# ARCHAEOLOGICAL SURVEY OF THE CHESAPEAKE BAY SHORELINES ASSOCIATED WITH ACCOMACK COUNTY AND NORTHAMPTON COUNTY, VIRGINIA

## VOLUME I

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# ABSTRACT

This report summarizes the results of an archaeological survey conducted along the Chesapeake Bay shorelines of both Accomack County and Northampton County, Virginia. Accomack and Northampton counties represent the southernmost extension of the Delmarva Peninsula. The study area encompasses the confluence of the Chesapeake Bay and the Atlantic Ocean. A shoreline survey was conducted along the Chesapeake Bay to gauge the erosion threat to the archaeological resources situated along the shoreline. Archaeological sites along shorelines are subjected to numerous natural processes. Aside from erosion, some of the natural processes influencing shoreline related cultural resources include coastal inundation, prehistoric aeolian processes, bioturbation, recent coastal dune formations, chemical processes within tidal marshes, redeposition, and surface "sheet-erosion" or deflation. These natural processes greatly influence the success of an archaeological survey and what data are collected, noted, and observed while conducting a survey. Summaries associated with these natural processes are presented in this report. The report also offers examples, using Delmarva Peninsula archaeological data, which illustrate how these natural processes influence and limit the interpretive value of single analysis or one-time archaeological survey surface data.

As a "double-blind" test, the actual locations and cultural chronologies associated with previously recognized and recorded sites were not collected prior to the completion of the survey. By not knowing the previous site data, the present shoreline survey would help assess and gauge the accuracy of the previous single "one-time" archaeological survey data. The survey methodology would also gauge and assess the dynamics

associated with archaeological sites in coastal settings and how coastal environments influence archaeological survey data. The previous archaeological site data associated with the shoreline study area are presented in the report. The previous site information is compared with the data from the eleven sites relocated during the present study. The results suggest coastal environments and the natural processes associated with these environments greatly influence the data gleaned from single "one-time" archaeological shoreline surveys. Suggestions to alleviate the interpretive limitation problems associated with archaeological resources in coastal settings are also presented.

The present survey located and documented 108 archaeological sites, which span 13,000 years of the region's prehistory and history. Of these, 97 archaeological sites had not been previously recorded. Recognizing the interpretive limitations associated with sites in coastal settings, a cultural synthesis of the site data cannot be constructed at this time. Limited site data are presented in respect to the presence of non-local lithic materials and marine subsistence information noted at some of the prehistoric archaeological sites. Limited comparisons are made between the prehistoric marine subsistence data from the upper, middle, and lower Chesapeake Bay sections of the Delmarva Peninsula. Suggestions are presented as a means to alleviate the limitations associated with future interpretive cultural synthesis summaries.

The Virginia Eastern Shore shoreline survey has functioned mainly as a guide to cultural resource managers and future researchers. The project suggests that natural processes, not cultural processes, are a major influence in coastal environments. Unfortunately, the degree of site significance and erosional threat cannot be accurately evaluated at this time. With all of the sites documented and degree of erosion reflected

along each shoreline, the researcher does not know if one is “at the beginning of the race or at the end”. Obviously, significance and threat are greatly dependent on such unknown data. As a final summary, suggestions are presented as a means to gauge and assess the significance and threat at each site. The report concludes that significance and threat must be evaluated on a site-by-site basis.

ACKNOWLEDGEMENTS

A project of this nature involves the cooperation of many individuals, institutions, and agencies. The Virginia Department of Historic Resources' Threatened Sites Program funded the Virginia Eastern Shore survey. Mr. David Hazzard of the Virginia Department of Historic Resources was a major contributor to this project and helped with the success of the final report. The grant was processed through the Department of Anthropology at Temple University, Philadelphia. All of my fellow graduate students and the departmental staff at Temple University are acknowledged for their continued support. The support of the staff associated with Temple University's Grant Accounting office and the Research and Program Development office is greatly appreciated. I would also like to thank Dr. R. Michael Stewart at Temple University for supervising the project and providing constructive criticisms. The help of Dr. Athony Ranere, the chairperson of the Anthropology Department, is also greatly appreciated. I would also like to acknowledge the help of Ms. Eunice Connor at the Department of Anthropology for her assistance during the project.

Outside of the various institutions, numerous people helped and contributed to the project. I would like to thank Mr. Mike Owens, a fellow graduate student, for being involved with the project. Not only was he involved with the project, Mike provided the "all important" scale for many of the photographs taken during the survey. Mr. Norman K. Brady contributed many weekends of his time to the survey. Mr. Brady also provided a power boat that allow me to conduct shoreline surveys along some very inaccessible islands within the study area. Mr. Joseph McAvoy and Mrs. Lynn McAvoy also

contributed time, effort, and space towards the success of the final report. I would also like to thank all of the residents of the Virginia Eastern Shore for their kind hospitality. It amazes me that there are still places on the Delmarva Peninsula that you can feel at home even though you are not a local resident. Also I would like to acknowledge and thank all of the previous archaeologists and researchers that have worked on the Virginia Eastern Shore. It was their effort that provided me with important comparative data. I would like to thank all of my family members being patient and providing assistance during this and all of my previous work. Finally, I would like to acknowledge my father for taking me to my first eroding archaeological shoreline site. Over the years, I have come to the conclusion that a lot of the ideas about shoreline sites my father and I took for granted, others had never contemplated. This project was an attempt to document some of these ideas so that others could benefit.

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# CHAPTER 1

# INTRODUCTION

In the early spring of 1999, the principal investigator was contacted by the Virginia Department of Historic Resources about the feasibility of conducting an archaeologically related shoreline survey of both Accomack and Northampton counties along the Virginia Eastern Shore. The shoreline survey was initiated in an attempt to document the archaeological sites being threatened by shoreline erosion along the Chesapeake Bay portions of both Accomack and Northampton counties. One of the goals of the project was to analyze shoreline processes and their impacts on cultural resources. The second goal was geared towards the recognition of archaeological sites associated with shoreline settings. The final goal was oriented towards assessing the related natural impacts on archaeological interpretations. The shoreline survey would be an attempt to record site data for archaeological researchers, cultural resource managers, and the general public. Mr. David Hazzard of the Virginia Department of Historic Resources acted as the monitor for the project and provided connections, support, and information throughout the duration of the project. Dr. R. Michael Stewart of Temple University also acted as the project monitor. The Virginia Department of Historic Resources' Threatened Sites Program provided funding for the survey.

The linear exposure associated with the study area was extensive but consisted of only a narrow section of periodically submerged terrain between the mean high tide mark and mean low tide mark. The previous experience of the principal investigator (Lowery 1992a, 1992b, 1993a, 1993b, 1994, 1995b, 1995c, 1996, 1997, and 1999) of conducting

similar surveys along the shorelines of Maryland's Eastern Shore provided the experience for dealing with such environments.

The Virginia Eastern Shore encompasses a large portion of the Delmarva Peninsula (see Figures 4 and 5). The region has a documented cultural history that encompasses the past 13,000 years (Custer 1989; Dent 1995; Rountree and Davidson 1997; and Wittkofski 1982 and 1988). Archaeological surveys in the region have also documented numerous prehistoric sites. Recognizing some of the threats impacting archaeological resources along eroding shorelines, the survey attempted to document the sites only along the Chesapeake Bay section of the Virginia Eastern Shore. No interior tilled fields or Atlantic coastal shorelines were examined during the project.

The shoreline survey fieldwork began in the summer of 1999 and continued until the summer of 2000. The entire shoreline between the Maryland line and the mouth of the Chesapeake Bay were examined for eroding sites. All of the shoreline associated with the tributaries and watersheds draining into the Chesapeake were also examined. Rather than research the records for the previously recorded site locations prior to the fieldwork, the data associated with the previously recorded sites were not researched until the survey had been completed. By not researching the known site records prior to the fieldwork, the survey would not be biased towards relocating these sites even under the worst visual conditions. The present survey would also serve as a "double-blind" test to see if the previously recorded sites could be relocated. It was deduced that the ability of the fieldwork to detect the presence or absence of the previously recorded sites would be a way to gauge the dynamics associated with coastal environmental settings. By gauging

how coastal environments influence what you see and what you do not see in the archaeological record, the survey would quantify the limitations of "one-time" archaeological surveys. At the conclusion of the fieldwork, the project located and documented 108 archaeological sites distributed along the Chesapeake shorelines of both Accomack and Northampton counties. Archival research after the completion of the project indicated that only eleven of the previously recorded sites in both counties were relocated during fieldwork as a result of this project. The following report attempts to document the site data associated with the documented sites, factors effecting shoreline erosion, concerns relative to regional shoreline erosion and its impact on the region's archaeological sites, and problems associated with archaeological assessments of regional survey data.

The report is organized into various sections. An overview of the research design is presented. A brief summary of the Virginia Eastern Shore study area is also presented. Regional paleoenvironmental and paleoecological data and problems with these data are recapitulated. A generalized overview of the regional prehistory and history is also presented. A brief summary of the previous archaeological work relative to the study area is summarized. All of the previously recorded shoreline sites within the study area are obtainable in two tables (see Tables A.1 and A.2). Considering that the project had to deal with shoreline erosion, a section of the report discusses the various factors effecting shoreline erosion in the macro-Chesapeake Bay region. In respect to shoreline erosion, another section of the report attempts to assess the shoreline erosion on the Virginia Eastern Shore. A section of the report is devoted towards addressing some of the

problems relating to archaeological assessments of regional shoreline survey data. An overview of the various natural factors, which influence the archaeological record, provides the foundation for the resulting survey site data.

An overview of the results of the shoreline survey is presented. The overview includes information associated with each individual site discovered during the project. Relating to one of the primary goals of the project, the summary of the newly discovered sites includes a section on the archaeological sites threatened by shoreline erosion. The section also discusses how the present survey data compares to the previously recorded sites in both Accomack and Northampton counties. Recognizing the biases associated with the project, a brief discussion highlights some of the "exotic" non-local lithic materials observed at a few of the prehistoric sites in the region. Also recognizing some of the biases associated with the project, a discussion highlights the prehistoric marine subsistence data observed at some of the Virginia midden-refuse sites. A comparison between the marine subsistence data associated with the Virginia survey and previous shoreline surveys in Maryland are also presented. The summary and conclusions offers an overview of the goals of the project and indicates whether these goals were achieved. The conclusion section highlights some of the interpretive limitations associated with limited "one-time" surveys. As a final discussion, the report highlights some suggestions for future research and how the shoreline survey can be used as a "stepping-stone" for addressing the interpretive limitations associated with the present study.

The final report has two appendixes accompanying the report. Appendix A consists of a series of tables presenting various aspects associated with the project. The

tables in this appendix present summaries of the previous archaeological site information for the study area and summaries of the archaeological site information gleaned from the present project. The tables also summarize and assess the erosion observed at all of the newly discovered sites. The tables present data on the previously recorded sites in both counties and address concerns relative to their observed presence or absence during the project. In respect to the eleven relocated sites, one of the tables in Appendix A compares the previous site information to the site information gleaned during this project. These comparisons should help illustrate some of the inadequacies of "one-time" survey data. Lastly, two tables in Appendix A provide specific information about the prehistoric sites that produced "exotic" non-local lithic materials and marine resource subsistence information. The standard Virginia site data forms completed as a result of this project are included in Appendix B. The site data forms are also on file at the Virginia Department of Historic Resources in Richmond, Virginia.

The survey data provide information associated with 108 archaeological sites. Ninety-seven of the sites had not been previously documented with the Virginia Department of Historic Resources. Seventy-eight of the newly recorded archaeological sites and five of the eleven relocated archaeological sites are associated with Accomack County. Nineteen of the newly recorded archaeological sites and six of the eleven relocated archaeological sites are associated with Northampton County. The cultural components observed at all of the sites discovered during this project span the past 13,000 years of the regions prehistory. All of the site-specific data were recorded on

standard Virginia site data forms. A complete set of site data forms is included in Appendix B. An example of a Virginia site data form is illustrated in Figures 1, 2, and 3.

# CHAPTER 2

# RESEARCH DESIGN

The purpose of the project was to survey, locate, and assess the archaeological resources along the bay side of Virginia's Eastern Shore. The object was to locate known sites and to search for new sites along the shorelines. Observations and documentation were made on all sites regarding their current condition, new information available (on the basis of artifacts or features observed), and threats that have in the past, are currently, or may in the near future have deleterious effects on the site and it's resources. The tasks and goals defined prior to the project included:

1. Assess the existing records of archaeological sites in Accomack County consistent with that which was done for Northampton County (see Underwood and Stuck 1999). Tables were to be completed for known sites identifying sites by time period and by type/function. A figure was also to be created to indicate the frequency of sites along major drainages.
2. Conduct a comprehensive archaeological survey to include all of shorelines along the Chesapeake Bay side of Virginia's Eastern Shore from Cape Charles to the Maryland border. In addition to the survey of the shoreline fronting the Chesapeake Bay, all-major drainage's emptying into the bay will be examined for a minimum distance of 500 meters along both banks to the extent these banks are threatened by erosion. Topographic U.S.G.S. 7.5 minute quadrangles and U.S.D.A soil maps will be used during the survey.

3. Document known and newly discovered sites along the shore on standard Virginia site data forms (see Figures 1, 2, and 3). Provide all relevant information toward determining site time period, type/function, and size/boundaries. Information shall include types and number of artifacts observed or recovered. Also, state perceived or real threats to these sites and their severity. Information shall be recorded on Virginia Department of Historical Resources site inventory forms. Create a photographic 35mm slide record of sites, significant features exposed in the eroding shorelines, and samples of artifacts recovered. Particularly photographic slides illustrating threats should also be included. Diagnostic artifacts will be labeled, and all artifacts bagged and boxed by site number.

4. Prepare recommendations based on site significance, which necessitates a cultural historical synthesis as background. Prepare recommendations based on site threat.

The shoreline survey methods utilized during the project were based on Lowery's previous shoreline survey work (1992a, 1992b, 1993a, 1993b, 1995b, 1996, 1997, and 1999) conducted along the eroding shorelines of Maryland's Eastern Shore. The shoreline survey methods involve an assessment of whether a particular shoreline is erosive, non-erosive, or accreting. All shorelines were examined through the use of a kayak. Kayaks provide the surveyor with the ability to examine shoreline conditions closely and they also allow the surveyor to work in shallow water. Kayaks also permit

the collection of cultural material from the shallow waters, which are immediately adjacent to a particular shoreline.

All of the shorelines within the study area were categorized as erosive or non-erosive based on field observations. Some shorelines were deemed inadequate for extensive archaeological examination. Shorelines with gradually sloping upland banks fringed by sand that has been stabilized by saltmarsh cordgrass were deemed as non-erosive. Shorelines that had thick deposits of barren coastal sand extending from below mean low water to the inland areas above extreme high tide were also deemed as non-erosive. Upland shorelines that had steep bank profiles with exposed sub-soil were deemed as erosive. Low tidal marsh shorelines that had steep bank profiles with exposed organic layers and sub-soil below mean low water were also deemed as erosive. Only erosive shorelines were extensively examined for exposed or eroded archaeological resources. These eroded shorelines were walked and the bank profiles were inspected for exposed features. An examination of the bank-cuts would permit the documentation of any exposed culturally related archaeological features, associated soil types, and regional geologic landforms. The survey methods would also involve examination of all associated shoreline sediments and the redeposited debris adjacent to each eroded shoreline. The eroded sediments were also scanned for redeposited cultural artifacts. Redeposited cultural materials are typically located in shallow depressions, around tree roots and other barriers, at the base of bank cuts, on top of the modern shoreline land surface, and distributed as debris “bands” based on tidal changes and storm activity. The remaining non-erosive shorelines were closely inspected from the kayaks used during the

survey. The shoreline sediments adjacent to these non-erosive areas were also inspected from the kayak for any evidence of redeposited cultural material. All shorelines were examined during maximum low tide to facilitate the greatest level of shoreline exposure.

Survey methods would involve an examination of associated bank-cuts adjacent to each eroded shoreline. Throughout the project, United States Department of Agriculture soil maps for Accomack and Northampton counties were utilized as a general basis for assessing potential landforms, geologic features, and soils that may have prehistoric and historic cultural components. Assessment of site potential and site prediction localities were based on site predictive models developed by the author for Maryland's Eastern Shore (Lowery 1997: 26-42). Rather than conduct archival research about the location of previously recorded sites in the region prior to the shoreline survey, the principal investigator decided to assess the archaeological sites along the shorelines of Accomack and Northampton counties without site location data. By conducting the shoreline survey without prior site location data, the present survey would be a test of Lowery's (ibid.) site predictive model. The present survey would also test the validity of one-time "blitzkrieg" survey techniques so frequently employed by State agencies to amass regional site location data. It was assumed that the principal investigator may or may not find all or most of the previously recorded sites in the region. It was also suggested that the sites missed during the survey would provide important data relative to site destruction and the dynamics of site reburial in coastal settings. These data would be valuable for addressing threatened sites as well as addressing the problems with one-time archaeological surveys.

Prior to the survey, 419 archaeological sites had been recorded in the Virginia Department of Historic Resources archives for Northampton County and 459 archaeological sites were on file for Accomack County. Since the present shoreline survey wanted to gauge the problems associated with the dynamics of coastal environments and the impact on cultural resources, the data for these previously recorded sites were not known before the survey was conducted. Therefore, the actual locations of the archaeological sites in the coastal eroded area of the Virginia Eastern Shore were not known before fieldwork was conducted. Also, the cultural chronologies associated with the previously recorded sites were not known. As such, the actual shoreline survey was a "double-blind" survey. No known survey bias was associated with the project. All shorelines were examined, and any evidence for an eroded archaeological site was documented. General descriptive summaries of each shoreline were documented, and the conditions of all of the sites were noted. Diagnostic artifacts associated with each site were collected, bagged, and labeled. Photographs (i.e., 35mm slides) were taken during the project. Most of the sites were photographed and strategic non-culturally related sections of the shoreline were also photographed. The photographic images attempted to document site erosion, the dynamics of coastal processes, various field conditions, and assess coastal environments.

After the completion of the project, the data for the previously documented sites were acquired. Archival research indicated that 32 archaeological sites in Accomack County were located immediately adjacent to or within 100 yards of the shoreline (see Figure 10 and Table A.1). Archival research also indicated that 54 archaeological sites in

Northampton County were located immediately adjacent to or within 100 yards of the shoreline (see Figure 10 and Table A.2). The archival data helped to assess and gauge the dynamics of coastal processes and how these processes influence what archaeologists see and what they do not see relative to the archaeological record.

The survey began during the summer of 1999 and continued sporadically throughout the fall and winter. The bulk of the survey was conducted from April 2000 though June 2000. The final report presents the results of the survey, suggestions for future research, and the conclusion. Several topical themes were presented in the final report which discuss the additional research issues that were a "spin-off" of the survey. The topics in the final report relate to the natural processes effecting shoreline sites, the visibility of archaeological sites in coastal and terrestrial settings, and how the interplay of natural variables greatly impact archaeological interpretations of the past.

**VIRGINIA DEPARTMENT OF HISTORIC RESOURCES**
**ARCHAEOLOGICAL SITE INVENTORY FORM**

City/County: **ACCOMACK COUNTY**
Site Name: **WATTS ISLAND #1**
Temporary Designation:

VDHR Site Number: 44 AC 214
Other VDHR Number:

Cultural/Temporal Affiliation: *Prehistoric: Middle Archaic, Late Archaic (?), and Middle Woodland Paleoindian and Early Archaic components have been reported at the site (see notes under the assemblage description for addtional collections associated with the site).*

Site Class: X Terrestrial, Open-Air ___ Terrestrial, Cave/ Rockshelter X Underwater

Thematic Contexts: *Indeterminant*

Site Function: *Unknown*

Specialized Contexts:

USGS Quadrangle: **Tangier Island Quad** Loran:
UTM Zone: **18** Easting: **0421308 E** Northing: **4185007 N**

(Attach photocopy of appropriate section of USGS 7.5 minute series topographical map showing site boundaries.)

Physiographic Province: *Eastern Shore-Coastal Plain* Drainage: *Pocomoke / Tangier Sound*
Landform: *Tidal Marsh (Inundated Landscape)* Aspect: *N/A*
Elevation: *1-.5 feet above sea level* Slope: *0 - 1 percent*
Site Soils: *McA: Melfa-Hobucken complex* Adjacent Soils: *AmA, MuA, & BkA*
Nearest Water Source: *Pocomoke / Tangier Sound* Distance: *0 feet*

Ownership Status: ___ Private ___ Public/Local: ___ Public/State: X Public/Federal:

Owner Name(if private): *N/A* Owner Telephone: *N/A*
Owner Address: *N/A*

Informant Name: *None* Informant Telephone: *N/A*
Informant Address: *N/A*

Surveyed By: Darrin Lowery Affiliation: Temple University Date: 7/12/00
Address: 5264 Blackwalnut Point Road, c/o General Delivery, Tilghman, MD 21671

Site Dimensions: *2486 feet or 757 meters of eroded shoreline exposure (6 feet wide). Site Length, Width, and Thickness not known.*

Survey Strategy: ___ Historic Map Projection ___ Informant X Observation ___ Surface Testing ___ Subsurface Testing

Survey Description: *The survey included a series of three shoreline examinations over a period of six months. Shorelines were examined during maximum low tide. Eroded bank cut exposures were examined. Cultural artifacts (minus FCR) found along the shoreline and in offshore shallow depressions were collected.*

Site Condition: *Heavy shoreline erosion is greatly impacting the site. Cutural levels are located beneath 1 to 3 feet of a surficial tidal marsh O horizon. Wind, wave energy and currents are greatly impacting intact cultural features, as well as, the redeposition of eroded artifacts.*

Page 1

Figure 1. Example of the Front Cover of a Standard Virginia Site Data Form.

**VIRGINIA DEPARTMENT OF HISTORIC RESOURCES**
**ARCHAEOLOGICAL SITE INVENTORY FORM**

Current Land Use: *Federal Wildlife Refuge*

Specimens Obtained: X Yes ___ No Depository: VDHR

Assemblage Description: *2 quartz St. Albans points (1 basal frag.), 1 quartz generalized side-notched point, 1 chert stemmed point, 5 point distal fragments (2 quartz, 1 quartzite, 2 chert), 1 chert point basal fragment, 1 argillite Fox Creek basal fragment, 11 bifacial perform fragments (4 quartz, 4 quartzite, 1 basalt, 2 rhyolite), 1 chert endscraper, 1 chert side-scraper, 144 quartzite flakes, 123 quartz flakes, 86 chert flakes, 48 basalt flakes, 9 jasper flakes, 5 rhyolite flakes, and 3 argillite flakes.*

Specimens Reported: X Yes ___ No

Owner Name: *Unknown*

Assemblage Description: *At least three Clovis fluted points have been found at this site. Two Clovis points from Watts Island are in the collection of Bart Quillen and the third was examined by Darrin Lowery in a collection (person's name unknown) presently located in SomersetCounty, Maryland. A large black chert Charleston corner-notched point from Watts Island was also in this same Somerset County collection.*

Field Notes: X Yes ___ No Depository: VDHR

Photographic Documentation: X Yes ___ No Depository: VDHR

Report(s): X Yes ___ No Depository: VDHR

Reference(s): *A final report of the Virginia Eastern Shore survey, will be on file at the VDHR.*

Additional Comments: *Watts Island #1 produced a very large accumulation of debitage derived from cobble reduction. Interestingly, no cobble outcrops are located along the present shoreline of Watts Island. Large cobble outcrops (associated with ancient Potomac paleochannel deposits) are presently at or above sea level along the north shore of Pocomoke Sound (in Somerset County) and along the mainland areas near Beasley Bay in Accomack County. During the Early Holocene and Late Pleistocene, lower sea levels would have exposed extensive cobble outcrops offshore of Watts Island within the Tangier and Pocomoke paleochannels. Based on the lack of cobble cores and the debitage flake platforms, it seems that secondary cobble related biface reduction was conducted at the site. Primary cobble reduction must have been performed at some other unknown locality. Primary cobble reduction was observed by the Darrin Lowery at 18 So 194 (in Somerset County along Pocomoke Sound) while conducting a county wide survey for the Maryland Historical Trust in 1997. Similar primary reduction was also observed at the Beasely Cobble Reduction site in coastal Accomack County. Erosion has greatly altered the archaeological remains associated with Watts Island #1. Given the shoreline exposure, buried archaeological remains are still preserved at the site. Several fragments of fire-cracked rock were observed within the inundated, and gleyed B horizon buried below the tidal marsh O horizon. Immediate archaeological testing is suggested for the entire Watts Island landmass. The present landmass and the exposed cultural remains are among the most threatened archaeological sites on the entire Virginia Eastern Shore.*

Form Completed By: Darrin Lowery Affiliation: Temple University Date: 7/12/00

Address: 5264 Blackwalnut Point Road, c/o General Delivery, Tilghman, MD 21671

*For VDHR Staff Only*

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Page 2

Figure 2. Example of the Middle Portion of a Standard Virginia Site Data Form.

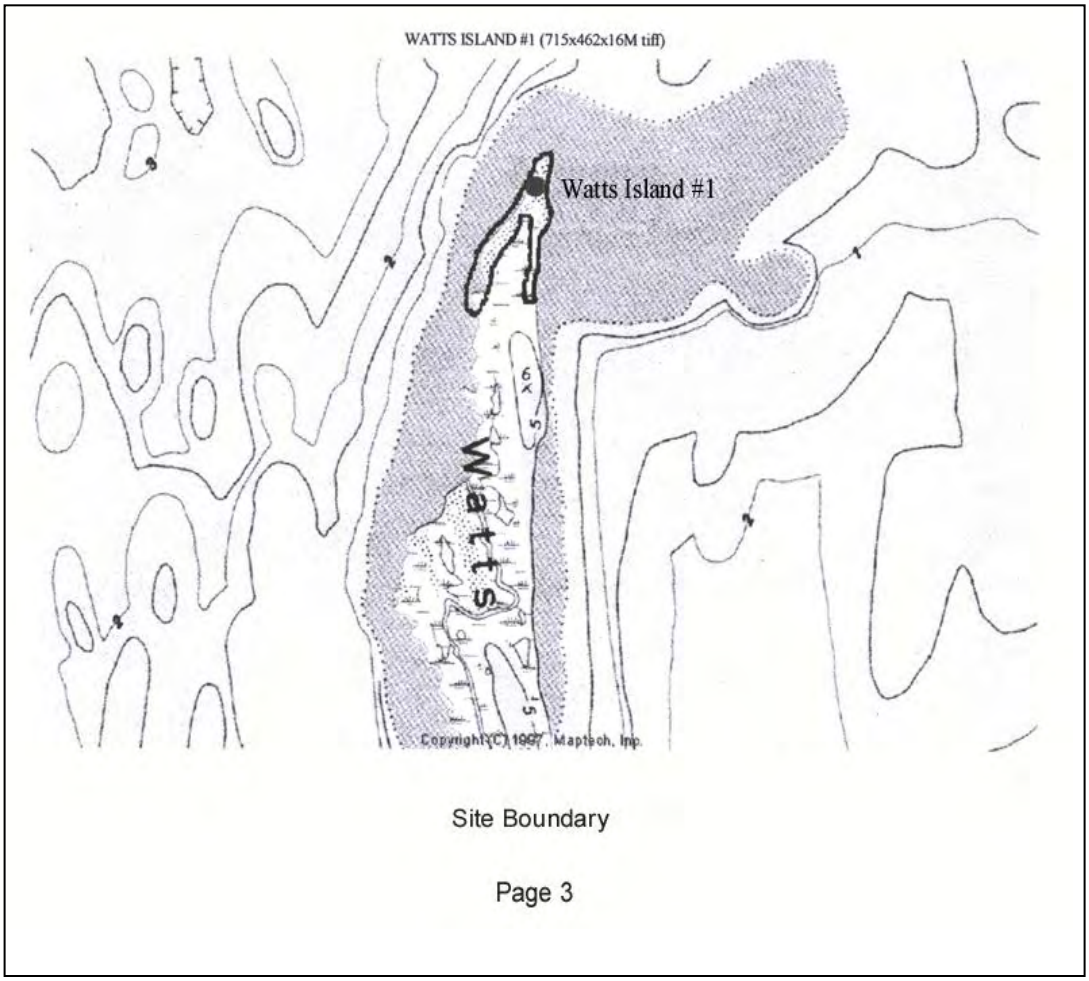


Figure 3. Example of the Last Page of a Virginia Site Data Form.

# CHAPTER 3

# ENVIRONMENTAL AND GEOMORPHIC BACKGROUND

The Virginia Eastern Shore includes a long narrow peninsula of land at the southern-most end of the Delmarva Peninsula (Figure 4). The area encompasses two counties: Accomack County and Northampton County (Figure 5). The following discussion will briefly summarize the Virginia Eastern Shore Study area. The reader is referred to more detailed studies in respect to the geology, geography, forest communities, wetland communities, and the marine ecology associated with the Chesapeake Bay region. The discussion that follows only summaries the environment and ecology of the region.

## Virginia Eastern Shore Study Area

Accomack County is the easternmost part of the Commonwealth of Virginia. Like Northampton County, Accomack is wedged between the Chesapeake Bay and the Atlantic Ocean. In respect to land area, Accomack County encompasses 386,400 acres, or 604 square miles (Peacock and Edmonds 1994). Geologically, Accomack County's surface soils are documented as Pleistocene and Holocene age soils (Geologic Map of Virginia 1993). Peacock and Edmonds (1994) indicate that the soil types documented in the county include Arapahoe mucky loam (AhA), Arapahoe-Melfa complex (AmA), Assateague fine sand (AtD), Beaches (BeB), Bojac soils (BhB, BkA, and BoA), Camocca fine sand (CaA), Chincoteague silt loam (ChA), Dragston fine sandy loam (DrA), Fisherman fine sand (FhB), Fisherman-Assateague complex (FmD), Fisherman-Camocca

complex (FrB), Magotha fine sandy loam (MaA), Melfa-Hobucken complex (McA), Molena soils (MoB, and MoD), Munden sandy loam (MuA), Nimmo sandy loam (NmA), Polawana mucky sandy loam (PoA), and Seabrook loamy fine sand (SeA).

The geologic formations associated with the county include the Omar formation, the Kent Island formation, the Wachapreague formation, the Occohannock member, the Butlers Bluff member, and Joynes Neck sands (ibid.). Generally, sands with some gravel dominate these geologic formations. Peacock and Edmonds (1994: 2) and Cobb and Smith (1989: 1-2) indicate that the climate of both Accomack and Northampton counties is mild in winter and hot and humid in summer. Even so, both counties are subject to frequent steady storms in winter, fall, and spring (Peacock and Edwards, ibid.; and Cobb and Smith, ibid.). Although both counties are north of the usual track of hurricanes and tropical storms, the region has experience several severe storm events in the past (Pielke 1990: Appendix A). The offshore salinity environments along the Chesapeake Bay side of Accomack County would be defined as seasonally mesohaline (15-18 ppt) and polyhaline (18-30 ppt) (White 1989: Figure 3). The salinity environments along the ocean side of Accomack (ibid.) would be defined as seasonal polyhaline (18-30 ppt) and euhaline (above 30 ppt). White's (ibid: 133-159) work suggests that the region would include a variety of high salinity adapted plants, fishes, mollusks, birds, and land animals in the region of modern Accomack County.

Accomack County is ecologically diverse. The northwest section of the county, which is adjacent to the bay, includes large expanses of broad and flat tidal marsh (Figure 6). Dry parallel ridges, small knolls, hummocks, and semi-circular "Carolina-bay" ridges

intersect these marshes. The landforms within these marshes are covered by salt-water tolerant tree and plant species. The ridges, knolls, and hummocks provide the only dry land surfaces within the tidal marshes. The northwest section of Accomack is topographically the lowest area of the Virginia Eastern Shore. Numerous offshore tidal marsh islands occur in this portion of the Virginia Eastern Shore. Tangier Island is presently the only inhabited offshore island. The offshore environment in northwest Accomack is relatively stable. Aside from the Pocomoke, which establishes Accomack County's northern border, no large river watersheds occur in Accomack or Northampton counties.

Listed north to south, the major watersheds of Accomack County include a portion of the Pocomoke River, Pocomoke Sound, Messongo Creek, and the Beasley Bay macro-watershed; including Cattail Creek, Muddy Creek, Guilford Creek, Bagwell Creek, Hunting Creek, Doe Creek, and Deep Creek. South of Beasley Bay, the watersheds of Accomack County include Chesconessex Creek, Back Creek, Onancock Creek, Matchotank Creek, Pungoteague Creek, Butcher Creek, Nandua Creek, Craddock Creek, and Occohannock Creek. All of the creeks south of the Pocomoke River are small and rarely larger than 10 kilometers in length. During low sea stands in the prehistoric past, all of the watersheds north of Occohannock Creek would have been tributaries of the Tangier Sound/Pocomoke River macro-watershed. During the Late Pleistocene and Early Holocene, the watersheds south of and including Occohannock Creek would have been tributaries of the ancestral Susquehanna River and the developing Chesapeake Bay.

The southwest portion of Accomack County resembles most of the areas in Northampton County bordering the Chesapeake. Occohannock Creek establishes the southwestern boundary between Accomack and Northampton counties. Along the shorelines, the Occohannock Creek area is topographically higher than Accomack's northwest section. From a shoreline perspective, Accomack's topography increases from the north as you move toward the southern shorelines. As a result, the southwestern corner of Accomack County does not have the large tidal marshes common to the north. Northampton County also does not have large expanses of tidal marsh. The ecological and environmental diversity expressed in today's Virginia Eastern Shore is an artifact of Late Holocene sea-level rise. The Late Holocene environmental diversity did not exist in the past during periods with lower sea stands.

The shorelines adjacent to the bay in Northampton County show uniformity all along the coast. The marine resources differ along the shoreline, but from an ecological standpoint these shorelines and the inland areas adjacent to the shores are very similar. In respect to land area, Northampton County encompasses 227,300 acres, or 325 square miles (Cobb and Smith 1989). Geologically, Northampton County's surface soils are documented as Pleistocene and Holocene age soils (Geologic Map of Virginia 1993). According to Cobb and Smith (1989), the soil types documented in the county include Assateague soils (AsE, and AtD), Beaches (BeB), Bojac soils (BhB, BkA, and BoA), Camocca fine sand (CaA), Chincoteague silt loam (ChA), Dragston fine sandy loam (DrA), Fisherman fine sand (FhB), Fisherman-Assateague complex (FmD), Fisherman-Camocca complex (FrB), Magotha fine sandy loam (MaA), Molena loamy sand (MoD),

Munden sandy loam (MuA), Nimmo sandy loam (NmA), Polawana mucky sandy loam (PoA), and Seabrook loamy fine sand (SeA). The major soil differences between Accomack and Northampton counties relates to the fact that no Arapahoe mucky loam (AhA), Arapahoe-Melfa complex (AmA), and Melfa-Hobucken complex (McA) soils are documented in Northampton County. Not surprisingly, these soil types are associated with large Chesapeake Bay related tidal marsh settings, which Northampton County is lacking. The Pleistocene and Holocene-age geologic formations associated with Northampton County's soils include the Omar formation, the Kent Island formation, the Wachapreague formation, the Occohannock member, the Butlers Bluff member, and Joynes Neck sands (ibid.). Sands with some gravel dominate these geologic formations. The younger geologic formations are more prevalent in Northampton County than in Accomack.

Topographically, the shorelines adjacent to the bay in Northampton County are dominated by modern, Holocene, and Pleistocene-age dune formations. All of the modern dunes along Northampton County's shorelines are relative small and range from 1 to 15 feet in height. These dunes represent eroded sediment deposited along shorelines being reworked by aeolian processes. These dunes could be only a few years old. In contrast, middle to late Holocene-age dunes are also present. The Holocene dunes are present from Savage Neck south to the area north of Butler's Bluff. Some of these Holocene dunes have topographic elevations greater than 50 feet and cover landscapes that are not archaeologically old (Figure 7). Unlike the recent shoreline dunes, the older dune formations cannot be easily explained in this discussion. It is likely that these

earlier dunes are the result of climatic changes and the close proximity of the dune fields to abundant parent source materials. From Butler's Bluff to the shorelines south of Kiptopeke, aeolian strata are exposed in the bank profile. The exposed strata along Butler's Bluff include middle to late Holocene age dunes along with more deeply buried aeolian strata which would be Pleistocene to early Holocene in age.

According to White (1989: Figure 3), the offshore salinity environments along the Chesapeake Bay side of Northampton County would be defined as seasonally mesohaline (15-18 ppt) and polyhaline (18-30 ppt). The salinity environments along the ocean side of Northampton (ibid.) would be defined as seasonal polyhaline (18-30 ppt) and euhaline (above 30 ppt). White's (1989: 133-159) work suggests that the region would include a variety of high salinity adapted plants, fishes, mollusks, birds, and land animals in the region of modern Northampton County. The southern Chesapeake Bay offshore environments of Northampton County are more akin to the Atlantic Ocean than the Chesapeake. Like the watersheds of Accomack County, Northampton's watersheds are relatively small. Occohannock Creek defines the northern boundary of Northampton County along the Chesapeake Bay. Listed north to south, the major watersheds of Northampton County include Occohannock Creek, Nassawadox Creek, Hungars Creek, Mattawomen Creek, The Gulf, Cherrystone Inlet, Kings Creek, Old Plantation Creek, and Elliotts Creek. All of the creeks in Northampton County are rarely larger than 10 kilometers in length. During low sea stands in the prehistoric past, all of the watersheds south of and including Occohannock Creek would have been tributaries of the ancestral Susquehanna River and the developing Chesapeake Bay. The mid-peninsular drainage

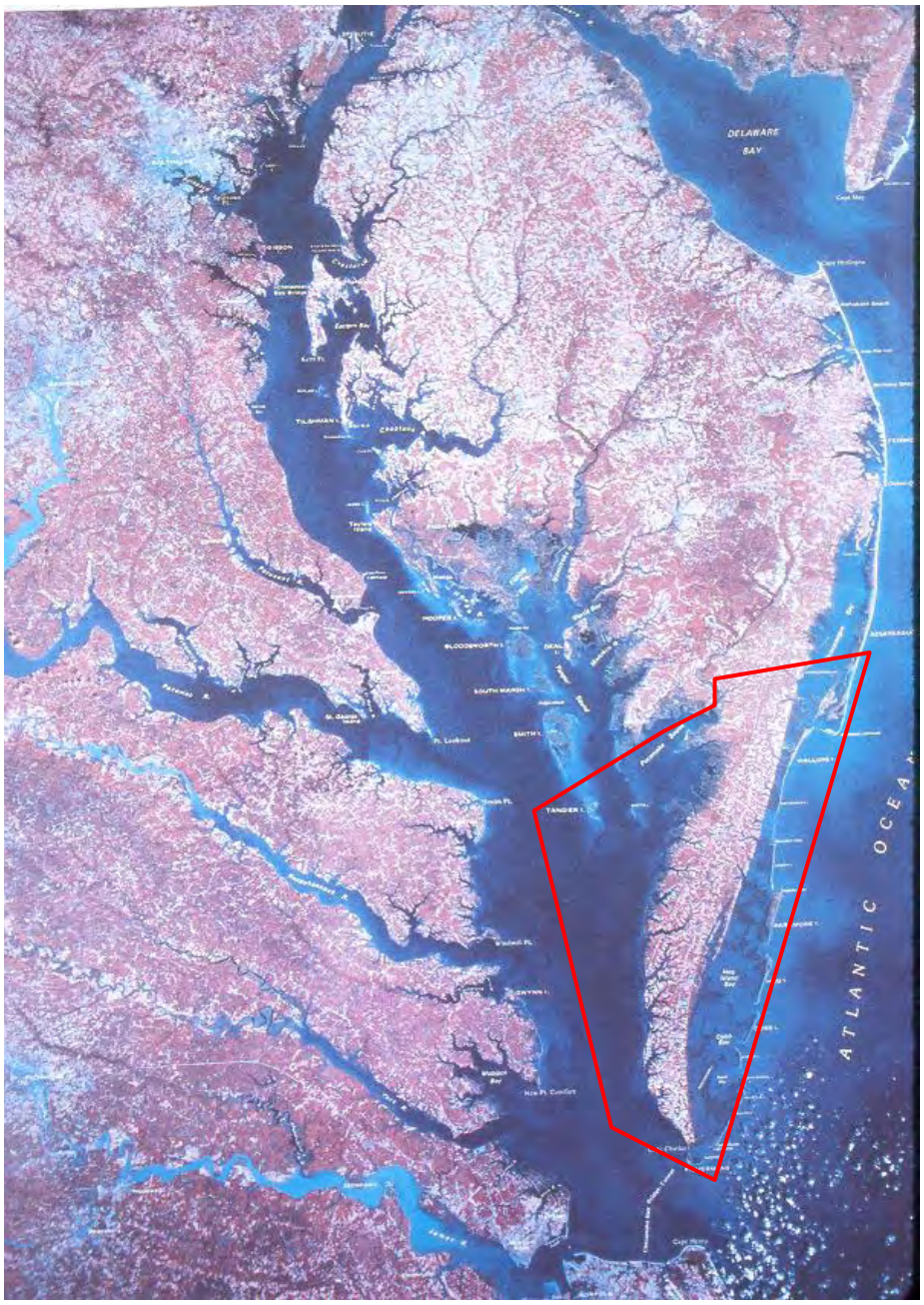


Figure 4. Satellite View of the Chesapeake Bay and the Delmarva Peninsula Delineating the Virginia Eastern Shore Study Area.

