grants

or donation of land or other real property) any other entity, in connection with any project on which a contract for capital grant has been made under this subchapter, in the form of (1) cash grants to defray expenditures within the purview of subsection (e) (1) of this section; (2) donation, at cash value, of land or other real property (exclusive of land in streets, alleys, and other public rights-of-way which may be vacated in connection with the project, or of air rights over streets, alleys, and other public rights-of-way) in the urban renewal area, and demolition, removal, or other work or improvements in the urban renewal area, at the cost thereof, of the types described in clauses (2), (3), (7), (9), and (10) of the second sentence of subsection (c) of this section; . . . ([See above.])

42 U.S.C. 1500. Congressional Declaration of Findings and Purpose

([As it would appear to be amended by the Housing and Urban Development Act of 1970, Public Law 91-609, 84 Stat. 1770, Title VII, Section 701 (c) and (d)].)

. . . . . .

(c) The Congress further finds that there is a need for timely action to preserve and restore areas, sites, and structures of historic or architectural value in order that these remaining evidences of our history and heritage shall not be lost or destroyed through the expansion and development of the Nation's urban areas.

(d) It is the purpose of this chapter to help curb urban sprawl and prevent the spread of urban blight and deterioration, to encourage more economic and desirable urban development, to assist in preserving areas and properties of historic or architectural value, and to help provide necessary recreational, conservation, and scenic areas by assisting State and local public bodies in taking prompt action to (1) provide, preserve, and develop open-space land in a manner consistent with the planned long-range development of the Nation's urban areas, (2) acquire, improve, and restore areas, sites, and structures of historic or architectural value, and (3) develop and improve open-space and other public urban land, in accordance with programs to encourage and coordinate local public and private efforts toward this end.

42 U.S.C. 1500a. Grants to States and Local Public Bodies

([As it would appear to be amended by the Housing and Urban Development Act of 1970, Public Law 91-609, 84 Stat. 1770, Title VII Sections 702 (a) and (b)].)

(a) Authorization. The Secretary is authorized to make grants to States and local public bodies to help finance (1) the acquisition of title to, or other interest in, open-space land in urban areas and (2) the development of open-space or other land in urban areas for open-space uses. The amount of any such grant shall not exceed 50 per centum of the eligible project cost, as approved by the Secretary of such acquisition or development. Not more than 50 per centum of the non-Federal share of such eligible project cost may, to the extent authorized in regulations established by the Secretary, be made up by donations of land or materials.

. . . . . .

(c) Restrictions on use of grants. No grants under this title shall be made to (1) defray ordinary State or local governmental expenses, (2) help finance the acquisition by a public body of land located outside the urban area for which is exercises (or participates in the exercise of) responsibilities consistent with the purpose of this title, (3) acquire and clear developed land in built-up urban areas unless the local governing body determines that adequate open-space land cannot be effectively provided through the use of existing undeveloped land, or (4) provide assistance for historic and architectural preservation purposes, except for districts, sites, buildings, structures, and objects which the Secretary of the Interior determines meet the criteria used in establishing the National Register.

(d) Determination of further terms and conditions for assistance. The Secretary may set such further terms and conditions for assistance under this chapter as he determines to be desirable.

(e) Review of applications; consultation with the Secretary of the Interior; exchange of information. The Secretary shall consult with the Secretary of the Interior on the general policies to be followed in reviewing applications for grants under this chapter. To assist the Secretary in such review, the Secretary of the Interior shall furnish him (1) appropriate information on the status of national and statewide recreation and historic preservation planning as it affects the areas to be assisted with such grants, and (2) the current listing of any districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, and culture which may be contained on a National Register maintained by the Secretary of the Interior pursuant to other provisions of law. The Secretary shall provide current information to the Secretary of the Interior from time to time on significant program developments.

42 U.S.C. 1500b. Planning Requirements

[(As it would appear to be amended by the Housing and Urban Development Act of 1970, Public Law 91-609, 84 Stat. 1770, Title VII,

Section 703.)]

The Secretary shall make grants under section 1500 a and 1500c-1 of this title only if he finds that such assistance is needed for carrying out a unified or officially coordinated program, meeting criteria established by him, for the provision and development of open-space land which is a part of, or is consistent with, the comprehensively planned development of the urban area.

42 U.S.C. 1500c. Conversions to Other Uses

[(As it would appear to be amended by the Housing and Urban Development Act of 1970, Public Law 91-609, 84 Stat. 1770, Title VII, Section 704.)]

No open-space land for the acquisition of which a grant has been made under this chapter shall be converted to uses not originally approved by the Secretary without his prior approval. Prior approval will be granted only upon satisfactory compliance with regulations established by the Secretary. Such regulations shall require findings that (1) there is adequate assurance of the substitution of other open-space land of as nearly as feasible equivalent usefulness, location and fair market value at the time of the conversion; (2) the conversion and substitution are needed for orderly growth and development; and (3) the proposed uses of the converted and substituted land are in accord with the then applicable comprehensive plan for the urban area, meeting criteria established by the Secretary.

([Note: Title VII, Section 705 of Public Law 91-609, 84 Stat. 1770, provides additional wording which would appear further to amend this section and this chapter by adding, "No open-space land involving historic or architectural purposes for which assistance has been granted under this title shall be converted to use for any other purpose without the prior approval of the Secretary of the Interior."])

42 U.S.C. 1500d. Technical Assistance, Studies, and Publication of Information

(a) In order to carry out the purpose of this chapter, the Secretary is authorized to provide technical assistance to State and local public bodies and to undertake such studies and publish such information, either directly or by contract, as he shall determine to be desirable.

(b) The Secretary is authorized to use during any fiscal year not to exceed $125,000 of the funds available for grants under this

chapter to undertake such studies and publish such information. Nothing contained in this section shall limit any authority of the Secretary under any other provision of law.

(c) Notwithstanding any other provision of this chapter, the Secretary may use not to exceed $10,000,000 of the sum authorized for contracts under this chapter for the purpose of entering into contracts to make grants in amounts not to exceed 90 per centum of the cost of activities which he determines have special value in developing and demonstrating new and improved methods and materials for use in carrying out the purposes of this chapter.

42 U.S.C. 1500d-1. Grants for Historic Preservation

The Secretary is authorized to enter into contracts to make grants to States and local public bodies to assist in the acquisition of title to or other permanent interests in areas, sites, and structures of historic or architectural value in urban areas, and in their restoration and improvement for public use and benefit, in accordance with the comprehensively planned development of the locality. The amount of any such grant shall not exceed 50 per centum of the total cost, as approved by the Secretary, of the assisted activities. The remainder of such cost shall be provided from non-Federal sources.

Criteria for Grants for Historic Preservation. Section 605 (h) of Public Law 89-754 provided that: "Commencing three years after the date of the enactment of this act [November 3, 1966], no grant shall be made (except pursuant to a contract or commitment entered into less than three years after such date) under Section 709 of the Housing Act of 1961([this section]) or Section 701 (h) of the Housing Act of 1954 [Section 461 (h) of Title 40], or under Section 103 of the Housing Act of 1949 [Section 1453 of this title] to the extent that it is to be used for historic or architectural preservation, except with respect to districts, sites, buildings, structures, and objects which the Secretary of Housing and Urban Development finds meet criteria comparable to those used in establishing the National Register maintained by the Secretary of the Interior pursuant to other provisions of law." This annotation may have been superseded by section 1500a (c) as it appears to have been enlarged by Public Law 91-609, 84 Stat. 1770, Title VII, Section 702 (b), particularly in regard to the wording having reference to the National Register. [(See page 260.)]

42 U.S.C. 1500e. Definitions

[(As it would appear to be amended by the Housing and Urban Development Act of 1970, Public Law 91-609, 84 Stat. 1770, Title VII, Section 709.)] As used in this chapter --

(1) The term 'open-space land' means any land located in an urban area which has value for (A) park and recreational purposes, (B) conservation of land and other natural resources, or (C) historic, architectural, or scenic purposes.

(2) The term 'urban area' means any area which is urban in character, including those surrounding areas which, in the judgment of the Secretary, form an economic and socially related region, taking into consideration such factors as present and future population trends and patterns of urban growth, location of transportation facilities and systems, and distribution of industrial, commercial, residential, governmental, institutional, and other activities.

(3) The term 'State' means any of the several States, the District of Columbia, and Commonwealth of Puerto Rico, the territories and possessions of the United States.

(4) The term 'local public body' means any public body (including a political subdivision) created by or under the laws of a State or two or more States, or a combination of such bodies and includes Indian tribes, bands, groups, and nations (including Alaska Indians, Aleuts, and Eskimos) of the United States.

(5) The term 'open-space uses' means any use of open-space land for (A) park and recreational purposes, (B) conservation of land and other natural resources, or (C) historic, architectural or scenic purposes.

42 U.S.C. 3303. Eligibility for Assistance; Implementation of Programs,. . . . . .

(a) A comprehensive city demonstration program is eligible for assistance under sections 3305 and 3307 of this title only if --

(1) physical and social problems in the area of the city covered by the program are such that a comprehensive city demonstration program is necessary to carry out the policy of the Congress as expressed in section 3301 of this title;

(2) the program is of sufficient magnitude to make a substantial impact on the physical and social problems and to remove or arrest blight and decay in entire sections or neighborhoods; to contribute to the sound development of the entire city; to make marked progress in reducing social and educational disadvantages, ill health, underemployment, and enforced idleness; and to provide educational, health, and social services necessary to serve the poor and disadvantaged in the area, widespread citizen participation in the program, maximum opportunities for employing residents

of the area in all phases of the program, and enlarged opportunities for work and training;

(3) the program, including rebuilding or restoration, will contribute to a well-balanced city with a substantial increase in the supply of standard housing of low and moderate cost, maximum opportunities in the choice of housing accommodations for all citizens of all income levels, adequate public facilities (including those needed for education, health and social services, transportation, and recreation), commercial facilities adequate to serve the residential areas, and ease of access between the residential areas and centers of employment;

(4) the various projects and activities to be undertaken in connection with such programs are scheduled to be initiated within a reasonably short period of time; adequate local resources are, or will be, available for the completion of the program as scheduled, and, in the carrying out of the program, the fullest utilization possible will be made of private initiative and enterprise; administrative machinery is available at the local level for carrying out the program on a consolidated and coordinated basis; substantive local laws, regulations, and other requirements are, or can be expected to be, consistent with the objectives of the program; there exists a relocation plan meeting the requirements of the regulations referred to in section 3307 of this title; the local governing body has approved the program and, where appropriate, applications for assistance under the program; agencies whose cooperation is necessary to the success of the program have indicated their intent to furnish such cooperation; the program is consistent with comprehensive planning for the entire urban or metropolitan area; and the locality will maintain, during the period an approved comprehensive city demonstration program is being carried out, a level of aggregate expenditures for activities similar to those being assisted under this title which is not less than the level of aggregate expenditures for such activities prior to initiation of the comprehensive city demonstration program; and

(5) the program meets such additional requirements as the Secretary may establish to carry out the purposes of this title; Provided, That the authority of the Secretary under this paragraph shall not be used to impose criteria or establish requirements except those which are related and essential to the specific provisions of this subchapter.

(b) In implementing this subchapter the Secretary shall --

(1) emphasize local initiative in the planning, development, and implementation of comprehensive city demonstration programs;

(2) insure, in conjunction with other appropriate Federal

departments and agencies and at the direction of the President, maximum coordination of Federal assistance provided in connection with this subchapter, prompt response to local initiative, and maximum flexibility in programing, consistent with the requirements of law and sound administrative practice; and

(3) encourage city demonstration agencies to (A) enhance neighborhoods by applying a high standard of design, (B) maintain, as appropriate, natural and historic sites and distinctive neighborhood characteristics, and (C) make maximum possible use of new and improved technology and design, including cost reduction techniques.