Figure 5. Political Map of the Virginia Eastern Shore with Accomack County and Northampton County Delineated.

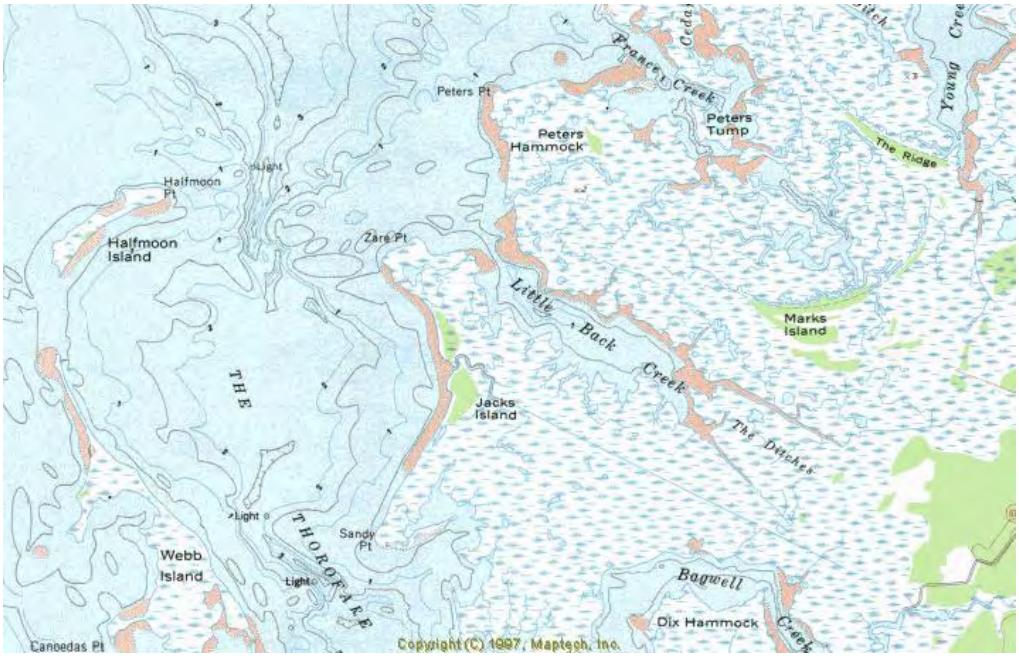


Figure 6. Area in Northwest Accomack County with "Carolina Bay" Features Surrounded by Tidal Marsh.

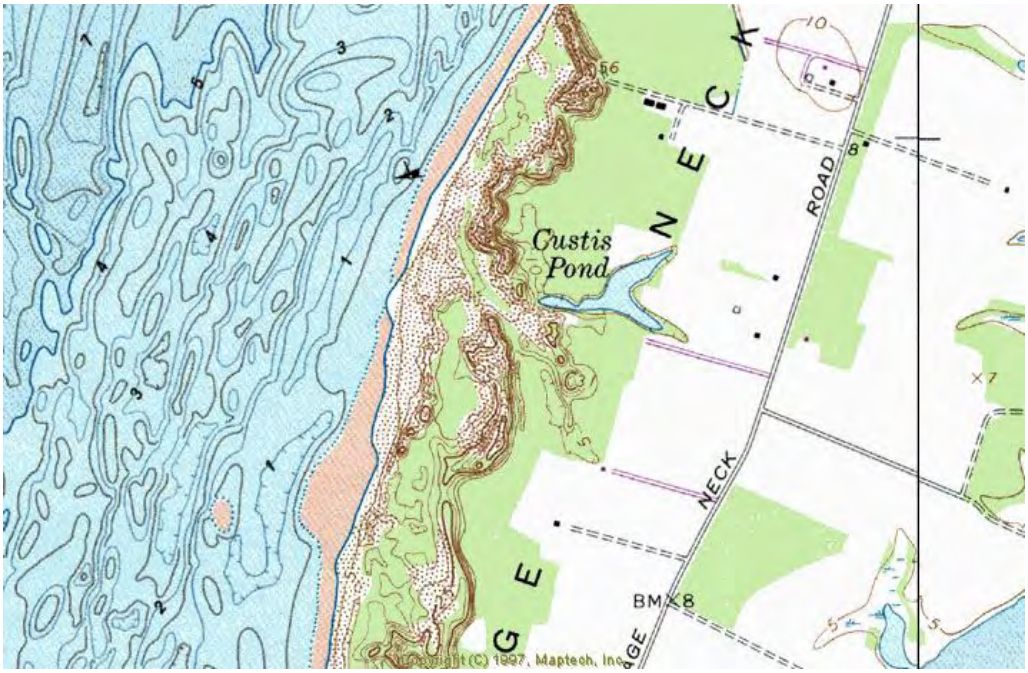


Figure 7. Large Middle to Late Holocene Dunes on Savage Neck, Northampton County, Virginia.

divide is intersected by the modern Chesapeake Bay near Butler's Bluff and Kiptopeke State Park along the shorelines of Northampton County. During the height of the last glacial maximum 18,000 years ago, the ancestral Susquehanna River paleochannel was also adjacent to the modern shorelines located between Butler's Bluff and Kiptopeke State Park (see Schubel and Zabawa 1972; Genau et al. 1994: 166-175; Chen et al. 1995: 605-614; and Kerhin et al. 1996: 57-69). The Butler's Bluff and Kiptopeke State Park shoreline is the only location south of Havre de Grace, Maryland along the Chesapeake Bay where the modern shoreline is adjacent to what would have been the ancestral Late Pleistocene Susquehanna River. It seems topography and circumstance spared this relic shoreline section from Holocene sea-level rise. The convergence of the Chesapeake Bay and the Atlantic Ocean defines the southern boundary of the county. Fisherman's Island represents the southern-most land mass associated with Northampton County.

The modern environmental diversity of the Chesapeake portion of both Accomack and Northampton counties is expressed on land and in the waters adjacent to the region's shorelines. The region is dominated by sandy soils. As a result, drought tolerant plant species were observed in both counties' forests. Prickly Pear Cactus (*Opuntia compressa*), Black Cherry (*Prunus serotina*), and Virginia Pine (*Pinus virginiana*) were observed within interior forested areas. In southern Northampton County, Live Oak (*Quercus virginiana*) was observed in a few of the sandy-wooded areas. Associated with these plant species, the traditional array of pines (*Pinus taeda*, and *Pinus serotina*), and oaks (*Quercus alba*, *Quercus stellata*, *Quercus bicolor*, *Quercus prinus*, *Quercus michauxii*, *Quercus falcata*, and *Quercus phellos*) were present. Also observed were

American Holly (*Ilex opaca*) and Red Cedar (*Juniperus virginiana*). In respect to the marine environments, the region is dominated by varying salinity regimes. In the offshore areas and within the tributaries, virtually every mollusk species defined by Lippson and Lippson (1974: 35-41) for the Chesapeake Bay was observed. Of importance, modern live beds of the American Oyster (*Crassostrea virginica*) were not noted. In contrast, numerous Hard Clams (*Mercenaria mercenaria*), Atlantic Ribbed Mussels (*Geukensia demissa*), Knobbed Whelks (*Busycon carica*), and Channeled Whelks (*Busycon canaliculatum*) were present. The whelk species were more common in waters south of Cherrystone Inlet. Clearly, the distribution of whelks is a reflection of salinity regimes boundaries within the Chesapeake. Lippson and Lippson (ibid: 41) indicate that the whelk species observed in the bay are associated with salinities between 18 ppt to greater than 30 ppt. Both living "left" and "right" handed whelks were noted in the shallows adjacent to the shorelines of southern Northampton County. In reference to fish species, it is assumed that all or most of the species defined by Murdy, Birdsong, and Musick (1997) could be found within the offshore areas and within the tributaries associated with the Virginia Eastern Shore.

The resident population listed in the 1997 census data includes 45,100 people within the study area (Eastern Shore of Virginia Economic Development Commission, n.d.). Of the total population, 32,300 individuals live in Accomack County and 12,800 reside in Northampton County (ibid.). The dominant businesses are associated with the agriculture and poultry industries (ibid.; Peacock and Edmonds 1994; and Cobb and Smith 1989). The region is well suited for both industries. With productive soils

(Peacock and Edmonds 1994; and Cobb and Smith 1989), a high annual level of precipitation, and a moderate climate (Eastern Shore of Virginia Economic Development Commission, n.d.), the Virginia Eastern Shore has the essential elements needed for both the agriculture and poultry industries.

## Paleoenvironmental Data

Numerous sources of data provide evidence for the climatic and environmental changes that have occurred in the Middle Atlantic region over the past 12,000 years. Custer (1984c: 30-37, 44-48, 62-64, 89-93, 154) has provided a detailed overview of the paleoenvironmental data. Data from Custer and Griffith (1984), Brush (1986), and Harrison et al. (1965) are also relevant to the discussion. Most of the paleoenvironmental reconstructions are based on a series of radiometrically dated pollen samples and plant macro-fossils collected from river channels, shallow bays, marshes, swamps, peat bogs, and water filled depressions. A summary of the paleoenvironmental data reflecting Custer and Mellin's (1991) work in the Atlantic Coastal Zone of Delaware is presented in Table 1. Additional paleoenvironmental studies relative to the region were conducted in New Castle and Kent counties (Kellogg and Custer 1994).

The paleoenvironmental summary presented in Table 1 provides a generalized overview of what the pollen data suggests about the vegetation changes that have occurred on the Delmarva Peninsula over the past 14,000 years. The pollen data reflect the macro-environment, but it fails to portray an accurate picture of the micro-environments associated with specific areas within the Middle Atlantic region. The

Table 1. Summary of Environmental Changes (after Custer and Mellin 1991)

| Episode: | Interior Well Drained Zone: | Poorly Drained Zone: | Major Drainage Zone: | Coastal Zone: |
|---|---|---|---|---|
| Late Glacial (14,000 – 10,000 years B.P.) | Boreal forests limited grasslands. | Bogs and swamps with deciduous gallery forest in floodplains. | Deciduous gallery forest with some grasslands low productivity. | Few estuarine settings, scrubby boreal woodlands. |
| Pre-Boreal/ Boreal (10,000 - 8,500 years B.P.) | Boreal forest. | Bogs and swamps with deciduous gallery forest. | Deciduous gallery forest and boreal forest. | Boreal forest, few estuarine settings, low productivity. |
| Atlantic (8,500 - 5,000 years B.P.) | Oak-Hemlock deciduous mesic forest. | Extensive bogs and swamps with deciduous gallery forest. | Mesic deciduous forests. | Mesic Deciduous some estuarine settings, low productivity. |
| Sub-Boreal (5,000 - 2,800 years B.P.) | Oak-Hickory xeric forests and grasslands. | Few bogs and swamps. | Deciduous gallery with some fringing salt marshes, xeric forests and grasslands in in floodplains. | Extensive salt marshes with scrubby xeric vegetation and fringing xeric deciduous forests, high productivity. |
| Sub-Atlantic (2,800 years B.P. - Recent) | Oak-Pine-Hickory forest with mixed mesophytic communities. | Bogs and swamps with deciduous gallery forest. | Deciduous gallery forests (Oak-Chestnut) with extensive fringing salt marshes. | Extensive salt marsh, Oak-Pine woodland with some scrubby xeric vegetation, high productivity. |

micro-environments may have played an important role relative to the settlement patterns of the early cultures within the Delmarva Peninsula. Wanser (1982: 47) noted that micro-environments within southern Maryland were highly variable during the last 11,000 years of human occupation. The pollen data and the forest reconstructions may not reflect the overall vegetational composition during any given period.

Recent work at Paleoindian (circa 13,500 to 11,300 calendar years old and not to be confused with radiocarbon years) and Early Archaic (circa 11,300 to 8,800 calendar years old and not to be confused with radiocarbon years) human occupation sites within the Chesapeake Bay area portray an environment that the pollen record does not record (see Lowery and Custer 1990; Ebright 1992; McAvoy 1997; and McWeeney 1997). Lowery and Custer (1990) found carbonized hickory, butternut, and seed plants within an Early Archaic hearth. Ebright (1992) found hickory phytoliths associated with the basal portion of a Paleoindian period Clovis point. McAvoy and McAvoy (1997) and McWeeney (1997) have reported carbonized hickory from an Early Archaic hearth. Interestingly, hickory pollen does not appear within the Chesapeake region in any of the pollen samples associated with the Late Pleistocene or Early Holocene (see Jacobson, Webb, and Grimm 1987: 279, Plate 1, and Plate 2). These cultural sources of environmental data suggest that the regional forests were more diverse than the pollen record suggests. The tree species represented in the previously mentioned culturally related archaeological contexts might be smaller components of a larger prehistoric forest community. Even so, the small or micro-forest communities may have been more important to prehistoric peoples than the generalized macro-forest community.

In reference to pollen, tall deciduous tree species or sub-species (i.e., Shagbark Hickory; *Height: 70-100'*) produce smaller quantities of pollen than the short deciduous tree species or sub-species (i.e., American Beech; *Height: 60-80'*). Also, pollen from smaller trees has more aerodynamic features than the pollen from larger trees. Variations in pollen production are associated with the adaptive strategy of individual tree species or sub-species. Hydric, mesic, and xeric tree species or sub-species produce different quantities of annual pollen. The variation is a result of individual tree species adaptations to variable soil and water conditions. Individual tree height, annual pollen production, and pollen structure are all adaptive strategies that contribute to the spread of pollen and the successfulness of tree reproduction. The adaptive features of certain tree species would contribute to the relative amounts of pollen detected in core samples. Therefore, the environmental reconstructions may be more of a sample of tree species pollen production than a true representation of the ancient forests.

Pollen diagrams can be misleading. Pielou (1991: 54) created a scenario that illustrated the problems associated with percentage pollen diagrams. She imagined a forest in which almost all the pollen was produced by pine, hemlock, and birch with each species forming thirty-three percent of the total. Hypothetically, suppose the hemlocks were all killed by a severe pest infestation. As a result, the percentages of pine and birch would each rise to fifty percent, even though the actual numbers of pines and birches in the forest had not changed at all (ibid.). Individual tree species pollen production can result in a biased interpretation of ancient pollen found in the geologic record. Even so, these arguments do not alter the fact that the quality of the environment has changed over

the past 18,000 years, and the climatic changes would also be reflected in a forest community.

To make the problems associated with pollen diagrams more confusing and less reliable, ancient pollen deposited on the bottoms of lakes, ponds, bogs, and rivers can be eroded, damaged, or dissolved (Pielou 1991: 68). Certain plant and tree pollen resists the natural erosive effects of various depositional environmental conditions. Pielou noted that pollen deposited in cold, acid, oxygen-deficient water of peat bogs lasts much longer than the pollen deposited in warm, eutrophic waters where bacteria thrive. The problem is further amplified by the fact that the pollen associated with certain plant species naturally breaks down. Pielou observed that white pine pollen is very resistant to breakdown, whereas aspen pollen decays quickly. Pielou also noted that only five percent of the actual forest pollen associated with the plants that once grew in a region is preserved as fossil pollen. The five percent preserved only documents a small portion of the true forest plants that once existed. Modern analogues to the misleading nature of using pollen for past environmental reconstructions have been documented. In recent years, dense deposits of tree pollen have been transported via low-pressure air masses as far north as the Canadian arctic (Campbell et al. 1999: 29-30). The non-local pollen found in the Canadian arctic tundra is over 1000 kilometers north of the coniferous tree line (ibid.). Clearly, if future palynologists were not aware of the long distance air movement of tree pollen, they may create a false reconstruction of the 20$^{th}$ century Canadian arctic landscape. Paleoenvironmental reconstructions of the Middle Atlantic area may need to be seriously reevaluated based on the numerous variables associated

with individual plant species adaptation, plant pollen production, plant pollen preservation, individual plant species pollen decay, and the long-distance transport of pollen. The image of past environments presented in Table 1 may be a false image and misleading. Even so, palynology offers one of the primary means to access past environments.

Table 2 provides an overview of the episodes, climates, and the sea levels associated with the Late Pleistocene and the Holocene. The paleoclimatic data indicate that the Delmarva region has undergone drastic changes over the past 13,000 years. Modern environments, like the past environments, are extremely variable. A drought one year may be offset by a year of abnormally large amounts of precipitation. The climates over the past 13,000 years represent general trends. These trends incorporate seasonal variations. The relative sea levels are based on the sea level curves presented by Dent (1995: Figures 3.5 and 3.6). Dent's sea level curves differ from some of the data presented by other researchers (see Kerhin et al. 1996: 61; Bowen 1988: 158-168). Bowen states that no one universally applicable curve can apply to Late Glacial and Holocene sea levels.

New evidence about the Late Glacial episode indicates that it may have been more diverse than illustrated in Table 2. After 18,000 years B.P. (the glacial maximum), climatic models typically reflect a rapid demise of the glacial ice sheets, warmer climates, shifting plant communities, and rapid sea level rise (see Ruddiman and Wright 1987). Recent data suggests that the glacial retreat experienced during the Late Glacial episode is interrupted by at least one major glacial readvance (Rind et al. 1986; Wright 1989;

Table 2. Summary of the Paleoclimatic History (after Edwards and Merrill 1977; Steponaitis 1980: Figure 2.4; Kraft and Brush 1981; Colman, Halka, and Hobbs 1991; Dent 1995: Figure 3.5 and 3.6)

| Date: | Episode: | Climate: | Sea Level: |
|---|---|---|---|
| Present | **Sub-Atlantic** | Mild & Wet | 0 m (0 ft.) |
| 1000 yrs. BP | | | -1.25 m (-4.06 ft.) |
| 2000 yrs. BP | | | -2.25 m (-7.31 ft.) |
| 3000 yrs. BP | **Sub-Boreal** | Warm & Dry | -4 m (-13 ft.) |
| 4000 yrs. BP | | | -6 m (-19.5 ft.) |
| 5000 yrs. BP | **Atlantic** | Warm & Moist | -8.5 m (-27.62 ft.) |
| 6000 yrs. BP | | | -10 m (-32.5 ft.) |
| 7000 yrs. BP | | | -15 m (-48.75 ft.) |
| 8000 yrs. BP | | | -24 m (-78 ft.) |
| 9000 yrs. BP | **Pre-Boreal/ Boreal** | Cool & Dry | -38 m (-123.5 ft.) |
| 10000 yrs. BP | | | -60 m (-195 ft.) |
| 11000 yrs. BP | **Late Glacial** | Cold & Wet | -70 m (-227.5 ft.) |
| 12000 yrs. BP | | | -95 m (-308.75 ft.) |
| 13000 yrs. BP | | | -110 m (-357.5 ft.) |

Peteet et al. 1990; Peteet 1992; Mayle et al. 1993; Mikolajewicz et al. 1997; Benson et al. 1997). A glacial readvance occurred between 11,000 and 10,000 years B.P. and is referred to as the Younger Dryas event (Wright 1989; Peteet et al. 1990; Peteet 1992; Mayle et al. 1993; Mikolajewicz et al. 1997; Benson et al. 1997). The Younger Dryas event is a period where the continental ice sheets in the northern hemisphere ceased to retreat and started to expand. The Younger Dryas event affected the climate and vegetation of eastern North America (Peteet et al. 1990; Peteet 1992). Areas in northern New Jersey, which had established a deciduous hardwood community by 12,000 years B.P., experienced an expansion of boreal taxa (i.e., spruce, fir, larch, paper birch, and alder) between 11,000 and 10,000 years B.P. (Peteet et al. 1990). The Younger Dryas event represents a cold and extremely dry period for portions of northeastern North America, Canada, and Europe (Wright 1989; Peteet et al. 1990; Peteet 1992; and Mayle, et al. 1993). Grace Brush (personal communication: 11/7/98) has presented paleoclimatic data associated with the Potomac River watershed that suggests the Younger Dryas event impacted the Middle Atlantic region. The radiocarbon dated 10,500-year-old loess deposits, which cover the northwestern portion of the Delmarva Peninsula (Foss et al. 1978: 329-334), may also reflect that the Younger Dryas climatic event impacted the region (Daniel Wagner, personal communication: 9/24/00). Recently, Mikolajewicz et al. (1997) and Benson et al. (1997) have noted nearly synchronous climate change in western North America and the North Pacific. If the local region experienced the effects of the Younger Dryas, the Younger Dryas coincides with the Paleoindian groups who occupied the area. The Younger Dryas event would have had a profound impact on the

Paleoindian cultures of North America and would have affected subsistence and settlement patterns. Based on the Late Glacial climatic information, the summary presented in Table 2 will need to be revised.

Haynes (1991: 438-450; 1993; and 1999) may have been the first to detect the Younger Dryas drought and its impact on the Paleoindian Clovis culture. Like Haynes (ibid.), Willig (1991) has also found evidence that lakes in the Great Basin region were low during the Clovis period. Haynes (1991 and 1993), Willig (1991), and Dunbar (1991) present evidence that during the Clovis/Younger Dryas period (11,000 - 10,000 years B.P.), human occupation sites were focused around reliable water sources.

Recently, Cronin (1999: 194-303) has provided detailed data about the various climatic events associated with the Late Pleistocene and Holocene. Cronin's data suggest that the climates associated with the Late Glacial through Late Holocene were very complex and that the Holocene may have been more diverse than illustrated in Table 2. In his (ibid: 253-303) discussion of Holocene centennial and decadal climatic variability, Cronin discusses the climatic impacts associated with the "altithermal and hypsithermal", the "Neoglaciation", the "Medieval Warm Period", and the "Little Ice Age". Relative to the Late Holocene, Cronin (ibid: 275) notes that in the eastern United States during the "Medieval Warm Period" and "Little Ice Age" there were no sustained century-long periods of climate wetness or dryness. There were, however, decadal periods of wetness and dryness (ibid.). Grace Brush (personal communication: 11/7/98) has indicated that climatic data associated with the Nanticoke and Potomac watersheds indicate increased dryness and regional fires during portions of the "Medieval Warm Period". Other

evidence for dry events during the Late Pleistocene through Late Holocene relate to dune deposits. Inland dunes have been documented in the Carolinas and Georgia dating from 15,000 years old to as recent as 3,000 years old (Markewich and Markewich 1994). Markewich and Markewich (ibid.) note that the last major dune-forming episode occurred sometime between 5,000 and 3,000 years ago. The ages postulated by Markewich and Markewich (ibid.) for the last dune-forming episode (drying event) coincides quite well with the Sub-Boreal warm and dry episode in Table 2. Obviously, periods of climatic wetness and dryness during the Holocene would have had a profound impact on prehistoric settlement and subsistence patterns. Climatic transitions from cool to warm periods during the Holocene would have also impacted prehistoric populations. The recent climatic data indicate that the generalized "long-period" climatic summaries presented in Table 1 and in Table 2 may need to be revised.

Table 2 also provides information about the sea level rise that has occurred over the past 13,000 years. The coastal inundation within the Chesapeake Bay and along the Atlantic seashore has greatly altered the shape of the land, the distribution of marine resources, and the distribution of terrestrial plant and animal resources. Coastal sea level rise has contributed to the inundation of prehistoric archaeological resources. It also contributed to dramatic changes in the settlement and subsistence strategies practiced by prehistoric peoples. Lowery (1997: Figures 1 - 4) illustrated the physical changes in the Chesapeake Bay over the past 10,500 years B.P. Others (Hughes 1980: 93; and Wilke and Thompson 1977) have produced similar Chesapeake Bay sea level rise maps. But, Lowery (1997: Figures 1 - 4) utilized recent data relating to Susquehanna paleochannel

reconstructions (Schubel and Zabawa 1972; Genau et al. 1994: 166-175; Chen et al. 1995: 605-614; and Kerhin et al. 1996: 57-69) in creating his Chesapeake Bay sea level rise maps. Lowery also utilized Dent's (1995: Figures 3.5 and 3.6) sea level curve to establish the relative dimensions of the ancestral Chesapeake Bay/Susquehanna River. Updated and modified versions of Lowery's earlier maps are presented in Figures 8, 9, and 10. Figure 8 defines the Chesapeake Bay region circa 13,000 years ago. Figure 9 illustrates the Chesapeake Bay circa 8,000 years ago. Figure 10 delineates the Chesapeake Bay circa 4,000 years ago, and Figure 4 shows the Chesapeake region as it appears today. Much in the same way that Augustine Herrman's 1670 map of the Chesapeake does not reflect the historic diversity of the bay environments, the rough changes to the Chesapeake Bay / Susquehanna River projected by other researchers for the past 10,500 years (see Wilke and Thompson 1977; Hughes 1980: 93; and Lowery 1997: Figures 1 - 4) do not reflect the micro-estuarine environmental changes that were so important to prehistoric peoples.

Lowery (1997: Figure 7) has suggested that the salinity regime boundaries along some of the major Delmarva watersheds that drain into the Chesapeake have changed from the Late Woodland saltier regimes to modern fresher regimes. The salinity regime changes were different during the Late Woodland period. During the Late Woodland period, most Delmarva tributaries were saltier than they are at present. The data (Lowery 1997) suggest that the mesohaline zone within the Choptank watershed extended further up the main channel of the river. This is based on observations and assumptions about the distribution of prehistoric archaeological sites with oyster processing activities (i.e.,

shell middens and shell pit features). The observed modern freshness of the Delmarva tributaries can be attributed to the deforestation of the region during historic periods (Grace Brush, personal communication: 11/7/98). Given the lack of riverine/estuarine paleoenvironmental data, the pre-Late Woodland salinity regime boundaries along the Chesapeake and its tributaries cannot be established. Clearly, salinity zones along the inundated rivers of Maryland and Virginia's Eastern Shore were important to prehistoric peoples.

Given the sea level data presented in Table 2, the Late Pleistocene, Early Holocene, and Middle Holocene were periods of rapid sea level rise. As a result, rapid coastal and estuarine environmental changes would have occurred along the Atlantic coast and within the mouth of the Chesapeake Bay during these periods. The Virginia portion of the Delmarva Peninsula should have experienced the establishment of coastal and estuarine environments earlier than areas north along Maryland's Eastern Shore. Unfortunately, Middle and Late Holocene sea level rise may have inundated most, if not all, of the prehistoric sites which reflect the early utilization of marine resources along Virginia's Eastern Shore (Blanton 1996). During the Late Holocene, coastal and estuarine environmental changes would have stabilized along the Atlantic coast and within the Chesapeake Bay. Rapid coastal and estuarine environmental changes would have occurred within the tributaries entering the Chesapeake Bay during the early portion of the Late Holocene. By the latter portion of the Late Holocene, the marine environments associated with the tributaries would have stabilized. Coastal and estuarine resources and environments along the length of the Chesapeake would have varied in the

recent prehistoric past much in the same way these resources and environments differ today (see White 1989). The refuse associated with the recent prehistoric past should reflect the diversity of these ancient environments. The ecological changes associated with the inundation of the Chesapeake would have had a profound impact on the subsistence patterns of regional prehistoric peoples.

## Factors Effecting Shoreline Erosion in the Macro Chesapeake Bay Region

Shoreline erosion in the Chesapeake Bay has been a recognized problem for several decades (see Singewald 1949; Athearn et al. 1974; Hardaway and Anderson 1980). These studies were mainly concerned with determining "hot spots" of erosion and cost effective means to deal with the shoreline erosion problem. In addressing the factors that influence shoreline erosion, it is important to understand the interrelatedness of these various factors. A region's geology can influence shoreline erosion. Weather and climate patterns can influence shoreline erosion. The orientation of a shoreline with respect to the wind and wave energy can influence shoreline erosion. The sediment types associated with a region can also influence the degree of shoreline erosion. Other factors influencing shoreline erosion include storm events, tidal fluctuations, tidal current changes, seasonal changes in weather patterns, terrestrial plant species, and the relationship of a shoreline to nearby or adjacent shorelines. The following summary will discuss each of these factors. The reader is referred to Butzer (1976), Strahler and Strahler (1989), and Waters (1992) for more discussion about coastal erosion and deposition environments.

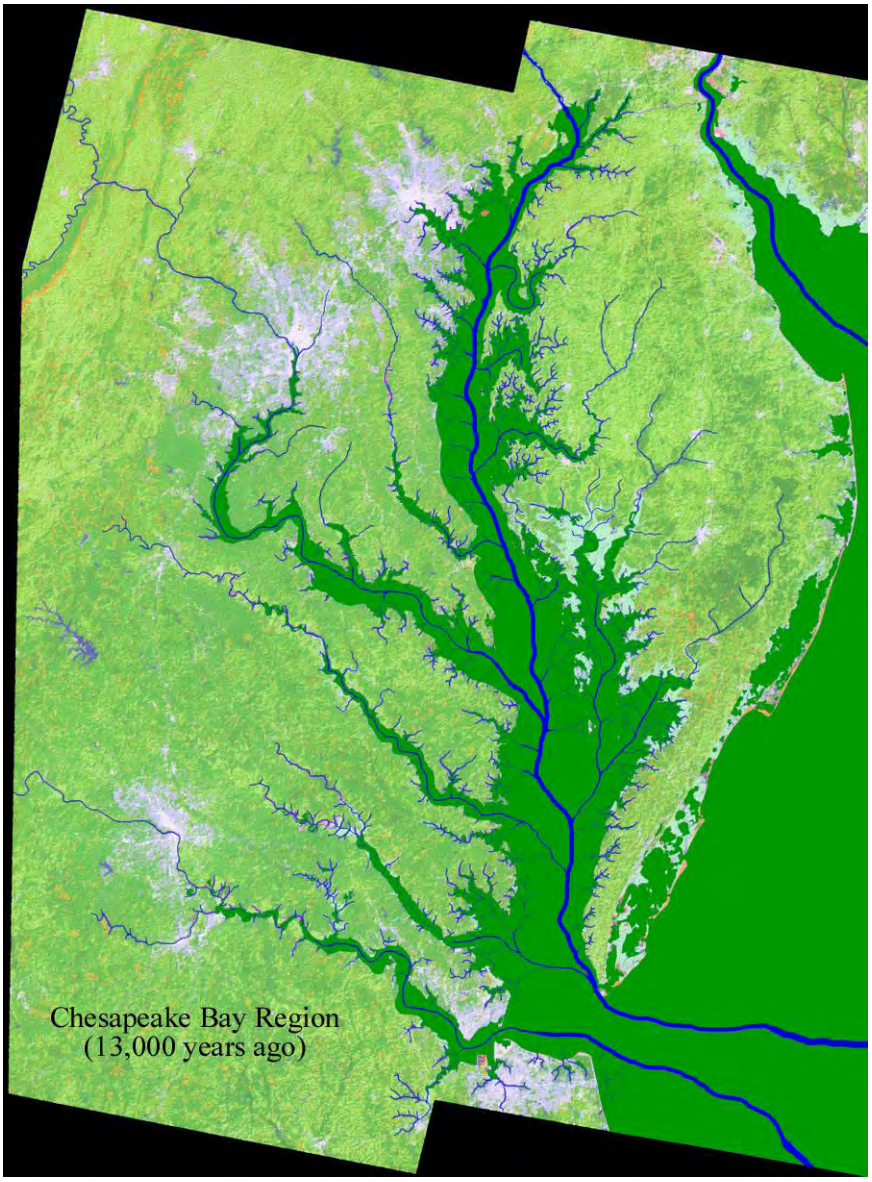


Figure 8. Late Pleistocene Image of the Chesapeake Bay (Modified Version of Coast Watch Program 1989).

Figure 9. Early Holocene Image of the Chesapeake Bay (Modified Version of Coast Watch Program 1989).

Figure 10. Middle Holocene Image of the Chesapeake Bay (Modified Version of Coast Watch Program 1989).

From a geological and geographical standpoint, the macro Delmarva Peninsula consists of a thick blanket of consolidated and loosely consolidated to unconsolidated Cretaceous to Holocene age sediments. The thickness of these sediments varies greatly across the peninsula and the distribution of these formations on the peninsula also varies. Accomack and Northampton counties include the Kent Island formation, the Wachapreague formation, the Nassawadox formation, the Occohannock member, the Butlers Bluff member, the Joynes Neck sand, and the Omar formation (Geologic Map of Virginia 1993). All of the geologic formations and members plotted for Accomack and Northampton counties are Pleistocene and Holocene in age and include primarily unconsolidated sands. Unconsolidated sands adjacent to shorelines are easily eroded. Even so, this does not mean that all shorelines in Accomack and Northampton counties are going to be eroded.

The modern weather patterns across the entire region are relatively consistent. That is to say, air masses and wind patterns are consistent from the north end of the peninsula to the southern end of the peninsula. The two dominant wind directions affecting the west side of the Delmarva Peninsula are northwest winds and southwest winds. The speed of the wind and the duration of the wind influence erosion. Obviously, the speed and duration of the winds affecting the region are not constant. The transition from high-pressure to low pressure systems create regional prevailing wind patterns. High-pressure systems entering the region usually result in northwesterly wind gusts with varying wind velocities for one to several days. In contrast, the backside of a high-pressure system in transition to low-pressure air mass usually results in southwesterly

wind gusts with varying wind velocities for one to several days. Northwesterly and southwesterly winds moving across the Chesapeake Bay consistently create erosive wave energies that impact the west side of the Delmarva. Easterly winds also impact the region. But, the affects of easterly winds predominantly impact the east side of the Delmarva Peninsula. During easterly storm events the Chesapeake side of the Delmarva would be on the "leeward" and wave energies would predominantly impact the western shore of the bay. Even so, this does not mean that all shorelines in Accomack and Northampton counties are only eroded by northwest and southwest winds. There are exceptions where areas are only eroded when winds are from the east, southeast, or northeast. Of all the shoreline exposures in Accomack and Northampton counties, the largest amount of linear shoreline is impacted by northwesterly and southwesterly winds. Therefore, force and direction of seasonal winds are factors influencing shoreline erosion. The over-water distance across which the wind blows or "fetch" is a major factor in respect to shoreline erosion. Even so, additional factors aside from wind direction and exposure clearly influence shoreline erosion in the Accomack and Northampton region.

The additional factors which influence shoreline erosion work on a site-to-site basis. One factor is the shape of the shoreline in respect to the prevailing wind directions and the resultant waves. A shoreline that is perpendicular to the wind and the resultant wave energy direction is going to be impacted more by erosion than a shoreline that is parallel to the wind and the resultant wave energy. This observation is simply common sense. "Windward" shorelines that are perpendicular to the wind and wave energies (i.e., directions) are going to take the brunt of the erosive energies. In this case, all of the wave

and wind energies are going to be exhausted as the linear waves, which are parallel to the shoreline, crest and strike the shoreline. In respect to archaeological remains, artifacts will not be moved laterally along the shorelines at sites that are perpendicular to the wave energy (Lowery n. d.). In other words, littoral drift will not greatly impact the movement of artifacts that have eroded from shoreline sites perpendicular to the wind and wave energy directions. In contrast, windward shorelines that are parallel to the wind and wave energies (i.e., directions) are simply going to be brushed as the waves move in a given direction. In this case, the wave and wind energies are simply going to move past the parallel shoreline and no energy will be exhausted. In respect to archaeological remains, artifacts have the potential to be moved great distances along the shorelines at sites that are parallel to the wave energy (Lowery n. d.). In other words, littoral drift will greatly impact the movement of artifacts that have eroded from shoreline sites parallel to the wind and wave directions. Clearly the relationship and orientation of shorelines to prevailing wind and wave energy directions are factors influencing shoreline erosion and redeposition.

Other interrelated variables also affect the degree of shoreline erosion at a given locality. Parent sediment types associated with the region also influence the degree of shoreline erosion. The predominantly sandy soils of Accomack and Northampton counties would erode more easily than the silty, loamy, or clayey soils of the central Maryland Eastern Shore. The bonding aspects of silts, clays, or loams tend to resist wave erosion. The loose unconsolidated nature of sands tend erode easily. Waters (1996: 19-28) discusses how soil textural properties, the mode of particle transport, the energy flow,

and the depositional environment are interrelated. In addressing shoreline erosion, it is also important to understand what happens to sands and silty clay loams after they have been eroded. In areas where silty clay loams predominate along shorelines, wave energy eventually breaks up the clastic bonds associated with these soils. The silty clay loams break down into their individual particle sizes and become easily entrained and suspended within the water. The entrained and suspended silty clay loam particles move great distances away from the eroded parent shoreline via currents and tides. As a result, the areas immediately offshore from the eroded silty clay loam locality are literally stripped of potential "break water" sediments. In areas where parent sands predominate along shorelines, wave energy easily breaks up the shoreline into the individual sand grain particles. In contrast to the silty clay loams, sand grains are only held in suspension for short periods of time. Obviously, the ability to hold sand in suspension depends on the amount of wave energy. Sand, gravel, and even cobbles can be moved great distances during storm events. Under moderate conditions, sand grains are moved via saltation along the bottom and are not held in suspension via currents or tides. As a result, sands are deposited inshore and offshore from the parent eroded terrestrial locality in areas where tides and current movement are minimal. Over time, coastal dunes, shallow sand bars, and barrier tidal sand islands can develop along the shore associated with the parent-eroded site (Figure 11 and Figure 12). These dunes, shallow sand bars, and barrier tidal sand islands act as excellent natural "breakwater" barriers and literally stop continued shoreline erosion. These natural breakwater offshore and inshore landforms are uncommon in regions with eroded or eroding silty clay loam shorelines. In

summation, terrestrial shorelines made up of sands are easily eroded. But when eroded, the deposition of sands as coastal dunes, offshore bars, and barrier sand islands can reduce the chance for continued terrestrial shoreline erosion. In contrast, silty clay loam shorelines are not associated with the same offshore phenomenon. The dominant sediments associated with a region are factors influencing shoreline erosion.

Offshore water depths and changes in water depths over time are factors influencing shoreline erosion. Shallow offshore environments as well as deep offshore environments greatly impact the degree of shoreline erosion. Shallow regions with sand bars, large offshore sand shelves, and barrier sand islands cause wave energy to dissipate before the energy can reach the terrestrial shoreline. In areas with broad shallow offshore environments, waves crest and the waves break before hitting the mainland. Thus, the energy is dissipated. Even the most exposed shoreline can have zero erosion if the offshore depths and distribution of sediments act as erosion barriers. In contrast, deep-water offshore environments adjacent to a terrestrial shoreline promote erosion. Deep regions with no barriers cause wave energy to be stored and not exhausted before hitting the terrestrial shoreline. Under these circumstances, the maximum amount of wave energy is released directly onto the exposed terrestrial shoreline and the shoreline erodes rapidly. The bottom of the Chesapeake Bay is not constant and unchanging. Offshore environments can change radically during storm events or slowly as a result of current changes. Therefore, an area deemed non-erosive today might become very erosive in the future.

Other obvious factors influencing shoreline erosion include storm events, tidal fluctuations, tidal current changes, seasonal changes in weather patterns, terrestrial plant species, and the relationship of a shoreline to nearby or adjacent shorelines. Storm events can clearly influence the degree a shoreline erodes. Storm events can also radically alter the degree of erosion a region experiences after the storm has past. As a result, an area or shoreline that was unaffected by erosion prior to a storm becomes highly susceptible to erosion after a storm. The reverse can also be true. A change in current patterns could deposit large amounts of sandy sediment in front of an eroded shoreline and completely stop any additional erosion. Seasonal changes in weather patterns can over an annual basis radically alter the factors influencing shoreline erosion at any given locality. Barrier sediment observed at a shoreline locality during the summer months might be completely gone during the winter months (see Figures 13 and 14). Thus, a site shifts annually from non-erosive during the summer to erosive during the winter. Terrestrial plant species can also influence the degree of shoreline erosion. For example, imagine a given stretch of shoreline with topographic and environmental changes from tidal marsh lowland to a forested ridge. The shoreline in this scenario experiences the same high levels of wave energy. The tidal marsh consists of a dense mat of plant roots, which are intermeshed. The forested ridge consists of macro-plants (i.e., trees) with large root systems, which are not as intermeshed as the roots systems along the marsh. As a result, the forested ridge will erode quicker than the adjacent tidal marsh. Finally, the relationship of a shoreline to nearby or adjacent shorelines can be a factor influencing shoreline erosion. For example, a point of land may act as a barrier deflecting or

dissipating wave energy. The deflected or dissipated wave energy may reduce or minimize the erosion along an adjacent section of shoreline. The reverse can also be true. The geometry of a shoreline may also accelerate erosion along an adjacent section. All of the variables mentioned influence the degree of shoreline erosion at any given locality. The researcher interested in addressing shoreline erosion at a given locality needs to assess these variables over multiple years and seasonal weather shifts before establishing a plan to deal with an erosion problem.

The factors effecting shoreline erosion in the macro-Chesapeake Bay region are numerous. These variables affect each shoreline and each eroding archaeological site adjacent to the bay in varying degrees. The researcher should understand the dynamics of shoreline erosion before defining or lumping any given region as erosive or non-erosive. Even though the defined erosion factors influence the shorelines of the bay on a macro-scale, the impact on any given section of shoreline within the bay is on the micro-level. That is to say, even the smallest portion of shoreline within the Chesapeake Bay may be erosive in one section but non-erosive along another section.