THE MARYLAND ARCHEOLOGICAL RESOURCES ACT OF 1968

(Annotated Code of Maryland: Natural Resources, Title 2, Subtitle 3; Revised 1973)

SECTION 2-301. LEGISLATIVE INTENT. In order to protect and preserve historical, archeological, and scientific information, matters and objects found on privately owned lands in the state, the General Assembly declares that archeological excavations on privately owned lands should be discouraged except in accordance with the spirit and authority of this subtitle. A person who knows the locations of any archeological site in the state is encouraged to communicate the information to a reputable museum, an institution of higher education, a recognized scientific or historical institution or society, or the survey.

SECTION 2-303. DIVISION OF ARCHEOLOGY -- CREATED AND CONTINUED; STATE ARCHEOLOGIST: APPOINTMENT OF OTHER EMPLOYEES. The Division of Archeology is created and continued within the survey. The administrative head of the division is the State Archeologist who shall be a professional archeologist whom the director of the survey appoints in accordance with the state merit system. The director of the survey shall appoint, in accordance with the state merit system, assistants and other employees provided in the state budget.

SECTION 2-303. SAME -- DUTIES. The Division of Archeology shall:

(1) Sponsor, engage in, and direct fundamental research into the

archeology of the state and encourage and coordinate archeological research and investigation undertaken by any scientific or historical institution or society, museum, or institution of higher education in the state;

(2) Cooperate in excavation of sites of historical or archeological significance in custody or control of any other state unit;

(3) Protect and encourage the preservation of prehistoric or historic sites located on privately owned lands in the state;

(4) Retrieve and preserve objects of archeological significance discovered during the course of any public construction in the state;

(5) Cooperate with and assist museums, institutions of higher education, and scientific or historical institutions and societies in the preservation and protection of objects and materials of archeological nature in their custody;

(6) Make available to museums, institutions of higher education, and scientific or historical institutions and societies objects and materials suitable for demonstrating the archeological history of the state;

(7) Make available to public and private schools in the state exhibits, and assist in the instruction of pupils as to the manner of life of the early settlers and natives of the state;

(8) Cooperate with similar agencies of other states for the general purpose of preserving archeological sites and objects and materials of archeological significance and prevent the exploitation of these sites, objects, and materials in this state by institutions or agencies of other states;

(9) Disseminate archeological facts and materials through publication of reports of archeological research and investigation; and

(10) Enforce laws regulating archeological sites, objects, and materials on state-owned or controlled lands.

SECTION 2-304. ADVISORY COMMITTEE ON ARCHEOLOGY.

(a) Created and continued; organization. -- The advisory committee on archeology is created and continued. It consists of five members whom the director of the survey appoints from among citizens of the state who have skill and knowledge in archeological matters including representatives of reputable museums, institutions of higher education, and recognized scientific or historical societies or institutions. A member of the committee serves an

indefinite term. A vacancy is filled in the same manner as an original appointment. The committee shall choose a chairman. A committee member may not receive compensation for his services but shall be reimbursed for necessary travel expenses and disbursements made in order to attend any meeting or perform any other official duty. There shall be at least four meetings a year held at the call of the chairman. The State Archeologist shall attend all advisory committee meetings.

(b) Duties. -- The committee shall advise the survey on archeological matters and propose rules and regulations regarding archeological matters for its review and appropriate action.

SECTION 2-305. PERMIT REQUIRED FOR ARCHEOLOGICAL EXCAVATION; POWERS OF STATE HIGHWAY ADMINISTRATION NOT SUPPLANTED. A person may not excavate, appropriate, injure, or destroy any archeological site situated on land owned or controlled by the state without a permit from the survey. Nothing contained in this subtitle abrogates or supplants any power of the State Highway Administration.

SECTION 2-306. ISSUANCE OF PERMITS; RULES AND REGULATIONS TO CONDUCT EXCAVATIONS; PURPOSE OF EXCAVATIONS. The survey may grant a permit for archeological excavation of an archeological site on land the state owns or controls to any person or institution who or which in the survey's judgment is qualified to conduct an excavation to gather objects and materials of historical or archeological value or interest. The survey may adopt and promulgate rules and regulations for excavation. The rules and regulations shall be designed to assure proper safeguarding and preservation of the objects and materials for the people of the state. Archeological excavation shall be conducted only for the benefit of reputable museums, institutions of higher education, or other recognized scientific or historical institutions or societies, so as to increase knowledge and appreciation of archeological objects and materials.

SECTION 2-307. RULES AND REGULATIONS TO PRESERVE SITES, OBJECTS, AND MATERIALS. The survey may adopt and promulgate rules and regulations regarding preservation of sites, objects, and materials of archeological significance for the people of the state.

SECTION 2-308. SURVEY MAY ACCEPT GIFTS AND EXPEND OR INVEST SAME. The survey may accept any inter vivos or testamentary gift for any purpose within its jurisdiction. Unless otherwise specified by the donor, the Survey may expend both principal and income of any inter vivos or testamentary gift of money for its purposes or invest it in whole or in part in general obligations of the state.

SECTION 2-309. OWNERSHIP AND DEPOSIT OF ARCHEOLOGICAL OBJECTS

AND MATERIALS. Any object or material of historical or archeological value or interest found on an archeological site or land owned or controlled by the state is the property of the state. It shall be deposited for permanent preservation in a reputable museum, institution of higher education, or with a recognized scientific or historical institution or society.

SECTION 2-310. PENALTY FOR VIOLATION OF SUBTITLE. Any person who violates any provision of this subtitle or any rule or regulation promulgated pursuant to it is guilty of a misdemeanor and upon conviction is subject to a fine not exceeding $100 or imprisonment not exceeding 30 days, or both, with costs imposed in the discretion of the court. A separate offense shall exist for each day excavation, appropriation, or an act of injuring or destroying any archeological site occurs.