Figure 11. Coastal Dune Formations on the Chesapeake Bay Shore, Occohannock Neck, Virginia.

Figure 12. Offshore Barrier Sand Island on the Chesapeake Bay Shore, Church Neck, Northampton County, Virginia.

Figure 13. Erosive Winter View of a Shoreline Archaeological Site, Talbot County, Maryland.

Figure 14. Non-erosive Summer View of the Same Archaeological Site in Figure 13.

# CHAPTER 4

# CULTURAL, HISTORICAL, AND ARCHAEOLOGICAL BACKGROUND

The Chesapeake Bay and Delmarva Peninsula represent a large geographic region of the Atlantic coastal area and the Middle Atlantic region. The terrestrial and marine-coastal environments within this broad region were very diverse over the entire region's prehistory. Prehistoric human adaptations probably varied at any given point in time over the macro-Delmarva region. Therefore, the following prehistoric overview represents a general framework for assessing the region's past. It can be assumed there were unique adaptations within the region that are not expressed in this overview. The lack of acknowledgement of these ancient adaptations in the following overview is an expression of the lack of focused intra-regional research. As additional focused research is conducted within the Delmarva region, the following overview will have to be modified to accommodate this new data.

## Paleoindian Period

The Paleoindian period is the first diagnostic cultural episode in the Western Hemisphere. Traditionally, the Paleoindian period is represented by several types of distinctive fluted projectile points. The earliest uncontested evidence of people in North America has been radiometrically dated to roughly 11,500 to 10,000 radiocarbon years B.P. Recently, Fiedel (1999: 95-115) has presented data that suggests Clovis-age sites, which are circa 11,500 to 10,800 radiocarbon years B.P., are older than archaeologists

previously thought. Clovis-age radiometric dates, when calibrated, are in essence 13,500 to 12,800 calendar years old (ibid. Figure 6).

Archaeological sites with cultural components older than Clovis have been reported in the Western Hemisphere (see Dillehay 1997). In the Middle Atlantic region of the United States, archaeological sites with radiometrically dated cultural levels situated stratigraphically below Clovis cultural levels have also been reported (see McAvoy and McAvoy 1997). Additional pre-Clovis sites have been reported for the Middle Atlantic region (see Adovasio 1993: 199-218; and Stanford 1998 and personal communication: 6/17/99). Stanford believes that the Clovis culture developed out of a pre-Clovis population situated somewhere in the southeastern portion of the United States. The dense numbers of fluted Clovis-style points and the diverse types of fluted points found in the Southeast (see Anderson and Faught 1998: 163-187; and Anderson, Faught, and Gillam 1998) are two lines of evidence which Stanford (1998 and personal communication: 6/17/99) argues in support for a southeastern origin of the Clovis culture. Stanford (ibid.) believes that the archaeological evidence found by Adovasio (1993: 199-218) at Meadowcroft Rockshelter, by McAvoy and McAvoy (1997) at Cactus Hill, and recent discoveries by Albert Goodyear at the Topper site provide evidence for a pre-Clovis population in the Eastern United States. Stanford (1997, 1998, and personal communication: 6/17/99) and others (Bruce Bradley, personal communication: 11/24/98; Boldurian and Cotter 1999: 117-123) have suggested the pre-Clovis and Clovis populations found in the Eastern United States are related to the Solutrean culture of Europe. Stanford (1997, 1998, and personal communication:

6/17/99) has suggested that people may have crossed the North Atlantic during the Late Pleistocene. The Solutrean-like technologies associated with the pre-Clovis sites in the eastern United States may represent the archaeological expression of the Solutrean influences across the Atlantic from Western Europe (ibid.). In a recent book by Dixon (1999), he argues that the initial colonization of the Americas occurred along the west coast of North America during the Late Pleistocene. The traditional "ice-free corridor" model for the initial colonization of the Americas seems unlikely. Stanford (1998, and personal communication: 6/17/99) has indicated that geological evidence suggests the "ice-free corridor" was not "ice-free" at the time the areas south of the Laurentide and Cordilleran ice sheets were already colonized.

The data associated with the pre-Clovis/Clovis debate is highly controversial and always changing. This topic is discussed because it does have relevance to the coastal portions of the Middle Atlantic region. If the work at Cactus Hill indicates cultures were in the Middle Atlantic region before Clovis and if Stanford's arguments are accurate, then the coastal areas of New Jersey, Delaware, Maryland, and Virginia may have some pre-Clovis archaeological data. If the "diagnostic" pre-Clovis artifacts found at Cactus Hill (McAvoy and McAvoy 1997: Figure 5.42 and 5.65) or Meadowcroft Rockshelter (Adovasio 1983: Figure 1; and 1993: Figures 3, 4, 5, 6, and 8) were present in surface collections, the argument could be made that professional and avocational archaeologists would not be able to recognize these artifacts as "pre-Clovis".

In the Middle Atlantic region, the types of diagnostic Paleoindian projectile points found as surface manifestations and within excavated contexts include the Clovis point,

the Cumberland/Barnes point (cf. Wright and Roosa 1966; Roosa 1977; Storck and Bitter 1989: 176; and Deller 1989: 200-203), the Crowfield point (cf. Deller and Ellis 1984: 41-71), the Hardaway-Dalton point, and the Hardaway Side-Notched point (Coe 1964). Examples resembling the Suwannee/Simpson style fluted point (see Daniel and Wisenbaker 1987: 44-54) typically found in the Southeast and the Debert style fluted point (see MacDonald 1985: 70-77) typically found in the Northeast have been observed in regional assemblages. Brown illustrates one fluted point (1979: #23) that resembles the Suwannee/Simpson point and three fluted points (1979: #9, #22, and #57) that resemble the Debert style point. Given the fact that Fiedel (1999: 95-115) has presented data which suggest that the Paleoindian period is older and lasted longer than previously thought, the range of variation in fluted point styles in any given region may be important to document and recognize. Until these "distinctive" Paleoindian point types are found in good excavated contexts, regional archaeologists can only speculate what the variation in projectile points mean.

The Clovis type projectile point is the earliest recognized Paleoindian period projectile point and the most common type of fluted point found on the Delmarva Peninsula (Brown 1979). Brown's work did not discern the range of fluted point styles that were previously mentioned. Her chronology only defined three types: Clovis, Mid-Paleo, and Dalton-Hardaway. Others (Custer 1984a, 1996) have employed the same Paleoindian projectile point chronology. The Paleoindian point chronology employed by Brown and Custer is based on excavations associated with the Flint Run area (Gardner and Verry 1979). Gardner and Verry (1979) define the Mid-Paleo point type as small,

more finely made, thinner, and finely fluted. Small "Mid-Paleo" fluted point preform was also found stratigraphically above Clovis points at the Flint Run sites (ibid: Figure 4I). Collins and Kay (1999: 46-50) note that very small points manufactured at a diminutive scale are associated with Clovis age sites. The range of fluting styles, preform preparation, and post-fluting retouch suggests more diversity in regional Paleoindian fluted projectile points than has been recognized. The range of variation is apparent even in the Clovis and Mid-Paleo categories defined by Brown (1979) and Custer (1984a and 1996). It could be argued that some of the points defined by Brown as Mid-Paleo point types (1979: #3, #42, #52, #55, and #62) are indeed "small" Clovis points. "Small" Clovis points are a distinct part of the Clovis tool kit (see Collins and Kay 1999: 46-50; Graham et al. 1981: Figure 2; Haury et al. 1959: Figure 12; and Hester 1972: Figure 89). It is arguable that some of the points defined by Brown as Clovis point types (1979: #21, #69, and #70) are indeed Cumberland/Barnes style points (see Storck 1997). The fluted point types defined by Brown (1979) may need to be revised or re-categorized.

The Clovis point is a pan-regional projectile point type that occurs in diverse environmental contexts over the entire North American continent. Kellogg and Custer (1994) provide an environmental overview of the Paleoindian period. In the Middle Atlantic, sea levels were significantly lower because a large portion of the earth's ocean water was locked up in the Laurentide and Cordilleran ice sheets. Estimates indicate that the sea levels around the world were approximately 76 to 60 meters (250 to 195 feet) below the present level. Numerous species of Pleistocene megafauna roamed the continent (Graham and Mead 1987). Evidence indicates that in the eastern portions of

the North American continent, woodland fauna included the musk ox, the mammoth, the mastodon, the moose, the peccary, the white-tailed deer, the caribou, the elk, and the giant beaver (Carbone 1976: 67). Whether the Middle Atlantic region Paleoindian groups utilized and hunted Pleistocene megafauna (i.e., mastodon, and mammoth) is open to speculation. Dent (1995: 128 and 142) notes that floral (i.e., nuts, seeds, and berries) and aquatic (i.e., fish and shellfish) remains have been found at two sites in the East (i.e., Dust Cave and Shawnee Minisink). Even so, Dust Cave is not a Clovis site (see Driskell 1996: 315-330). Therefore, the only site within the Middle Atlantic region with reliable Clovis subsistence data would be the Shawnee Minisink site (McNett, 1985). Does the generalized Clovis menu excavated at the Shawnee Minisink site represent the Clovis menu for every Paleoindian in the Middle Atlantic region? Given the ecological diversity in the modern Middle Atlantic region, one would assume that the ecological diversity during the Late Pleistocene was equally complex. I would argue that the environmental summaries for the region (i.e., Kellogg and Custer 1994) are too general and tend to focus on the metaphorical "forest" rather than the uniqueness of the individual "trees". In other words, micro-environments were more important to Paleoindians than the general macro-environment. Unfortunately, traditional techniques of paleoecological reconstruction would negate the unique micro-environments for the Paleoindian period of the Middle Atlantic region.

Numerous Clovis period kill sites have been discovered in the western portion of the United States. At these kill sites, human artifacts have been found in association with extinct fauna, such as the mammoth. An excellent summary of the faunal remains from

the more important kill sites is presented in an article by Graham and Mead (1987: 382-383). Evidence from the western Clovis kill sites indicates that mammoth and bison were frequent prey species (Graham and Mead 1987: 382-383; Bonnichsen et al. 1987: 408). In the eastern portion of the United States, very few sites have produced faunal remains in association with Clovis artifacts. The Kimmswick site in eastern Missouri has produced Clovis projectile points in association with several mastodons and a giant sloth (Graham and Mead; ibid.). In the Northeast, the Hiscock site in western New York has produced three fluted Clovis style projectile points in association with mastodon remains and the remains of other mammals (Gramly and Funk 1990: 16). Gramly and Funk (ibid.) suggest that the mastodon carcasses found at the Hiscock site may have been scavenged and not actually hunted by Paleoindians. Several tantalizing Paleoindian sites in Florida have produced Clovis style fluted points in contexts with Late Pleistocene faunal remains (Dunbar 1991: 198-211). Recently, Tankersley and Redmond (2000: 42-46) have reported Clovis stone and bone tools in association with several flat-headed peccaries and giant beaver from Sheriden Cave in Ohio. The archaeological evidence from the East suggests Paleoindian subsistence may have been partially based on Pleistocene megafauna (Gramly and Funk 1990: 16). At the Shawnee-Minisink site in the upper Delaware Valley, carbonized plant food and fish remains have been found within a Paleoindian hearth (McNett and McMillan 1974; McNett et al. 1975; 1977; Kauffman and Dent 1982). Evidence from the Shawnee-Minisink site indicates that a portion of the Paleoindian diet was based on gathered resources. Even though sites on the Delmarva Peninsula have produced no food remains within a Paleoindian context, it

can be assumed that similar hunted and gathered resources may have been utilized by the local Paleoindian inhabitants.

Researchers would probably argue against my assertion that local Clovis peoples may have hunted Pleistocene megafauna. It is arguable that within the modern terrestrial coastal plain, preservation factors have greatly impacted the expression of Pleistocene megafauna remains. Very few Pleistocene mammal remains have been found on the coastal plain of the Delmarva Peninsula. One record indicates that in 1866, a workman uncovered the remains of a woolly mammoth (*Mammuthus primigenius* ?) and the remains of a southern mammoth (*Mammuthus columbi* ?) on Oxford Neck in Talbot County, Maryland (Preston 1983: 19). Unfortunately, the Oxford Neck Pleistocene fossils have not been dated and it is not known what skeletal remains were associated with the discovery. Recently, a fragment of a two mastodon molars (*Mammut americanum*), several horse molars (*Equus* sp.), a peccary molar (*Mylohyus nasutus*), a camel molar (*Hemiauchenia macrocephala*), several bison teeth (*Bison antiquus*), a tapir tooth (*Tapirus veroensis*), a giant beaver molar (*Castoroides ohioensis*), a dire wolf pre-molar (*Canis dirus*), and a white-tailed deer pre-molar (*Odocoileus virginianus)* were found associated with a buried pond/lake strata dated to 17,820 +/- 170 years B.P. (AA-3870). The Late Pleistocene mammal remains mentioned above were found on Tilghman Island in Talbot County near the mouth of the Choptank River (Lowery 1999). Buried pond and lake sediments are considered to great places for vertebrate fossil preservation. Even so, it is important to recognize that the megafauna remains from the Tilghman Island locality included only teeth and enamel. Therefore, it is arguable that poor Late

Pleistocene vertebrate fossil preservation in the Middle Atlantic region has greatly impacted the archaeological expression of Clovis subsistence. Even so, the vertebrate remains from the Tilghman Island locality do provide some valuable data relative to the types of Late Pleistocene animal species living on the Delmarva during the last glacial maximum. It is important to note that Pleistocene megafaunal remains have also been discovered offshore on the continental shelf adjacent to the Delmarva Peninsula (Edwards and Merrill 1977: 9). Demonstrating Paleoindian exploitation of the various megafaunal species noted within the region may never occur. Even so, it is important to note that roughly contemporaneous megafauna remains have been found on the Delmarva Peninsula.

Tool kits associated with Paleoindian sites in the Middle Atlantic region can vary from being highly curated to showing little evidence of reuse or resharpening. The Paw Paw Cove Paleoindian site complex in Talbot County, Maryland has produced artifacts, which are very small and have multiple working edges (Lowery 1989a: 143-164; 1989b). The Paw Paw Cove assemblage reflects a high degree of tool curation. In contrast, the Meekins Neck Paleoindian site complex in Dorchester County, Maryland has produced an assemblage of virtually unresharpened Clovis points and several large single purpose flake tools (Lowery and Phillips 1994: 29-36). The Meekins Neck assemblage seems to be a pristine Clovis assemblage that reflects very little tool curation. The Meekins Neck flake tool assemblage seems to be based on large cryptocrystalline cobbles (ibid.). The degree of tool curation at sites on the Delmarva Peninsula was originally associated with the distance a site is located from the primary lithic outcrop (see Lowery 1992c). At that

time, Lowery (1992c) believed the farther a group traveled on its migratory pattern and the longer a group stayed away from the primary lithic resources, the more curated a tool kit would have become. Based on earlier observations, a cyclical movement pattern was proposed for prehistoric groups during the Paleoindian and Early Archaic periods (Custer 1990: 108-109; Lowery 1989a: 161-162; Lowery and Custer 1990: 111-114). It was thought that a cyclical movement pattern would explain the diversity and variation seen in the tool kits from Paleoindian and Early Archaic sites on the peninsula (Lowery and Custer 1990: 102-114).

Custer (1984a) has reported a Paleoindian preference for high-quality cryptocrystalline materials at sites on the Delmarva Peninsula. Lowery (1989a, 1989b, and 1992c) also indicates a preference for high quality cryptocrystalline materials; but non-cryptocrystalline materials, such as quartz and quartzite, are also present in local Paleoindian assemblages. Ninety-two percent of the Paleoindian assemblage from the Higgins site (Ebright 1992) was made from locally available non-cryptocrystalline quartz and quartzite cobbles. Twenty-five percent of the cultural diagnostics from the Clovis levels at the Cactus Hill site were manufacture from quartz and quartzite (McAvoy and McAvoy 1997: Table 7.1). In the Northeast, some researchers have suggested that Paleoindians were "addicted" to primary cryptocrystalline materials. The assertion that Paleoindians only used primary quarry-related stone to make tools is commonly noted in the published record. For example, Deller (1989: 209) notes "…Paleoindians relied almost exclusively on chert from <u>bedrock</u> sources for their raw material supplies rather than exploiting materials from secondary sources such as tills and stream beds."

Statements such as this have only fostered misconceptions about local Paleoindian lifeways. Even Ebright (1992: 243-244, 254-255, and 411) suggests that some of the tools and the waste debris associated with the Paleoindian levels at the Higgins site in Maryland are similar to cherts from the Normanskill formation in New York, jaspers from quarries near Fleetwood, Pennsylvania, and chalcedonies from the Williamson quarry site near Dinwiddie, Virginia. Using Ebright's (ibid.) data one could argue that Paleoindians in the Middle Atlantic were very mobile and traveled to these distant quarries or traded with other contemporaneous groups and acquired "exotic" non-local primary lithic materials. Unfortunately, Ebright (ibid.) failed to recognize the diversity of lithic materials within the local secondary cobble outcrops of the coastal plain. Lowery (2000) has demonstrated that "exotic" cherts, jaspers, and chalcedonies can be found within the local cobble outcrops of the Middle Atlantic Coastal Plain. Some of these local secondary cobble materials can resemble cryptocrystalline materials from distant primary outcrops. Ebright's focus (1992: 243-244, 254-255, and 411) on the "exotic" or "non-local" materials from the Paleoindian levels at the Higgins site is surprising considering that the diagnostic Clovis points and over ninety percent of the assemblage from the site are made of locally available quartz. Ebright even acknowledges (ibid: 243) that one of the quartz Clovis related bifaces exhibits cortex. Lowery's (2000) work on the Delmarva Peninsula suggests that regional Clovis groups utilized locally available secondary cobble sources and locally available primary Aquia formation orthoquartzites to manufacture their tool kits. Lowery (ibid.) would suggest that Clovis groups within the coastal plain were <u>not</u> traveling long distances to acquire bedrock materials for their

tool kits. Joseph McAvoy's work (personal communication: 3/27/00) in Virginia implies the same pattern. In other words, McAvoy (ibid.) and Lowery (2000) suggest that Clovis groups were local, had entrenched settlement patterns, and had restricted mobility patterns. The high density of Paleoindian diagnostic projectile points on the Delmarva Peninsula (see Lowery 1999 and 2000) and in southern Virginia (McAvoy 1992) clearly reinforces this observation. Lowery (2000) and McAvoy's (personal communication: 3/27/00) observations about Clovis age settlement and mobility patterns would have definite ramifications relative to the arguments related to pre-Clovis occupations within the Middle Atlantic region.

A variety of Paleoindian sites have been recorded on the Delmarva Peninsula and around the Chesapeake Bay (Dent 1995). Only one site on Maryland's portion of the Delmarva Peninsula has revealed sub-surface living floors and possible features (Lowery 1992c). A recent report has documented additional Paleoindian sites on the Delmarva Peninsula (Lowery and Phillips 1994). The Higgins site (Ebright 1992) represents the only other site in Maryland with excavated sub-surface living floors and possible features. The types of Paleoindian sites in the Chesapeake and Delaware Coastal Plains include base camps, hunting/procurement sites, secondary cobble quarry reduction sites, and isolated point finds. The differences between the forms of Paleoindian sites are based on the size and diversity of the tool assemblages found at each site. Unfortunately, the Paw Paw Cove site (Lowery 1992c) and the Higgins site (Ebright 1992) represent the only excavated Paleoindian sites in Maryland. It would be hard to assess the functional implications of sites that have produced surface fluted point finds without focused

excavation (Lowery 1999). Paleoindian sites have been found associated with the poorly drained soils around spring fed interior wetlands, the coastal plain terraces adjacent to freshwater interior streams, and the confluences of freshwater streams (Ebright 1992; Lowery 1997: 26-35).

Paleoindian sites in Maryland have not been found around the poorly drained, precipitation and aquifer fed "Carolina Bay" or "Bay/Basin" wetlands (Custer and Bachman 1986: 1-10). Jack Cresson (personal communication: 3/25/00) indicates that Paleoindian sites have been found associated with "Bay/Basin" features in the New Jersey Coastal Plain. Sassaman (1996: Figure 4.11) indicates that Paleoindians along the South Carolina Coastal Plain utilized "Carolina Bay" wetlands. Lowery's work (1989b, and 1992c) associated with the Paw Paw Cove site has revealed archaeological components situated within a poorly drained soils adjacent to a spring fed wetland. McAvoy's (personal communication: 6/30/99) recent work at the Williamson Paleoindian site in Virginia has revealed archaeological components situated within a poorly drained spring fed swamp. The presence of regional Clovis-age archaeological components within and around poorly drained spring fed wetlands may represent a regional settlement adaptation to the documented Clovis-age drought (see Dunbar 1991: 185-213; Gramly 1999: 32; Haynes 1991: 438-450, 1993: 219-236, and 1999; Laub and Haynes 1998; and Willig 1991: 91-118). Paleoindian sites, which reflect coastal adaptations and estuarine/coastal settlement patterns may exist on the continental shelf, but these sites would presently be inundated (ibid.).

## Early Archaic Period

Following the extinction of the Late Pleistocene fauna and the establishment of new environmental conditions, the human populations in the eastern United States began to adapt to a Holocene setting. Sea levels began to rise significantly as the ice sheets retreated. Between 10,000 and 9,000 radiocarbon years ago, changes have been observed in the archaeological record. Numerous Early Archaic sites have been found on the Delmarva Peninsula (see Custer 1986: 45-64; Lowery 1992a, 1992b, 1993b, 1994, 1995b, 1995c, 1996, and 1997; and Lowery and Custer 1990). Early Archaic sites have been found associated with the well-drained soils around spring fed interior wetlands, upland coastal plain terraces adjacent to interior streams, and the confluences of freshwater streams (Lowery 1997: 26-35). Contrary to Custer and Bachman's earlier studies (1986: 1-10), Early Archaic age components have been found associated with the well-drained circular ridges surrounding "Carolina Bays" or "Bay/Basins" (see Lowery 1997: 26-35). Early Archaic sites with coastal adaptations and estuarine settlement patterns may exist but these sites would presently be inundated (ibid.).

During the Early Archaic period a hunting and gathering lifestyle persisted. Unlike the Paleoindian period, a cyclical movement pattern has been proposed for the Early Archaic period (Lowery and Custer 1990). It is during the Early Archaic period that local groups seem to be extensively utilizing non-local primary cherts, chalcedonies, and jaspers. Stone tools and projectile points without any cobble cortex that resemble "Iron Hill" jasper have been observed in Early Archaic assemblages as far south as Watt's Island, Virginia. "Period specific" sites have provided the best data relative to

lithic utilization patterns. Both buried sites and surface sites can have "period specific" cultural affiliations. "Period specific" sites are those sites that have produced diagnostic projectile points associated with only one or a few related prehistoric periods. The limited number of diagnostic projectile points found at "period specific" sites suggest that the undiagnostic portion of the site's assemblage should be roughly the same age. Diagnostic Early Archaic projectile points and flake tool assemblages found at "period specific" archaeological sites suggest that cobble resources were also utilized. Even so, cobble utilization during the Early Archaic period is a minor component of the Early Archaic lithic reduction strategy. Varying degrees of lithic tool curation have been observed at several sites across the peninsula.

The Crane Point site (18TA221a), which is one of the largest Early Archaic assemblages reported within the Chesapeake coastal plain, provides the basis for many of the interpretations about the Early Archaic period on the Delmarva Peninsula. At the Crane Point site, numerous sidescrapers and endscrapers indicate that animals were butchered and processed at the site (Lowery and Custer 1990). The Crane Point site and other local Early Archaic Coastal Plain sites have produced rare and specialized flake tools that are more frequently documented at Early Archaic sites in South Carolina, Georgia, Florida, Alabama, and Mississippi. At least eight Waller knives (Geiger and Brown 1983; Goodyear, Michie, and Charles 1989; Lauro 1982; McGahey 1996; Purdy and Beach 1980; Purdy 1981; and Waller 1971) and six Edgefield scrapers (Goodyear, Michie, and Purdy 1980; Lauro 1982; Michie 1968 and 1972; and Purdy and Beach 1980) have been observed in local Delmarva Peninsula collections associated with sites

which have produced diagnostic Late Paleoindian and Early Archaic projectile points. These rare and specialized flake tools may indicate cultural affiliations between the Early Archaic groups on the Delmarva Peninsula and coastal plain groups in the Southeast. Grinding slabs, milling stones, and nutting stones indicate that plant resources were also processed at the Crane Point site (Lowery and Custer 1990). Other artifacts from the Crane Point site suggest that more diverse domestic activities were performed at regional Early Archaic sites. Large chipped stone adzes suggest that wooden items were manufactured, hematite lumps and red ochre stained grinding slabs indicate the use of pigments, and wedges and drills suggest that wood and bone items were manufactured. The tool assemblages from regional Early Archaic sites indicate a hunting and gathering lifestyle.

Even though researchers (Anderson and Sassaman 1996) have suggested both Paleoindian and Early Archaic groups practiced similar lifestyles, the Early Archaic occupants of the Delmarva area began to incorporate new technologies (i.e., chipped stone adzes, and plant processing tools) and practice different lithic reduction strategies (i.e., cyclical use of non-local primary lithic materials). During the Early Archaic period, projectile point styles also changed. Serrated and corner notched projectile points such as the Palmer, Charleston, Lost Lake, Decatur, Amos, Fort Nottoway/Thebes, and Kirk types are frequently found at Early Archaic sites on the Delmarva Peninsula. The changes in projectile points may represent a combination of non-local and local stylistic and functional influences. Data from the Delmarva Peninsula suggest that extensive trade in rhyolite or direct exploitation of the rhyolite quarries may have started during the

latter portion of the Early Archaic period (Custer 1986: 45-64). Custer (1986) notes that dense numbers of rhyolite artifacts appear within local Early Archaic assemblages. The presence of rhyolite would suggest direct acquisition and/or trade and exchange in non-local materials.

Unlike the Paleoindian period, some subsistence data is available for the Early Archaic period of the Delmarva Peninsula. A hearth feature from the Crane Point site contained hickory nut, butternut, acorn, amaranth, and chenopodium (Lowery and Custer 1990). The tool assemblage from the Crane Point site and the food remains from the hearth suggest a generalized foraging pattern during the Early Archaic period. A generalized foraging pattern and extensive utilization of plant resources have also been observed within the Early Archaic levels at the Cactus Hill site and other Early Archaic age sites in the Chesapeake Bay region (see McAvoy and McAvoy 1997, and Dent 1995).

## Middle Archaic Period

The Middle Archaic period (9,000 - 6,000 years B.P.) is one of the most poorly understood periods during the Delmarva Peninsula's prehistory. It is generally accepted that a hunting and gathering lifestyle persisted during the Middle Archaic period. Environmental change during the Atlantic episode created extensive interior wetland settings. Sea levels continued to rise (Colman, Halka, and Hobbs 1991), but were still significantly lower than the present. Pollen evidence indicates an oak-hemlock forest at the onset of the Atlantic episode (cf. Custer and Mellin 1989: 4-6; and Kellogg and Custer 1994). Numerous surface manifestations associated with the more diagnostic

Middle Archaic projectile points (i.e., MacCorkle, St. Albans, and LeCroy bifurcated points) have been found on the Delmarva Peninsula. Middle Archaic sites have been documented associated with the well-drained soils around "Carolina Bays", spring fed interior wetlands, upland coastal plain terraces adjacent to interior streams, and the confluences of freshwater streams (Lowery 1997: 26-35). Middle Archaic coastal adaptations and estuarine settlement patterns may exist but these sites would presently be inundated.

Between 9,000 and 8,000 years ago several distinctive projectile point types were being manufactured. The types include MacCorkle, St. Albans, and LeCroy (Broyles 1971). These early Middle Archaic types are easily recognizable because of their unique forms. From 8,000 to 6,000 years ago several projectile point styles were being manufactured that may not be as diagnostic or easily recognizable to the researcher. These styles include Stanly, Neville, Morrow Mountain, and the Guilford types of projectile points. Stewart (1998a), Stewart and Cavallo (1991), and Katz (2000) have recently reported triangular points from the deeply buried Archaic age levels at Abbott Farm and elsewhere. The scarcity of circa 8,000 to 6,000 year old Middle Archaic sites may not be because of low population densities but because of the lack of recognizable diagnostics (Jay Custer, personal communication: 8/20/92). Several of the Middle Archaic projectile point styles resemble later projectile point types and this may cause confusion.

Data from the Delmarva Peninsula suggests trade in rhyolite or direct exploitation of the rhyolite quarries continued during the Middle Archaic period. Rhyolite, a

distinctive non-local lithic material, appears with some regularity on the Delmarva Peninsula in Middle Archaic bifurcated point contexts (Stewart 1984b: 26; Custer 1989: 139). The closest source of rhyolite is located in western Maryland and in central Pennsylvania. The presence of rhyolite on the Delmarva Peninsula during the Middle Archaic period would indicate either direct procurement of rhyolite by native Delmarva groups or contact and trade with groups in areas where rhyolite outcrops.

Until stratified Middle Archaic sites are excavated on the Delmarva Peninsula, very little can be said about the tool kit variation associated with the region's Middle Archaic cultures. In areas outside of the Delmarva Peninsula other researchers have data relative to the tool kit variability during the Middle Archaic. Stewart and Cavallo (1991) discuss Middle Archaic tool kit variability for the Delaware Valley. Chapman (1973 and 1975) presents Middle Archaic tool kit data from excavated contexts in the southeastern United States. Within the Choptank River watershed, a single component Middle Archaic site has been located that may provide some data relative to Middle Archaic tool kit variability. A site (Lowery 1999) recorded during the Choptank River collection study (i.e., 18DO279 east) offers the best glimpse into the regional Middle Archaic tool kit. The shoreline assemblage from 18DO279 (east) suggests that regional groups had a micro-tool technology based on the bi-polar reduction of small pebbles and cobbles. The types of tools found at 18DO279 (east) indicate that regional groups had tool kits which included endscrapers, sidescrapers, spokeshaves, gravers, drills, bi-polar cores, micro-blade cores (?), utilized flakes, small bifaces, bifurcated projectile points, hammerstones, abraders, hematite, and ground stone adzes. The chipped stone tool assemblage from

18DO279 (east) suggests that flake tools, bifaces, and projectile points were manufactured from bi-polar flakes. Some plant processing tools are present in the assemblage from 18DO279 (east). The tool kit from 18DO279 (east) is almost identical to the excavated tool kit recovered by Chapman (1975) at the Rose Island site. Subsistence data are completely absent from local Delmarva sites, but it can be assumed that part of the diet consisted of plant foods similar to those which were found at the Crane Point site (Lowery and Custer 1990). Future work may help resolve some of the unanswered questions about the Middle Archaic period.

## Late Archaic Period

The Late Archaic period (6,000 - 3,000 years B.P.) is a period of continued environmental and cultural change. The environmental conditions during the sub-boreal episode indicate a warm and dry period with xeric forests and grasslands (Custer and Mellin 1989: 4-7; Kellogg and Custer 1994). By the end of the Late Archaic period sea levels, which had continued to rise, began to stabilize (see Colman, Halka, and Hobbs 1991). During the Late Archaic period, the archaeological record suggests that the Chesapeake Bay marine environment had established itself. Oysters, clams, and other shellfish had populated the middle reaches of the Chesapeake Bay. The environmental changes had an effect on the native populations of the region. Custer (1989) has recognized two cultural complexes: the Clyde Farm complex (5,000 - 3,000 years B.P.) and the Barker's Landing complex (4,000 - 3,000 years B.P.) on the Delmarva Peninsula

during the Late Archaic period. Both complexes reflect a focus on anadromous fish species and developing marine environments.

The technological aspects of each of these complexes are also very similar. Large broad blade knives, stemmed projectile points, steatite bowls, and early ceramics technologies are associated with regional Late Archaic period sites. The primary difference between the Clyde Farm complex and the Barker's Landing complex is related to the use of non-local lithic materials. During the Clyde Farm complex, the stone tool assemblages tend to be manufactured from local lithic materials acquired from regional cobble outcrops and silicified or iron cemented geologic strata. Cobble chert, jasper, quartz, and quartzite are the most common lithic materials found within Clyde Farm complex assemblages. Ironstone, which is found within the geologic layers of the coastal plain is also found at Clyde Farm complex sites. Silicified Miocene sandstone has also been observed within regional Late Archaic assemblages (Lowery 1998).

Custer (1982) has noted that based on the evidence provided by the Barker's Landing complex sites on the Peninsula, incipient ranked societies may have developed. The Barker's Landing complex appeared within the region around 4,000 years ago. The artifacts associated with the Barker's Landing complex are virtually identical to those found at Clyde Farm complex sites. The marked difference between the Barker's Landing complex and the Clyde Farm complex are the types of lithic materials utilized to manufacture stone tools. At Barker's Landing sites, exotic lithic materials were used to manufacture knives and projectile points. On the Delaware Bay side of the peninsula, Late Archaic age stone tools tend to be manufactured out of argillite. Argillite is a lithic

material that outcrops in the Delaware River valley, portions of New Jersey, and Pennsylvania. On the Chesapeake Bay side of the peninsula, stone tools tend to be manufactured out of rhyolite, a lithic material, which outcrops in western Maryland and central Pennsylvania. Custer (1989: 226) indicates that caches of argillite have been located at large Barker's Landing sites in Delaware. Most notable are the caches found at the Coverdale and Kiunk Ditch sites (Custer 1989: 230). Interestingly, the caches found in Delaware tend to include primary or early stage bifaces. Four caches associated with the Late Archaic Barker's Landing complex have also been found on the Chesapeake Bay side of the peninsula. The Chesapeake coastal plain caches tend to be manufactured out of rhyolite and they consist of secondary or late stage bifaces. Most notable is the cache found at the northern multi-component section of 18TA221b (Lowery 1992b: 24-25, and 1995d). The Chesapeake coastal plain caches also tend to have red ochre or powdered hematite in association with them. Hematite paintstones have also been found at Barker's Landing sites on the Chesapeake Bay.

The lithic data provided by the Barker's Landing sites on the peninsula indicate the presence of extensive trade and exchange or direct procurement in rhyolite, argillite, hematite, and steatite. The presence of caches of artifacts made of exotic lithic materials indicates a transformation from a technomic function to a sociotechnic function (Custer 1989: 230). Custer (1989: 230) also believes that the caches represent the emergence of a new type of symbol of social status. The combination of intensified food production, population growth, sedentary lifestyle, and the evidence of caches tend to indicate the presence of incipient ranked societies during the Barker's Landing complex (Custer

1982). The Barker's Landing complex marks the beginning of the social complexity that was to culminate during the Early Woodland period.

During the latter portions of the Barker's Landing complex, archaeological data indicates that shellfish, such as oysters, began to be exploited by the native inhabitants. At the Martingham site, Custer and Lowery, (n.d.) excavated a strata containing a thin shell midden, rhyolite broadspears, and steatite vessel fragments. The Martingham Habitation site is located on the Miles River, a tributary of Eastern Bay. The Martingham Habitation site represents the oldest terrestrial archaeological deposit, which suggests humans, within the region, were exploiting shellfish resources. By 3,000 years ago, the middle and upper portions of the Chesapeake Bay must have supported a shellfish population, which was utilized by the regions native inhabitants. Earlier archaeological evidence reflecting the use of shellfish by humans must surely be located on some ancient inundated shoreline terrace underneath the Chesapeake Bay. During the Late Archaic period, archaeological site settings reflect all of the nine settlement patterns defined by Lowery (1997: 26-35). The nine settlement patterns include settings on points of land, around coves, at stream confluences, around springs, along terraces adjacent to interior streams, on well-drained sand ridges, around bay-basin features, on knolls surrounded by estuarine wetlands, and adjacent to estuarine rivers.

## Early Woodland Period

The regional Early Woodland period (3,000 - 2,300 years B.P., see Dent 1995: 221) climates were important. Sea level continued to rise but at a very slow rate. The

marine environment of the Chesapeake Bay became firmly established. Extensive shellfish beds had developed and the marine environment became conducive to spawning fish (Custer 1988: 125). Stability of temperature and salinity conditions and the location of the brackishwater limits far upstream would have pushed spawning anadromous fish farther inland (Custer 1984b). Custer (1988: 125) notes that the coastal resources would have been richer, more predictable, and more extensively distributed than ever before. The terrestrial environmental record shows evidence of colder and wetter conditions during the Early Woodland period (Kellogg and Custer 1994: 98).

The Early Woodland period is characterized by the appearance of ceramic technologies. During the Late Archaic period, regional groups utilized stone bowls. Steatite bowls had to be brought or traded into the region from quarries located outside of the coastal plain (Brown n.d.; and Ward and Custer 1988: 33-49). During the initial portion of the Early Woodland period or terminal Late Archaic period, regional groups began to manufacture ceramic vessels. Several experimental ceramic types occur regionally (Custer 1989: 168-171). The regional terminal Late Archaic and Early Woodland ceramics include Marcey Creek, Ware Plain, Dames Quarter, Selden Island, Accokeek, Wolfe Neck, Popes Creek, Coulbourn, Nassawango, and Wilgus types. Ceramic technologies alleviated the burden of transporting heavy and fragile stone bowls. Ceramics permitted cooking directly over a fire (see Hulton 1984: Plate 44). Unlike stone bowls, ceramic vessels could be easily manufactured and replaced if damaged via the use of local clays. Various ceramic vessel types continued to be utilized throughout the entire Woodland period.

During the Early Woodland period (3,000 - 2,300 years B.P.), two cultural complexes have been identified on the Delmarva Peninsula (see Custer 1989). The Wolfe Neck complex is a distinctive Delmarva Peninsula cultural complex (Custer 1989: 253-256). Diagnostic artifacts associated with the Wolfe Neck complex include Wolfe Neck and Accokeek ceramics (Custer 1989: 171, 176) and their distribution indicates that Wolfe Neck sites occur throughout the Delmarva Peninsula (Custer 1989: 250). Subsistence data indicate that marine resources were heavily utilized during the time associated with the Wolfe Neck complex. Griffith and Artusy (1977: 5) note that periwinkle, mussels, clams, and oysters were utilized by the inhabitants of the Wolfe Neck site (75-D-10) in Delaware. Custer (1989: 255) speculates that as estuarine environments changed during the Early Woodland period, Wolfe Neck complex micro-band base camps moved to maximize the exploitation of the marine environment. The Wolfe Neck complex has settlement-subsistence systems that are similar to those noted for the preceding Clyde Farm complex (Custer: ibid.). Custer (1989: 256) has argued the presence of extensive shell middens during the Wolfe Neck complex is indicative of the processes of subsistence intensification that began during the Clyde Farm complex. Within the Chesapeake Bay, shellfish intensification and utilization may have started prior to the Early Woodland period. Evidence for pre-Early Woodland shellfish intensification would presently be inundated in the offshore areas of the Chesapeake Bay and the regional drowned tributaries.

Within the central portion of the Delmarva Peninsula, social complexity continued during the Early Woodland period. By 2,500 years B.P., the Delmarva Adena

complex was firmly established on the Delmarva Peninsula. The Delmarva Adena complex is expressed locally via exotic grave good and human burial associations. Three regional Adena related burial sites have been excavated (DeValinger 1970; Ford 1976; Thomas 1970, 1976; and Wise 1974). Other regional Adena related cemeteries have been discovered but not professionally excavated. Even the excavated cemeteries have only been minimally analyzed and published. The Delmarva Adena complex is regionally represented by salvaged cemetery assemblages, minimally excavated and published cemetery data, excavated living sites, and isolated surface finds.

The Delmarva Adena complex seems to be an interesting mix of exotic non-local and local items. Radiometric dates associated with the various local Delmarva Adena cemeteries indicate that the complex spans a long period of time (Custer et al. 1990: Figure 36). Based on radiometric data (ibid.), the Delmarva Adena complex is associated with a time interval between 2,750 years B.P. and 1,300 years B.P. Clearly, the Delmarva Adena complex is associated with both the Early and Middle Woodland periods. The span of time associated with the Delmarva Adena complex may explain the interesting mix of exotic non-local and local items.

Both Gardner (1982) and Custer (1982, 1987) suggest that during the Delmarva Adena complex a rudimentary “big-man” social organization with ranked kin groups appeared within the central portion of the peninsula. Exotic items from the Ohio Adena culture were being traded into the Delmarva Peninsula (see Stewart 1989). These exotic items are found at Delmarva Adena sites. The variety of exotic trade items sometimes included large flint bifaces, stone tube pipes, gorgets, pendants, stone paint cups, copper

beads, copper breastplates, cut sheet mica ornaments, pearls, boatstones, and birdstones (e.g., Ford 1976). Typically, the exotic trade items from the Ohio Valley are deposited in mortuary contexts on the Delmarva Peninsula. Caches and isolated finds of Adena artifacts have been found associated with regional habitation sites as well (e.g., Custer, Stiner, and Watson 1986; Lowery 1995a). The Delmarva Adena complex mortuary sites have some of the largest accumulations of Adena related items outside of the Adena heartland. Exotic non-local items are frequently found in association with locally manufactured items.

Delmarva Adena mortuary sites have been found within both watersheds of the Delaware and Chesapeake coastal plains. Custer (1989: 265-266) has proposed a ranking system for Delmarva Adena mortuary sites based on the size of the site and the quantity of Adena related artifacts found at each site. Major mortuary sites typically are large and have numerous Adena related artifacts in association with distinctive mortuary ceremonialism (Custer ibid.). Custer (ibid.) refers to these sites as major mortuary exchange centers. The major Delmarva Adena mortuary exchange centers would include the Sandy Hill site (Ford 1976), the St. Jones site (Thomas 1976), and the Frederica site (Thomas 1970). Custer (1989: 265) refers to small Delmarva Adena mortuary sites as minor mortuary exchange centers. Minor mortuary exchange centers typically have small accumulations of only a few different Adena related artifacts in association with distinctive mortuary ceremonialism (Custer, ibid.). The minor Delmarva Adena mortuary exchange centers include the Nassawango site (Wise 1974), the Killens Pond site (Thomas 1970), the West River site (Ford 1976), the Miles River site (Lowery 1989c)

and 18QU54 (Lowery 1992a). Isolated utilized and damaged Adena artifacts have also been recorded at habitation sites on the Delmarva Peninsula (see Lowery 1995a). Clearly, the most spectacular cultural remains have been found at the various mortuary sites located around the Chesapeake Bay. The spectacular non-local Adena related artifacts found at mortuary sites overshadows the fact that "less spectacular" locally made artifacts also occur in mortuary contexts. The locally made artifacts are equally important components of the Delmarva Adena complex. Ford (1976: 78) refers to a cache of twenty-four heavily burned, lanceolate, straight based points from the Sandy Hill site along the south side of Choptank River. Ford (ibid.) noted that he could not identify the type of lithic material represented in this cache. An examination of this cache (Lowery 1998) indicates these artifacts are made of Miocene silicified fossiliferous sandstone that is weathered and heavily ochre stained. Large primary outcroppings of Miocene sandstone are presently inundated at the mouth of the Choptank River (Lowery, ibid.). Mr. F. P. Williamson (personal communication: 10/21/99) commented that the cache of locally made bifaces were found in association with exotic non-local Ohio Adena artifacts at the Sandy Hill site.

At Delmarva Adena mortuary sites, a variety of burial treatments have been noted. Cremations are frequently noted and intentionally "killed" or mutilated artifacts associated with certain burials suggest status differentiation. Differential distributions of grave treatments and grave goods within cemeteries suggest the existence of ascribed status categories that crosscut age and sex (Custer 1988: 127). Lowery (1995a), in a study of isolated Adena artifacts, observed that "classic" Adena type blades or knives

show no utilization scars. Some of the large Adena blades or bifaces do show signs of isolated ridge wear along the high portions of each face. The isolated ridge wear would suggest the bifaces were carried long distances. Lowery (1995a) observed some Adena bifaces altered to local biface styles. Adena blades or knives were utilized only when they were accidentally broken or damaged by their owners. The distal portions of damaged Adena bifaces were converted into local point styles, whereas, the basal portions were resalvaged in an attempt to maintain the original form (ibid.). Lowery (ibid.) concludes that complete, unaltered, Adena blades functioned as "ideotechnic" artifacts within Delmarva Peninsula's Early Woodland societies. The "ideotechnic" unaltered Adena blades seemed to have served as status symbols and burial furniture for high-ranking individuals. When Adena blades were accidentally damaged before being used as burial furniture, the resalvaged basal portion of the biface functioned as a "sociotechnic" artifact. The converted distal portion of the biface functioned as a "technomic" artifact. Because the basal portion retained some of its original form, it served not only as a status symbol but also as a functional tool. The distal portion, having a completely altered shape and form, served solely as a functional tool. The highly altered distal ends of Adena bifaces were the most common isolated Delmarva Adena complex artifact found on regional archaeological sites. Lowery (ibid.) concludes that the "classic" Adena blade forms and the exotic lithic materials were viewed by local native groups as status symbols. Once the form was altered, the social and cultural value of the artifact was greatly devalued or reduced (ibid.).

Interestingly, the "exotic" items found within regional Delmarva Adena cemetery caches seem to be a diverse mixed variety of early (i.e., Adena "beaver-tailed" blades), middle (i.e., Cresap blades), and late (i.e., Robbins blades) Ohio Adena traits (see Ford 1976; and Dragoo 1963). "Exotic" non-Adena traits (i.e., pop-eyed birdstones, copper ear spools, and Copena style pipes) are also found within local Delmarva Adena cemeteries (see Lowery 1995a). Biface caches of quartz and silicified Miocene sandstone have also been found within regional cemeteries (see Ford 1976).

Delmarva Adena living sites have been discovered within the Chesapeake and Delaware coastal plains. Living sites typically have a few items manufactured out of exotic Ohio Valley lithic materials. But, generally a majority of the stone artifacts are manufactured out of local lithic materials. Ceramic remains, such as Coulbourn ware, Nassawango ware, and Wilgus ware, can also indicate the presence of a Delmarva Adena living site. The only excavated living site is the Wilgus site, which is located on a tributary of Indian River in Delaware. Remains from the midden areas of the site indicate the use of a wide variety of food resources. Marine resources, such as oysters, clams, and freshwater fish; terrestrial faunal resources, such as deer, turtles, and birds; and plant resources, such as Amaranth and Chenopodium were discovered within the midden features (Custer, Stiner, and Watson 1983). The Delmarva Adena complex represents a continued intensification of subsistence focused around the freshwater/saltwater marine resources associated with the Chesapeake and Delaware Bays. The Delmarva Adena complex represents a continued intensification of subsistence focused around the freshwater/saltwater marine resources associated with the Chesapeake and Delaware

Bays. During the entire Early Woodland period, regional archaeological site settings reflect all of the nine settlement patterns defined by Lowery (1997: 26-35).

## Middle Woodland Period

During the Middle Woodland period (roughly 2,300 - 1,000 years B.P., see Dent 1995: 221) two cultural complexes appeared on the Delmarva Peninsula. The environmental evidence indicates the occurrence of warm and dry conditions. Kellogg and Custer (1994: 98) indicate that after 2,000 years B.P. a dry interval occurred. Geomorphological evidence and soil analysis (Curry and Custer 1982; Custer and Watson 1987; Ward and Bachman 1987) suggest that stream flow patterns changed, aeolian erosion and deposition occurred, and minor and ephemeral streams were drying during this time. Sea levels had virtually stabilized by the Middle Woodland period and a common subsistence theme is a focus on especially productive estuarine and riverine environments (Custer 1988: 128). By 1,800 years B.P. a fissioning of communities is apparent on the Delmarva Peninsula, along with a disappearance of mortuary ceremonialism and extensive trade (ibid.).

The Carey/Late Carey complex (1,800 - 1,000 years B.P.) is one of the regional Middle Woodland cultural complexes. Diagnostic artifacts associated with Carey/Late Carey complex include Fox Creek points or knives, and Mockley ceramics. Sites associated with the Carey/Late Carey complex occur at numerous locations on the Delmarva Peninsula. Sites were situated at strategic locations along the entire length of the major drainages of both the Chesapeake and Delaware coastal plains. Carey/Late

Carey complex sites tend to be focused around estuarine and riverine resources. Regional Middle Woodland archaeological site settings reflect all of the nine settlement patterns defined by Lowery (1997: 26-35).

During the Carey/Late Carey complex, trade and exchange in lithic materials continued. Early or primary stage bifaces and late or secondary stage bifaces were traded into the Delmarva Peninsula. The early and late stage bifaces were manufactured out of rhyolite, argillite, Pennsylvania jasper, Normanskill chert, and small quantities Onondaga chert. The lithic material that was traded into the Chesapeake and Delaware drainages seems to have been for utilitarian purposes only. Carey/Late Carey complex caches of bifaces seem to have functioned primarily as utilitarian lithic reserves. The caches are typically associated with base camps (Lowery 1992b). The Carey/Late Carey complex caches are typically not associated with human burials. Cached bifaces are never intentionally "killed" or mutilated, and red ochre has never been observed associated with a biface cache. Therefore, unlike the Delmarva Adena caches, the Carey/Late Carey complex caches did not serve as symbols of status or wealth. The caches were primarily sources of lithic material with which knives, projectile points, and other tools could be manufactured. At some regional Carey/Late Carey complex sites, rhyolite flake debris associated with the reduction of early and late stage bifaces can be extensive (Lowery 1992b: 26).

The evidence provided by the Carey/Late Carey complex suggests a decline in social complexity (Custer 1989). Even though some settlements seem to resemble large single occupations, excavations at the Carey Farm site in Delaware suggest that they

represent seasonal reoccupations of the same site (Jay Custer, personal communication: 8/17/95).

Subsistence evidence for the Carey/Late Carey complex indicates a continued focus on estuarine or riverine resources. Sites along the Chesapeake Bay and its associated tributaries typically have massive shell middens and numerous shell-filled pit features. The sites with large shellfish refuse are typically situated adjacent to the rich estuarine environments associated with the Chesapeake Bay and its tributaries. Diagnostic Carey/Late Carey complex artifacts, such as Fox Creek type knives or projectile points and Mockley ceramics, have been found in association with other food remains within midden features. At the Carey Farm site, shellfish, deer, beaver, turtle, dog, muskrat, turkey, woodchuck, and hickory nuts were found within refuse features (Custer 1989: 277). At the Martingham habitation site, oysters, soft-shell clams, periwinkle, elk, and deer remains were found within a refuse filled pit-house (Custer and Lowery: n.d.). At 18QU256, Lowery (1993a) recovered oysters, soft-shell clams, razor clams, periwinkle, and deer from a midden that was deposited within a marsh. The dense refuse debris associated with regional Middle Woodland sites indicates a marine subsistence focus. But, other hunted and gathered resources also seemed to supplement the human diet.

By 1,300 years B.P., the Webb complex appeared on the Delmarva Peninsula. Webb complex sites are not common. Diagnostic remains associated with Webb complex sites include Jack's Reef projectile points, Hell Island ceramics, bone artifacts, large pentagonal bifaces, and steatite platform pipes. At least three mortuary Webb

complex sites have been recorded on the Delmarva Peninsula. The Riverton site (18WI5) has produced platform pipes, large pentagonal bifaces, pendants, bannerstones, and an array of both large and small Jack's Reef projectile points in association with mortuary remains (Jackson 1954; William Yates, personal communication: 3/20/92). The Oxford site (18TA3), which was analyzed by Custer and Doms (1984), produced two large pentagonal bifaces, a platform pipe, and many more Webb complex artifacts. Recent discoveries at the Oxford site have revealed a mortuary component with associated large pentagonal and triangular bifaces, Jack's Reef projectile points, an antler billet, and *Dentalium* shell beads.

Of all of the Webb Complex mortuary sites on the Delmarva Peninsula, the Island Field site has produced the most data about the culture (Custer et.al. 1990). The Island Field site, like both the Riverton and Oxford sites, has close ties to the cultures of the eastern Great Lakes region (Custer et al. 1990: 201-207). Custer et al. (ibid.) observed that the evidence from the Island Field site suggests that the society was egalitarian. Even though the society that established the Island Field site was probably egalitarian, there may have been a few individuals who held special status positions within the society (Custer et al. 1990: 192). A majority of the items found within the caches are utilitarian artifacts and do not indicate a socially stratified society (Custer et al. ibid.). The items, such as the various flint knapping tools, found at Island Field tend to be typical of grave goods associated with an egalitarian group rather than a complex society (Custer et al. ibid.).

The physical anthropological data indicate that during the Webb complex the society was mid-way between agricultural and hunting and gathering on the Delaware coastal plain (Custer et al. 1990: 199). At the Oxford site numerous shell filled pit features have been observed eroding from the shoreline. Some of the shell pit features have revealed diagnostic Webb complex artifacts (i.e., Jack's Reef projectile points). The evidence from the pit features found eroding from the Oxford site suggests that hunting and gathering may have formed the basic subsistence strategy on the Chesapeake portion of the Delmarva Peninsula.

The diagnostic traits of the Webb complex seem to show links with sites within the eastern Great Lakes region (Custer et al. 1990: 207). Diagnostic Webb complex artifacts also suggest ties to the Northeast. Jack's Reef points, bone artifacts, and platform pipes have been found at cemetery sites in central and western New York and southern Ontario (Ritchie 1980: 228-268). Custer et al. (1990) indicates that the Webb complex may represent an Algonquian migration from the eastern Great Lakes into the Delmarva area between 1,500 and 1,300 years B.P. A migration into the region would also explain the cultural links between the Webb complex and the Algonquian cultures of the Great Lakes region.

## Late Woodland Period

The Late Woodland period (1,000 - 400 years B.P.) marks some drastic changes for human populations on the Delmarva Peninsula. During the Late Woodland period the environmental conditions were essentially modern in character (see Custer and Mellin

1989: 4-7). Regional Late Woodland archaeological site settings reflect the entire nine settlement pattern types defined by Lowery (1997: 26-35).

Custer (1988: 131) has noted at least two forms of subsistence strategies for the Late Woodland period in the Middle Atlantic region. In some areas of the Middle Atlantic region, maize agriculture made its appearance by 1,000 years B.P. Sedentism is generally associated with the adoption of maize agriculture. Even so, the archaeological evidence from the Delmarva Peninsula indicates that maize agriculture did not locally play a major role in Late Woodland subsistence. Custer (1988: 131) observed that in the Delaware Coastal Plain some semi-sedentary villages are present with poorly developed maize agriculture and a coastal resource subsistence pattern. Recently, residues adhering to some fragments of Late Woodland prehistoric ceramics found at the Holland Point site (18DO220) on the Choptank River were tested for maize (Michael Stewart, personal communication: 5/20/99). The results of the tests suggested that maize residue was not present on any of the ceramics tested (ibid.) Even though bone and organics were well preserved, Walker (2000) has not found macro-botanical cultigen remains from the inundated midden at the Holland Point site. Therefore, some archaeological data associated with the Delmarva Peninsula suggests that some of the Late Woodland inhabitants did not practice maize agriculture (ibid.). Presently, it is not know how significant maize agriculture was to Maryland Coastal Plain groups. In general, Late Woodland subsistence patterns in the northern Delmarva Peninsula and within the Choptank River watershed seem to be focused on a mixed shellfish diet, an exploitation of fish resources, a utilization of wild plant foods, and a series of hunted faunal resources.

The regional Late Woodland diet may also have been supplemented with some maize agriculture. Rountree and Davidson (1997) indicate that corn was in use by the regional groups along the Virginia Eastern Shore at the time of European contact. More research needs to be focused on variations in local subsistence patterns during the Late Woodland period.

After the Middle Woodland period ended, long distance trade and exchange declined. The trade in rhyolite and argillite, which was so prevalent during the Carey/Late Carey complex, did not continue into the Late Woodland period. The breakdown in the trade and exchange of rhyolite and argillite coincides with an observed decrease in the procurement of these lithic materials at the quarry sites (Stewart 1984a, 1984b, and 1989). Within the Delmarva Peninsula, stone tools and bifaces are almost exclusively manufactured out of local cobble materials during the Late Woodland period. Limited trade and exchange of soapstone pipes may have occurred, but they have extremely spotty distributions and generally occur in Late Woodland burial contexts (Stewart 1989: 63). The disruption of trade and exchange in lithic materials occurred prior to 1,000 years B.P. in the Chesapeake and Delaware coastal plains. It has been suggested that during the late Middle Woodland period a migration into the peninsula area by groups from the eastern Great Lakes region may have disrupted the trade networks (Custer 1989: 310). Therefore, the social disruption associated with the appearance of the Webb complex may have marked an end to the exchange of rhyolite and argillite.

Associated with the regional Late Woodland period are several cultural traits that may not be practiced by earlier groups. One of these traits relates to a "new" hunting technology. After 1,000 years B.P., the Native American inhabitants of the Delmarva Peninsula manufactured predominately triangular projectile points. Custer (1989: 301) notes that the appearance of triangular projectile points indicates the introduction of the bow and arrow into the Middle Atlantic region. The bow and arrow does not appear in the archaeological record of the Arctic until after 4,500 years B.P. (Harp 1983: 134). Therefore, it is assumed that the bow and arrow were only recently introduced into the region.

During the Late Woodland period, various diagnostic Late Woodland ceramic types are associated with the Chesapeake and Delaware coastal plains. Also, during the Late Woodland period large mass graves or "ossuaries" have been observed (see Mercer 1897). Recently, Curry (1999) has provided an excellent summary of the Late Woodland aboriginal ossuaries in Maryland. Unlike the Early and Middle Woodland cemeteries found on the Delmarva Peninsula, "ossuaries" typically contain only human remains and lack "exotic" grave goods (see Curry 1999). Several ossuaries have been reported on the Delmarva Peninsula (Mercer 1897; Curry 1999; Richard B. Hughes, personal communication: 9/22/92; and Jay F. Custer, personal communication: 8/20/92). Ossuaries are also present on the Virginia Eastern Shore (David Hazzard, personal communication: 1/24/00).

Along the Virginia Eastern Shore, Rountree and Davidson (1997: 26-27) indicate that socially complex societies had developed during the Late Woodland period. The

Eastern Shore chiefdoms may have been limited to the Virginia portion of the Delmarva Peninsula. Custer (1989: 330-331) indicates that increases in sociocultural complexity did not occur in the lower Delaware Bay during the Late Woodland period. Custer's (ibid.) views may also apply to the Late Woodland groups along Maryland's portion of the Eastern Shore.

## Contact Period

The first explorations into the Middle Atlantic region have been highlighted by previous researchers (see Kraft 1989). The first known written account of the European landfall on the Delmarva Peninsula occurred in 1524. In 1524 a French explorer, Giovanni da Verrazzano landed at a place he named "Arcadia" (Kraft 1989: 7). According to Kraft (ibid.), "Arcadia" is probably present-day Accomack County, Virginia or Worcester County, Maryland. In his travels within the Delmarva Peninsula, Verrazzano and his crew may have explored the headwaters of the Pocomoke River. Records indicate that his group traded with the local natives. Because Verrazzano and his crew very well may have explored the area, made contact, and traded with the natives of "Arcadia", 1524 represents the first likely documented European contact on the Delmarva Peninsula. Even though earlier undocumented interactions between Europeans and Native Americans may have occurred, the Verrazzano exploration denotes the beginning of the contact period. The initial contact in one portion of the Chesapeake Bay coincides with continued Late Woodland lifestyles in other portions of the watershed. Early contact with the Native American groups of the Chesapeake Bay continued into the

late 16th century. On October 15, 1565, the Spanish governor, Pedro Menendez de Aviles wrote Philip II regarding the inhabitants of the Bay of Santa Maria (Chesapeake Bay) and his plans to occupy the area (Kraft 1989: 9).

By 1570, the Spanish had established a mission on the west shore at the foot of the Chesapeake Bay (Kraft 1989: 11). The success of the Spanish mission was short lived. On February 9, 1571, the Chiskiacs attacked the mission and killed the Jesuit missionaries (ibid.). The Spanish avenged the massacre of the Jesuits in August 1572 when they attacked the Chiskiac village and killed eight of the suspected murderers (ibid.).

Even though contact among Native Americans and Europeans occurred in the Middle Atlantic region during the 16th century, it is believed that very few archaeological sites with "diagnostic" early contact period artifacts would be associated with the initial period of European contact. A majority of the Native American contact sites would tend to be associated with the 17th century fur trade era. On the Delmarva Peninsula, contact sites from the 17th century are scarce. The few possible candidates for 17th century contact sites within the upper portion of the Delmarva Peninsula include 7NC-E-42 (see Custer and Watson 1985), the Arrowhead Farm site (Custer, Jehle, Ward, Watson, and Mensack, n.d.), the Locust Neck site (McNamara 1985), the Chicone site (Virginia Busby, personal communication: 10/18/95), the Indiantown Farm site (Lowery 1993b: 47), and 18QU292 (Lowery 1992a). In the Middle Atlantic region, one aboriginal site has been discovered that has European items associated with a late 16th century date. The Schultz site in Lancaster County, Pennsylvania is the earliest site in the

Susquehannock sequence of cultural development along the lower Susquehanna River (Kent 1989: 19-21). Scraps of cut-brass and brass spiral earrings from the site indicate either contact with Europeans or contact with groups who had early interactions with Europeans between A.D. 1575 - 1600 (Kent ibid.). Middle 17th century through early 18th century deeds and land patents from the Delmarva region occasionally record evidence about Native American constructed bridges and roads (Mayre 1934). Based on the evidence from the Middle Atlantic region (see Potter 1993: 161), it is suggested that the Contact period began circa 1525 and may have continued into the 17th century.

The utilization of agricultural resources by native groups increased during the period following European contact. As Europeans claimed portions of the Delmarva Peninsula and set up trading posts, the demand for land and "Indian" corn by Europeans increased. As a result, native groups were forced into smaller territories and became more sedentary. The sedentary groups recorded by Europeans during the mid to late 17th century relied much more on maize agriculture. Maize provided a stable food source for groups who could no longer move into European occupied areas (Thomas Davidson, personal communication: 3/15/92; Rountree and Davidson 1997). Maize also provided native groups with a commodity, which could be traded for European goods (ibid.).

## Historic Period

In respect to the history of the Virginia Eastern Shore, the details are much more regionally specific. Many volumes have been published which highlight aspects of the local history (see Wise 1911; Whitelaw 1951; Hatch 1957; Turman 1964). Each one of

these volumes covers the history of the Virginia Eastern Shore in great detail. The reader is advised to seek out these references for more in-depth data relative to the subject. Given the large volume of data, rewriting the history of both Accomack and Northampton counties would not do justice to the individuals, places, and the factors involved. The reader will also note that in the detailed historical volumes mentioned (see Wise 1911; Whitelaw 1951; Hatch 1957; Turman 1964) selective individual interpretations of the past are evident. The authors of each of these volumes emphasized certain individual aspects of the past and de-emphasized other aspects. As a result, neither of the historical volumes represents a holistic all-encompassing view of the history associated with the Virginia Eastern Shore. Future researchers and archaeologists are advised to conduct an analysis of the primary historical resources of the region, when focusing on an individual property, residence, place, or archaeological site. In keeping with the previous research conducted by Underwood and Stuck (1999), the history of the region can be categorized under several chronological headings. These headings are listed below and provide a chronological framework for Virginia's history. Much in the same fashion as the previously discussed prehistoric chronology, the historic framework represents recognized spans of chronological time. Obviously, the historic chronological periods have more documented details than the prehistoric periods previously discussed. From earliest to most recent the chronological periods are the: *SETTLEMENT TO SOCIETY (1607-1750)* period, *COLONY TO NATION (1750-1789)* period, *EARLY NATIONAL (1789-1830)* period, *ANTEBELLUM (1830-1860)* period, *CIVIL WAR (1861-1865)* period, *RECONSTRUCTION AND GROWTH (1865-1914)* period, and *WORLD WAR I*

*TO THE PRESENT (1914-2000)* period (see Underwood and Stuck 1999). Architectural, political, economic, and industrial events help to define these recognized historic chronological periods. Rather than present a bunch of disjointed historical facts that highlight certain "specific" historical aspects while negating others, the summary presented below is only a bare framework of the region's history. It should not be used as a basis for future historic research on the Virginia Eastern Shore.

Like the Jamestown settlement, the Virginia Eastern Shore has a very long English history. Prior to the English, other nationalities may have explored the region. In 1524 a French explorer, Giovanni da Verrazzano, landed at a place he named "Arcadia" (Kraft 1989: 7). Kraft (ibid.) believes that "Arcadia" is probably present-day Accomack County, Virginia or Worcester County, Maryland. Wise (1911: 4), evidently privy to additional data, suggests that Verrazzano landed ten miles north of Cape Charles. If Wise's (ibid.) assessment is accurate, the Virginia Eastern Shore was clearly one of the earliest European landing sites in North America. By 1603, there was a second attempt to land on the Virginia Eastern Shore by an Englishman. On the 29th of July 1603, Bartholomew Gilbert anchored a bark of fifty tons a mile off the Eastern Shore of Virginia (ibid.). In need of water and fuel, a group including Gilbert landed on the shore. Indians attacked the group killing Gilbert and one of the landing crew (ibid.). Clearly, other explorers had seen the region, which would later become Virginia's Eastern Shore. John White's 1585 map of the region (Hulton 1984: Plate 59) shows a point or peninsula north of the entrance to the Chesapeake Bay. The point or peninsula would represent the

southern extension of Northampton County. White's map (Hulton 1984: Plate 60) also denotes some native villages along the southern end of Northampton County.

By 1608, the Virginia Eastern Shore had been surveyed by John Smith. The results of Smith's survey were published in his famous and often reproduced 1612 "Map of Virginia". Smith's map is very generalized. Even so, it provides a better view of the Virginia Eastern Shore than White's 1585 map. Smith illustrates only a few small tributaries along the Eastern Shore peninsula. His map does document the presence of two Indian villages. One village is identified as Accowmack and it was located near the southern end of the peninsula. The second village is identified as Accohanock and it was located somewhere near the present Occohannock Creek. Underwood and Stuck (1999: 7) speculate that the Accowmack village was located near Cape Charles possibly along Sanderson Point and associated with Cherrystone Inlet. Turner and Opperman (2000) are attempting to document the exact locations of both sites along the Virginia Eastern Shore.

The first documented settlement or use of the region by Englishmen occurred in 1614 when the Virginia Company sent Lt. William Craddock to the Eastern Shore to purchase land from the Indians to provide salt and fish for the Jamestown settlement. By 1616 "Dale's Gift" had been established near Old Plantation Creek (Wise 1911: 22). Salt was extracted by boiling the briny saltwater of the region. Turman (1964: 8) provides an overview of the salt extracting process. The first permanent settlement appears to date to circa 1619, when Thomas Savage moved to what became known as Savage's Neck. Indeed, Thomas Savage and the native Indians of the Eastern Shore

helped alleviate the problems facing the Jamestown Colony during the 1622 "Starving Time". Turner and Opperman (2000) discuss the Virginia Eastern Shore with respect to the Virginia Company settlements on the shore and Powhatan-English interactions. By the late 17th century, the Virginia Eastern shore had a substantial population of English colonists. The number of settlements is evident on Augustine Herrman's (1670) map of "Virginia and Maryland" (Figure 15). Herrman's map delineates at least 150 English settlements along the Chesapeake Bay side of the Virginia Eastern Shore.

Herrman's map is surprisingly accurate and shows most of the region in great detail. The map clearly portrays the 1668 boundary between Maryland and Virginia defined by a row of trees running across the Eastern Shore from the Atlantic to the Bay. It is evident that lands to the north of this boundary would later be included and incorporated into modern Accomack County. It is also evident that most of the names for the islands, creeks, and necks associated with the region have not changed. Saxis Island is defined on the map as "*Sicocex Ile*". The peninsula leading to Saxis Island and areas up to Pitts Creek on the Pocomoke River would later be annexed into Accomack County. Comparing the Herrman map to modern maps of the Virginia Eastern Shore clearly reflects the accuracy of Herrman's work. Muddy Creek "*Moddy Cr*"; Guilford Creek "*Gildfore*"; Watts Island "*Wats Ile*"; Chesconessex Creek "*Chissonossick*"; Onancock Creek "*Onankok*"; Nandua Creek "*Nantue*"; Craddock Creek "*Craddick*"; Occohannock Creek "*Accahanock*"; Nassawadox Creek "*Nasswatticx*"; Hungars Creek "*Hungars*"; Savage Neck "*Savith Neck*"; Cherrystone Inlet "*Cherriston*"; Kings Creek "*Kings Cr*"; and Old Plantation Creek "*Old Plantat Cr*" are defined in their proper position and

location. Given the fact that Herrman's map plots the location of 17th century residences, his map should provide researchers with an early glimpse into the distribution of settlements within both counties.

In 1663 Virginia's Eastern Shore was divided into two counties: Accomac and Northampton. Representatives of both counties were present at the House of Burgesses' session held on September 10, 1663 (Wise 1911: 166). The division line established between the two counties initiated grievances among the peoples Northampton County. Feeling cheated out of land, the people of Northampton were upset that Accomack County's territory was twice as large as Northampton's (ibid: 172). Initially, court for the "new" county of Accomack was held at the tavern of John Cole in Pungoteague (ibid: 175-176). By 1680 a court was to be constructed at Onancock. Onancock was the seat of Accomack until 1786 when a courthouse was constructed in the "new" town of Accomac or Drummondtown (ibid: 233). The first courthouse of Northampton County was established at Town Fields on the north side of Kings Creek (Turman 1964: 66). In 1677 the people of the northern part of Northampton County petitioned for a new centrally located courthouse. By 1690, a new Northampton County courthouse had been constructed in Eastville. Robert Alexander's 1781 map (Figure 16) clearly reflects the importance of the courthouses to the region. The roads into the Virginia Eastern Shore from Snow Hill, Maryland intersect the towns with courthouses. In 1781 Accomack County's courthouse was located at Onancock and Northampton's courthouse was located in Eastville. Alexander's map (Figure 16) shows a primary road intersecting the

Figure 15. Augustine Herrman's 1670 Map of *Virginia and Maryland* Showing the Virginia Eastern Shore.

towns on the shore with courthouses. A secondary highway extends to the east of the main road to an undesignated town. The undesignated town may be the site of Accomack County's new courthouse in the town of Accomac or Drummondtown.

During the 17th, 18th, and 19th centuries, the northern boundary between Virginia's Eastern Shore and Maryland was contested. The controversies about this boundary began in the mid to late 17th century when Edmund Scarburgh of Accomack County contested that the boundary between Maryland and Virginia was actually defined by the Wicomico River (Torrence 1973). By the mid to late 17th century, Somerset County in Maryland included those lands between the modern Pocomoke River and the modern Wicomico River. The supposed confusion about the boundary was associated with John Smith's 1612 map of "Virginia". Smith plotted two prominent localities whose locations were contested during the mid to late 17th century and 19th century. The boundary between Maryland and Virginia on the Delmarva Peninsula was established by "*Watkins poynt*" east to the "*Wighco flu*". Considering the inaccuracies of Smith's 1612 map, controversies about the boundary were bound to occur. Lord Baltimore's charter only vaguely drew a southern boundary from where the Potomac River discharges into the Chesapeake Bay "and from thence, by the shortest line, as far as the promontory of place called Watkins' Poynt, [and then by] a right line drawn from the promontory or head of land called Watkins' Point, beside the Bay aforesaid, situate near the river of Wighco, on the west as far as the great ocean on the eastern coast" (Report and Journal of Proceedings of the Joint Commissioners 1874: 219-220). By the mid to late 17th century, the "*Wighco flu*" had been renamed the Pocomoke River. A small river not on Smith's

map and twenty miles farther north in Maryland had been named the Wicomico River. "*Watkins' Poynt*" remained somewhere along Tangier or Pocomoke Sound. Edmund Scarburgh in an attempt to gain more lands for Virginia contended that the Wicomico River was Smith's "*Wighco flu*", not the Pocomoke (Torrence 1935). Scarburgh's claim would mean that most of the areas in Maryland defined as Somerset County were actually part of Accomack County, Virginia. In the mid 19th century, the actual location of Watkins' Point was questioned. Lieutenant N. Micher and John de la Camp's 1860 map of the "Southern Boundary of Maryland" contended that Smith's 1608 Watkins' Point locality was situated on the south end of Jane's Island in Somerset County (Papenfuse and Coale 1982: Figure 135). Even so, the western boundary line at the mouth of Pocomoke Sound in Micher and Camp's 1860 map suggested that all of Smith Island belonged to Maryland. The eastern boundary line along the Pocomoke River in Micher and Camp's map firmly established the modern boundary. The arbitration of 1877 decided on a broken western boundary line that gave some of Smith Island to Virginia and some to Maryland (ibid: 118). It is ironic that the Virginia Eastern Shore had been settled by the English for almost 400 years, but its political boundary was not established until roughly 125 years ago.

The Virginia Eastern Shore economy was primarily oriented towards an agricultural based lifestyle from the 17th century through the present. By the 19th century, a railroad system was planned for both counties. In 1855 a survey was made through the Virginia Eastern Shore for a rail line from Snow Hill, Maryland to Eastville (Turman 1964: 179). It was not until 1884 that the railroad line was constructed and operating.

The railroad was completed as part of the New York, Philadelphia, and Norfolk line to the town of Cape Charles in early May 1884 (Turman 1964: 199; Whitelaw 1951: 43). Steamer services were also established by the late 19th century. Improved long-distance transport increased the demand and production of regionally perishable seafood products and shifted farming towards "truck crops". By the late 19th and 20th centuries, industry and tourism were part of the Virginia Eastern Shore lifestyle. The completion of the 17.6 mile-long Chesapeake Bay Bridge Tunnel in the late 20th century made transport to mainland Virginia very easy. As a result, steamboat and ferry transport pretty much ceased after the construction of the bridge-tunnel. Ferry transport continues to destination points such as Tangier Island and Smith Island in northwestern Accomack County. The tourism industry has increased within the region. Sportfishing and the demand for vacation homes have also increased. Labor-intensive agriculture, which dominates both Accomack's and Northampton's entire 400 year history, remains a significant part of the modern Eastern Shore lifestyle.

The Virginia Eastern Shore was at one time the frontier of the English-speaking New World. As time passed, the frontier boundary obviously shifted westward. Relative to the New World, the Virginia Eastern Shore region as a whole experienced numerous firsts. The water associated with the Pocomoke River and the Pocomoke Sound interface was the location of the first naval engagement between English speaking peoples on the waters of North America. In 1635 a naval battle between the Maryland colony and a Virginian named William Claiborne occurred at this location (Hopkins 1991: 3). The first dramatic performance in the New World was held at Folkes Tavern in Pungoteague

(Turman 1964: 66). On August 27, 1665, three local men presented a play called "The Bear and the Cub" at the tavern (ibid.). It is evident that the region maintains a rich historic heritage. Unfortunately, within the confines of this report only certain aspects of the past can be highlighted. The historic summary that is presented was a brief attempt to highlight when Europeans first explored the Virginia Eastern Shore, when the English first settled the region, how regional names have remained constant over the entire history, when political institutions within the region were defined, how the boundaries between Maryland were established, and how transportation influenced the area. The historian, reader, researcher, and interested layperson should refer to Wise 1911; Whitelaw 1951; Hatch 1957; and Turman 1964 for more specific aspects of both Northampton County and Accomack County history.

## Previous Archaeological Work Within the Coastal Areas of Accomack and Northampton Counties

The study area for the present survey was focused only along the shorelines of both Accomack and Northampton counties. Accomack County has a total of approximately 459 officially documented archaeological sites recorded in the Archives Division of the Department of Historic Resources in Richmond. Northampton County has a total of approximately 419 officially documented archaeological sites recorded at this same institution. Of the 878 archaeological sites documented for the Virginia Eastern Shore, 32 previously recorded sites in Accomack County and 54 previously

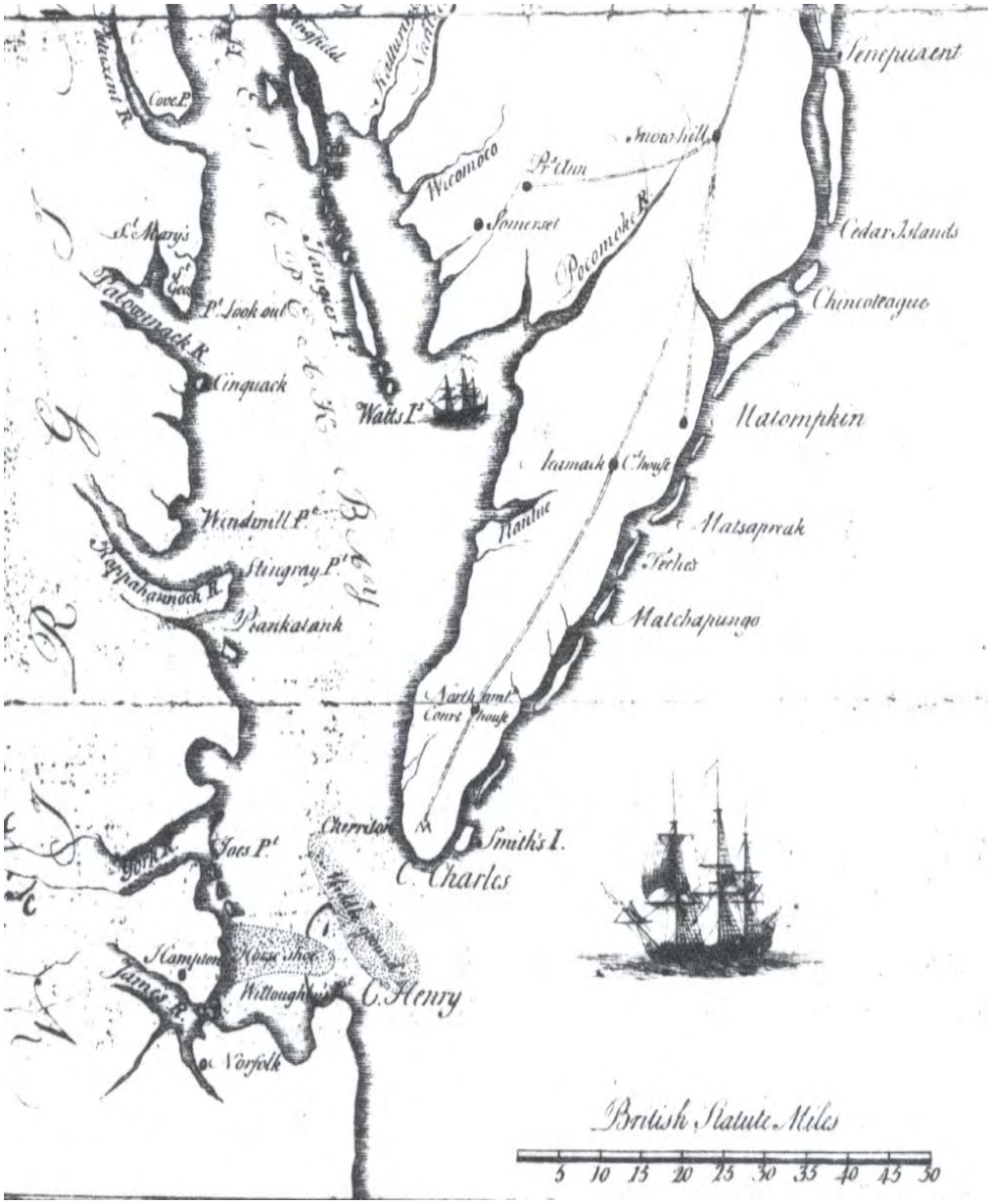


Figure 16. Robert Alexander's 1781 *Map of the Delmarva Peninsula* Showing the Road Systems on Virginia's Eastern Shore.

recorded sites in Northampton County were noted within the shoreline study area. The data for these sites are presented in Table A.1 and Table A.2. Figure 17 roughly plots the locations of the sites listed in Table A.1 and Table A.2. The total of 54 sites noted in Northampton County along the shoreline coastal zone is at odds with the total presented by Underwood and Stuck (1999: 17). Underwood and Stuck (ibid.) indicate that 137 sites in Northampton County are potentially undergoing erosion. Underwood and Stuck (ibid.) conducted no actual shoreline research within Northampton County. The present shoreline survey concluded that 61 of the sites reported by Underwood and Stuck (ibid.) as erosive were actually situated inland from the Chesapeake shoreline and located in non-erosive environments. The remaining 22 sites reported by Underwood and Stuck (ibid.) were located along the Atlantic side of Northampton County and out of the present study area. The sites listed in Table A.1 and Table A.2 are considered to be within the study area and located along or immediately adjacent to shorelines. The data in Table A.1 and Table A.2 basically summarize the previous research focused within the Chesapeake coastal study area of Accomack and Northampton counties. Table A.1 and Table A.2 list each site by number, provides general quadrangle level location information, summarize the cultural chronologies expressed at each site, list who recorded the site, and when the site form was completed. It is apparent with the sites listed in Table A.1 and Table A.2 that the cultural chronologies expressed at these sites are poorly understood. It would seem that the distribution of the documented eroding sites (Figure 17) suggests more erosion is occurring along the bay side of southern Accomack County and along most of the bay shorelines of Northampton County. The

data in Figure 17 are more of a reflection of where previous researchers have focused their survey efforts than a reflection of intense erosion or actual density of archaeological sites.

Previous research within the study area is relatively limited. Mark Wittkofski (1982 and 1988) conducted the most extensive and the most focused archaeological survey within the Eastern Shore of Virginia. It is evident in Table A.1 and Table A.2 that he recorded the largest number of archaeological sites within both counties. Blanton and Margolin (1994) have summarized the underwater archaeological resources for the region. Morgan et al. (1997) focused their efforts around salvage excavations at historic barrel well features found along the eroded shorelines of Church Neck. Archaeological survey along Old Plantation Creek and King's Creek by McSherry, McCartney, Hodges, and Lounsbury (1993) documented several sites along eroding shorelines. Rountree and Davidson's (1997) book, though pertinent to the region, mainly focused on archival data and research relating to the regional Native Americans immediately before and after European contact. Underwood and Stuck's (1999) erosion study for Northampton County did not result in any extensive fieldwork. Their (ibid.) report only attempted to assess the erosion threat to archaeological sites via archival research. From the information presented, it is evident that very little supplementary work has been conducted on those previously recorded sites listed in Table A.1 and Table A.2.

Figure 17. Locations of the Previously Documented Archaeological Sites Along Accomack County's and Northampton County's Chesapeake Bay Shoreline.