Humboldt County, California

Resolution No. 71-14, March 16, 1971

Establishing County Policy Regarding Protection of Indian Graves, Burial Grounds, Cemeteries and Ceremonial Sites Within Humboldt County

Whereas, Indians comprise a substantial segment of the population of Humboldt County with strong emotional, historical, and environmental ties to lands within Humboldt County; and

Whereas, because there has been continuous Indian occupation of many areas within Humboldt County since time immemorial; and

Whereas, many Indian individuals, groups, and tribes are concerned that increased commerce, new roads, new water projects, and similar improvements may encroach on and, in some cases, destroy existing Indian graves, burial grounds, cemeteries, and ceremonial sites; and

Whereas, the Northwest Indian Cemetery Protective Association was formed by Indians of Humboldt County for the following purposes:

(a) The protection of Indian cemeteries in the Northwest California area.

(b) The preservation of these cemeteries as peaceful and final resting places for the relatives and ancestors of Indians of California.

(c) The prevention of further desecration of these cemeteries.

(d) The education of the public to the great indignity suffered by Indians whose relatives' graves are interfered with by anthropologists and vandals; and

Whereas, the Northwest Indian Cemetery Protective Association has respectfully requested the Board of Supervisors of Humboldt County to adopt a policy in harmony with these aims.

Therefore, Be It Resolved that the Humboldt County Board of Supervisors adopts the following broad policy with respect to Indian graves, burial grounds, cemeteries, and ceremonial grounds within Humboldt County:

1. That whenever any project or operation, for which the

County is responsible in whole or in part, will involve activities which may adversely affect Indian graves, cemeteries, burial grounds, or ceremonial sites, the County will, as early in the planning process as possible but, in any case prior to final approval or authorization of such project or operation, consult with representatives of Northwest Indian Cemetery Protective Association and other interested Indians.

Such consultation will be directed to the questions of whether the project or operation will adversely affect Indian graves, cemeteries, burial grounds, or ceremonial sites and whether there are reasonable alternative means of accomplishing the project or operation which would not adversely affect such graves, etc. If the project will adversely affect such graves, etc., and there are no reasonable alternative means available, then no final approval or authorization shall be given unless the project sponsor agrees in writing to take full responsibility for preserving, protecting, and/or relocating such graves, cemeteries, burial grounds, or ceremonial sites and the project sponsor shall do so in accordance with the directions and wishes of the Northwest Indian Cemetery Protective Association.

2. The County will request and encourage State and Federal agencies working within the County to adopt a similar policy for their projects and operations.

3. County law enforcement agencies will continue to vigorously enforce those laws which protect Indian burial grounds, cemeteries, and ceremonial sites.

4. Finally, in all matters which may relate to Indian cemeteries and Indian ceremonial grounds, the County will conscientiously attempt to consult and reach agreement with representatives of the Northwest Indian Cemetery Protective Association.

Inyo County, California

Inyo County Code Chapter 9.52, Disturbance of Archaeological, Paleontological And Historical Features

Sections:

9.52.010	Indian burial site - Disturbance prohibited - Exceptions.
9.52.020	Indian burial site - Disturbance - Project plans required.
9.52.030	Project or action - Commission approval - Requirements.
9.52.040	Project or action - Discovery of Indian burial site.
9.52.050	Penalty for violation.
9.52.060	Civil remedies.

9.52.010 Indian burial site - Disturbance prohibited - Exceptions.

Excavation or exploration for archaeological, educational, or artifact collection purposes of any Native California Indian burial site shall not be permitted.

This section shall not be construed to prohibit surveys conducted by or contracted for by the county of Inyo, or the Big Pine Indian Reservation, or the Bishop Indian Reservation, or the Death Valley Timbi-Shaw Shoshone Band, or the Fort Independence Indian Reservation, or the Lone Pine Indian Reservation, or the Owens Valley-Paiute-Shoshone Band, on land in their respective jurisdiction, for the purposes of determining the existence of a Native California Indian burial site or the effect that a proposed project or action may create on a Native California Indian burial site; provided the surveys shall not significantly disturb Native California Indian burial sites; and provided the person designated by the county to be responsible for surveys conducted by or contracted for by the county shall, within a reasonable time prior to the survey, notify the Native California Indian Tribes or Bands designated in this section of the time and place of the intended survey and allow a representative of the Native California Indians to be present and assist in the location of Native California Indian burial sites during the survey. (Ord. 245 : II, 1973.)

9.52.020 Indian burial site - Disturbance - Project plans required.

When the preponderance of archaeological or historical evidence indicates that a site was set aside for the repose of the human remains of a community of Native California Indians, no public or private project or action in the county of Inyo is responsible for, or may regulate, in whole or in part, that may disturb a Native California Indian burial site, shall be expressly permitted until plans for the project or action shall be submitted to the Big Pine Indian Reservation, the Bishop Indian Reservation, the Death Valley Timbi-Shaw Shoshone Band, the Fort Independence Indian Reservation, the Lone Pine Indian Reservation, the Owens Valley-Paiute-Shoshone Band, or representatives they may designate, for review and comment. The plans shall contain the information necessary to describe the project or action and the probable effect it will have on the burial site. Failure to comment within twenty days shall be regarded as a review with no comment; provided, if written request is received within the twenty-day comment period, the time for review and comment may be extended by the county planning commission. (Ord. 245 : III, 1973.)

9.52.030 Project or action - Commission approval - Requirements.

No publicly or privately sponsored project or action shall be expressly permitted by the county planning commission, hereinafter, "the commission", or any other county agency where the commission finds that any archaeological, paleontological, and historical features, or Native California Indian burial sites may be disturbed in any way by the project or action; provided, the commission may conditionally expressly permit the project or action if the project or action sponsor takes responsibility for preservation, protection, or relocation of the features or sites in accordance with a specific plan for preservation, protection, or relocation that shall be reviewed and approved by the commission after a public hearing. The public hearing shall be held, in the instance of Native California Indian burial sites, following the review and comment required by Section 9.52.020.

No plan shall be sufficient and no plan shall be approved by the commission unless the plan, in addition to proposed preservation, protection, or relocation measures, shall propose reasonable alternatives to the proposed project or action that do not require significant disturbance of the features or sites. The commission may deny express permission if it finds a reasonable alternative exists.