# CHAPTER 5

# RESULTS

The survey produced several forms of data that are essential to cultural resource managers, historians, and archaeologists. The survey provided field data that can help gauge the level of shoreline erosion along the Chesapeake Bay shorelines of both Accomack and Northampton counties. The survey located 108 archaeological sites with cultural data which span the past 13,000 years. The survey also produced information relative to the problems associated with the use of survey data to recreate or reconstruct ancient lifeways. The following discussion highlights these topics.

## Assessments of Shoreline Erosion on the Virginia Eastern Shore

Previous assessments of the shoreline erosion on the Virginia Eastern Shore have been limited (see Underwood and Stuck 1999). Underwood and Stuck's (ibid.) assessment was based on a very limited amount of fieldwork along the Atlantic side of Northampton County and conversations with local informants. They (ibid: 26) indicate that the local informants make it clear that erosion is most severe on the Chesapeake Bay. My previous experience in Maryland clearly implies that local informants think every section of land adjacent to a body of water is eroding! Local informants have also been known to greatly exaggerate the degree of shoreline erosion. There are more accurate ways to quantify the erosion of a given area than summaries based on hearsay. There are also better ways to quantify erosion than relying solely on a single field examination of a small part of a region's shoreline. The previous discussion in Chapter 3 highlights the

numerous variables involved in shoreline erosion. The following summary will highlight the ways to assess erosion prior to fieldwork and how to assess erosion while in the field. An accurate erosional assessment of an area should primarily be based on shoreline field examinations. Data will also be presented on how research can be used to gauge erosional threats due to sea level rise. The summary will also attempt to assess erosion along the Eastern Shore of Virginia's Chesapeake Bay shoreline. Erosional assessments were based on the continuous field examinations conducted during this project.

One of the best ways to assess the degree of shoreline erosion in and around the Chesapeake Bay prior to fieldwork involves the examination of historic maps. Unfortunately for the Chesapeake Bay region, accurate and detailed maps required for an assessment of shoreline erosion were not made prior to the mid-19$^{th}$ century. It would be futile, if not worthless, to compare Augustine Herrman's 1670 (see Figure 15) map to the modern shoreline to gauge the degree of erosion in the study area. Herrman's map, though accurate for its time, does not have the level of accuracy or scale to be useful for erosional assessments of the Virginia Eastern Shore. By the mid-19$^{th}$ century, the United States Coastal Survey produced a series of maps that provide the earliest and most accurate data to gauge shoreline erosion. These maps not only provide dimensional land data, but they also delineate tidal marsh, forested areas, tilled fields, hedgerow boundaries, houses, orchards, sand beaches, cemeteries, salt works, and even in rare cases duck blinds. These maps are essential resources for shoreline studies.

Figure 18 illustrates a small section of a United States Coastal Survey map conducted in 1849. The area encompassed in Figure 18 is the coastal area of Rumbley

and Frenchtown in Somerset County, Maryland. Rumbley and Frenchtown are situated at the confluence of the Manokin River and Tangier Sound. The area is highly exposed and subjected to wind and wave activity. In Figure 18, it is evident the level of detail portrayed in these early maps. Rumbley and Frenchtown include a series of dry "Carolina Bay" ridges surrounded by saltwater tidal marsh. In the past, these saltwater marshes were freshwater interior wetlands when sea levels were lower. Late Holocene sea level rise inundated the freshwater wetlands and radically changed the ecology of the region. The ecological and environmental setting of the Rumbley-Frenchtown area is almost identical to the inundated "Carolina Bay" features in northwest Accomack County (see Figure 6). With the level of detail portrayed in Figure 18, the extent of the land area can be accurately defined, the extent of tidal marsh can be defined, the extent of dry land surfaces with tilled fields and forests can be defined, and the marginal areas fringing tidal marshes and forested ridges can be defined. Basically, the image in Figure 18 is like a mid-19$^{th}$ century aerial photograph of the Rumbley-Frenchtown section of the Delmarva Peninsula. Comparisons with later maps of the same region help gauge the level of shoreline erosion.

Figure 19 is a small section of the 1989 U.S.G.S. 7.5' minute quadrangle illustrating the same area shown in Figure 18. A comparison between Figure 18 and Figure 19 indicates that the Rumbley-Frenchtown area has experience mild erosion over the past 140 years. As previously mentioned, the Rumbley-Frenchtown area is very

Figure 18. A Section of an 1849 United States Coastal Survey Map (T-270) Illustrating Inundated "Carolina Bay" Features Near Rumbley and Frenchtown, Somerset County, Maryland.

exposed and subjected to wind and wave activity from Tangier Sound and the Manokin River. Only those areas north and west of the "*A Hill Camping Area*" in Figure 19 have been eroded. Even so, the extent of erosion over the 140-year interval is limited. Like the Virginia Eastern Shore, offshore sand bars have acted as breakwaters and curbed the erosion of the otherwise exposed coastal areas of Rumbley and Frenchtown.

Researchers have attributed high rates of erosion along shorelines in the Chesapeake Bay to increased sea-level rise over the last 100 years (Ward et al. 1989: 8-10). Therefore, the factors associated with the recently reported acceleration in sea level rise would be important in accessing erosional threats to archaeological resources. These researchers have postulated between 1 foot and 1.5 feet of sea-level rise over the past 100 years (ibid.; and Leatherman 1996). Ward et al. (1989: 10) have carried the sea-level rise variable to catastrophic proportions. They (ibid.) indicate with 1 foot of sea level rise along the lowlands of the Eastern Shore the horizontal erosion of the shoreline could exceed 1,000 feet in a century. Ward et al. (1989) failed to recognize that shorelines can erode extensively along the Eastern Shore with zero sea level rise. If the variables presented in Chapter 3 are applicable, shorelines can recede great distances in short periods of time or stay constant over long periods of time. The reason for accelerated shoreline erosion along some portions of the Eastern Shore has more to do with the fact that the Delmarva Peninsula consists of unconsolidated parent sediments, than it does with increased recent sea level rise.

A comparison between the images presented in Figure 18 and Figure 19 clearly indicates a lack of sea level rise over the past 140 years. In the present, the Rumbley and

Frenchtown area is topographically very low (see Figure 19). In the past, the Rumbley and Frenchtown area was also topographically very low (see Figure 18). It is evident in both figures that the shorelines have not receded 1,000 feet or more over the last 140 years. Equally important, the distribution and total area of dry non-tidal marsh ridges in the Rumbley-Frenchtown region have not changed over the 140-year interval.

The extent of tidal marsh and dry coastal non-tidal landforms over time is an important factor gauging sea level rise. Tidal marshes grow vertically as sea levels rise (Darmody and Foss 1978). Non-tidal forested landforms (i.e., ridges and knolls) will eventually be covered by tidal marsh soils and salt-loving marsh plants (i.e., halophytes) as sea levels rise. Therefore, the ridges delineated in Figure 18 during the 1849 survey should have disappeared or been greatly reduced in size if sea levels had risen 1 foot to 1.5 feet over the past 140 years. A comparison between the ridges and tidal marshes delineated in Figure 18 and in Figure 19 does not show any losses or gains to both of these land features. This is significant considering that the ridges are also topographically low. Therefore, the radical sea level rise suggested by Ward et al. (1989) and Leatherman (1996) for the Chesapeake Bay is not evident along some of the lowland portions of the Eastern Shore. Interestingly, other lowland sections of Maryland's Eastern Shore show the same pattern expressed at the Rumbley-Frenchtown locality. Along Slaughter Creek in Dorchester County, Maryland and within the Horsehead Wetland portion of Queen Anne's County, Maryland virtually no losses of upland low non-tidal ridges are evident when the 1849 coastal surveys are compared to modern surveys. Therefore, increased erosion as a result of recent accelerated sea level rise

seems to be totally unfounded. Even so, inundation as a result of localized subsidence is evident along some portions of the Delmarva Peninsula (Ward et al. 1989: 28).

There are various ways to assess shoreline erosion while in the field. There are some obvious features that can suggest a region has either erosional shorelines or non-erosional shorelines. As mentioned in the section on the factors influencing shoreline erosion, it is not effective to categorize a large shoreline as either erosive or non-erosive. Even the most eroded shorelines may have areas of sediment accretion. Sediment accretion along a given stretch of shoreline can be ephemeral or long-term. The duration of sediment accretion plays a major role in the stability of a shoreline.

Figure 20 illustrates a typical section of shoreline along Nandua Creek in Accomack County. The eroded tree roots and stumps in the foreground of Figure 20 are the obvious features, which suggest parts of this shoreline are eroded. Wave energy has removed all of the sediment that originally surrounded the tree roots and exposed the trees to saltwater. Exposure to saltwater resulted in the death of the trees. Also, note in the foreground of Figure 20 the parent A and B soil horizons are completely exposed and only covered by limited quantities of redeposited sand. In the background, the quantity of redeposited sand increases dramatically and the shoreline has a very low slope. In the far background, tidal marsh plants have begun to stabilize the redeposited sand. In essence the shoreline pictured in Figure 20 represents an interaction between erosion, redeposition, accretion, and stabilization. Is the shoreline pictured in Figure 20 erosive or non-erosive? How would you categorize the shoreline if you could only apply one term

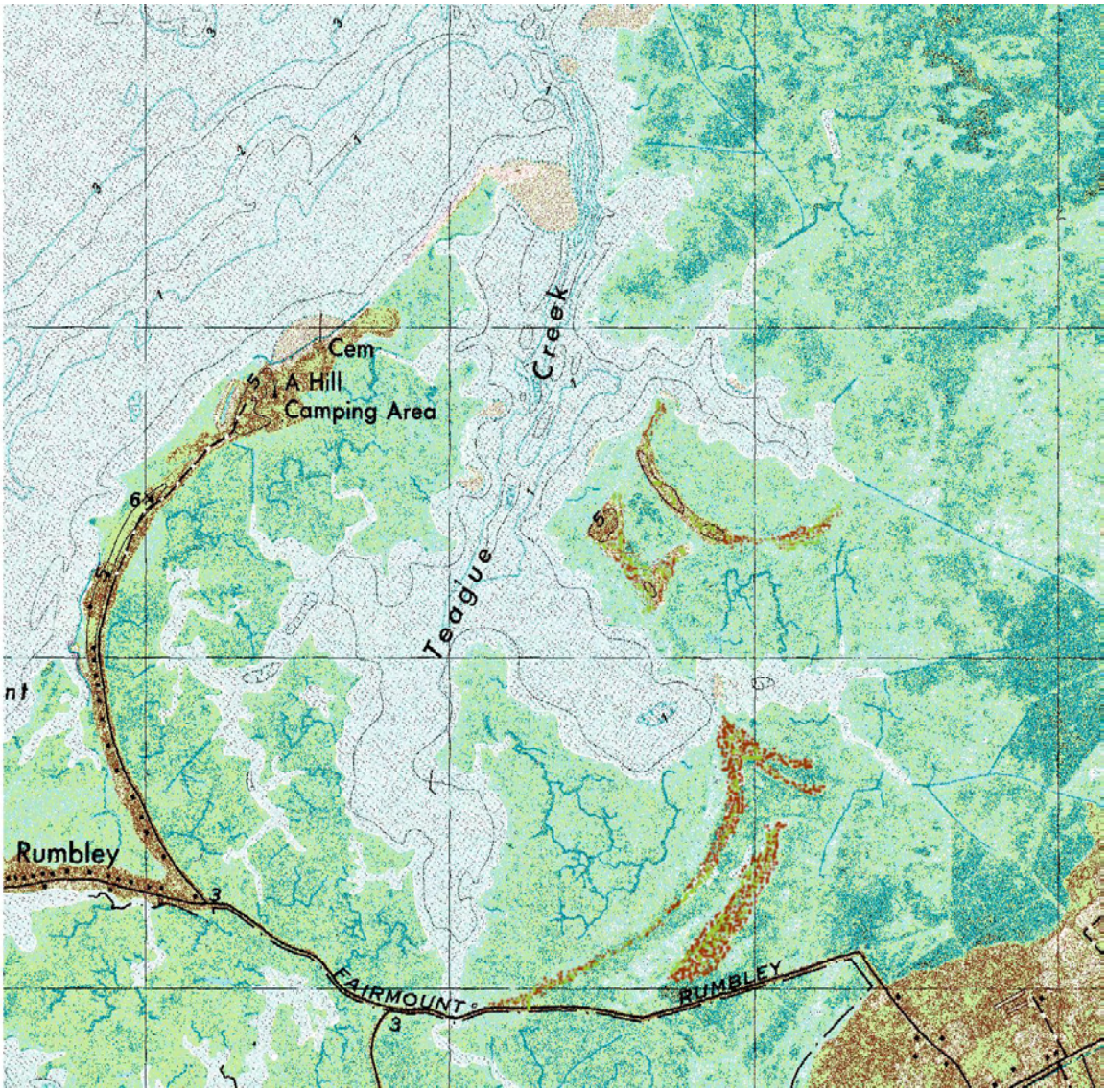


Figure 19. A Section of the 1989 U.S.G.S. 7.5' Minute *MARION* Quadrangle Illustrating the Inundated "Carolina Bay" Features Near Rumbley and Frenchtown, Somerset County, Maryland.

to this section of shoreline? The various degrees or levels of shoreline erosion (i.e., slight, moderate, high, and severe) are defined by Ward et al. (1989: 76). Ward et al. (ibid: 84) categorized this section of Nandua Creek as having slight to moderate erosion. The categorization of the shoreline in Figure 20 as having slight to moderate erosion would imply that its annual erosion rate was between 1 to 3 feet per year (ibid: 76). The shoreline in the foreground of Figure 20 may indeed have an erosion rate between 1 and 3 feet per year. But, the shoreline in the background is accreting and becoming stabilized.

The most obvious features suggesting that the shoreline in Figure 20 is erosive are the eroded tree stumps. The exposed tree root systems in Figure 20 are evenly distributed around the base of the trunk. The patterns expressed in the root systems of trees represent an adaptation for stability, nutrient extraction, water extraction, and weight distribution (Norman K. Brady, personal communication: 4/20/99). The root patterns suggest the trees were surrounded by soil when they initially grew. The close-up image of an eroded tree along Savage Neck in Northampton County (Figure 21) shows the same pattern expressed along the Nandua shoreline (Figure 20). The tree in Figure 21 also suggests that it was surrounded by soil until the sediment was removed by shoreline erosion, which eventually killed the tree. The eroded tree stumps in Figure 20 and Figure 21 are roughly 25 to 30 year old Loblolly pines (Norman K. Brady, personal communication: 4/20/99). Therefore, you can conclude that at least 25 to 30 years ago, the shorelines pictured in Figures 20 and 21 were interior forest settings situated inland from the shoreline. As a result, the young Loblolly pines grew until they were subsequently killed by erosion and salt-water intrusion.

Figure 20. Shoreline Along Nandua Creek, Accomack County, Virginia.

Figure 22 illustrates a section of shoreline along the interior portion of Nandua Creek in Accomack County. The image illustrates a large Loblolly pine adjacent to a shoreline. At the base of the Loblolly pine in Figure 22, the root pattern of the tree clearly suggests this section of shoreline is non-erosive and has been non-erosive for a very long time. The roots immediately adjacent to the shoreline turn inland towards the parent landmass and do not extend out into the water. As previously mentioned, the patterns expressed in the root systems of trees represent an adaptation for stability, nutrient extraction, water extraction, and weight distribution (Norman K. Brady, personal communication: 4/20/99). The Loblolly pine in Figure 22 initially germinated along the edge of a bank adjacent to the shoreline. As a result, the root system adapted to the lack of land along the shore side. The roots of the tree grew back towards the parent landmass for stability, nutrients, water, and weight distribution. The Loblolly pine in Figure 22 successfully adapted to a marginal shoreline environment. Given the size of the trunk, the Loblolly is at least a 60-year-old tree (Norman K. Brady, personal communication: 8/20/00). Therefore, the tree in Figure 22 suggests the shoreline has not eroded over the entire 60-year period. Clearly, this is a very stable shoreline and would not be a good place to look for any eroded archaeological remains associated with a site.

Field observations are a major part of any shoreline archaeological survey. In addressing shoreline erosion, plants, trees, sediment, slope, redeposition, and historical data are all important and interrelated aspects. For example, if the historic map data for the region pictured in Figure 22 indicated that erosion had occurred over the past 100

Figure 21. Tree Root Patterns Along Savage Neck, Northampton County, Virginia.

years, the field observations would indicate that the maps are in error because of the age of the associated tree situated along this section of shoreline. All of these interrelated aspects should be taken into consideration before a section of shoreline or an archaeological site are categorized as eroded or threatened.

The field observations conducted during this survey provided for general assessments of the erosion threat along the entire Chesapeake Bay shoreline of Accomack and Northampton counties. As previously mentioned, it is very hard and in some cases erroneous to generalize the degree of erosion in a geographic region. The shoreline in Figure 20 clearly illustrates this problem. Ward et al. (1989: Figures 4.2, 4.3, and 4.9; Tables 4.2, 4.3, and 4.6) attempt to assess the degree of erosion within the entire Virginia Eastern Shore study area. The levels or degrees of shoreline erosion defined by Ward et al. (1989: 76 and Table 4.1) were utilized during this project to quantify erosion within the region and to assess the erosion threat to archaeological resources (see Table A.4). Mild or slight erosion was defined as less than one foot per year (ibid.). Moderate erosion was defined as between one and three feet per year (ibid.). Heavy or high erosion was defined as three to six feet per year and severe erosion was defined as greater than six feet per year (ibid.). Ward et al. (ibid.) assessed erosion from the perspective of development, storm threats, property loss, and methods to curb erosion. The present study is interested in erosional threats to archaeological resources. The following will attempt to summarize erosion along the Virginia Eastern Shore from cultural resource perspective. Future researchers should not generate erosional threat assessments about

Figure 22. Tree Root Patterns Along Interior Nandua Creek, Accomack County, Virginia.

archaeological resources based on the following generalized summaries about erosion patterns on the Virginia Eastern Shore. Accurate erosional threat assessments to archaeological resources should be based on a site-by-site analysis and multi-year fieldwork.

The Virginia Eastern Shore consists of numerous watersheds. These watersheds provided a basis for summarizing the erosion, or lack thereof, noted along the shoreline. Figure 23 roughly defines the boundaries of the watersheds and delineates twelve sections along the Virginia Eastern Shore. The erosion assessments are based on a combination of fieldwork and pre-fieldwork data.

Section #1 includes all of the Virginia shorelines associated with the Tangier Sound watershed (Figure 23). The southern end of Smith's Island, Goose Island, Tangier Island, Great Fox Island, and Watts Island are included within this section. These islands consist of mainly low tidal marshes intersected by dry ridge landforms. Coastal beach formations are present along some of the shorelines and act as erosional barriers. The shorelines with coastal beach formations are presently non-erosive. The exposure of these islands to heavy wind and wave activities and the field observations suggest the majority of the shorelines in this region are severely eroded (greater than 6 feet per year) in some areas and moderately eroded to highly eroded (3 to 6 feet per year) in others. As general assessment, section #1 has the greatest erosional threat of any other section along the Virginia Eastern Shore.

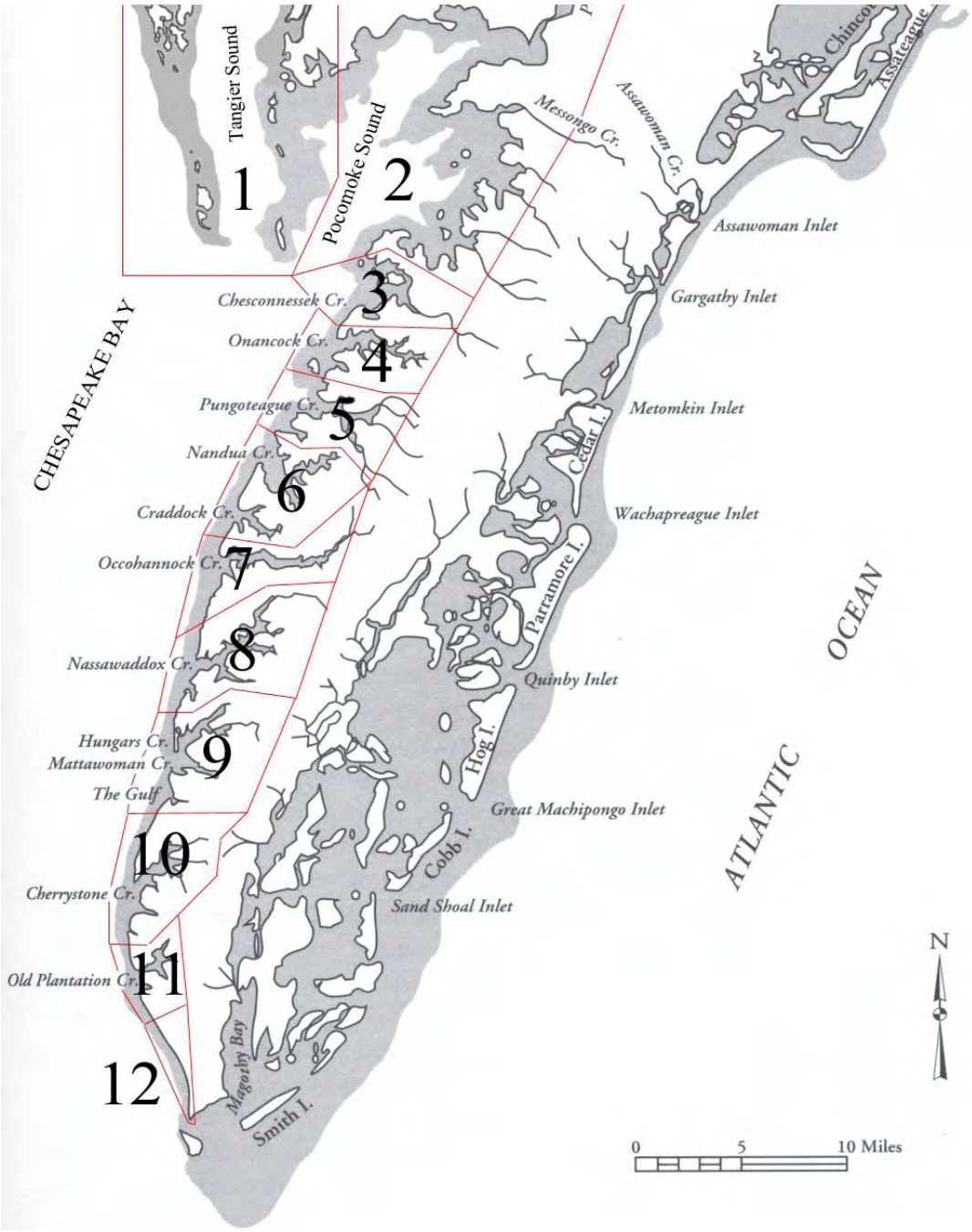


Figure 23. Erosion Sections Along the Virginia Eastern Shore.

Section #2 includes all of the Virginia shorelines associated with the Pocomoke Sound watershed (Figure 23). All of the shorelines associated with the creeks, channels, and coves draining into Beasley Bay are included in this section. Like section #1, the shorelines consist mainly of low tidal marshes intersected by dry ridge landforms. Coastal beach formations are present along some of the shorelines and act as erosional barriers. The shorelines with coastal beach formations are presently non-erosive. The exposure of these shorelines to wind and wave activities and the field observations suggest the majority of the shorelines in this region are moderately eroded (1 to 3 feet per year) in some areas and slightly eroded (0 to 1 foot per year) in others. As a general assessment, section #2 would be the second most eroded portion of the Virginia Eastern Shore. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects.

Section #3 includes the Chesconessex Creek and Back Creek watersheds (Figure 23). The interior portion of Chesconessex Creek is highly developed. Shoreline revetments and bulkheads along the interior portion of Chesconessex Creek have essentially stopped erosion. The undeveloped interior shorelines have sloping banks fringed by tidal marsh. In essence, these interior areas are also non-erosive. The mouth of Chesconessex Creek includes broad tidal marshes with some intersecting dry ridge landforms. Some isolated areas at the mouth of Chesconessex Creek seem to be subjected to slight to moderate erosion (0 to 3 feet per year). The sections of Back Creek are slightly eroded (0 to 1 foot per year), non-eroded, and accreting. As a general assessment, section #3 would seem to be relatively stable. Any major erosion concerns

relative to archaeological resources should be focused at the mouths of both Chesconessex and Back creeks. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along portions of both creeks.

Section #4 includes the Onancock Creek and Matchotank Creek watersheds (Figure 23). The interior portion of Onancock Creek is highly developed. Shoreline revetments and bulkheads along the interior portion of Onancock Creek have essentially stopped erosion. The undeveloped interior shorelines have sloping banks fringed by tidal marsh. In essence, these interior areas are also non-erosive. The mouth of Onancock Creek includes broad tidal marshes with some intersecting dry ridge landforms. Most areas at the mouth of Onancock Creek and Matchotank Creek seem to be subjected to moderate erosion (1 to 3 feet per year). The sections of Matchotank Creek are slightly eroded (0 to 1 foot per year), non-eroded, and accreting. As a general assessment, section #4 would seem to be relatively stable. Any major erosion concerns relative to archaeological resources should be focused at the mouths of both Onancock and Matchotank creeks. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along portions of both creeks.

Section #5 includes the Pungoteague Creek and Butcher Creek watersheds (Figure 23). A small portion of Pungoteague Creek is developed. Shoreline revetments and bulkheads along the developed portions of Pungoteague Creek have essentially stopped erosion. Most of the undeveloped interior shorelines have sloping banks fringed by tidal

marsh. In essence, most of the interior areas are non-erosive. The mouths of Pungoteague Creek and Butcher Creek include broad tidal marshes, low ridges, and low topographic non-tidal shorelines. Most areas at the mouth of Pungoteague Creek and Butcher Creek seem to be subjected to moderate erosion (1 to 3 feet per year). The sections of Butcher Creek are slightly eroded (0 to 1 foot per year), non-eroded, and accreting. As a general assessment, section #5 would seem to be slightly eroded. Major erosion concerns relative to archaeological resources should be focused at the mouths of both Pungoteague and Butcher creeks. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along portions of both creeks.

Section #6 includes the Nandua Creek and Craddock Creek watersheds (Figure 23). Only a very small portion of Nandua Creek and Craddock Creek could be considered developed. Shoreline revetments and bulkheads occur along the few developed portions of both creeks. These barriers have essentially stopped erosion. Most of the undeveloped interior shorelines are fringed by tidal marsh. Low bank cuts and eroded tree stumps suggest most of the interior areas are erosive. The mouths of Nandua Creek and Craddock Creek include broad tidal marshes, low ridges, and low topographic non-tidal shorelines. Most areas at the mouth of Nandua Creek and Craddock Creek seem to be subjected to moderate erosion (1 to 3 feet per year). Only a few sections of Nandua Creek and Craddock Creek are slightly eroded (0 to 1 foot per year), non-eroded, or accreting. As a general assessment, section #6 would seem to be moderately eroded. Erosion concerns relative to archaeological resources should be focused along most of

both Nandua and Craddock creeks. Aside from section #1 and section #2, the area encompassing section #6 is one of the more eroded portions of the Virginia Eastern Shore. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along small portions of both creeks.

Section #7 includes the Occohannock Creek watershed (Figure 23). A small portion of Occohannock Creek is developed. Shoreline revetments and bulkheads along the developed portions of Occohannock Creek have essentially stopped erosion. Most of the undeveloped interior shorelines have sloping banks fringed by tidal marsh. In essence, most of the interior areas are non-erosive. The mouth of Occohannock Creek includes limited tidal marshes and low topographic non-tidal shorelines. Most areas at the mouth of Occohannock Creek seem to be subjected to slight to moderate erosion (0 to 3 feet per year). As a general assessment, section #7 would seem to be slightly eroded. Major erosion concerns relative to archaeological resources should be focused at the mouth of Occohannock Creek. The Occohannock Neck shoreline consists of moderately eroded sections separated by coastal beach formations, revetments, and bulkheads. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along portions of the watershed.

Section #8 includes the Nassawadox Creek, Church Creek, and Westerhouse Creek watersheds (Figure 23). Small portions of both Nassawadox Creek and Church Creek are developed. Shoreline revetments and bulkheads along the developed portions

of these creeks have essentially stopped erosion. Virtually all of the undeveloped interior shorelines of Nassawadox Creek, Church Creek, and Westerhouse Creek have sloping banks fringed by tidal marsh. In essence, most of the areas in section #8 are non-erosive. The mouths of Nassawadox and Westerhouse creeks include limited tidal marshes and low topographic non-tidal shorelines. Some areas at the mouth of Nassawadox Creek and Westerhouse Creek along Church Neck seem to be subjected to moderate erosion (1 to 3 feet per year). Even so, portions of the Church Neck shoreline encompass stable non-erosional coastal beach formations. Aside from a few very small sections, Church Creek is non-erosive. As a general assessment, section #8 would seem to be only slightly eroded (0 to 1 foot per year). Erosion concerns relative to archaeological resources should be focused along the Chesapeake Bay shoreline between the mouth of Nassawadox Creek and Westerhouse Creek. On the north side of Nassawadox Creek, the Occohannock Neck shoreline consists of moderately eroded sections separated by coastal beach formations, revetments, and bulkheads. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along portions of the watershed.

Section #9 includes the Hungars Creek, the Mattawoman Creek, and The Gulf watersheds (Figure 23). Portions of Hungars Creek, Mattawoman Creek, and The Gulf are developed. Shoreline revetments and bulkheads along the developed portions of these creeks have essentially stopped erosion. Virtually all of the undeveloped interior shorelines of Hungars Creek, Mattawoman Creek, and The Gulf watersheds have sloping banks fringed by tidal marsh. In essence, most of the areas in section #9 are non-erosive.

The mouths of Hungars Creek, Mattawoman Creek, and The Gulf include numerous sand bars and shoals. Some areas along Church Neck, Wilsonia Neck, and Old Town Neck seem to be subjected to moderate erosion (1 to 3 feet per year). Even so, portions of these shorelines encompass stable non-erosional coastal beach formations. Aside from a few very small sections, Mattawoman Creek is non-erosive. As a general assessment, section #9 would seem to be only slightly eroded (0 to 1 foot per year). Erosion concerns relative to archaeological resources should be focused along the Chesapeake Bay shoreline between the mouth of Hungars Creek and The Gulf. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along portions of the watershed.

Section #10 includes the Cherrystone Inlet and Kings Creek watersheds (Figure 23). Portions of Cherrystone Inlet and Kings Creek are developed. Shoreline revetments and bulkheads along the developed portions of these watersheds have essentially stopped erosion. Virtually all of the undeveloped interior shorelines of the Cherrystone Inlet and Kings Creek watersheds have sloping banks fringed by tidal marsh. In essence, most of the areas in section #10 are non-erosive. The mouths of Cherrystone Inlet and Kings Creek include numerous sand bars and shoals. Most areas along Savage Neck seem to be subjected to moderate erosion (1 to 3 feet per year). Even so, portions of the Savage Neck shoreline encompasses stable non-erosional coastal beach formations. Virtually all of Kings Creek is non-erosive. As a general assessment, section #10 would seem to be only slightly eroded (0 to 1 foot per year). Erosion concerns relative to archaeological resources should be focused along the Chesapeake Bay shoreline along Savage Neck.

Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along portions of the watershed.

Section #11 includes the Old Plantation Creek and Elliotts Creek watersheds (Figure 23). These watersheds are essentially closed-mouth creeks. Portions of both creeks are developed. Shoreline revetments and bulkheads along the developed portions of these watersheds have essentially stopped erosion. All of the undeveloped interior shorelines of the Old Plantation Creek and Elliotts Creek watersheds have sloping banks fringed by tidal marsh. In essence, most of the areas in section #11 are non-erosive. The mouths of both creeks include numerous sand bars and shoals. The most extensive erosion is evident along the shoreline between Cape Charles Harbor and Old Plantation Creek. The shorelines along this section seem to be subjected to moderate erosion (1 to 3 feet per year). Between the mouth of Old Plantation Creek and Elliotts Creek slight to moderate erosion is also evident (0 to 3 feet per year). Even so, both of these Chesapeake Bay shorelines encompass stable non-erosional coastal beach formations. As a general assessment, section #11 would seem to be only slightly eroded (0 to 1 foot per year). Erosion concerns relative to archaeological resources should be focused along the Chesapeake Bay shoreline. Coastal beach formations (i.e., dunes), tidal marsh soils, and redeposited offshore sand (i.e., spits, bars, and tidal islands) help curb the wind and wave erosional effects along portions of the watershed.

Section #12 encompasses the southern end of Northampton County between Elliotts Creek and Fisherman's Island (Figure 23). Section #12 is not associated with any

major creeks or drainages. Several small-unnamed feeder streams along this shoreline drain directly into the Chesapeake Bay. The two major sections of shoreline within section #12 are Butler's Bluff and Kiptopeke Beach. These shorelines include topographically high bluffs composed of aeolian sand. Some shallow offshore bars are present. Even so, the proximity of the modern shoreline to a deep offshore paleochannel accelerates shoreline erosion. Sediment associated with the bluffs typically slumps down the face of the bank and acts as a temporary erosion barrier. Coastal beach formations, and redeposited offshore sand help curb the wind and wave erosional effects along portions of the shoreline. As a general assessment, section #12 would seem to be moderately eroded (1 to 3 foot per year). Erosion concerns relative to archaeological resources should be focused along the Chesapeake Bay shoreline one quarter of a mile north and south of the Kiptopeke Pier. The shoreline associated with the Kiptopeke Pier area is an accreting shoreline.

As a general summary, the various sections of the Virginia Eastern Shore presented in Figure 23 are not equally eroded. One of the goals of the survey was to assess and determine what portions of Accomack and Northampton counties had the greatest levels of observed erosion. From the summaries presented, sections #1 and #2 are the heaviest eroded portions of the Virginia Eastern Shore. Section #6 seems to be the third most eroded portion of the Virginia Eastern Shore. From an erosion standpoint, section #5 and section #12 would seem to represent the fourth and fifth most eroded shorelines in the study area. It is important to note that the ranking of these sections

should in no way effect how cultural resource managers assess the erosion threat to shoreline related archaeological sites outside these sections.

The previous discussion highlighted the ways to assess shoreline erosion prior to fieldwork and how to assess shoreline erosion while in the field. Data were also presented on how to gauge erosional threats in the Chesapeake Bay due to reports of rapid sea level rise over the last century. The final summary attempted to assess erosion along the Eastern Shore of Virginia's Chesapeake Bay shoreline. These erosional assessments were based on field examinations conducted during this project. In reference to "threatened" archaeological sites along shorelines, future researchers will need to assess them on a site-by-site basis. It is advised that future researchers understand seasonal shoreline variations and the multi-year changes to individual shorelines before casting judgment about the degree of threat to any archaeological site.

## Results of the Eroded Shoreline Analysis of Accomack and Northampton Counties

The survey along the Chesapeake Bay shoreline of Accomack and Northampton counties located 108 archaeological sites (see Figure 24). Specific data on each of these sites are located on standard Virginia site data forms (see Figures 1, 2, and 3, and Appendix B). A complete set of Virginia site data forms that resulted from this project are included in Appendix B of this report and a set is also on file at the Virginia Department of Historic Resources in Richmond, Virginia. Within each site data form, the site boundary is plotted on corresponding sections of the U.S.G.S. 7.5' minute quadrangles. The general data for the sites located during the project are also

summarized in Table A.3. Table A.3 lists the site number, quadrangle name, site cultural chronology, and the site name. Specific data (i.e., soils, slope, and artifact types) relative to each site are included in each site data form. Cultural resource mangers and future researchers should refer to the site forms on file or in Appendix B for detailed site reference information.

Since the survey was geared towards assessing how shoreline erosion is impacting archaeological sites, erosion assessments for each site discovered during the project were constructed. These assessments were based on field observations and pre-survey map data. The various degrees of shoreline erosion were defined based on the work of Ward et al. (1989: 76 and Table 4.1). Table A.4 summarizes the erosion assessments associated with the sites found during the present survey. In Table A.4, the site number, the site name, the degree of erosion, and the erosion section are listed for each archaeological site found during the survey. The erosion sections listed in Table A.4 of Appendix A correspond to the sections defined in Figure 23. The information should help cultural resource managers assess which sites are threatened by erosion. Unfortunately, the degree of erosion at a given site may change as time progresses. For example, a site defined as being impacted by mild erosion (i.e., less than one foot per year) may become subjected to higher levels of erosion as adjacent shorelines change. Also, the actual size dimensions of each of the recorded sites are not known. If a site defined as having mild erosion is only represented by a five-foot section of intact deposits, it will be completely destroyed in roughly five years, whereas, a site defined as having moderate erosion (i.e., one to three feet per year) could be represented by several

hundred acres of intact deposits. The site impacted by moderate erosion could have intact archaeological deposits for decades, even though it has a higher shoreline erosion rate. Cultural resource managers, in assessing the degree of actual erosion threat to a given archaeological site, should not use the data presented in Table A.4 of Appendix A. The actual boundaries of each site should be clearly defined before any of the data in Table A.4 has cultural resource management value.

From the data presented in Table A.4, all of the archaeological sites in section #1 of Figure 23 are subjected to heavy erosion. The seven sites in section #1 are all located along the exposed shorelines of tidal marsh islands. In section #2, twelve sites with mild erosion, twelve sites with moderate erosion, and one site with heavy erosion were located. Section #2 revealed the largest number of eroded archaeological sites along the Chesapeake shoreline. In section #3, six sites with mild erosion and two sites with moderate erosion were documented. Section #4 revealed only two archaeological sites. Both sites in section #4 are subjected to mild shoreline erosion. Section #5 revealed seventeen archaeological sites. Of these sites, fifteen are subjected to mild erosion and the remaining two are subjected to moderate erosion. Section #6 revealed the second largest number of eroding archaeological sites. Twenty-two sites were documented in section #6. Nine sites with mild erosion, twelve sites with moderate erosion, and one site with heavy erosion were located in section #6. Section #7 revealed twelve eroding archaeological sites. In section #7, six sites with mild erosion, five sites with moderate erosion, and one site with heavy erosion were documented. In section #8, three sites with mild erosion, one site with moderate erosion, and two sites with heavy erosion were

located. Section #9 only revealed two eroding archaeological sites. One site in section #9 is subjected to moderate erosion and the remaining site is subjected to mild erosion. Three sites were discovered in section #10. Two of the sites in section #10 are subjected to moderate erosion and the remaining site is subjected to mild erosion. Only one site with moderate erosion was documented in section #11. Three sites were documented in section #12. Like section #10, two of the sites in section #12 are subjected to moderate erosion and the remaining site is subjected to mild erosion. It should be noted that the erosion assessments in Table A.4 are only general observations. Future site-specific work should help gauge the erosion impacts and threats to these archaeological sites.

It is obvious in Tables A.1, A.2, and A.3 of Appendix A that the present survey only located eleven of the 86 previously recorded sites associated with the shorelines of Accomack and Northampton counties. Tables A.5 and A.6 present data about the condition of the "relocated" sites and provide field observations or comments about all of the sections of shorelines which were associated with the previously documented archaeological sites. Some of the seventy-five sites were not relocated because these sites are no longer eroded. Several sections of the shoreline had coastal dunes with thick deposits of sand. It is assumed that the sites previously documented along these shoreline sections are still intact, but buried underneath deposits of recent sand. A few of the seventy-five previously recorded sites are no longer exposed because recent shoreline erosion controls (i.e., bulk heading and rip-rap) have attempted to stabilize the erosion. A large portion of the sites defined as being associated with shorelines are essentially

Figure 24. Generalized Locations of the Archaeological Sites Discovered During the Chesapeake Bay Shoreline Survey of Accomack and Northampton Counties.

inland sites situated back from the shoreline. Redeposited offshore sediments have in some cases stabilized the erosion. Though not as thick as coastal dunes, the redeposited sediments can act as the foundation for marsh and wetland formation. If marsh and wetland plant species become established within the redeposited sediments, the shoreline can be considered stabilized or non-erosive. Redeposited sediments can also act as "blankets" of sediment that can hide eroding features and eroded artifacts. Finally, a few of the seventy-five previously recorded sites have been or may have been completely destroyed by shoreline erosion. Most of the completely eroded sites were located in section #1 or section #2 of Accomack County (see Figure 23). It is important to remember that site conditions can change with one single storm event. An area with thick coastal dune deposits can be stripped of sand during a storm event, and a formerly buried site can again be exposed to shoreline erosion.

As a way to assess how the dynamics of shoreline erosion and coastal conditions can effect what an archaeological survey detects or does not detect, the assemblages and cultural chronologies defined for the eleven "relocated" sites were compared to the data on file at the VDHR archives. The comparison between the data documented for these eleven sites are presented in Table A.7. The observations in Table A.7 present some interesting data. For example, 44AC52 was recorded in 1978. The 1978 data indicate that 44AC52 is a prehistoric site with Middle to Late Archaic components. The present shoreline survey project located the prehistoric component at 44AC52, but was unable to determine what prehistoric cultural periods were associated with the site. The present survey also discovered that the site has a 19$^{th}$ century historic component. Obviously, the

data from both surveys when combined provide a better image of the cultural chronology represented at 44AC52. Even so, the data from both archaeological surveys may still not have accurately portrayed the actual cultural components present at 44AC52.