If, in that instance of Native California Indian burial sites, relocation is expressly permitted by the county, interested Native California Indians in the county shall have the right to

disinter and bury; provided, if the interested Native California Indians do not disinter and bury within fourteen days of notice to the Native California Indian tribes or bands designated in Section 9.52.020, then any sponsor shall disinter and bury. Relocation shall be as near as possible to the original site. Relocation shall not be the preferred way to secure Native California Indian burial sites. (Ord. 245 : IV, 1973.)

9.52.040 Project or action - Discovery of Indian burial site.

If in the course of a project or action commenced pursuant to express permission in accordance with this chapter, or in the course of a project or action in any way commenced, over which the county has jurisdiction, an archaeological, paleontological, or historical or a Native California Indian burial site is discovered, the person responsible for the project or action shall notify the county planning commission of the existence of the feature or site, and in the instance of an archaeological, paleontological, or historical feature, if any damage to the feature or site is contemplated, allow the commission a reasonable time, not to exceed fourteen days, to relocate the feature if the commission, in its discretion, finds relocation is proper, considering the resource value of the feature balanced against the economic detriment to the project or action, and, in the instance of a Native California Indian burial site, the commission shall notify interested California Native Indians in the county, within three days of notification to the commission by the person responsible for the project or action, of the existence of the discovered Native California Indian burial site, and expressly permit the interested Native California Indians eleven days to relocate the burial site in accordance with the relocation provisions of Section 9.52.030. (Ord. 245 : V, 1973.)

9.52.050 Penalty for violation.

A violation of this chapter, or any provision thereof, is punishable as a misdemeanor by fine not exceeding five hundred dollars, or by imprisonment not exceeding six months or by both. (Ord. 245 : VI, 1973.)

9.52.060 Civil remedies.

Nothing in this chapter prohibits any citizen or group of citizens from pursuing any civil remedies available to said parties pursuant to law. (Ord. 245 : VII, 1973.)

Marin County, California

Marin County Code Chapter 5.32, Excavating Indian Middens

Sections:

5.32.010 Purpose of chapter.
5.32.020 Permit required to excavate.
5.32.030 Liaison agency.
5.32.040 Application for permit.
5.32.050 Issuance.
5.32.060 Conditions for issuance.
5.32.070 Conformance to stated conditions required.
5.32.090 Violation a misdemeanor.

5.32.010 Purpose of chapter.

In Marin County there exist certain deposits of shells and other materials in mounds hereinafter referred to as Indian middens, believed to have been deposited by Indians in the distant past. The middens may be of inestimable value in formulating the early history of the county and the habits of Indians when the middens are studied under the supervision of qualified archaeologists. Uncontrolled excavations into the aforesaid middens for commercial purposes without regard to their possible historical and archaeological values are destructive of the archaeological integrity of the sites. (Ord. 1589 : 1, 1967.)

5.32.020 Permit required to excavate.

It is unlawful for any person, firm, corporation or copartnership to knowingly disturb in any fashion whatsoever, or excavate, or cause to be disturbed or excavated any Indian midden without a permit being issued therefor by the department of public works. (Ord. 1589 : 1, 1967.)

5.32.030 Liaison agency.

Upon receiving written application therefor, the board of supervisors shall designate an institution of higher learning, or an association having as one of its major purposes the study of Indian relics or sites having archaeological significance, as a liaison agency between the department of public works and institutions of higher learning or associations, having as one of their purposes of study of objects of archaeological significance. (Ord. 1589 : 3, 1967.)

5.32.040 Application for permit.

Application for a permit to excavate Indian middens shall be in a form acceptable to the director of public works, and may be made by the owner of the middens or a person authorized in writing by the owner, to make the application. The permit shall state whether the excavation is for either archaeological or nonarchaeological purposes. (Ord. 1825 : 1, 1971/Ord. 1589 : 4, 1967.)

5.32.050 Issuance.

Upon receipt of an application for the excavation of an Indian midden, the director of public works or his designee shall forward the application to the liaison agency designated by the board of supervisors pursuant to Section 5.32.030. Within five days of the receipt of the application, the liaison agency so designated shall notify the director of public works whether the midden for which application is made for excavation is of archaeological significance. If the designee certifies that the midden is not of archaeological significance, a permit shall be issued to the applicant upon the receipt of the certificate. (Ord. 1589 : 5, 1967.)

5.32.060 Conditions for issuance.

In the event the liaison agency certifies that the midden for which application for excavation is made is of archaeological significance, the director of public works may issue a permit, but shall subject the permit to conditions including but not limited to the following:

(A.) Prior to nonarchaeological excavation or removal of materials from the middens, the permittee shall not excavate for a period of sixty days in order to allow archaeological excavation of the site;

(B.) The permittee or owner of the property shall be required to grant a license for the excavation, identification, and classification of artifacts and proper scientific analysis of materials having historical or archaeological significance to recognized institutions of higher learning or associations having as their major purpose the study of Indian relics and other sites having archaeological value. The terms of the license shall be such as are agreed to by the prospective licensee and property owner. (Ord. 1825 : 2, 1971/Ord. 1589 : 6, 1967.)

5.32.070 Conformance to stated conditions required.

Any act done under the authority of a written permit issued

hereunder shall be in accordance with the terms and conditions of the permit. (Ord. 1589 : 7, 1967.)

5.32.090 Violation a misdemeanor.

Any person violating the provisions of this chapter is guilty of a misdemeanor and upon conviction thereof shall be punished as provided in Section 1.04.270. In the event of a continuing violation, each day that the violation continues constitutes a separate and distinct offense. (Ord. 1589 : 9, 1967.)

Hawaii Act 216 of 1969

A BILL FOR AN ACT Relating to the Preservation and Protection of Prehistoric and Historic Sites and Archaeological Remains. Be It Enacted by the Legislature of the State of Hawaii:

SECTION 1. Chapter 9 of the Revised Laws of Hawaii 1955 is amended by adding a new section to read as follows;

"Sec. 9- . Archaeological investigation, recording and salvage; appropriations. Whenever any public construction or improvement of any nature whatsoever is undertaken by any government agency on lands which are controlled or owned by the State or by any county and which are sites of historic or prehistoric interest and value, or locations of prehistoric or historic remains, one per cent of the appropriations for such public construction or improvement, or so much thereof as may be necessary, shall be expended by the department of land and natural resources for the archaeological investigation, recording and salvage of such sites or remains when it is deemed necessary by the department."

SECTION 2. Section 14-8 of the Revised Laws of Hawaii 1955 is amended to read as follows:

"Sec. 14-8. Prehistoric and historic sites and remains.

(a) The department of land and natural resources shall locate, identify, and preserve in suitable records information regarding prehistoric and historic sites, locations, and remains. The information shall be submitted to the director of taxation who shall clearly designate on all tax maps of the State, the location of all prehistoric or historic sites, or locations and remains. The

department shall cooperate with other state agencies and owners of private prehistoric or historic sites.

(b) Before any public construction or improvement of any nature whatsoever is undertaken by the State, the city and county of Honolulu, or any of the counties, or any governmental agency or officer, the head of such agency or such officer shall first examine the current tax map of the area to be affected by such public construction or improvement to determine whether any heiaus, ancient burial places, or sites, or remains of prehistorical or historical interest are designated on such map. If so designated, the proposed public construction or improvement shall not be commenced, or, in the event it has already begun, continued, until the head of such agency or such other officer shall have advised the department of the proposed public construction or improvement and shall have secured the concurrence of the department or, as hereafter provided, shall have secured the written approval of the governor.

If the concurrence of the department is not obtained after ninety days after the filing of a request therefor with the department by, or after the filing of a notice of objections by the department with, the agency or officer seeking to proceed with any project, such agency or officer may apply to the governor for permission to proceed notwithstanding the nonconcurrence of the department and the governor may take such action as he deems best in overruling or sustaining the department.

(c) Before any construction, alteration, or improvement of any nature whatsoever is undertaken or commenced on a designated private prehistoric or historic site by any person, he shall give to the department three months notice of intention to construct, alter, or improve the site.

After the expiration of the three-month notification period, the department shall either commence condemnation proceedings for the purchase of the site or remains, permit the owner to proceed with his construction, alteration or improvement, or undertake or permit the recording and salvaging of any historical information deemed necessary to preserve Hawaiian history, by any qualified agency for this purpose.

Any person who violates the provisions of the first paragraph of this subsection shall be fined not more than $1,000 or imprisoned not more than ninety days, or both."

SECTION 3. Chapter 14 of the Revised Laws of Hawaii is amended by adding a new section to read as follows:

"Sec. 14-8.5. Excavation and removal of prehistoric and historic

remains on private lands.

Before any prehistoric or historic remains are excavated or removed from private lands by the department of land and natural resources, the department or its designated investigators shall first secure the written approval of the owner of such lands. Whenever the value of the private prehistoric or historic site is diminished by the excavation or removal of prehistoric or historic remains by the department of land and natural resources, the owner of the site shall be compensated for the loss, at a monetary sum mutually agreed upon by the department and the owner or at a monetary sum set by the court."

SECTION 4. Section 14-10.2 of the Revised Laws of Hawaii 1955 is amended to read as follows:

"Sec. 14.10.2 Permits to examine ruins, excavate and gather objects on public lands.

Permits for the examination of ruins, excavation of archaeological sites, and the gathering of objects of antiquity upon lands owned or controlled by the state or any county, may be granted by the department of land and natural resources to persons or institutions which they deem properly qualified to conduct such examination, excavation, or gathering, subject to such rules and regulations as the department may prescribe; provided, that the examination, excavations, and gatherings are undertaken for the benefit of public museums, universities, colleges, or other recognized public scientific or educational institutions, with a view to increasing the knowledge of such objects and that the gatherings may be made for permanent preservation in public museums if so deemed by the department."

SECTION 5. Section 14-10.3 of the Revised Laws of Hawaii 1955 is amended to read as follows:

"Sec. 14-10.3 Penalties.

It shall be unlawful for any person to take, appropriate, excavate, injure or destroy any prehistoric or historic ruin or monument or object of antiquity, situated on lands owned or controlled by the State without the permission of the department of land and natural resources. Any person who violates this section shall be fined not more than $1,000 or imprisoned not more than ninety days, or both.

Any prehistorical and historical objects and remains which have been taken without a permit shall be seized, deposited and preserved in public museums by the department of land and natural resources."

SECTION 6. Chapter 14 of the Revised Laws of Hawaii 1955 is amended by adding a new section to read as follows:

"Sec. 14- . Reproduction of prehistorical or historical objects; representation as originals; penalties.

It shall be unlawful to reproduce or forge a prehistorical or historical object with the intent to represent it as an original. Any person who violates this section shall be fined not more than $1,000 or imprisoned not more than ninety days, or both."

SECTION 7. Chapter 99 of the Revised Laws of Hawaii is amended by adding a new section to read as follows:

"Sec. 99- . Reservation of rights to prehistoric and historic remains on leased public lands.

The board of land and natural resources shall, in leases of public lands retain the rights to all prehistoric and historic remains found on such lands."

SECTION 8. The Revisor of Statutes may reword and renumber the references in this Act and make such other formal or verbal changes as may be necessary to conform with the Hawaii Revised Statutes.

SECTION 9. This Act shall take effect upon its approval.

British Columbia, Canada

Archaeological and Historic Sites Protection Act, May 11, 1972

1. In this Act, unless the context otherwise requires,

   (a) "designated," when used in relation to a site or an object, means designated under section 2; and "designate" and "designation" have corresponding meanings;

   (b) "minister" means the member of the Executive Council charged from time to time with the administration of this Act;

(c) "object" means an object of archaeological or historic significance;

(d) "permit" means a valid and subsisting permit issued under this Act;

(e) "site" means land of archaeological or historic significance, and includes land covered by water. 1972, c.4, s. 1.