According to the data form associated with the archaeological site defined as 44AC161, the site has produced some evidence for a prehistoric component along with historic trade beads (Wittkofski 1988: 143). Given the data on the original forms, 44AC161 would be defined as a Late Woodland, Contact, or 17$^{th}$ century site with trade items. The present survey documented an 18$^{th}$ century, 19$^{th}$ century, and a 20$^{th}$ century component for 44AC161. Continued erosion, offshore sedimentation, and alterations to the shoreline maybe the factors influencing the observed differences between the chronological summaries documented 44AC161 during each separate survey.

Another example relates to site 44AC214. The original data form was completed in 1981 and indicated that 44AC214 has an unknown prehistoric component. The present shoreline project documented diagnostic prehistoric artifacts associated with the Paleoindian, Early Archaic, Middle Archaic, Late Archaic, and Middle Woodland periods. The present data associated with 44AC214 were gathered as a result of three controlled shoreline surveys and an examination of private surface collections from the site (see Table A.7). 44AC214 may have additional prehistoric components, but the diagnostic remains associated with these components were not exposed when the site was examined.

Another interesting comparison relates to the site defined as 44NH65. The 1980 data from 44NH65 indicate an unknown historic component. Information from the

present shoreline survey shows that it has an unknown prehistoric component. Clearly, there are major discrepancies between the chronological data recorded for 44NH65. The discrepancies do not necessarily mean that one data form is wrong and the other is right. Time, erosion, sedimentation, redeposition, and other unforeseen factors may be influencing what data are associated with 44NH65 during the two separate visits.

The final example relates to the site defined as 44NH8. 44NH8 represents the atypical situation. Two independent shoreline surveys documented the same cultural chronology and the same type of cultural features. 44NH8 was recorded as a 17$^{th}$ century site with eroded barrel well features. The present project documented the same 17$^{th}$ century cultural chronology and a barrel well feature. The barrel well feature observed during the present survey may or may not be the same as the examples documented earlier. Continued erosion may have exposed another barrel well feature over the 27-year duration. It is evident from the eleven relocated sites and the resulting survey data that independent one-time surveys rarely portray the actual cultural chronologies associated with a given site. The lack of accurate cultural and chronological data is not very surprising considering the factors associated with shoreline settings.

The region's coastal settings, erosion patterns, and depositional environments bias the site distribution pattern exhibited in Figure 24. The observed site patterning suggests that a cluster of archaeological sites occurs between Pungoteague Creek south to Occohannock Neck. The clustering of sites seems to be a result of the region's coastal settings. North of Pungoteague Creek, the area is dominated by broad tidal marshes. The broad tidal marshes resist erosion and mask larger portions of the inundated upland

landscape. South of Occohannock Neck, the region is dominated by higher topographic shorelines dominated by sand. When exposed the sandy high topographic shorelines erode easily, but the redeposited offshore sand acts as an erosional and accretional barrier along a large portion of Northampton County. In the area between Pungoteague Creek and Occohannock Neck, the region has less tidal marsh coverage when compared to the shorelines to the north. Also, the area between Pungoteague Creek and Occohannock Neck, are topographically lower and have more sandy loam soil coverage when compared to the shorelines to the south. As a result, eroded archaeological sites are more visible between Pungoteague Creek and Occohannock Neck and this visibility may have influenced the site patterning in Figure 24.

To summarize the cultural chronological data discovered during the survey, Table A.3 provides an overview. Paleoindian age components were documented at four archaeological sites. Early Archaic components were documented at six archaeological sites. Nine sites revealed Middle Archaic components. Late Archaic components were the most prevalent chronological material found during the survey. Twenty-five sites revealed Late Archaic diagnostic remains. Early Woodland age components were documented at eighteen sites. Middle Woodland age components were documented at twenty-three sites, and twenty-four sites revealed Late Woodland diagnostic remains. Numerous sites were classified as having unknown prehistoric components. Future work may provide more data about the prehistoric sites that produced no period specific diagnostic remains. No Contact age sites were documented during the project. 17$^{th}$ century components were documented at six sites, and twelve sites revealed 18$^{th}$ century

diagnostic remains. Twenty sites revealed 19th century cultural components, and 20th century diagnostic remains were found at nine sites. Only three sites were classified as having unknown historic components.

Secondary cobble outcrops were discovered during the project within Beasley Bay in Accomack County. Associated with these cobble outcrops were several archaeological sites with evidence of prehistoric cobble reduction. Large cobbles and even boulder size pieces of quartzite, quartz, chert, and jasper were noted in these deposits. The cobble exposures and prehistoric cobble reduction activity resemble the sites located by Lowery (1996 and 1997) immediately north of Beasley Bay in Somerset County, Maryland. Figure 25 shows the locations of the cobble outcrops in Somerset County, Maryland and in Accomack County, Virginia. These outcrops would represent ancient channel deposits associated with the Potomac River watershed. Even though debitage was noted at the reduction sites in Accomack County, limited chronologically related diagnostic remains were discovered.

The only way to accurately assess the cultural and chronological data associated with eroding sites is to re-examine the eroded shorelines on a regular basis over many seasons. Excavations of intact portions of sites are also needed. Continued re-examination and archaeological testing would refine the cultural chronologies expressed at these sites. Additional work would permit the creation of period specific site distribution maps for the region. Presently, the lack of accurate site chronological data indirectly suggests that regional assessments of prehistoric and historic settlement patterns and site predictive models are greatly flawed.

## Evidence of Prehistoric Trade and Exchange

The shoreline survey along the Chesapeake Bay portion of the Virginia Eastern shore did produce some evidence relating to prehistoric trade and exchange. The following discussion will highlight some of the data associated with this topic. The discussion will also provide comparative observations between the Virginia data and previous research data based on Lowery's survey work (1992a, 1992b, 1993a, 1993b, 1994, 1995b, 1995c, 1996, 1997, and 1999) along Maryland's portion of the Delmarva Peninsula. These discussions are not meant to be a final summary of all of the known data. These discussions are meant as a stepping-stone towards further research into these topics. Obviously, more questions will result from these discussions than will be answered.

During the survey, twenty prehistoric archaeological sites revealed evidence for the movement of non-local materials into portions of the Virginia Eastern Shore. It is important to note that the density of these exotic materials within the twenty sites should not necessarily be attributed to cultural phenomenon. The natural processes influencing each of the twenty sites would influence the density of the non-local materials collected during this survey. Numerous natural variables are involved in the expression of these non-local materials at any or all of the twenty sites. Littoral drift, offshore sediment types, volume of shoreline sediments, and offshore bottom contours are only a few of the coastal processes that influence the density and number of artifacts collected from a shoreline site. The number of exotic artifacts should not be trusted for any type of

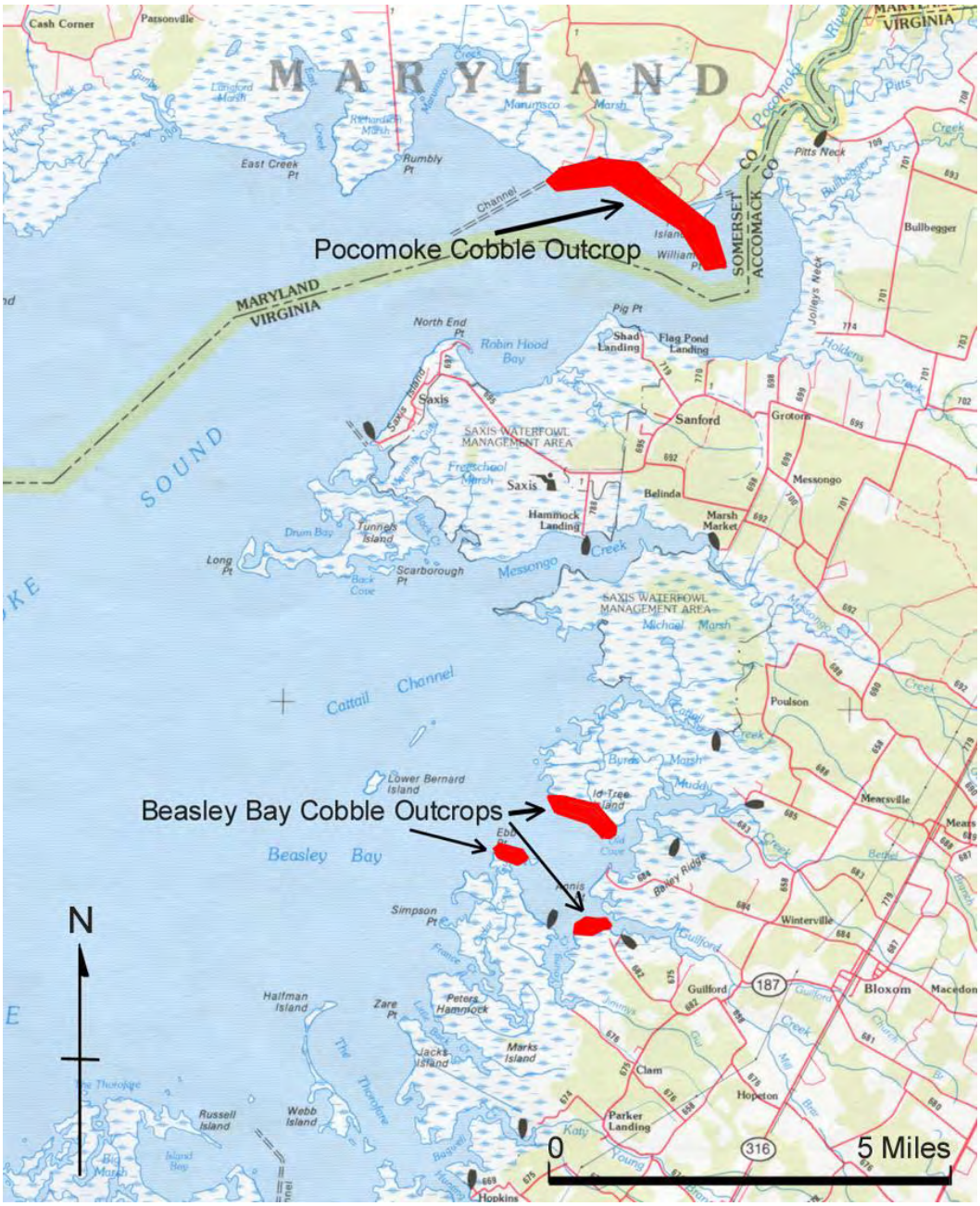


Figure 25. Cobble Outcrops (Modified DeLorme Mapping Company 1995: 62).

density analysis. Table A.8 of Appendix A lists all twenty sites and defines the types of exotic materials observed during the survey. Figure 26 portrays the site locations in the table that produced exotic non-local lithic materials. Table A.8 lists the number of lithic artifacts manufactured out of these non-local materials, and a brief description of the types of artifacts is also included. From the diagnostic artifacts listed in Table A.8, Late Archaic and Middle Woodland projectile points are the dominant types of artifacts manufactured out of non-local rhyolite and argillite materials. Other researchers have noticed a similar pattern of rhyolite and argillite usage along the Delmarva Peninsula (Custer 1984d, 1984e, and 1989; Stewart 1984a, 1984b, 1987, and 1989; and Lowery 1992b: 24-26, 1995d, and 1999: 80-82, Table 7 - 13). Even though the Virginia Eastern Shore shows the same pattern of preferential usage, the quarry source for rhyolite and argillite may differ from the source areas documented for sites on the northern Delmarva Peninsula (see Custer 1984d; and Stewart 1984a, 1984b, 1987, and 1989).

From the data present in Table A.8, rhyolite is the most common non-local lithic material found at sites along the Virginia Eastern Shore. Argillite is a distant second. Argillite may or may not be of non-local origin. Lowery (1999: 91-92) has observed argillite cobbles and boulders within the ancient paleochannel systems of the Susquehanna River. Therefore, studies focusing on the significance of argillite within the Virginia Eastern Shore await further research. Steatite is the third most common exotic non-local lithic material found on the Virginia Eastern Shore. Steatite artifacts were collected at three sites. These artifacts included one fragment of a Late Archaic stone bowl, one large fragment of un-worked steatite, and a Late Archaic bowl fragment that

had been grooved and converted to a net-weight. The actual quarry source for the Virginia steatite may differ from the source areas documented for sites on the northern Delmarva Peninsula (see Brown n.d.). Further research is needed relative to the potential quarry sources for the steatite observed at the Virginia Eastern Shore sites. Finally, copper was found at two sites along Messongo Creek in Accomack County. The cultural period associated with the copper artifacts could not be determined. Within thirty miles of Messongo Creek, Early Woodland Delmarva Adena Complex burials with numerous copper artifacts (i.e., beads, pendants, and cups) have been reported at the Nassawango site (Custer 1989: 263-264; and Wise 1974). The source of the copper artifacts and the cultural periods associated with the copper cannot be determined.

## Marine Subsistence

During the survey, twenty prehistoric archaeological sites revealed midden evidence associated with prehistoric marine subsistence along the Virginia Eastern Shore. Samples of the types of shells within the bank profile were collected from each midden during the survey to accurately assess the species diversity expressed at the sites. The density of the species within the middens could not be assessed based on the survey data. Only the presence of a species or absence of a species was noted. Even when assessing presence or absence, numerous non-cultural variables are involved in the archaeological expression of these marine species at any or all of the twenty sites. Table A.9 of Appendix A lists all twenty sites, defines the general species types observed during the

Figure 26. Sites on the Virginia Eastern Shore with Rhyolite, Argillite, Steatite, and Copper.

survey, and describes the associated diagnostic prehistoric artifacts. In Table A.9, oyster refers to *Crassostrea virginica*, clam (i.e., hard clam) refers to *Mercenaria mercenaria*, scallop refers to *Aequipecten irradians*, whelk refers to *Busycon carica*, mussel refers to *Geukensia demissa*, and periwinkle refers to *Littorina irrorata*.

Figure 27 illustrates the location of the twenty archaeological sites found during the survey that had eroding prehistoric shell-filled refuse features. Based on the data presented in Table A.9 of Appendix A, oyster and clam (i.e., hard clam) are the most prevalent species found in the refuse features associated with the twenty sites. Nineteen of the twenty sites revealed evidence for oyster utilization. Eighteen of the twenty sites revealed evidence for hard clam utilization. Interestingly, scallop and whelk were observed at five prehistoric midden sites. Three of the twenty sites revealed evidence for bay scallop utilization and two of the twenty sites revealed evidence for knobbed whelk utilization. At all five of the sites with scallop and whelk, oyster and hard clam were also observed. The presence of scallop and whelk at some of the sites indicate offshore environmental conditions in the vicinity of each site with high salinities when the sites were occupied. According to Lippson and Lippson (1974: 41, 211), the modern whelk species occupy the lower tidal and sub-tidal portions of the Chesapeake Bay with salinities greater than 18 ppt. Lippson and Lippson (ibid.) do not list the scallop (i.e., *Aequipecten irradians*) as a resident of the Chesapeake Bay. Gosner (1978: 147) indicates that the bay scallop can be found from the Gulf of Mexico to Cape Cod from the low tide line down to 50 feet. The presence of bay scallop at three of the Virginia midden sites may be significant. If Lippson and Lippson (1974) are correct, the presence

of midden-related bay scallop indicates it was a resident of the lower Chesapeake Bay marine ecosystem in the prehistoric past. Also, Atlantic ribbed mussel and marsh periwinkle were found at two of the midden sites on the Virginia Eastern Shore. Because the shells of mussel and periwinkle are fragile, their presence or absence at some or all of the midden sites may be skewed by preservation factors.

It is important to relate the Virginia Eastern Shore midden data to the midden data observed at archaeological sites farther north along Maryland's portion of the Delmarva Peninsula. It would be nice to summarize all of the know midden data, but space and the focus of this report does not permit it. Shell midden species data from Maryland's Eastern Shore familiar to the primary researcher (Lowery 1992a, 1992b, 1993a, 1993b, 1994, 1995b, 1995c, 1996, 1997, and 1999) was used as a rough comparison to the Virginia Eastern Shore midden data. Figure 28 illustrates the individual midden sites selected for comparison to the Virginia data. The sites listed defined in Figure 28 represent a broad spectrum of archaeological sites with diverse settings. Table 3 summarizes the site-specific midden data and employs Lippson and Lippson's (1974: 207-218) Chesapeake Bay species list with species distributions by salinity zone.

By overlaying the data in Table 3 onto the Chesapeake Bay salinity map (see Figure 28), Lippson and Lippson's (ibid.) list should allow the researcher to compare the archaeological species distribution data to the modern species distribution data. Only one of the archaeological sites shown in Figure 28 and described in Table 3 has an anomalous

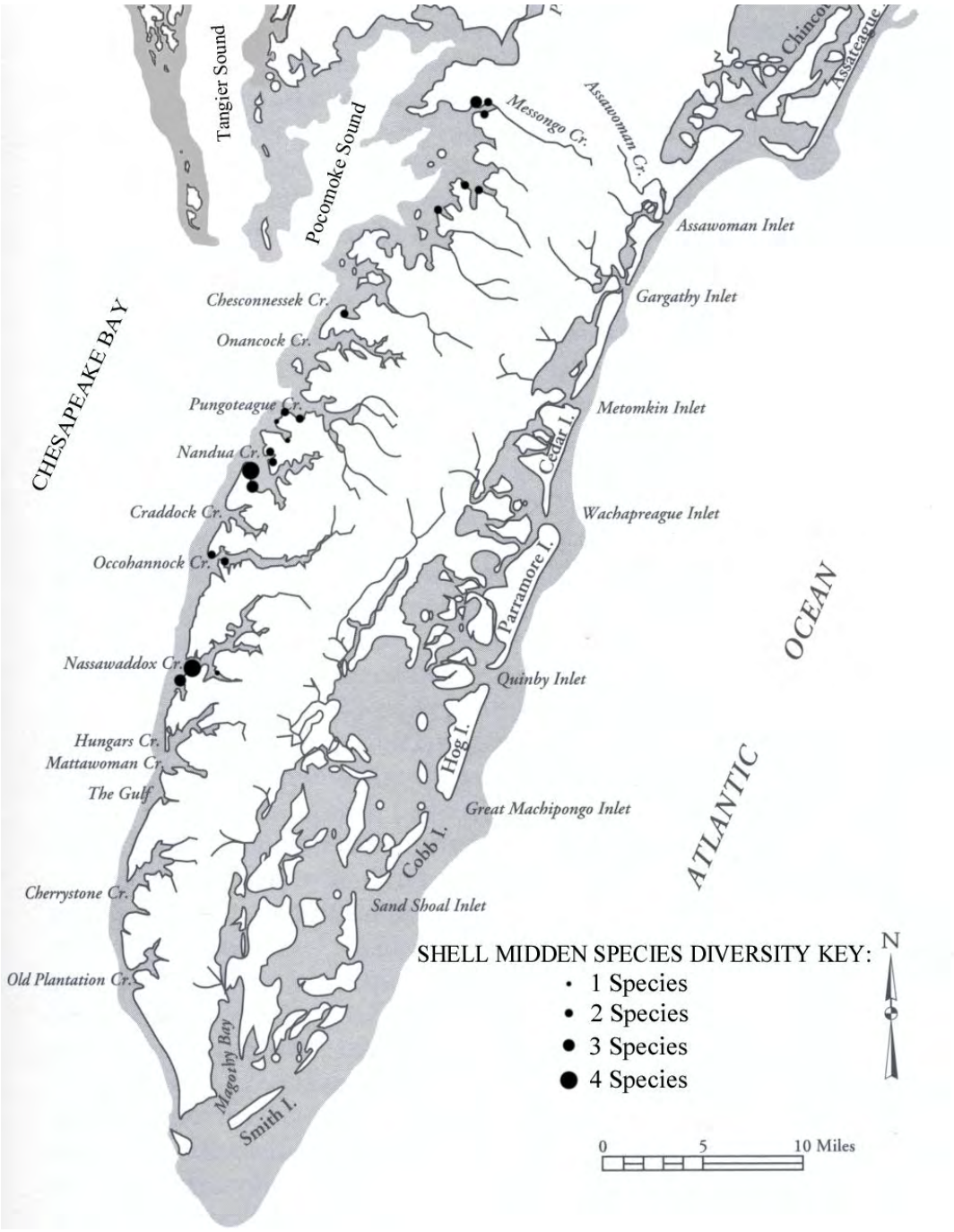


Figure 27. Marine Species Diversity Observed at Prehistoric Midden Sites on the Virginia Eastern Shore.

Table 3. Macro-Chesapeake Bay Prehistoric Midden Refuse Data (see Figure 28)

| Site #: | Species Noted: | Salinity Zone (see Lippson and Lippson 1974): |
|---|---|---|
| 1). 18QU719 | O | Middle Upper Zone 2 to Zone 3 |
| 2). 18QU492 | O | Middle Upper Zone 2 to Zone 3 |
| 3). 18QU485 | O | Middle Upper Zone 2 to Zone 3 |
| 4). 18QU413 | O, SC | Upper Zone 2 to Zone 3 |
| 5). 18QU256 | O, SC, RC, P | Lower Zone 2 to Zone 3 |
| 6). 18TA32 | O, SC, P | Upper Zone 2 to Zone 3 |
| 7). 18DO230 | O | Middle Upper Zone 2 to Zone 3 |
| 8). 18DO220 | O, SC, P | Upper Zone 2 to Zone 3 |
| 9). 18DO368 | O, P | Middle Upper Zone 2 to Zone 3 |
| 10). 18DO369 | O, P | Middle Upper Zone 2 to Zone 3 |
| 11). 18DO372 | O, SC, P | Upper Zone 2 to Zone 3 |
| 12). 18DO35 | O | Middle Upper Zone 2 to Zone 3 |
| 13). 18SO20 | O, HC, P | Lower Zone 2 to Zone 3 |
| 14). 18SO191 | O, HC, P | Lower Zone 2 to Zone 3 |
| 15). 44AC527 | O, HC, W | Zone 3 |
| 16). 44AC528 | O, HC | Lower Zone 2 to Zone 3 |
| 17). 44AC505 | O, HC | Lower Zone 2 to Zone 3 |
| 18). 44AC465 | O, HC | Lower Zone 2 to Zone 3 |
| 19). 44AC537 | HC | Lower Zone 2 to Zone 3 |
| 20). 44AC512 | O, HC, BS, P | Zone 3 |
| 21). 44AC513 | O, HC, BS | Zone 3 |
| 22). 44AC356 | O, HC | Lower Zone 2 to Zone 3 |
| 23). 44NH429 | O, HC, BS, M | Zone 3 |
| 24). 44NH431 | O, HC, W | Zone 3 |

Species Code: O = American Oyster *Crassostrea virginica*, Middle Upper Zone 2 to Zone 3
SC = Soft-shell Clam *Mya arenaria*, Upper Zone 2 to Zone 3
RC = Stout Razor Clam *Tagelus plebeius*, Lower Zone 2 to Zone 3
P = Marsh Periwinkle *Littorina irrorata*, Middle Upper Zone 2 to Zone 3
HC = Hard Clam *Mercenaria mercenaria*, Lower Zone 2 to Zone 3
W = Knobbed Whelk *Busycon carica*, Zone 3
BS = Bay Scallop *Aequipecten irradians*, Zone 3
M = Ribbed Mussel *Geukensia demissa*, Middle Upper Zone 2 to Zone 3

archaeological related mollusk species. 44AC527 has produced knobbed whelk shells in a prehistoric midden context. Given the salinity tolerances of the species (see Table 3), whelk should not naturally occur in the area around Messongo Creek in Accomack County. There are several possible explanations for the presence of whelk at 44AC527. The whelk shell could have been brought to the site. Stewart (1989) acknowledges the use of whelk shell as a trade and exchange item within the Middle Atlantic region. The whelk shell at 44AC527 could also represent a prehistoric meal procured from the waters of Messongo Creek. If the whelk was caught locally, the prehistoric salinities of Messongo Creek would have to be higher than present. Lowery (1997: Figure 8) has documented major salinity zone shifts in the Chesapeake Bay by comparing archaeologically related midden deposits with modern distributions of the same salinity dependant mollusk species. Unfortunately, both scenarios are possible and future research may solve the problem.

In respect to the midden comparisons between Maryland and Virginia, several general observations were made. Midden sites in Virginia were less predictable than the midden sites found farther north in Maryland. The prehistoric middens in Maryland and Virginia both produce cultural artifacts along the eroded shoreline. But, several observations were made while assessing the Virginia middens. The artifacts assemblages associated with the Virginia middens were very limited. A typical midden assemblage included fire-cracked rock and prehistoric ceramics. Debitage, projectile points, and bifaces were uncommon, if not very rare. In comparison, most of the Maryland middens

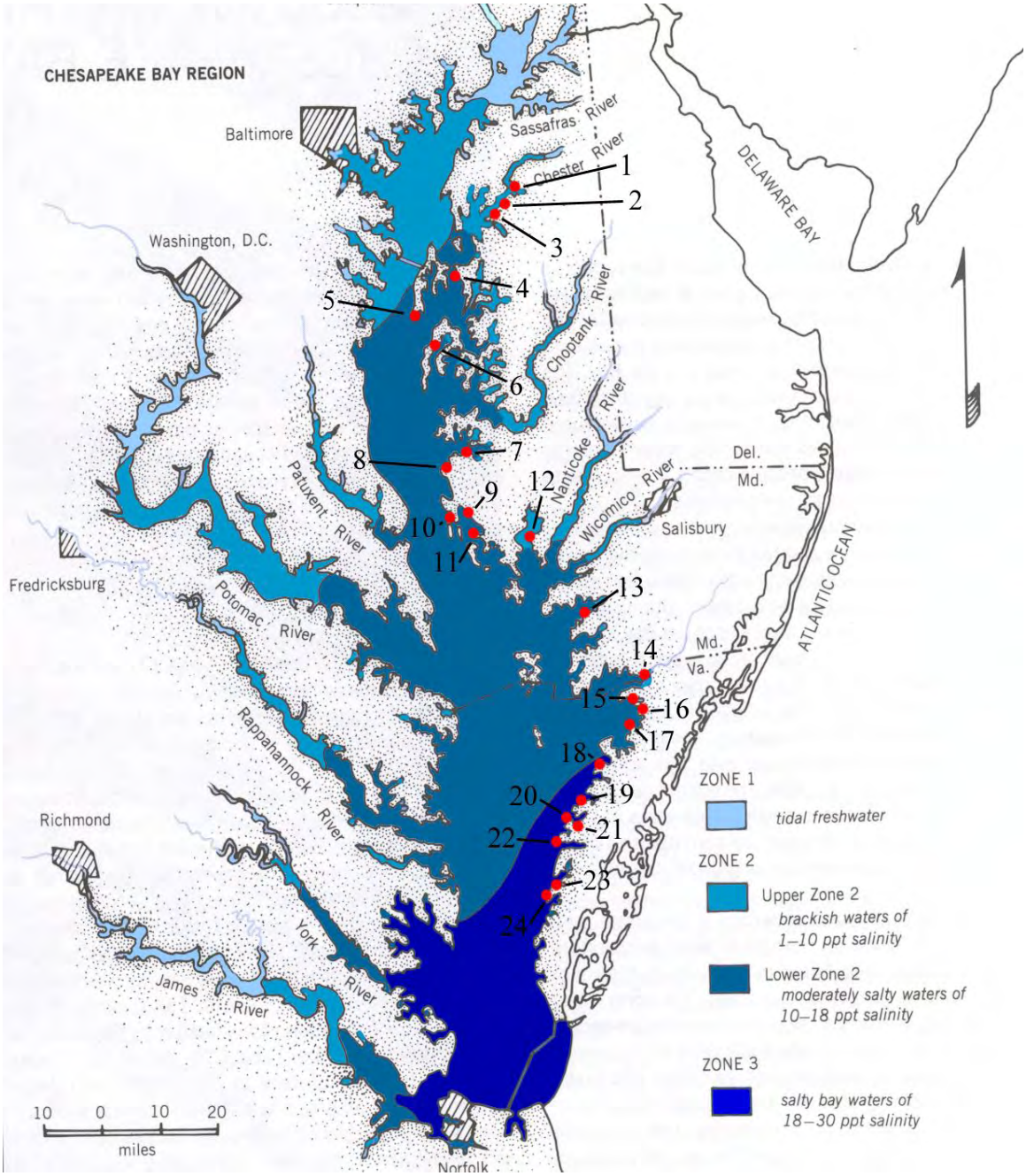


Figure 28. Macro-Chesapeake Bay Prehistoric Midden Refuse Data with Modern Salinity Zone Boundaries (see Lippson and Lippson 1974: 6).

also produced fire-cracked rock and prehistoric ceramics. In contrast, debitage, flake tools, projectile points, and bifaces are very common in the Maryland middens. Given the inadequacies of the shoreline survey, it is hard to speculate on these observations. The comparative observations are mentioned for future researchers to address.

Also, in respect to the midden comparisons between Maryland and Virginia, differences between the sizes of the middens were noted. As a gross comparison, the prehistoric middens in Maryland are larger in size and in thickness. For example, several Maryland sites (i.e., 18QU719, 18QU492, 18QU485, 18SO20, and 18SO191) have surface exposures that encompass between ten and seventy acres. A few of the Virginia middens along the Chesapeake Bay are less than one acre. Most of the Virginia prehistoric sites with shell refuse reveal only shell-filled pit features or shallow lenses. As a final note, there was an observed difference between the predictability of Maryland and Virginia midden sites and settings. In areas along the Virginia Eastern Shore where middens were expected, these settings produced only small marine refuse features or only diagnostic Late Woodland cultural material lacking marine refuse debris. If these same settings were along Maryland's Eastern Shore, the comparable Maryland sites would have produced dense marine refuse and cultural debris. These observations suggest some cultural and ecological process may be influencing the size of the Virginia middens and the unpredictability of midden sites on the Virginia Eastern Shore. The lack of projectile points and associated debitage may also be linked to cultural and ecological processes. Given the inadequacies of the shoreline survey, it is hard to speculate on these

observations. The comparative observations are mentioned for future researchers to address.

## Problems With Archaeological Assessments of Regional Survey Data

Archaeologists in the Middle Atlantic region have always utilized regional survey data to "recreate" or "reconstruct" ancient human life ways, settlement models, and subsistence patterns (see Custer 1984c, 1989; and Dent 1995). Regional survey data have enabled cultural resource managers to construct site predictive models and assess site function. The following discussion attempts to highlight how natural processes can greatly bias the archaeological record. The discussion will address these factors so that future researchers will be aware of the dynamic processes at work within the Delmarva Peninsula. Hopefully, the reader will use the data presented in this discussion to seriously question previous assumptions about the region's archaeological record. The purpose of this discussion is to assess and relate these natural processes to the Virginia Eastern Shore.

### Aeolian Deposition on the Delmarva Peninsula

Previous archaeological and geological research has recognized aeolian processes at work on the Delmarva Peninsula (Foss et al. 1978; Curry 1980; Curry and Custer 1982; Custer 1984c and 1989: 180). Waters (1992: 195-200) presents a summary of the factors associated with archaeological site formation processes in aeolian environments. The data suggest aeolian processes can effect the expression of the regions archaeological

record. Several localities along the Virginia Eastern Shore with evidence of aeolian deposition and burial are presented. These data are compared to other sites farther north in Maryland's portion of the peninsula.

Aeolian processes can influence the expression of the archaeological record upon the surface of the landscape. Fortunately for this discussion, the vertical bank-cut associated with shoreline erosion can expose an archaeological record that is made invisible by aeolian processes. Figures 29 and 30 show a section of eroded shoreline along Savage Neck in Northampton County. The images presented in Figures 29 and 30 include a portion of shoreline illustrated in Figure 7. Two eroding archaeological sites were discovered along this section of shoreline as a result of this project. One of the sites had been previously recorded. The second site had not been recorded and is pictured in Figures 29 and 30. The site contains an eroding feature with a fragment of Early Woodland type prehistoric ceramics and a cluster of fire-cracked rock. The feature was exposed in the yellow-orange B horizon situated below the dark organic rich A horizon in Figure 29.

The dark A horizon, which is located stratigraphically above the eroded feature, is located beneath at least 35 feet of aeolian sand (Figure 29). Inland from the shoreline, the aeolian landforms would be between 50 and 60 feet above the buried A horizon that is exposed along the shoreline (see Figure 7). The aeolian dune sand located above the archaeological components was not a recently active dune. Figure 30 clearly shows the uneroded inland portion of the dune. The portion of the dune not eroded by the Chesapeake Bay is part of a forest community with large trees. Therefore, the Savage

Neck locality suggests that over the past 2,000 to 2,500 years aeolian erosional and depositional processes have been at work along portions of the Virginia Eastern Shore.

Figures 31 and 32 show a section of eroded shoreline south of Kiptopeke Pier in Northampton County. 18,000 years ago, the shoreline was adjacent to the ancestral Susquehanna River and would have been a topographic bluff situated along the river's east bank. One previously unrecorded site was discovered along this section of shoreline during this project. Eroded cultural artifacts are associated with the Paleoindian and Early Archaic periods. Even though the cultural material was not found in situ, the eroded bank profile revealed a distinctive buried land surface. In the eroded shoreline, an A horizon was observed roughly 8 feet below the modern ground surface. Unlike the Savage Neck locality, the age of the buried land surface could not be determined. Archaeological components could potentially be deeply buried at this locality.

Figure 33 shows a section of eroded shoreline north of Kiptopeke Pier in Northampton County. The area is referred to as Butler's Bluff and includes a large bank cut that is 40 feet in elevation. 18,000 years ago, the shoreline was adjacent to the ancestral Susquehanna River. The modern shoreline would have been a topographic bluff situated along the east bank of the Late Pleistocene Susquehanna River. A single eroding archaeological site was discovered along this section of shoreline during the project, and it had not been previously recorded. The site revealed undiagnostic eroded prehistoric cultural artifacts. Even though the cultural material was not found in situ, the eroded bank profile revealed at least two distinctive buried land surfaces. In the bank profile, an upper buried A horizon was observed roughly 8 feet below the modern ground

Figure 29. Deeply Buried Early Woodland Archaeological Site Along Savage Neck in Northampton County, Virginia.

Figure 30. Uneroded Inland Side of the Archaeological Site Shown in Figure 29.

Figure 31. Buried A Horizon Exposed Along the Shoreline South of Kiptopeke Pier in Northampton County, Virginia.

Figure 32. Shoreline South of Kiptopeke Pier in Northampton County, Virginia.

surface and a lower buried A horizon was observed roughly 35 feet below the modern ground surface. Unlike the Savage Neck locality, the ages of these buried land surfaces could not be determined. Archaeological components could potentially be deeply buried at this locality. Future excavations may help resolve some the archaeological questions noted for Butler's Bluff. Radiometrically dating the organics within the buried land surfaces would also help resolve some the age-related questions associated with the buried landsurfaces observed at Butler's Bluff.

In the upper Chesapeake Bay region, there are very few examples of aeolian depositional processes resulting in buried land surfaces. The best example of this process was reported along the Choptank River at the Sandy Hill site in Maryland. The Sandy Hill site is presently adjacent to the shoreline of the Choptank River. In the 1920s and the 1950s, numerous Early Woodland Delmarva Adena Complex burials were discovered as a result of erosion and sand mining activities (Ford 1976). Delmarva Adena sites have been radiometrically dated in the region to roughly 1,800 to 2,500 years old (Custer et al. 1990). Figure 34 illustrates an old photo taken during the 1940s of the bank exposure at the Sandy Hill site. A dark continuous stratigraphic stain is roughly 15 to 20 feet below the modern ground surface. The dark soil stain seems to be a buried land surface or A horizon. Conversations with several of the individuals who found the Delmarva Adena complex burials indicate that the Early Woodland burials were approximately 5 feet below the dark soil level (Mr. F. P. Williamson, personal communication: 10/21/99; Mr.

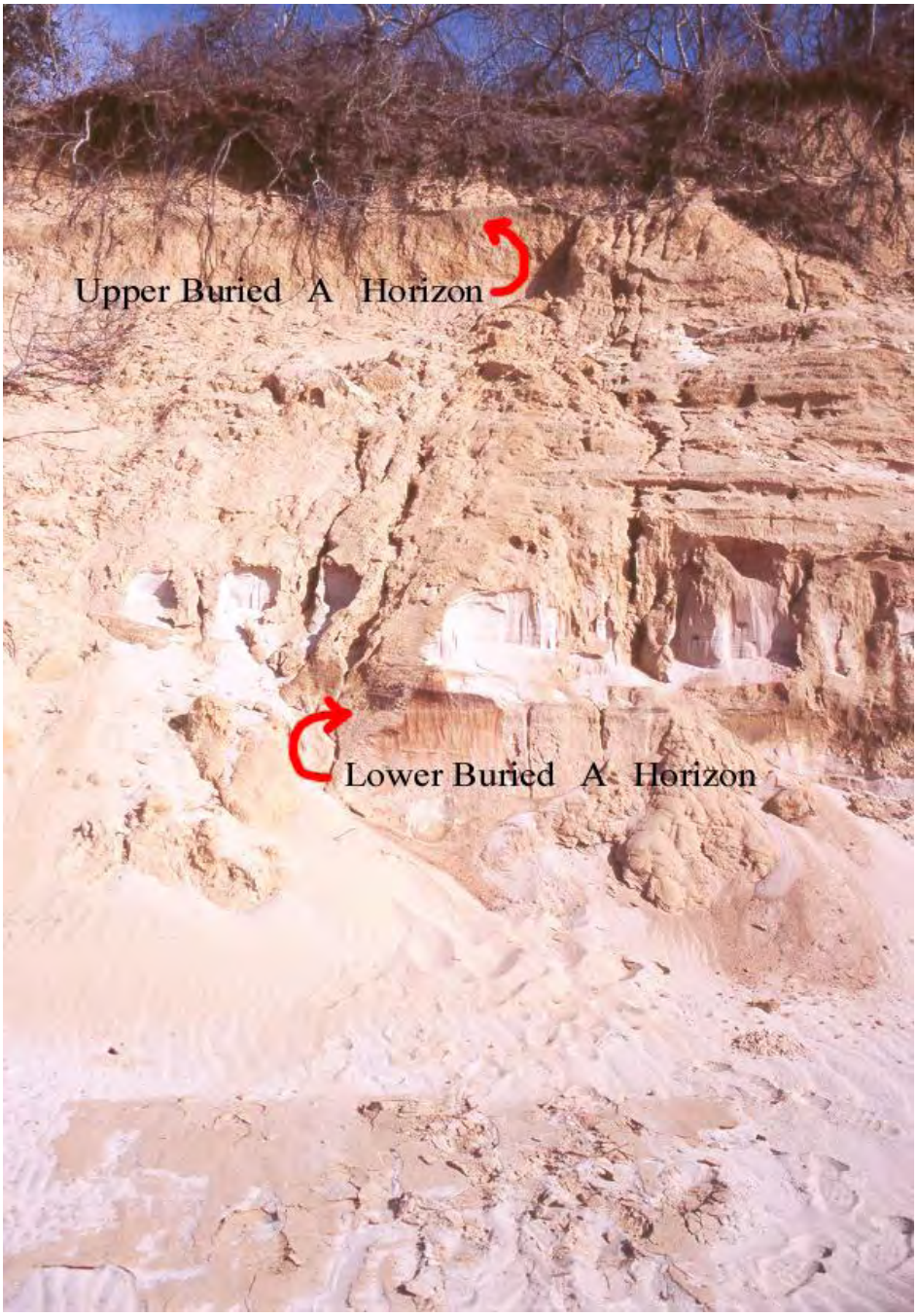


Figure 33. Superimposed Buried A Horizons Along the Eroded Shoreline at Butler's Bluff in Northampton County, Virginia.

Carlton Slagle, personal communication: 2/15/92; and Mr. William Yates, personal communication: 3/20/92). It would be safe to assume that the Sandy Hill site indicates aeolian processes resulted in the rapid burial of the Early to Middle Woodland land surface. Interestingly, this is the same pattern expressed at the Savage Neck archaeological site in Figures 29 and 30. Therefore, separate archaeological sites on the Delmarva Peninsula indicate that over the past 1,800 to 2,500 years aeolian deposition has resulted in the burial of similar prehistoric cultural components. It is suggested that a climatic event or the proximity to abundant source material were the catalysts for the observed similar aeolian depositional sequences.

For cultural resource managers and research archaeologists, it is important to acknowledge that aeolian processes can influence what is expressed in the archaeological record. If any of these sites were interior tilled field settings rather than shoreline bank cuts, prehistoric cultural components may not have been recognized. In the case of Savage Neck and Sandy Hill, Early to Middle Woodland period artifacts would clearly be well below the plowzone. If these sites were interior settings, standard shovel test pits would not have located the Early to Middle Woodland components. Figures 29 - 34 illustrate how natural processes (i.e., aeolian deposition) can affect the expression of the archaeological record. Cultural resource managers and research archaeologists should seriously consider these observations before assessing a region's cultural resources.

Figure 34. Bank Cut at the Sandy Hill Site (18DO30) in Dorchester County, Maryland.