2. (1) Where, in the opinion of the minister, land is of exceptional archaeological or historic significance, he may, by order, designate it as an archaeological site or as an historic site.

(2) Where, in the opinion of the minister, an object is of exceptional archaeological or historic significance, he may, by order, designate it as an archaeological object or as an historic object.

(3) Where land is designated under this section and it is shown that the value of the land is diminished by reason of the designation, the minister shall pay to the owner an amount to be determined by the Lieutenant-Governor in Council. 1972, c.4, s. 2.

3. The minister may, with the consent of the Lieutenant-Governor in Council and on behalf of the Crown, acquire, by purchase, gift, or lease, any site or object. 1972, c.4, s. 3.

4. No person or agency shall knowingly

(a) destroy, desecrate, deface, move, excavate, or alter in any way a designated site or remove from it an object;

(b) destroy, desecrate, or alter a burial-place or remove from it skeletal remains;

(c) destroy, deface, or alter an Indian painting or carving on rock;

(d) destroy, deface, alter, excavate, or dig in an Indian kitchen-midden, shell-heap, house-pit, cave or other habitation site, or a cairn, mound, fortification, or other site or object, situated on Crown lands,

except to the extent and in the manner that he is authorized to do so by a permit. 1972, c.4, s. 4.

5. (1) Upon application made to him in writing, the minister may issue a permit to excavate, or alter a site and to remove, move, or alter objects from it.

(2) The minister may limit a permit as to time and location, may require such reports as he deems necessary or proper, and may impose other terms and conditions that he considers necessary or proper.

(3) The minister may cancel or suspend a permit at any time. 1972, c.4, s. 5.

6. Where a person is excavating or altering, with the consent of the owner, a site or an object that is not situated on Crown lands or that has not been designated, the consent or agreement between that person and the owner shall be deemed to contain the following conditions

(a) that the consent or agreement is subject to sections 4 and 7; and

(b) that the person shall report to the minister the results of his findings and work, and shall submit to the minister such reports as the minister deems proper or necessary; and

(c) that the person shall not remove from the Province any object derived from the site without the written consent of the minister. 1972, c.4, s.6.

7. (1) For the purposes of this section

(a) "site investigation" means the examination of a site for the purpose of recording, removing, moving or salvaging objects;

(b) "site survey" means the examination of land for the purpose of determining the archaeological or historic resources of the land.

(2) Where, in the opinion of the minister, land contains a site that is likely to be altered, damaged, or destroyed by reason of commercial, industrial, agricultural, residential, or other development or activity, or is likely to depreciate or become dilapidated, he may

(a) order a site survey and, if he considers it necessary, a site investigation; and

(b) order the owner or person responsible for the development

or activity to provide sufficient funds for the site survey and, if required, the site investigation; and

(c) order that the development or activity be suspended in whole or in part until the site survey and, if necessary, the site investigation, have been completed.

(3) Where a site survey or site investigation is ordered under subsection (2), it shall be undertaken forthwith and in such a manner that it will not cause undue hardship on the owner or person responsible for the development or activity. 1972, c.4, s. 7.

8. A person who contravenes this Act, or a permit or direction of the minister under this Act, is guilty of an offence and is liable, on summary conviction, to a penalty of not more than one thousand dollars or to imprisonment for a term not exceeding six months, or to both the fine and the imprisonment. 1972, c.4, s. 8.

Appendix C

Sources of Information on Maryland's Prehistoric Resources

Federal and State Agencies

1. U.S. Department of the Interior
   National Park Service
   Washington, D.C. 20240 (202) 343-1100
   a. maps, reports, documents
   b. National Register of Historic Places; information on registration procedures

2. Advisory Council on Historic Preservation
   1522 "K" Street N.W.
   Washington, D.C. (202) 254-3974
   a. information on conservation procedures

3. National Trust for Historic Preservation
   740 Jackson Place N.W.
   Washington, D.C. (202) 638-5200
   a. information on conservation procedures, grants and educational materials

4. Division of Archeology
   Maryland Geological Survey
   Latrobe Hall
   Johns Hopkins University
   Baltimore, Maryland 21218 (301) 235-0771
   a. maps, reports, collections, documents, etc.

5. Maryland Historical Trust
   Shaw House
   21 State Circle
   Annapolis, Maryland 21401 (301) 267-1438
   a. maps, reports, collections, documents, etc.

6. Maryland Hall of Records Commission
   St. Johns and College Avenue
   Annapolis, Maryland 21404 (301) 267-5914
   a. maps, documents, etc.

7. Bureau of Archeology and Historic Preservation
   Division of Historical and Cultural Affairs
   Hall of Records
   P. O. Box 1401
   Dover, Delaware 19901 (302) 678-4739
   a. maps, reports, collections, documents, etc.

Universities

1. American University
   Department of Anthropology
   Washington, D.C. 20016 (202) 686-2182

   a. maps, reports, collections, etc.

      1. Contact Professor C. W. McNett

2. Catholic University of America
   Department of Anthropology
   620 Michigan Avenue N.E.
   Washington, D.C. 20064 (202) 635-5000

   a. maps, reports, collections, etc.

      1. Contact Professor W. M. Gardner

3. University of Maryland
   Department of Anthropology
   College Park, Maryland 20742 (301) 454-4154

Museums

1. Smithsonian Institution
   National Museum of Natural History
   Department of Anthropology
   Washington, D.C. 20560 (202) 628-4422

   a. National Anthropological Archives

      1. maps, reports, collections, etc.

   b. Contact Dr. C. Evans, Chairman

2. Natural History Society of Maryland
   2643 North Charles
   Baltimore, Maryland 21218 (301) 235-6116

   a. collections, publications, etc.