## Differential Surface Sheet Erosion

The Delmarva Peninsula consists of a variety of soil types. The soils vary from dense silt loams to almost pure sand. In the present, agriculture is the major industry on the peninsula. Over the past 350 years or so, tilling the ground surface has continually remove surface cover and exposed the region's soils to erosion. One of the primary methods of locating archaeological sites involves performing controlled surface collections in tilled fields. In theory, a controlled surface collection will indicate artifact clusters, potential cultural features, and evidence relative to the site's cultural chronology. As previously mentioned, aeolian depositional processes in a region may hinder the reliability of a controlled surface collection. Even so, given the variety of soil types, some soil types erode quicker than other types. Differential sheet erosion can expose archaeological sites in one region and limit the exposure of sites in another. Even though no controlled surface field collections were conducted as a result of this project, it is important to acknowledge the potential problems associated with differential sheet erosion on the Virginia Eastern Shore. Waters (1992: 205-206) presents a summary of the deflation process in reference to arid environments. Differential sheet erosion is a deflation process associated with anthropogenic alterations and disturbances to the modern land surface (i.e., agriculture). The following discussion will highlight how differential sheet erosion can impact the interpretation of the archaeological record. The discussion will also stress how archaeological sites can be overlooked because of differential sheet erosion.

Figure 35 illustrates a tilled field archaeological site in the interior portion of the Delmarva Peninsula near the town of Twilley in Wicomico County, Maryland. The site has produced five Paleoindian-age Clovis fluted points along with numerous Archaic and Woodland period diagnostics within the tilled field. Given the assemblage, the site seems to have archaeological components associated with the entire prehistory of the Delmarva Peninsula. The archaeological site is associated with the tilled area in the foreground of Figure 35. Fortunately for this discussion, the tilled field is adjacent to a 19$^{th}$ century cemetery. Historical maps indicate that the field adjacent to the cemetery has been tilled for at least 150 years. Based on the dates on the headstones, the cemetery began to be used about 1870 and it continues to be utilized today. As you will note, the agriculturally tilled field is directly adjacent to the cemetery. As you can see in Figure 35, a marked topographic change occurs at the transition between the cemetery and the tilled field. There is at least a five-foot topographic drop-off between the modern cemetery land surface and the modern tilled field land surface. The difference between these two land surfaces represents the degree of sheet erosion over the period between 1870 and the present. The site in Figure 35 has soils, which are defined as Evesboro sand (Hall 1970: Sheet 13). Evesboro sand consists of almost pure sand; it occupies areas that are locally called "sugar sandhills" (ibid: 14). Hall (ibid.) notes that Evesboro soil is very susceptible to drought and soil blowing is a severe hazard. The site would be easily discovered by traditional archaeological site survey techniques. A comparison between the site in Figure 35 and other tilled sites with different soil types will accentuate how differential sheet erosion affects the expression of the archaeological record.

Figure 35. Archaeological Site in Wicomico County, Maryland Affected by Severe Sheet Erosion.

Figure 36 illustrates a tilled field in the coastal portion of the Delmarva Peninsula on Tilghman Island in Talbot County, Maryland. Prehistoric archaeological components have been found along the eroded shoreline near the house in the background of the photo (Figure 36). Over 1,430 diagnostic projectile points were reported by Lowery (1992b: 22) exposed along this section of eroded shoreline. Since 1992, an additional 950 projectile points have been found along this same section of eroded shoreline. A portion of the assemblage found along the shoreline included 51 Early Archaic notched and stemmed points, 125 Middle Archaic bifurcated points, 781 stemmed points, 254 Middle Woodland Fox Creek points, and over 310 triangular points. Given the assemblage, the shoreline site seems to have archaeological components associated with the entire prehistory of the Delmarva Peninsula. Fortunately for this discussion, a tilled field extends along the shoreline and adjacent to a 19$^{th}$ century cemetery. Historical maps indicate the field has been tilled for at least 200 years. Based on the dates on the headstones, the cemetery began to be used about 1850 and it continues to be utilized today. As you will note in Figure 36, the agriculturally tilled field is directly adjacent to the cemetery, and only a barely perceptible topographic change occurs at the transition between the cemetery and the tilled field. At most, there seems to be a six-inch topographic drop-off between the modern cemetery land surface and the modern tilled field land surface. The difference between these two land surfaces represents the degree of sheet erosion over the period between 1850 and the present. The field in Figure 36 has soils which are defined as Elkton silt loam (Reybold 1970: Sheet 33). Even under the most ideal conditions, the field has been subjected to numerous controlled surface

collections. No prehistoric cultural material has been found during any of the controlled surface collections. Outside researchers may suggest that all of the prehistoric components have been destroyed by erosion. They may also suggest that the artifacts along the shoreline represent the vestigial remnant of what was a very large archaeological site. These suggestions are clearly wrong. Recent test excavations near this field have revealed buried archaeological components. Cross-mended artifact fragments found over long periods along the shoreline suggest cultural levels are being eroded from the adjacent eroding field. The site in Figure 36 would not be easily discovered by tradition archaeological site survey techniques. A comparison between the site in Figure 36 and the site in Figure 35 accentuates how differential sheet erosion affects the expression of the archaeological record.

The site in Figure 35 has soils which are conducive to sheet erosion. Over the past 150 years, agricultural activities have accelerated the erosion of the ground surface. At the site in Figure 35, the archaeological remains (i.e., projectile points, stone tools, debitage, and pottery) have resisted the effects of sheet erosion. Relative to the site, all periods of the region's prehistory are confined to the present plowzone layer. In contrast, the site in Figure 36 has dense loamy soils, which resist the effects of sheet erosion. Over the past 200 years, agricultural activities have not eroded the ground surface. At the site in Figure 36, the prehistoric archaeological levels are too deeply buried to be disturbed by the agricultural tilling on the ground surface. As a result, the only expression of the site in Figure 36 is along the eroded shoreline, which exposes the deeply buried cultural levels.

Figure 36. Archaeological Site in Talbot County, Maryland Not Affected by Sheet Erosion.

In the discussion presented above, the 19th century cemeteries surrounded by tilled fields provided the gauge to assess differential sheet erosion. Fortunately, both localities had prehistoric archaeological components. As a result, the discussion accentuates the effects sheet erosion can have on the archaeological record of the Delmarva Peninsula. Several questions can be proposed: Which one of the archaeological sites pictured in Figure 35 or Figure 36 is more "significant"? Which archaeological site can tell researchers more about the prehistoric past? Which site deserves more protection? Would conventional archaeological survey techniques locate the archaeological site in Figure 36 had it not been exposed by shoreline erosion? With differential sheet erosion, other archaeological research problems are encountered. For example, Custer (1986) analyzed the distribution of Paleoindian-age and Early Holocene projectile points and site locations on the Delmarva Peninsula. He (ibid: 48) omitted eroded shoreline archaeological site data because they consist "primarily of isolated beach finds." As a result, the distribution maps created by Custer (ibid: Figure 2, Figure 3, and Figure 4) suggest that most of the "good" Paleoindian and Early Archaic archaeological sites are located in the interior portion of the Delmarva Peninsula. Lowery's work (1999: Table 17 and Table 18) suggests that the tilled archaeological sites in the interior portion of the Delmarva Peninsula are impacted more by heavy sheet erosion than the tilled fields in the coastal shoreline areas with loamy soils. Contrary to the reasoning behind Custer's (1986: 48) omission of diagnostic archaeological remains found along shorelines, the lands adjacent to some of these coastal shorelines have buried and intact archaeological sites.

Even though the present survey did not involve any controlled tilled field analysis, observations within the study area indicated that sheet erosion might have an influence on the expression of the region's archaeological record. In reference to the study area, the Virginia Eastern Shore is dominated by sandy soils with some areas containing loamy soils. Agriculture is the dominant industry for both Accomack and Northampton counties. Cultural resource managers and research archaeologists should be aware that sheet erosion may have impacted and may continue to impact the Virginia Eastern Shore archaeological database.

## Coastal Inundation and the Formation of Tidal Marsh Environments

Large areas adjacent to the Chesapeake Bay in Maryland and Virginia have extensive tidal marsh wetlands. Over 30,000 acres of Accomack County, Virginia encompass areas defined as tidal marsh (Peacock and Edmonds 1994: 7). In Maryland, over 100,000 acres of Dorchester County encompass areas defined as tidal marsh (Matthews 1963: 2). Tidal marsh soils are a major component of the Delmarva Peninsula. The extent of tidal marsh and the formation of tidal marsh environments is a reflection of sea level rise and coastal inundation (Darmody and Foss 1978). The 130,000 acres of tidal marsh in Accomack and Dorchester counties represents a broad former dry-land surface that has been inundated during the Late Holocene. These former dry-land surfaces have amazing potential to produce intact and buried archaeological components. The following discussion will highlight how tidal marsh environments and the coastal inundation process has impacted the region's archaeological record. Waters

(1992: 249-290) presents a discussion on coastal environments. Some of Waters (ibid.) discussions are pertinent to the region. The section will address some of the fallacies associated with tidal wetland settings and how tidal marshes influence what we see and cannot see in the archaeological record.

Figure 6 illustrates a portion of Accomack County, which encompasses a large area of tidal marsh. The northwest portion of Accomack County is like many sections of the Delmarva Peninsula. Like the other sections of the Delmarva, the northwest portion of Accomack County has produced numerous archaeological sites. Unfortunately, the archaeological sites presently located above sea level in Figure 6 are only a small reflection of the archaeological resources present in this region. Tidal marsh settings can create situations for amazing preservation, but other factors associated with these environments can result in the destruction of archaeological sites without erosion. Figure 37 illustrates a section of an eroding tidal marsh in Talbot County, Maryland. The shoreline in Figure 37 has produced archaeological components associated with the Early Archaic through Late Woodland periods. Lowery (1992b: 24-25) has documented over 5,000 diagnostic projectile points and bifaces from this site. Figure 37 shows at least a two-foot thick layer of tidal marsh peat or O horizon situated over an inundated landscape or gleyed B horizon. Cultural material is being eroded from the basal gleyed B horizon. Figure 38 illustrates a “Savannah River Stemmed” point being eroded from the gleyed B horizon. The gleyed B horizon strata at this site also produced an in situ cache of seventeen Lehigh-Snook Kill broadspears. It is evident in Figures 37 and 38 that inundated tidal marsh archaeological sites exist on the Delmarva Peninsula.

Figure 37. Inundated Archaeological Site (18TA221b) Within a Tidal Marsh Setting, Talbot County, Maryland.

Figure 38. In Situ Projectile Point Within a Gleyed B Horizon at 18TA221b, Talbot County, Maryland.

Tidal marsh environments and the coastal inundation process have impacted the region's archaeological record. Most of the tidal marsh settings the Delmarva Peninsula formed as a result of sea level rise. Tidal marshes grow vertically and encroach inland as sea levels rise (Darmody and Foss 1978). Darmody and Foss (ibid.) categorize these types of tidal marshes as submerged upland marsh soils. The inundation of upland settings and the formation of tidal marshes on top of these upland settings effectively exclude these landscapes from traditional agricultural disturbance. Therefore, these submerged upland settings would logically contain relatively undisturbed archaeological components. Unfortunately, this is not always the case. With the formation of tidal marshes, bioturbation from biological entities associated with coastal environments is a major factor.

Within the tidal marshes, the various Fiddler crab species (i.e., *Uca minax*, *Uca pugilator*, and *Uca pugnax*) and the Little Square crab species (*Sesarma reticulatum*, and *Sesarma cinereum*) create deep burrows that intrude into and bioturbate inundated archaeological sites. The population of the Fiddler crabs and Little Square crabs within a given tidal marsh can be truly amazing. Figure 39 illustrates some of the camera-shy Fiddler crabs as they retreat from an exposed shoreline. Fiddler crabs and Little Square crabs construct deep burrows that intrude into archaeological components buried below tidal marsh sediments. Figure 40 illustrates numerous Fiddler crab burrows associated with an eroding archaeological site at Zare Point near the mouth of Little Back Creek in Accomack County (see Figure 6). Figure 40 shows numerous one to two inch diameter holes which intrude into the B horizon at the site. The dark stain in Figure 40 represents

a possible post-hole or root feature that has evidence of burrow disturbance. In the foreground, two fragments of fire-cracked rock and one fragment of a prehistoric ceramic vessel are evident. It is evident that some tidal marsh adapted species impact the regions archaeological record. The number of sediment-filled burrow holes may help assess the degree of Fiddler crab disturbance at most tidal marsh archaeological sites.

In offshore settings immediately adjacent to a shoreline archaeological site, other species can impact the submerged archaeological record. Mollusks, such as the Soft-Shelled clam (*Mya arenaria*), the Angel Wing (*Cyrtopleura costata*), the False Angel Wing (*Petricola pholadiformis*), and the Fallen Angel Wing (*Barnea truncata*) bore into clay or mud within the intertidal and subtidal zones (Lippson and Lippson 1974: 35-37). Recent excavations at an eroding tidal marsh archaeological site in Dorchester County, Maryland revealed an inundated Woodland period pit feature with soft-shelled clam disturbance (Jesse Walker, personal communication: 7/6/00). Bioturbation and the movement of artifacts up and down through the various cultural strata at archaeological sites associated with coastal tidal marsh settings is a factor to be addressed when working in these regions.

Soil scientists have classified tidal marsh soils for the Delmarva Peninsula. How soil scientists classify tidal marsh soils is another major problem facing unfamiliar archaeologists conducting research in coastal areas. Archaeologists utilize the U.S.D.A. county soil surveys to aide in regional archaeological survey work. Soil surveys provide drainage data and slope data. The generalized soil profiles associated with the county

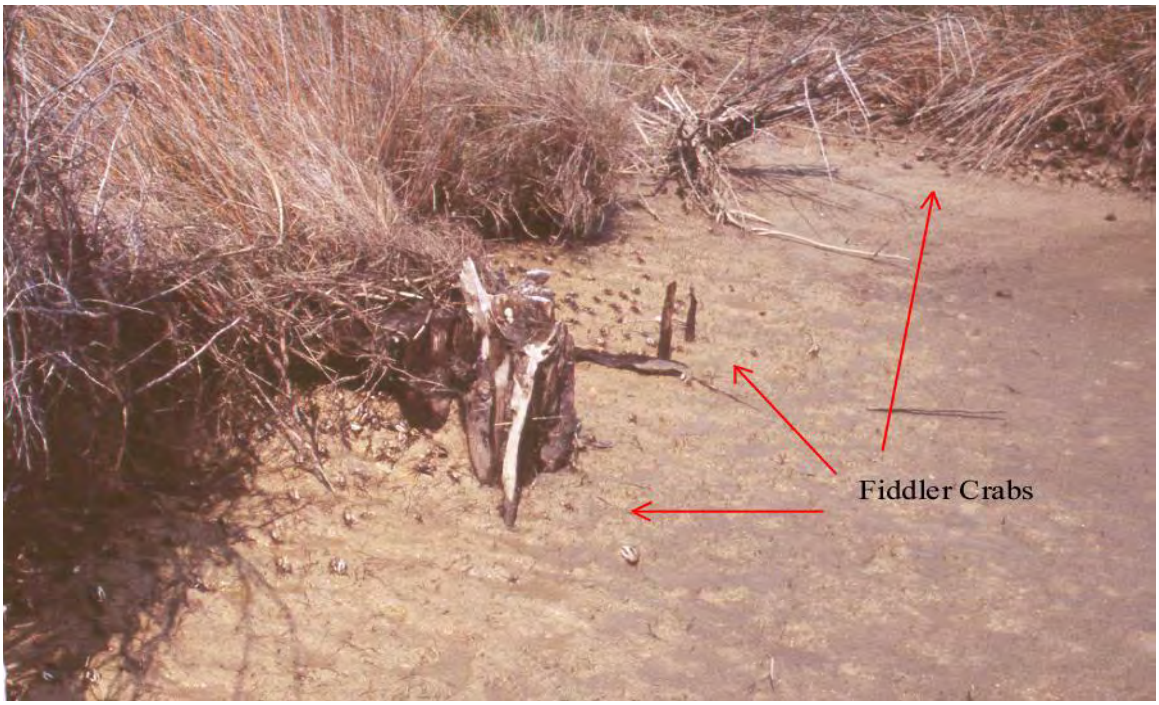


Figure 39. Herds of Retreating Fiddler Crabs Along a Tidal Marsh Shoreline in Back Creek, Accomack County, Virginia.

Figure 40. Eroded Archaeological Site (East Halfmoon #1) in Accomack County, Virginia Illustrating the Bioturbation Damage Associated with Fiddler Crabs.

soil surveys can provide information relative to estimating the age of the soil strata listed in the profile descriptions. The rough age estimates can provide archaeologists with data relative to the age of the cultural material associated with certain strata. With respect to tidal marshes, the soil survey maps are relatively worthless. For example, the soil survey of Accomack County has classified all of the tidal marsh soils as Melfa-Hobucken complex soils (i.e., McA). Peacock and Edmonds (1994: 64-66) indicate that Melfa-Hobucken soils are very deep soils, which are very poorly drained, and consist of unconsolidated sediments with very low slopes. Peacock and Edmonds (ibid.) provide a description of a typical pedon or profile. With the Melfa series, the upper 0 to 6 inches is described as an Oe horizon. The Oe horizon would technically be the surface estuarine tidal marsh peat layer. It is important to note that the Oe horizon associated with the areas labeled as Melfa-Hobucken soils varies in thickness. Bank cuts along sections of the Accomack shoreline indicate that the Oe horizon could be greater than 6 feet thick in some areas. Below the Oe horizon, Peacock and Edmonds (ibid.) indicate that the typical profile has an inundated A horizon that extends from 6 to 13 inches in depth. The strata below the A horizon create the archaeological confusion and problems. Peacock and Edmonds (ibid.) indicate that four distinctive C horizons occur below the inundated A horizon. The first C horizon (i.e., Cg1) occurs from 13 to 26 inches below the ground surface; the second C horizon (i.e., Cg2) occurs from 26 to 40 inches below the ground surface; the third C horizon (i.e., Cg3) occurs from 40 to 50 inches below the ground surface; and the fourth C horizon (i.e., Cg4) occurs from 50 to 85 inches below the ground surface. If you were to assess these strata as C horizons based on the definition of

a true C horizon (Waters 1992: 47), the unfamiliar archaeologist would assume based on the soil surveys that these strata could not contain cultural material. Therefore, the unfamiliar archaeologist would not waste time and effort looking for buried cultural components in these strata. As a result, excavations or investigations into the Melfa series C horizons would not be conducted. Darmody and Foss (1978) correctly identified these soils as inundated uplands. Therefore, the C horizons listed for the Melfa series (Peacock and Edmonds 1994: 64-66) are actually inundated and gleyed B horizons. Buried and inundated prehistoric cultural material could be located in the strata situated 13 to 85 inches below the A horizon in the typical tidal marsh soil profile description.

Figure 41 shows a tidal marsh bank cut along Deep Creek in Accomack County. Though eroded, the cut has exposed the remnants of the base of a tree that once grew on an upland landscape when this region was not affected by saltwater intrusion. As sea levels rose, the tree died because it could not tolerate the increased frequency of saltwater. After it died and rotted, a tidal marsh was established and an O horizon buried the remnants of the tree stump. As the shoreline eroded, the stump was exposed along the bank cut. The tree stump indicates that the land surface below the O horizon was an upland setting when sea levels were lower. In essence, the stump should provide data relative to the rate of regional sea level rise. If the stump were radiometrically dated, the date should indicate when this tidal marsh was last forested and topographically above the influence of saltwater intrusion. The tree stump in Figure 41 indicates the soils situated below the tidal marsh O horizon is an inundated A horizon. The in situ archaeological remains shown in Figure 38 indicate the soil below the inundated A

horizon is actually a gleyed B horizon. Archaeologists should be aware of these observations before a study area containing a broad tidal marsh is assessed for buried archaeological remains.

Tidal marsh environments and the formation of a thick O horizon can create situations where archaeological sites are buried and, in some cases, inaccessible to terrestrial archaeological examination. In essence, coastal inundation would have a major impact on what is observed during a shoreline archaeological survey. Figure 42 illustrates how the formation of a tidal marsh O horizon can influence how archaeologists might misinterpret an inundated upland landscape.

The hypothetical image portrayed in Figure 42 is probably very common along the marshy areas of the lower Delmarva Peninsula. Within the tilled field areas, Site #1.1 and Site #2 would be easily located via a traditional controlled field collection. Site #2 is entirely within the tilled field. Site #1.1 has an inundated component (i.e., Site #1.2) situated below the tidal marsh O horizon. The cultural material associated with Site #1.2 would only located if sub-surface testing was conducted within the tidal marsh. Unlike Site #2 and Site #1.1, Site #1.2 should have better integrity because it had not been subject to agricultural disturbance. In Figure 42, Site #3 is buried deeply below the tidal marsh O horizon. Traditional archaeological survey techniques (i.e., a shoreline collection, shovel test pits, and a controlled field collection) would not detect Site #3. If the shoreline continued to erode, the surface of Site #3 may eventually be subjected to sub-bottom offshore erosion. If sub-bottom offshore erosion occurred, artifacts may be

Figure 41. Inundated Upland Along Deep Creek in Accomack County, Virginia.

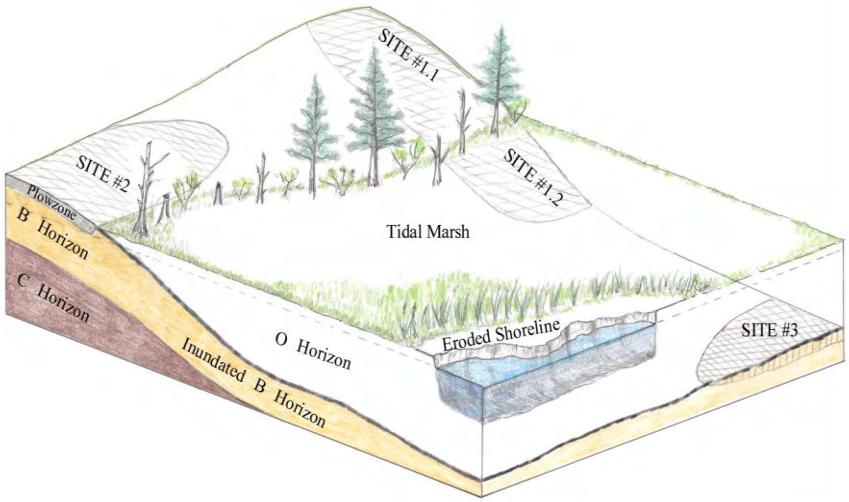


Figure 42. Hypothetical Coastal Environment: Inundated Upland Landscape.

removed from primary contexts at Site #3 and redeposited on top of the eroded shoreline. If this were to occur, an archaeologist conducting a shoreline survey might assume that the lack of a buried upland land surface within the bank cut and the redeposited artifacts along the shoreline reflect the remains of a completely destroyed or eroded archaeological site. In essence this conclusion would be wrong! The archaeological components would be located offshore and out of view. It is important for archaeologists to remember that the flatness of the tidal marshes within the Chesapeake Bay is very deceiving. Underneath of these flat endless land surfaces is a buried landscape that has topographic relief. The buried topographic land surface would have been important to ancient peoples. Archaeologists may need to conduct controlled augering of tidal marshes to locate any inundated or buried archaeological sites.

Tidal marshes can create situations where the preservation of cultural debris is amazing. For example, some Woodland period sites buried under tidal marshes in Maryland have produced copious amounts of shell and animal bone refuse. The following discussion briefly highlights some potential preservation problems associated with tidal marshes that have been historically drained or channelized. Darmody and Foss (1978: 32-35) discuss how draining or channelizing tidal marshes can result in the formation of sulfuric acid. Darmody and Foss (ibid.) note that an important property of marsh soils is their sulfur content. Sulfur is accumulated in marsh soils when anaerobic bacteria reduce the sulfate in the surrounding seawater (ibid.). The intensity and extent of reduction, and the resultant accumulation of sulfides in a marsh, depends upon the sulfate supply from the water and the content of organic matter, free iron and clay in the soil

(ibid.). They (ibid.) indicate if tidal marsh soils containing sulfidic materials are drained, the pH may drop from about neutrality to less than 2. The pH change is due to the oxidation of sulfur compounds by aerobic bacteria to form sulfuric acid. Draining or channelizing tidal marshes could have major impacts on the preservation of archaeological remains (i.e., shell middens, shell-filled pit features, human remains, and faunal remains). Cultural resource managers and research archaeologists need to assess how channelizing and draining tidal marshes on the Delmarva Peninsula may have impacted the archaeological record.

Coastal environments and the formation of tidal marshes create situations where archaeological sites can be preserved or not preserved. Archaeologists should recognize this before they negate the influence that tidal marsh landscapes have had on the archaeological record. Excavation within a tidal marsh would be very expensive and challenging to conduct. Tidal marshes are conduits for water movement. In essence, archaeological sites within tidal marshes are inundated archaeological sites and have to be treated as such. If archaeological work is conducted within tidal marshes and offshore areas adjacent to these environments, researchers need to acknowledge the potential burial, bioturbation, and preservation factors associated with these areas.

## The Impact of Coastal Dunes on Shoreline Surveys

In coastal environments, eroded and redeposited sand is a major factor influencing what an archaeologist can see while conducting a shoreline survey. Figures 13 and 14 clearly illustrate how sand distributed along the shoreline can vary from season to season.

If the sand at the site in Figures 13 and 14 were to remain throughout the summer and winter, coastal dune formations may develop (see Figure 11). Along the southern Delmarva Peninsula, coastal dunes are very common. Therefore, these modern land features would influence the successfulness of an archaeological shoreline survey. The following discussion briefly highlights how coastal dunes can influence a shoreline survey.

Figure 43 illustrates a hypothetical situation that is relatively common along the Chesapeake Bay. An archaeological site is located on a forested ridge adjacent to the shoreline. The archaeological site has three separate components. Site #1.1 is located on the dry forested ridge land surface. An inundated component (i.e., Site #1.2) is adjacent to the ridge, but buried below a tidal marsh O horizon. Another inundated component (i.e., Site #1.3) is located offshore. Site #1.3 is buried below an inundated O horizon and a coastal dune formation C horizon. Essentially, all of the individual archaeological components are not eroded. If for example, the coastal dune shifts location for a very short duration. Some of the archaeological remains associated with Site #1.3 may be subjected to erosion and the artifacts may be redeposited along the surface of the exposed shoreline O horizon. If this were to occur, the archaeological remains would be evident during an archaeological shoreline survey and could be documented. Suppose that the archaeological remains associated with the site are again covered by a coastal dune formation after the site is documented. Subsequent archaeological surveys may not locate the documented archaeological remains along the shoreline. Cultural resource

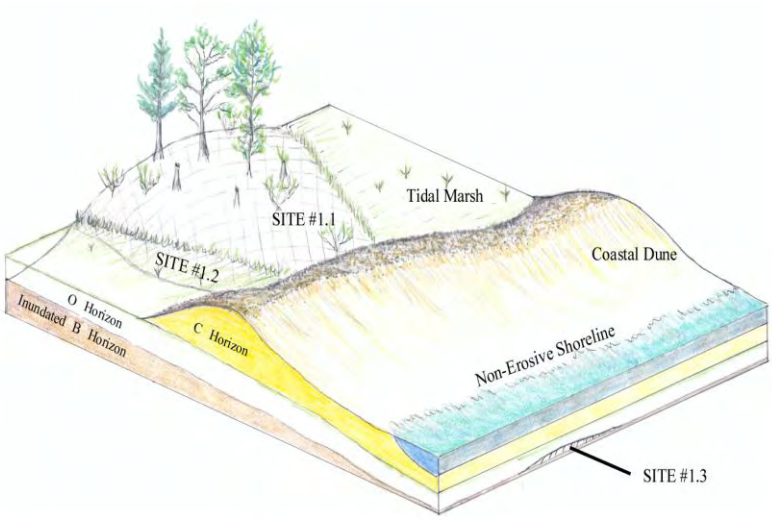


Figure 43. Hypothetical Coastal Environment: Coastal Dune Formation.

managers and archaeologists must recognize the dynamics of coastal environments. They should also recognize how the dynamics of coastal settings influenced past, influence present, and will influence future archaeologically related survey work.

Coastal dune formations can bury formerly eroded archaeological sites. Over short periods of time, the dunes can shift locations exposing any archaeological remains. Continued coastal processes may rebury the archaeological remains and make them seem to vanish. As a result, these processes can greatly influence what an archaeological shoreline survey detects and does not detect.

## Redeposition of Artifacts in Coastal Environments

As archaeological sites along the shoreline erode, the cultural artifacts eroded from these sites become part of the coastal sediment matrix. Outside of the region, several studies have been oriented towards the redeposition of artifacts and cultural debris in coastal environments (Gagliano 1984: 1-40; Hughes and Sullivan 1974: 6-10; Stright et al. 1999; and Waters 1992: 270-271). Figures 13 and 14 clearly indicate the dynamics associated with sediment adjacent to a given archaeological site. In some shoreline settings, the degree of artifact movement away from the parent archaeological site can be extreme. In other cases, the degree of artifact movement away from the parent site can be minimal. How would cultural resource managers and research archaeologists gauge the level of artifact movement at any coastal archaeological site? Recent research into this process at the Holland Point site (18DO220) in Dorchester County, Maryland may help answer this question (Lowery n. d.). The following discussion briefly highlights a simple

technique to gauge the level, direction, and degree of redeposition of artifacts in coastal environments.

The Holland Point site (18DO220) is a large eroding Early Woodland to Late Woodland shell midden situated along the south side of the Little Choptank River. The Maryland Historical Trust funded recent research at the site. One aspect of the recent research at the Holland Point site was focused on how to determine the level, direction, and degree of artifact redeposition along the shoreline (Lowery n. d.). The total length of the eroded shoreline associated with the Holland Point site included approximately 320 meters of shoreline. The shoreline was sectioned-off into eight 40-meter sectors. Each one of the eight sectors was subsequently parceled-off into eight 5-meter stretches of shoreline. Each 5-meter stretch of shoreline was broken up into an upper level and a lower level. The upper level consisted of redeposited materials that were above mean tide. The lower level consisted of redeposited materials that were below mean tide. Each individual upper and lower 5-meter stretch of shoreline associated with the eight sectors was systematically collected. All flake stone tools, ceramics, bone, and ground stone tools were collected. Also, fire-cracked rock from both the upper and lower levels were gathered and weighed. Augering along the shoreline and within the tidal marsh determined where intact midden deposits were located and where these midden deposits were not present. The controlled shoreline collection determined that the sectors closer to the intact midden deposits had the largest and heaviest artifacts (i.e., fire-cracked rock). The auguring suggested that wave energy and inshore currents adjacent to the shoreline had redeposited the shell and the artifacts over 200 meters from the parent shell midden.

An experiment was devised in an attempt to gauge the littoral movement of artifacts along the shoreline at the Holland Point site.

The experiment attempted to test how shoreline geometry, wind direction, wave energy, and currents impact an eroding archaeological site. Considering the range of artifact sizes, shapes, and weights at a given eroding archaeological site, the experiment attempted to determine how wind direction, wave energy, and currents influence these variables. Five separate locations along the Holland Point shoreline were selected as specific study localities. These localities were in settings along the shoreline that were subjected to various wind directions, wave energies, and had different shoreline geometries. Various size ceramic bathroom tiles were used as test subjects during the experiment. The variation in tile size, shape, and weight roughly reflect the range of artifact sizes, shapes, and weights observed at the site. At each separate locality along the shoreline, a package of ceramic tiles was deposited to assess the redeposition of artifacts. Each package of tiles included twenty one-by-one inch tiles, three one-by-two inch tiles, five two-by-two inch tiles, one two-by-three inch tile, and one three-by-three inch tile. The individual packages of thirty tiles were painted separate colors to avoid confusion during the experiment. Standard automotive car paints were used so that abrasion along the shoreline would not remove the colors. Each color was associated with a separate drop-off locality along the shoreline. The tiles were deposited along the shoreline on 7/17/00 and degree of movement was assessed 24 days later on 8/9/00 (see Figure 44).

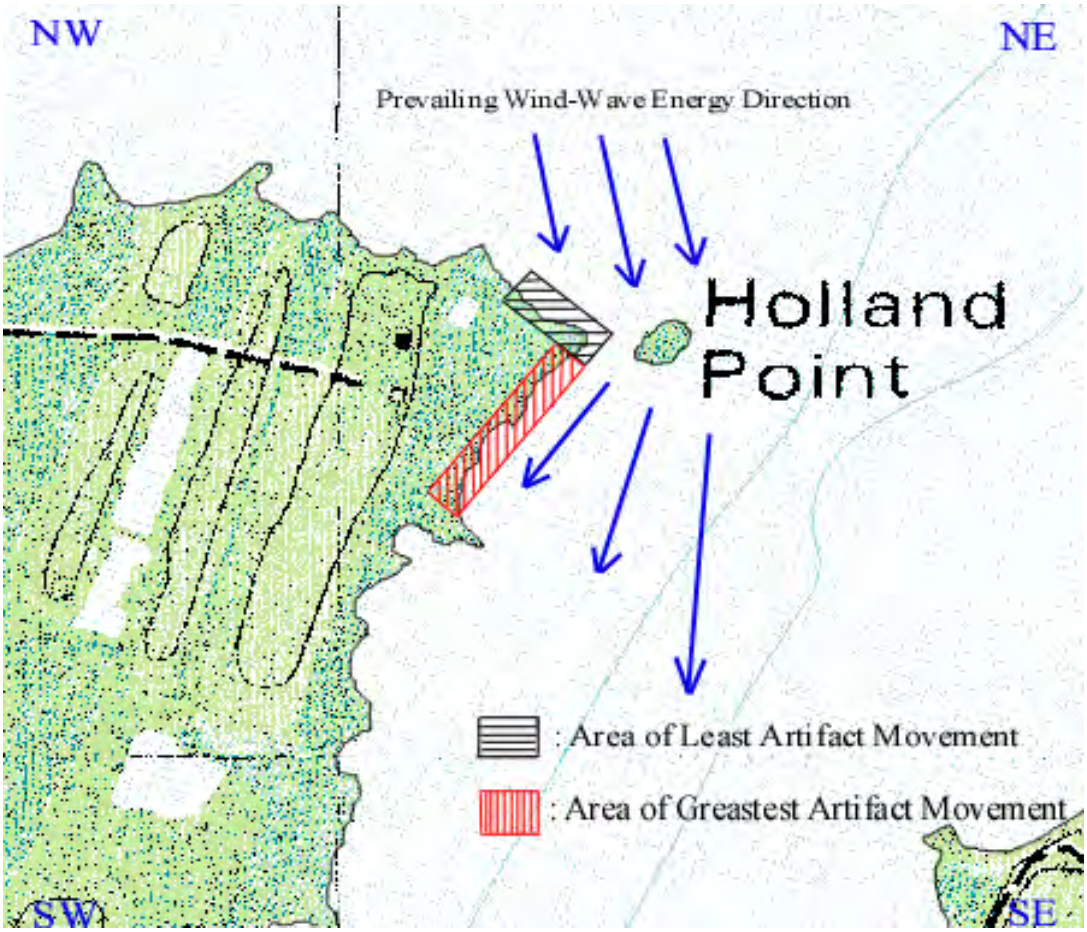


Figure 44. Artifact Movement and Redeposition at the Holland Point Site, Dorchester County, Maryland.

The data from the shoreline redeposition experiment at the Holland Point site indicated that shoreline geometry relative to the prevailing wind-wave direction is the major factor determining artifact movement. As previously assumed, inshore currents also influence the movement of materials along the shoreline. Interestingly, the tiles deposited along the shoreline with the greatest exposure to wave energy moved the least (see Figure 45). In this case, the wave crests were parallel to the shape of the shoreline (see Figure 45). The tiles deposited along the shoreline section where the waves crests were perpendicular to the shape of the shoreline had the greatest level of movement (see Figure 45). Over the duration of the experiment, the ceramic tiles deposited at Section #1.0 were redeposited and moved within 1 meter of the original drop-off locality. The ceramic tiles deposited at Section #1.15 were redeposited and moved within 9.2 meters of the original drop-off locality. Figures 44 and 45 designate this area of the shoreline at Holland Point as the "Area of Least Artifact Movement". The shoreline section in Figures 44 and 45 designated as the "Area of Greatest Artifact Movement" obviously showed the greatest level of ceramic tile movement. Over the duration of the experiment, the ceramic tiles in the "Area of Greatest Artifact Movement" were redeposited and moved between 5.85 meters and 47.4 meters of the original drop-off localities.

It is evident that artifact redeposition and movement are major factors associated with sites in coastal settings. It is also evident that the redeposition and movement of artifacts along the shoreline must be gauged on a site-by-site basis. Not all of the artifacts eroded from an archaeological site are being moved great distances. Lowery

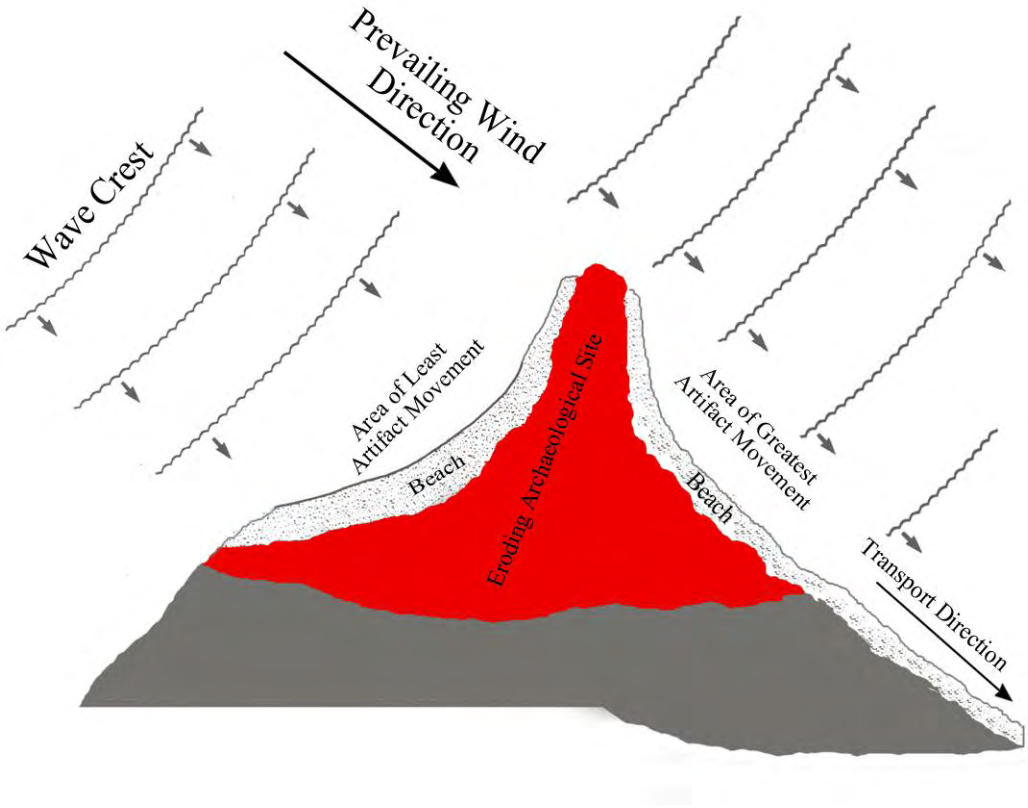


Figure 45. Prevailing Wind Direction, Wave Crest Orientation, and Artifact Movement at the Holland Point Site, Dorchester County, Maryland.

(2000) has reported the discovery of two conjoining fragments of a large bifacial thinning flake from a heavily eroded Paleoindian site along the Chesapeake Bay. The two conjoining flakes were found within seven meters of each other (ibid.). More importantly, the two conjoining flakes were discovered over a twenty-year period. In this example, the documentation of conjoining artifacts from the site suggests that redeposition may not be a major factor along this particular shoreline. It is hard to assess how the redeposition and movement of artifacts at eroding sites influences a shoreline archaeological survey. When an eroded archaeological site is discovered, the distribution of artifacts along the shoreline may or may not correlate to the actual dimensions of the site. In other words, shoreline sites may look bigger than their actual size. Given the level of redeposition, the cultural remains associated with an eroded site may be completely removed from the actual site area. Also, eroded artifacts are frequently redeposited on top of younger shoreline landscapes. If the younger landscape with the translocated artifacts stabilizes, the cultural material may become naturally reburied. Artifacts redeposited on top of a younger landscape frequently settle in depressions. After a shoreline stabilizes and the translocated artifacts are naturally reburied, the distribution and location of the artifacts within the shoreline may resemble cultural features or activity areas. But these pseudo-features or pseudo-activity areas are actually natural features and represent a mix of unassociated materials. Cultural resource managers and research archaeologists should be aware of these factors before they assess a given section of shoreline. Otherwise, erosion, redeposition, and the movement of artifacts along the shoreline will influence what cultural resource managers and research

archaeologists see in the archaeological record and how they perceive the archaeological data. In respect to the Virginia Eastern Shore, similar redepositional experiments should be conducted at eroding shoreline sites. These tests should help determine the relationship between beach finds and the contexts from which they may have been derived.

## Disadvantages of Single Shoreline Collection Site Assemblage Data

Lowery's (1999: 117-118) study of artifact collections associated with the Choptank River watershed addresses the problems associated with single surface and shoreline archaeological survey data. This discussion highlights how cultural resource managers and archaeologists to determine site function use survey assemblage data. The survey assemblage data are also used to assess the cultural components associated with an archaeological site. Using such limited or short-term data to determine a site's function or to assess site's cultural chronology can result in major misinterpretations. The following discussion will present an example of how misinterpretations can result from single shoreline survey assemblage data. Another example will discuss problems determining site function from detailed multi-year site assemblage data. The discussion will also present a summary of the problems determining site size in coastal environments. These discussions are mainly presented so that cultural resource mangers and research archaeologists are aware of these problems.