Libraries

1. U.S. Library of Congress
   10 First Street S.E.
   Washington, D.C. 20540 (202) 426-5000

2. U.S. Library of Congress
   Geography and Map Division
   845 South Pickett Street
   Alexandria, Virginia (202) 370-1216

3. Enoch Pratt Free Library
   400 Cathedral Street
   Baltimore, Maryland (301) 396-5430

Amateur Archaeological Societies

1. Archaeological Society of Maryland, Inc.

   a. Current Lists of Officers and Addresses Available from:

      Division of Archeology
      Latrobe Hall
      Johns Hopkins University
      Baltimore, Maryland 21218

Historical Societies

1. Maryland Historical Society
   201 West Monument
   Baltimore, Maryland 21202 (301) 685-3750

   a. maps, books, documents, etc.

2. St. Marys City Commission
   St. Marys City
   Maryland 20686 (301) 994-0779

3. Calvert County Historical Society
   Prince Frederick
   Maryland 20678

4. Historical Society of Cecil County
   Cecil County Library Building
   135 East Main Street
   Elkton, Maryland 21921

5. Historical Society of Charles County
   C/O Mr. Watson M. Perry
   Elleslie, Box 336
   Port Tobacco, Maryland 20677

6. Dorchester County Historical Society
Meredith House
904 LaGrange Street, Box 361
Cambridge, Maryland 21613

7. Historical Society of Harford County
324 Kenmore Avenue, Box 391
Bel Air, Maryland 21014

8. Historical Society of Kent County
Church Alley
Chestertown, Maryland 21620

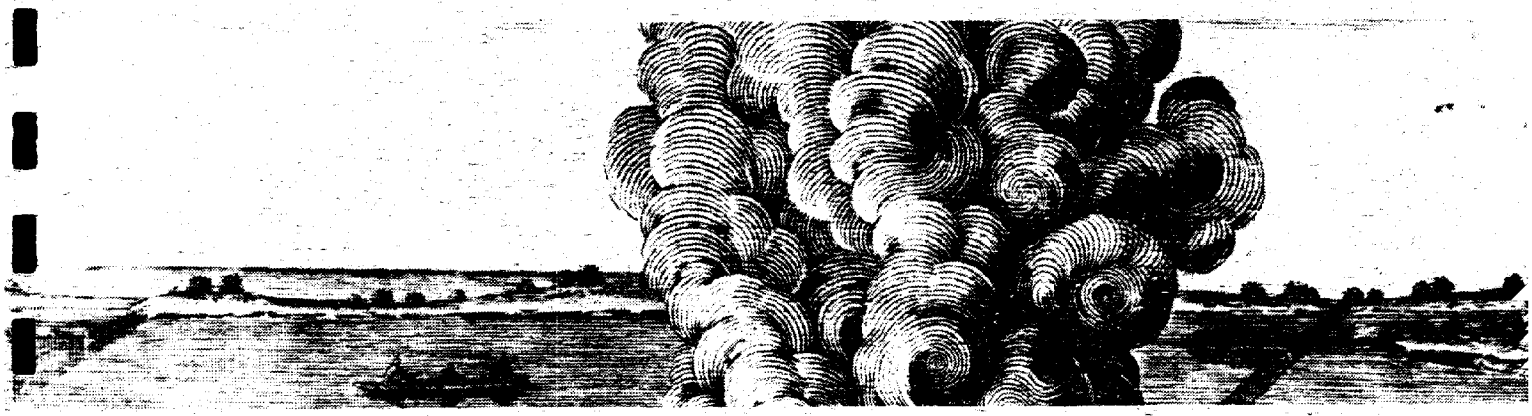
9. Prince Georges County Historical Society
C/O Frederick S. DeMarr
4010 Hamilton Street
Hyattsville, Maryland 20732

10. Queen Anne's County Historical Society
Box 296
Commerce Street
Centreville, Maryland 21617

11. St. Marys County Historical Society
Box 212
Leonardtown, Maryland 20650

12. Somerset County Historical Society
Teackle Mansion
Princess Anne, Maryland 21853

13. Wicomico County Historical Society
Gay Street
Salisbury, Maryland 21801



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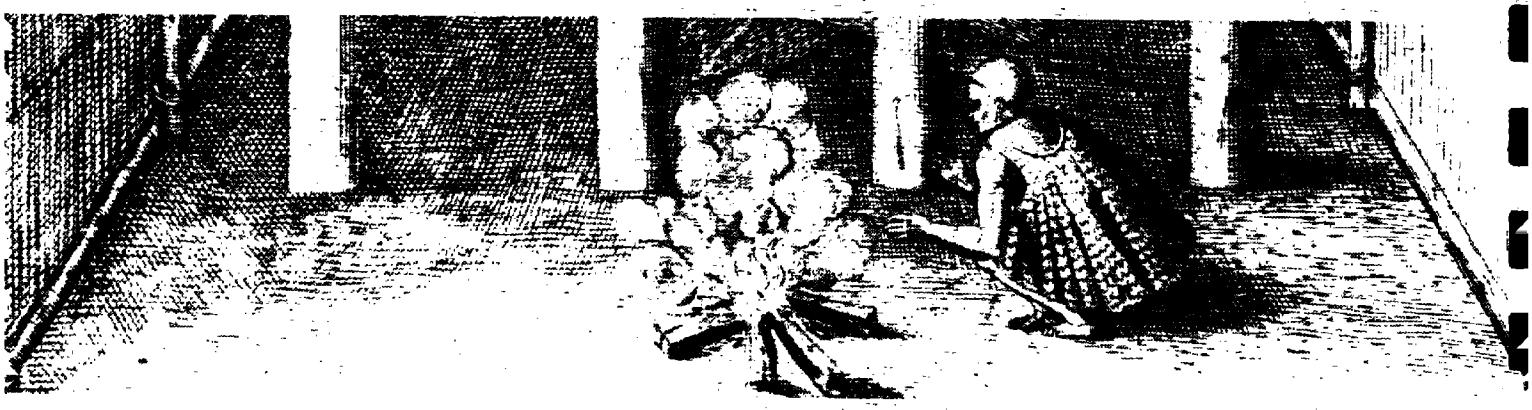

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