An eroding Maryland archaeological site analyzed during the Choptank River collection study (Lowery 1999) had been documented during a previous professional

shoreline survey (see Wilke and Thompson 1977). The documented site provides a basis for assessing the problems associated with determinations about site function and the cultural chronology associated with a site. 18TA192 was located by Wilke and Thompson (ibid.) during a shoreline survey associated with various portions of Talbot County. Dr. Jay Custer officially recorded the site from the notes and collections associated with the Wilke and Thompson survey (Talbot County Site File 1982). Based on the data associated with the site data form, Wilke and Thompson collected one argillite drill, one rhyolite Fox Creek point, one argillite Fox Creek point, and two quartz stemmed points from 18TA192 during their survey. The records indicate that chert flakes and shells were also associated with 18TA192 (ibid.). The Wilke and Thompson survey data was utilized by Jay Custer (Custer 1983) in constructing an archaeological resource management plan for the Upper Delmarva region (ibid: Table 13). Custer (ibid: 70) interpreted the artifact data and ecological data associated with 18TA192 as indicating the site functioned as a hunting/procurement site. Based on the survey records and tidal marsh setting associated with the site, I would have come to the same conclusion. Obviously, some of the conclusions associated with Custer's (1983) management plan were used in developing regional settlement patterns (ibid: Figure 26). Fortunately, one of the collections examined during Lowery's (1999) project had an assemblage associated with 18TA192 (ibid: Appendix III). Like the Wilke and Thompson assemblage, the assemblage recorded during Lowery's study (ibid.) from 18TA192 is also small and limited. The assemblage recorded in 1999 (ibid.) includes one Early Archaic point, three Middle Archaic to Middle Woodland points, one Early Woodland to

Middle Woodland point, ten Middle Woodland points, two Middle Archaic to Late Woodland points, four undiagnostic bifaces, and twenty-five flakes. Supplementing the Wilke and Thompson data with the 1999 Choptank River collection data, it is still arguable that 18TA192 seems to reflect a limited and ephemeral hunting/procurement prehistoric occupation. Based on additional work at 18TA192, it is arguable that the site was not simply a prehistoric hunting/procurement settlement (Lowery 1992b). The data that have been extracted from 18TA192 includes approximately 15,000 artifacts (ibid.). Over 11,000 non-local rhyolite artifacts are included in the total assemblage of 15,000 artifacts reported from the site (ibid.). Lowery (1999: 118) concluded that 18TA192 has produced the one of densest accumulations of non-local rhyolite artifacts on the entire Delmarva Peninsula. The shoreline associated with 18TA192 has also been collected by numerous other people. Some researchers and cultural resource managers might suggest that the inadequacies of the Wilke and Thompson collection may have been fostered by the extensive collecting history associated with the site. In other words, some would argue that over-collecting might have resulted in a "biased" professional shoreline survey assemblage. The extensive collecting history associated with 18TA192 has <u>not</u> impacted the data associated with the site. In other words, the site has not been "vacuum cleaned" by artifact collectors. Presently, 18TA192 is still littered with diagnostic artifacts and housands of rhyolite flakes. The density of waste debris associated with the site is a result of continued erosion and a lack of collector interest in waste debris.

Another example illustrates the problem determining a site's function even when detailed multi-year surface collections are available. 18TA212c is also located along an

eroded shoreline in Talbot County, Maryland. Lowery (1992b) indicates that 84 Middle Archaic bifurcated points have been found at 18TA212c. Continued documentation of the eroded artifact assemblages associated with 18TA212c has revealed 41 additional Middle Archaic bifurcated points. The 125 bifurcated points found at the site include MacCorkle, St. Albans, and LeCroy type projectile points. These points are roughly 8,800 to 8,000 radiocarbon years old (Custer 1996: 23). Were the 125 bifurcated points found at 18TA212c discarded during a single event or discarded over an 800-year period? Some might suggest that the density of bifurcated points at 18TA212c is anomalous and reflects a base camp (Lowery 1992b). Unfortunately, the cultural material found along the shoreline of 18TA212c is mixed with diagnostic debris that span the past 10,000 years of the region's prehistory. The Middle Archaic projectile point assemblage from 18TA212c does <u>not</u> provide any information about the function of the site during the Middle Archaic period. The 125 projectile points could have been discarded at a rate of one point every 6.4 years. If this did occur, the diagnostic assemblage would still be just as large, but determinations about the site's function would change greatly.

From the examples presented, it is argued that regional "one time" or "short term" shoreline survey data should be regarded as extremely biased. In other words, shoreline surveys will not determine site function or accurately assess the cultural chronologies associated with a given site. As mentioned many times, shoreline conditions vary from year to year, season to season, and day to day. These conditions will obviously impact the observed cultural data, which is collected during an archaeological shoreline survey. A single shoreline survey analysis of an area will only define the linear movement and

distributions of cultural material observed during the survey. Single "one time" shoreline surveys will not provide detailed data about the cultural chronologies and the density of cultural debris associated with an observed archaeological site. Therefore, an assessment of an archaeological site's importance should not be based on "blitzkrieg" shoreline surveys. The assessment of an archaeological site's importance has implications relative to the cultural resource management field. The example presented suggests that cultural resource managers should not be quick to assess an archaeological site's value based solely on "short term" survey data. An assessment of an archaeological site's function should also not be based on "short term" survey data. In an attempt to interpret the prehistoric past, intensive, multi-year and/or "long term" site collections have significant archaeological value. The extensive multi-year shoreline assemblages can provide a detailed glimpse into the cultural components associated with a particular site. These same multi-year site assemblages say very little about a particular site's function. Detailed archaeological excavations may be the only way to accurately assess site function.

In reference to the Virginia shoreline survey, the discussion questions the interpretive value of the data, which resulted from the project. The problems are clearly illustrated in Table A.7. The present survey re-examined several sites that had been previously documented. A comparison between the earlier data and the recent data for each of these re-examined sites illustrates the disadvantages of single shoreline collection information. Based on the data listed in Table A.7, some of the recent survey work failed to document the same chronological summaries defined by the earlier surveys. In some

cases, the recent survey work refined earlier survey data and provided more specific chronological summaries. In one instance, the earlier survey work indicated that a particular site had an unknown historic occupation. The recent survey work indicated that the same site had an unknown prehistoric occupation. In this instance, the stark contrast between the earlier chronological summary and the recent chronological summary illustrate the problems and limitations associated with single shoreline survey data.

## Site Dimensional Assessments in Coastal Environments

Along eroded shorelines, the true size of an archaeological site is very hard to assess. In coastal environments, tidal marshes can cover the site and make it less visible. Adjacent forested uplands and coastal dunes can also make a site less visible. When conducting a shoreline survey, analysis is focused on those areas between mean high tide and mean low tide. When delineating an eroded shoreline site, the archaeologist can in most cases only see a linear expression of the site. The standard archaeological site data forms, which are used to officially record archaeological sites, require site dimensional data (i.e., length, width, and thickness). Figure 46 illustrates the observed shoreline exposure of two eroding prehistoric shell middens along Nandau Creek in Accomack County. The actual inland extent of these sites could not be determined. It is not known whether the linear shoreline exposure represents the length, width, or a diagonal dimension associated with these two sites. The goal of the Virginia Eastern Shore shoreline survey was to locate archaeological sites being threatened by shoreline erosion.

Future individually focused site research projects will provide more data about the true dimensions of the sites that were discovered as a result of this and previous surveys in the region. Cultural resource managers and research archaeologists are reminded that the site dimensional data recorded during this project represent only one dimension. Unfortunately, it is not known what the recorded dimension represents (i.e., length, width, or a diagonal measurement).

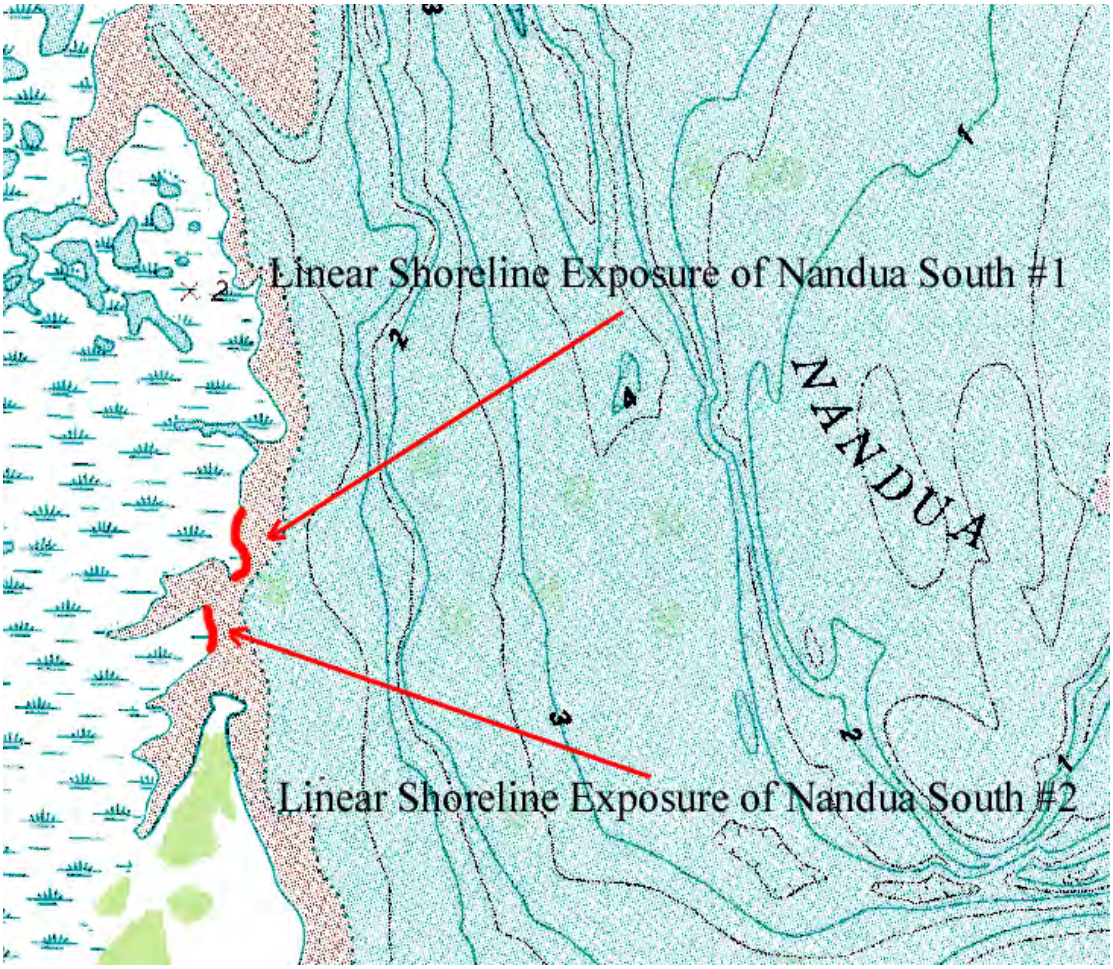


Figure 46. Linear Shoreline Exposures of Two Eroding Archaeological Sites Along Nandua Creek in Accomack County, Virginia.

# CHAPTER 6

# SUMMARY AND CONCLUSIONS

The shoreline survey of the Chesapeake Bay portion of the Virginia Eastern Shore produced 108 archaeological sites. These sites span the past 13,000 years of human occupation of the Middle Atlantic region. The survey also attempted to gauge the processes associated with shoreline related archaeological sites. The results of the project created a database for future research, and it also established some criteria for conducting archaeological fieldwork in coastal settings.

There were several tasks associated with the project. All of the tasks were completed. This report summarizing the tasks associated with the project, any observations, and the results. The project concluded that assessing the erosion threat and the degree of site "significance" could not be based on a single site analysis. As stated before, the real dimensions of each site also could not be determined. As such, it is impossible to gauge the level of threat or the degree of significance when the size of the intact portion of each site is not known.

This report attempted to gauge some of the archaeologically related problems facing researchers here on the Delmarva Peninsula. The problems discussed were primarily oriented towards coastal environments here in the Chesapeake Bay. It is equally important to understand the natural variables impacting the archaeological record as well as the archaeological record itself. The project and the report were oriented towards these objectives. Hopefully, future researchers will take these problems into consideration before, during, and after they conduct a project on the Delmarva Peninsula.

At the completion of the project, the data resulted in several conclusions. Even though the project located 108 eroding archaeological sites, assessments about these sites (i.e., function, size, level of integrity, significance, and cultural chronology) cannot be determined. It was also concluded that limited one-time surveys are very inadequate ways to address these site assessment concerns. Limited one-time surveys can locate archaeological sites. Even so, it is feared that a percentage of the real number of sites in the study area were missed as a result of adverse field conditions. Shoreline erosion in the region is a factor impacting shoreline related archaeological sites. Other factors such as bioturbation in coastal areas and chemical processes within tidal marsh settings must also be considered factors impacting the coastal archaeological record. Natural burial processes in the coastal plain must also be considered when conducting a survey. Coastal inundation and the formation of tidal marshes can greatly effect what is apparent in an archaeologically related surface survey. Interior aeolian deposition can also effect what is apparent in an archaeologically related surface survey. Coastal dunes formed as a result of the interaction between wind and water can greatly influence the success of an archaeologically related shoreline survey. These three burial processes must be recognized as variables influencing what a surface archaeological survey detects or does not detect. Relative to non-shoreline related erosion, deflation of the land surface as a result of sheet erosion should also be recognized as a variable influencing what a surface survey detects or does not detect. Finally, the redeposition of artifacts and cultural refuse in coastal environments can impact a survey (see Figure 47). All of these variables have and will probably continue to influence the archaeological record associated with the 108

sites documented during the project. As such, the data are not adequate enough to make assessments about the function of each site, the size of each site, the level of integrity associated with each site, the significance of each site, and the cultural chronology reflected at each site.

Clearly future research is needed on the Virginia Eastern Shore to provide cultural resource managers and research archaeologists with better techniques to properly manage the region's cultural resources. As it stands, the present project has created a database of individual localities where cultural material was observed eroding from the shoreline. What do these localities mean? Unfortunately, the present information cannot answer this question. Below are listed some potential future research projects that would help to provide some answers to this question and put the individual sites along the Chesapeake Bay into a regional perspective. The list of suggestions for future research includes:

1. To better understand how the archaeological sites on the Chesapeake Bay relate to other coastal sites in the region, a similar shoreline survey should be conducted along the Atlantic shore of the Virginia portion of the Delmarva Peninsula.
2. To better understand how the archaeological sites on the Chesapeake Bay relate to regional sites in non-coastal settings, a systematic survey of the interior agriculturally tilled portions of the Virginia peninsula should also be conducted.
3. Several of the archaeological sites with radically different coastal settings should be selected as candidates for focused archaeological testing. Testing at these sites should help to quantify some of the variables impacting the region's archaeological record. As such, cultural resource managers would have a better

means to assess how coastal sites are being impacted by these variables (i.e., shoreline erosion, redeposition, inundation, bioturbation, aeolian processes, and coastal dune formations).

4. A supplementary project should be geared towards assessing the paleoclimatic factors, which have influenced the region over the past 13,000 years. Focused site research can be supplemented by the paleoclimatic data. As a result, the cultural remains can be put into a regional paleoenvironmental perspective.
5. Sites with prehistoric marine refuse data should be studied. Systematically excavated midden data should help to assess the past marine environments associated with the region. At the same time, these data would provide information about regional prehistoric coastal subsistence patterns.
6. Exposed bank cuts should be examined and recorded. As a result, chronostratigraphic patterns associated with the regional archaeological record may emerge.
7. Limited excavations should be conducted within the preserved segments of all of the shoreline sites should be conducted. Not only would the excavations provide evidence associated with prehistoric and historic cultural lifeways, but the data would help balance the view provided by the shoreline discoveries.
8. Finally and most importantly, a program along the Virginia Eastern Shore should be established addressing the continued multi-year/multi-seasonal re-examinations of the eroding coastal sites. One-time shoreline surveys cannot provide much data about eroding archaeological sites. Multi-year/multi-seasonal

site re-examinations would help address the degree of site erosion threat, the degree of site significance, aspects about site-specific seasonal erosion processes, variations in the redepositional processes along individual shorelines, and help to resolve questions about the cultural chronologies associated with each site. If all or most of the eroding archaeological sites will not be subjected to future intensive archaeological investigations, multi-year/multi-seasonal re-examinations will provide valuable data. Overtime, continued erosion may completely consume the existing intact shoreline-related archaeological remains associated with each site. The program will basically be a periodic "check-up" of each threatened site. Erosion threats to "significant" features associated with each eroding site could also be addressed immediately. Otherwise, the lack of future site re-examinations would neglect each archaeological site and subject its future to the whims of nature.

From a "reflexive" perspective the shoreline survey of both Accomack and Northampton counties has provided some data. The data that resulted from this project are only as good as how cultural resource managers, research archaeologists, and the general public use it. If some or all of the suggestions for future research were instituted, then the data resulting from this project would have value. In conclusion, it is imperative that individuals recognize that follow-up studies for archaeological sites in eroding environments need to be conducted immediately. As the old saying goes, "Time and tides wait for no one."

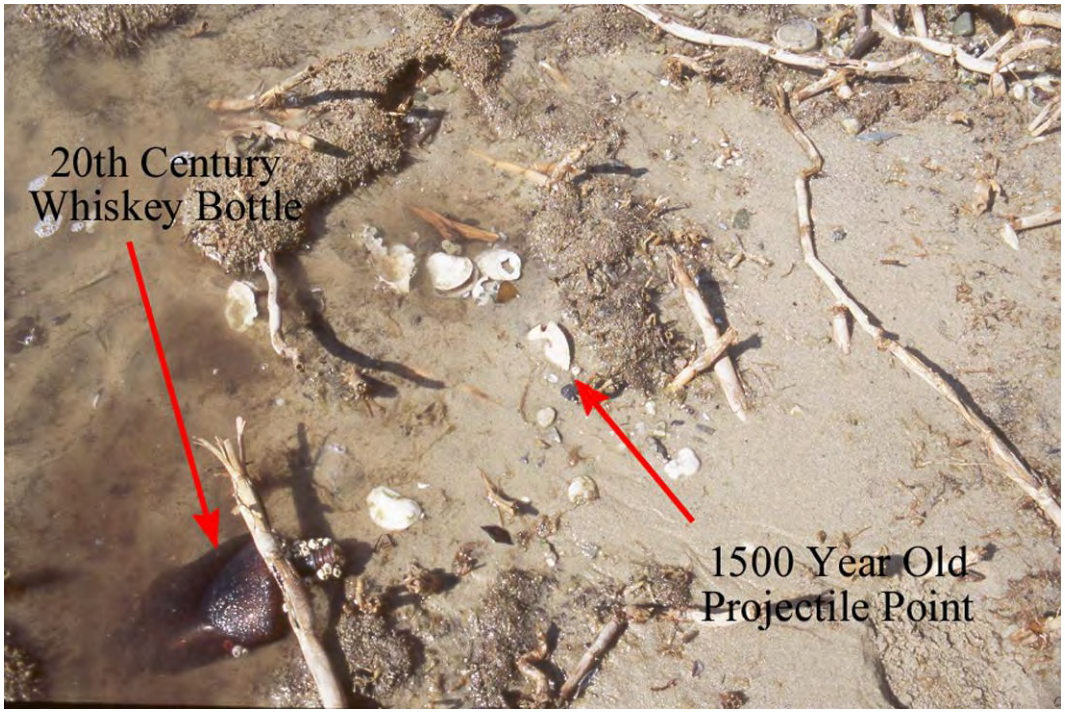


Figure 47. Unassociated Cultural Artifacts as a By-Product of Redeposition in Coastal Environments.

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# APPENDIX A

# VIRGINIA EASTERN SHORE ARCHAEOLOGICAL SITE INFORMATION

Appendix I: Table A.1
Previously Recorded Accomack County, Virginia Coastal Archaeological Sites

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Recorded By (date): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 2 | Saxis | | | | | ? | ? | ? | | | | | | H. MacCord 1963 |
| 44 AC 4 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | X | | | | N. Luccketti 1978 |
| 44 AC 6 | Crisfield | | ? | ? | ? | | | | | ? | ? | ? | ? | H. MacCord 1972 |
| 44 AC 10 | Exmore | | | | | ? | ? | ? | | | | | | H. MacCord 1973 |
| 44 AC 14 | Saxis | | | | | ? | ? | ? | | | | | | H. MacCord 1973 |
| 44 AC 48 | Jamesville | | ? | ? | ? | | | | | | | | | N. Luccketti 1978 |
| 44 AC 49 | Jamesville | | X | X | X | X | X | X | | | | | | N. Luccketti 1978 |
| 44 AC 50 | Jamesville | | X | X | X | X | X | X | | | | | | N. Luccketti 1978 |
| 44 AC 51 | Jamesville | | | | X | | | | | | | | | N. Luccketti 1978 |
| 44 AC 52 | Jamesville | | | X | X | | | | | | | | | N. Luccketti 1978 |
| 44 AC 54 | Saxis | | | | | ? | ? | ? | | | | | | T. Bastian 1978 |
| 44 AC 71 | Parksley | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | VHLC (no date) |
| 44 AC 126 | Jamesville | | | | | ? | ? | ? | | | | | | M. Wittkofski (1980) |
| 44 AC 136 | Parksley | | ? | ? | ? | | | | | | | | | M. Wittkofski (1980) |
| 44 AC 137 | Saxis | | | | | ? | ? | ? | | | | | | M. Wittkofski (1980) |
| 44 AC 152 | Nandua C. | | ? | ? | ? | | | | | | | | | M. Wittkofski (1980) |
| 44 AC 153 | Parksley | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | M. Wittkofski (1980) |
| 44 AC 160 | Pungoteague | | | X | X | X | X | X | | | | | | M. Wittkofski (1980) |
| 44 AC 161 | Pungoteague | | | | | | | X (?) | X (?) | X(?) | | | | M. Wittkofski (1980) |
| 44 AC 162 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski (1980) |
| 44 AC 177 | Pungoteague | | | | | | | | | | X | X | | M. Wittkofski (1980) |
| 44 AC 178 | Pungoteague | | | | | | | | | | X | | | M. Wittkofski (1980) |
| 44 AC 188 | Parksley | | | | | | | | | | X | | | M. Wittkofski (1980) |
| 44 AC 213 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski (1981) |
| 44 AC 214 | Tangier | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski (1981) |
| 44 AC 271 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | K. Egloff (1982) |
| 44 AC 277 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | K. Egloff (1982) |
| 44 AC 341 | Jamesville | | | | | | | | | | X | | | M. Wittkofski (1983) |
| 44 AC 355 | Jamesville | | | | | ? | ? | ? | | | | | | M. Wittkofski (1983) |
| 44 AC 356 | Jamesville | | | | | ? | ? | ? | | | | | | M. Wittkofski (1983) |
| 44 AC 357 | Jamesville | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | M. Wittkofski (1983) |
| 44 AC 397 | Tangier | | | | | ? | ? | ? | | | | | | M. Wittkofski (1983) |
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**KEY:**

**PI:** Paleoindian; **EA:** Early Archaic; **MA:** Middle Archaic; **LA:** Late Archaic; **EW:** Early Woodland; **MW:** Middle Woodland; **LW:** Late Woodland; **Cnt:** Contact; **17th:** 17th Century; **18th:** 18th Century; **19th:** 19th Century; and **20th:** 20th Century.

**X:** Cultural Component Present
**?:** Unknown if Cultural Component Present
**X(?):** Possible Cultural Component Present
"Unmarked": Cultural Component Absent or Not Documented

**PI EA MA LA EW MW LW** (all marked with **?**): Unknown Prehistoric Component

**17th 18th 19th 20th** (all marked with **?**): Unknown Historic Component

**EA MA LA** (all marked with **?**): Unknown Archaic Component

**EW MW LW** (all marked with **?**): Unknown Woodland Component

Table A.1 Previously Recorded Accomack County, Virginia Coastal Archaeological Sites

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Recorded By (date): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 2 | Saxis | | | | | ? | ? | ? | | | | | | H. MacCord 1963 |
| 44 AC 4 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | X | | | | N. Luccketti 1978 |
| 44 AC 6 | Crisfield | | ? | ? | ? | | | | | ? | ? | ? | ? | H. MacCord 1972 |
| 44 AC 10 | Exmore | | | | | ? | ? | ? | | | | | | H. MacCord 1973 |
| 44 AC 14 | Saxis | | | | | ? | ? | ? | | | | | | H. MacCord 1973 |
| 44 AC 48 | Jamesville | | ? | ? | ? | | | | | | | | | N. Luccketti 1978 |
| 44 AC 49 | Jamesville | | X | X | X | X | X | X | | | | | | N. Luccketti 1978 |
| 44 AC 50 | Jamesville | | X | X | X | X | X | X | | | | | | N. Luccketti 1978 |
| 44 AC 51 | Jamesville | | | | X | | | | | | | | | N. Luccketti 1978 |
| 44 AC 52 | Jamesville | | | X | X | | | | | | | | | N. Luccketti 1978 |
| 44 AC 54 | Saxis | | | | | ? | ? | ? | | | | | | T. Bastian 1978 |
| 44 AC 71 | Parksley | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | VHLC (no date) |
| 44 AC 126 | Jamesville | | | | | ? | ? | ? | | | | | | M. Wittkofski (1980) |
| 44 AC 136 | Parksley | | ? | ? | ? | | | | | | | | | M. Wittkofski (1980) |
| 44 AC 137 | Saxis | | | | | ? | ? | ? | | | | | | M. Wittkofski (1980) |
| 44 AC 152 | Nandua C. | | ? | ? | ? | | | | | | | | | M. Wittkofski (1980) |
| 44 AC 153 | Parksley | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | M. Wittkofski (1980) |
| 44 AC 160 | Pungoteague | | | X | X | X | X | X | | | | | | M. Wittkofski (1980) |
| 44 AC 161 | Pungoteague | | | | | | | X (?) | X (?) | X(?) | | | | M. Wittkofski (1980) |
| 44 AC 162 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski (1980) |
| 44 AC 177 | Pungoteague | | | | | | | | | | X | X | | M. Wittkofski (1980) |
| 44 AC 178 | Pungoteague | | | | | | | | | | X | | | M. Wittkofski (1980) |
| 44 AC 188 | Parksley | | | | | | | | | | X | | | M. Wittkofski (1980) |
| 44 AC 213 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski (1981) |

Table A.1 Previously Recorded Accomack County, Virginia Coastal Archaeological Sites

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Recorded By (date): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 214 | Tangier | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski (1981) |
| 44 AC 271 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | K. Egloff (1982) |
| 44 AC 277 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | K. Egloff (1982) |
| 44 AC 341 | Jamesville | | | | | | | | | | X | | | M. Wittkofski (1983) |
| 44 AC 355 | Jamesville | | | | | ? | ? | ? | | | | | | M. Wittkofski (1983) |
| 44 AC 356 | Jamesville | | | | | ? | ? | ? | | | | | | M. Wittkofski (1983) |
| 44 AC 357 | Jamesville | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | M. Wittkofski (1983) |
| 44 AC 397 | Tangier | | | | | ? | ? | ? | | | | | | M. Wittkofski (1983) |
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Table A.1 Previously Recorded Accomack County, Virginia Coastal Archaeological Sites

KEY:

Prehistoric Cultural Periods:
**PI**: Paleoindian; **EA**: Early Archaic; **MA**: Middle Archaic; **LA**: Late Archaic; **EW**: Early Woodland; **MW**: Middle Woodland; **LW**: Late Woodland; and **Cnt**: Contact.

Historic Cultural Periods:
**17th**: 17th Century; **18th**: 18th Century; **19th**: 19th Century; and **20th**: 20th Century.

**X**: Cultural Component Present
**?**: Unknown if Cultural Component Present
**X(?)**: Possible Cultural Component Present
"Unmarked": Cultural Component Absent or Not Documented

**PI EA MA LA EW MW LW** (all marked with ?): Unknown Prehistoric Component

**17th 18th 19th 20th** (all marked with ?): Unknown Historic Component

**EA MA LA** (all marked with ?): Unknown Archaic Component

**EW MW LW** (all marked with ?): Unknown Woodland Component

Appendix I: Table A.2
Previously Recorded Northampton County Coastal Archaeological Sites

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Recorded By (date): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 NH 3 | Jamesville | | ? | ? | ? | ? | ? | ? | | | | | | Luccketti 1978 & Custer 1985 |
| 44 NH 5 | C. Charles | | | | | ? | ? | ? | | | | | | H. MacCord 1969 |
| 44 NH 8 | Franktown | | | | | | | | | X | | | | H. MacCord 1973 |
| 44 NH 10 | Exmore | | | | | | | X | | | | | | W. Clark 1976 |
| 44 NH 34 | Elliotts Cr. | | | | | | | | | X | | | | VRCA 1977 |
| 44 NH 41 | Franktown | | | | | | | | | | | ? | | K. Egloff 1977 |
| 44 NH 42 | Franktown | | | | | | | | | X | | | | N. Luccketti 1978 |
| 44 NH 43 | Jamesville | | | | X | | X | | | | | | | N. Luccketti 1978 |
| 44 NH 44 | Jamesville | | | | | ? | ? | ? | | | | | | N. Luccketti 1978 |
| 44 NH 47 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1981 |
| 44 NH 48 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1981 |
| 44 NH 49 | Franktown | | | | | | | | | X | | | | M. Wittkofski 1979 |
| 44 NH 59 | Franktown | | | | | | | | | X | | | | M. Wittkofski 1980 |
| 44 NH 60 | Franktown | | | | | | | | | X | | | | M. Wittkofski 1980 |
| 44 NH 63 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1980 |
| 44 NH 64 | Jamesville | | | | | | | | | X | | | | M. Wittkofski 1980 |
| 44 NH 65 | Jamesville | | | | | | | | | ? | ? | ? | ? | M. Wittkofski 1980 |
| 44 NH 75 | Jamesville | | | | | ? | ? | ? | | | | | | M. Wittkofski 1980 |
| 44 NH 76 | Jamesville | | | | | | | X | | | | | | M. Wittkofski 1980 |
| 44 NH 85 | Cheriton | | | | | | | | | | X | | | M. Wittkofski 1980 |
| 44 NH 115 | Franktown | | | | | | | | | X | X | X | | M. Wittkofski 1982 |
| 44 NH 116 | Franktown | | X | X | X | X | | | | | | | | M. Wittkofski 1982 |
| 44 NH 118 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1982 |
| 44 NH 158 | Franktown | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 166 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 167 | Franktown | | | X | X | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 176 | Jamesville | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 179 | Jamesville | | | | | | | | | X | | | | M. Wittkofski 1983 |
| 44 NH 181 | Jamesville | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 192 | Jamesville | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 194 | Exmore | | | | | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 197 | Exmore | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 221 | C. Charles | | | | X | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 222 | C. Charles | | | X | X | | | | | | | | | M. Wittkofski 1983 |
| 44 NH 223 | C. Charles | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 224 | Cheriton | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 225 | Cheriton | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 255 | Cheriton | | | | | | | | | | | X | | M. Wittkofski 1984 |
| 44 NH 270 | Franktown | | | | | | | | | | | X | | M. Wittkofski 1984 |
| 44 NH 277 | Elliotts Cr. | | | | | | X | | | | | | | Fesler, Leigh, Luccketti 1987 |
| 44 NH 278 | Fish. Islnd | | | | | | | | | | | X | X | J. Wilson 1988 |
| 44 NH 336 | Elliotts Cr. | | | | | | | | | | | X | X | Fesler, Leigh, Luccketti 1988 |
| 44 NH 337 | Elliotts Cr. | | | | | ? | ? | ? | | | | | | Fesler, Leigh, Luccketti 1988 |
| 44 NH 343 | C. Charles | | | | | ? | ? | ? | | | | | | P. McSherry 1991 |
| 44 NH 346 | C. Charles | | | | | | | | | | | X | X | P. McSherry 1991 |
| 44 NH 347 | C. Charles | | | | | ? | ? | ? | | | | | | P. McSherry 1991 |
| 44 NH 348 | C. Charles | ? | ? | ? | ? | ? | ? | ? | | | | X | X | P. McSherry 1991 |
| 44 NH 351 | C. Charles | X | X | | X | | | | | | | | | P. McSherry 1991 |
| 44 NH 354 | C. Charles | | | | | | | | | X | | X | | P. McSherry 1991 |
| 44 NH 359 | Elliotts Cr. | | | | | | | | | X | | X | | T. Behrens 1990 |
| | | | | | | | | | | | | | | |

Appendix I: Table A.2
Previously Recorded Northampton County Coastal Archaeological Sites

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Recorded By (date): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 NH 360 | Elliotts Cr. | | | | | | | X | | | | | | T. Behrens 1990 |
| 44 NH 361 | Elliotts Cr. | | | | | ? | ? | ? | | | | | | T. Behrens 1990 |
| 44 NH 383 | Fish. Islnd | | | | | | | | | | | | X | M. Nash & E. Foster 1992 |
| 44 NH 384 | Fish. Islnd | | | | | | | | | | | | X | M. Nash & E. Foster 1992 |
| | | | | | | | | | | | | | | |

**KEY:**

**PI:** Paleoindian; **EA:** Early Archaic; **MA:** Middle Archaic; **LA:** Late Archaic; **EW:** Early Woodland; **MW:** Middle Woodland; **LW:** Late Woodland; **Cnt:** Contact; **17th:** 17th Century; **18th:** 18th Century; **19th:** 19th Century; and **20th:** 20th Century.

**X:** Cultural Component Present
**?:** Unknown if Cultural Component Present
**X(?):** Possible Cultural Component Present
"Unmarked": Cultural Component Absent or Not Documented

**PI EA MA LA EW MW LW** (all marked with **?**): Unknown Prehistoric Component

**17th 18th 19th 20th** (all marked with **?**): Unknown Historic Component

**EA MA LA** (all marked with **?**): Unknown Archaic Component

**EW MW LW** (all marked with **?**): Unknown Woodland Component

Table A.2 Previously Recorded Northampton County, Virginia Coastal Archaeological Sites

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Recorded By (date): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 NH 3 | Jamesville | | ? | ? | ? | ? | ? | ? | | | | | | Luccketti 1978 & Custer 1985 |
| 44 NH 5 | C. Charles | | | | | ? | ? | ? | | | | | | H. MacCord 1969 |
| 44 NH 8 | Franktown | | | | | | | | | X | | | | H. MacCord 1973 |
| 44 NH 10 | Exmore | | | | | | | X | | | | | | W. Clark 1976 |
| 44 NH 34 | Elliotts Cr. | | | | | | | | | X | | | | VRCA 1977 |
| 44 NH 41 | Franktown | | | | | | | | | | | ? | | K. Egloff 1977 |
| 44 NH 42 | Franktown | | | | | | | | | X | | | | N. Luccketti 1978 |
| 44 NH 43 | Jamesville | | | | X | | X | | | | | | | N. Luccketti 1978 |
| 44 NH 44 | Jamesville | | | | | ? | ? | ? | | | | | | N. Luccketti 1978 |
| 44 NH 47 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1981 |
| 44 NH 48 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1981 |
| 44 NH 49 | Franktown | | | | | | | | | X | | | | M. Wittkofski 1979 |
| 44 NH 59 | Franktown | | | | | | | | | X | | | | M. Wittkofski 1980 |
| 44 NH 60 | Franktown | | | | | | | | | X | | | | M. Wittkofski 1980 |
| 44 NH 63 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1980 |
| 44 NH 64 | Jamesville | | | | | | | | | X | | | | M. Wittkofski 1980 |
| 44 NH 65 | Jamesville | | | | | | | | | ? | ? | ? | ? | M. Wittkofski 1980 |
| 44 NH 75 | Jamesville | | | | | ? | ? | ? | | | | | | M. Wittkofski 1980 |
| 44 NH 76 | Jamesville | | | | | | | X | | | | | | M. Wittkofski 1980 |
| 44 NH 85 | Cheriton | | | | | | | | | | X | | | M. Wittkofski 1980 |
| 44 NH 115 | Franktown | | | | | | | | | X | X | X | | M. Wittkofski 1982 |
| 44 NH 116 | Franktown | | X | X | X | X | | | | | | | | M. Wittkofski 1982 |
| 44 NH 118 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1982 |
| 44 NH 158 | Franktown | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 166 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1983 |

Table A.2 Previously Recorded Northampton County, Virginia Coastal Archaeological Sites

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Recorded By (date): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 NH 167 | Franktown | | | X | X | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 176 | Jamesville | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 179 | Jamesville | | | | | | | | | X | | | | M. Wittkofski 1983 |
| 44 NH 181 | Jamesville | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 192 | Jamesville | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 194 | Exmore | | | | | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 197 | Exmore | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 221 | C. Charles | | | | X | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 222 | C. Charles | | | X | X | | | | | | | | | M. Wittkofski 1983 |
| 44 NH 223 | C. Charles | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 224 | Cheriton | | | | | | | | | | | X | | M. Wittkofski 1983 |
| 44 NH 225 | Cheriton | ? | ? | ? | ? | ? | ? | ? | | | | | | M. Wittkofski 1983 |
| 44 NH 255 | Cheriton | | | | | | | | | | | X | | M. Wittkofski 1984 |
| 44 NH 270 | Franktown | | | | | | | | | | | X | | M. Wittkofski 1984 |
| 44 NH 277 | Elliotts Cr. | | | | | | X | | | | | | | Fesler, Leigh, Luccketti 1987 |
| 44 NH 278 | Fish. Islnd | | | | | | | | | | | X | X | J. Wilson 1988 |
| 44 NH 336 | Elliotts Cr. | | | | | | | | | | | X | X | Fesler, Leigh, Luccketti 1988 |
| 44 NH 337 | Elliotts Cr. | | | | | ? | ? | ? | | | | | | Fesler, Leigh, Luccketti 1988 |
| 44 NH 343 | C. Charles | | | | | ? | ? | ? | | | | | | P. McSherry 1991 |
| 44 NH 346 | C. Charles | | | | | | | | | | | X | X | P. McSherry 1991 |
| 44 NH 347 | C. Charles | | | | | ? | ? | ? | | | | | | P. McSherry 1991 |
| 44 NH 348 | C. Charles | ? | ? | ? | ? | ? | ? | ? | | | | X | X | P. McSherry 1991 |
| 44 NH 351 | C. Charles | X | X | | X | | | | | | | | | P. McSherry 1991 |
| 44 NH 354 | C. Charles | | | | | | | | | X | | X | | P. McSherry 1991 |
| 44 NH 359 | Elliotts Cr. | | | | | | | | | X | | X | | T. Behrens 1990 |

Table A.2 Previously Recorded Northampton County, Virginia Coastal Archaeological Sites

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Recorded By (date): |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 NH 360 | Elliotts Cr. | | | | | | | X | | | | | | T. Behrens 1990 |
| 44 NH 361 | Elliotts Cr. | | | | | ? | ? | ? | | | | | | T. Behrens 1990 |
| 44 NH 383 | Fish. Islnd | | | | | | | | | | | | X | M. Nash & E. Foster 1992 |
| 44 NH 384 | Fish. Islnd | | | | | | | | | | | | X | M. Nash & E. Foster 1992 |
| | | | | | | | | | | | | | | |
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KEY:

Prehistoric Cultural Periods:

Table A.2 Previously Recorded Northampton County, Virginia Coastal Archaeological Sites

**PI**: Paleoindian; **EA**: Early Archaic; **MA**: Middle Archaic; **LA**: Late Archaic; **EW**: Early Woodland; **MW**: Middle Woodland; **LW**: Late Woodland; and **Cnt**: Contact.

Historic Cultural Periods:
**17th**: 17th Century; **18th**: 18th Century; **19th**: 19th Century; and **20th**: 20th Century.

**X**: Cultural Component Present
**?**: Unknown if Cultural Component Present
**X(?)**: Possible Cultural Component Present
"Unmarked": Cultural Component Absent or Not Documented

**PI EA MA LA EW MW LW** (all marked with ?): Unknown Prehistoric Component

**17th 18th 19th 20th** (all marked with ?): Unknown Historic Component

**EA MA LA** (all marked with ?): Unknown Archaic Component

**EW MW LW** (all marked with ?): Unknown Woodland Component

Appendix I: Table A.3
Archaeological Sites Recorded During the Virginia Eastern Shore Survey

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Site Name: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 460 | Pungo & Ches | ? | ? | ? | ? | ? | ? | ? | | | | | | Back Creek #1 |
| 44 AC 461 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | X | | Back Creek #2 |
| 44 AC 462 | Pungoteague | | | | X | X | | | | | | | | Back Creek #3 |
| 44 AC 463 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | X | X | | | Back Creek #4 |
| 44 AC 464 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | X | X | | Back Creek #5 |
| 44 AC 465 | Pungoteague | | | | | | | X | | | | | | Back Creek #6 |
| 44 AC 136* | Parksley | ? | ? | X | ? | ? | ? | ? | | | | | | Beasley Bay |
| 44 AC 491 | Parksley | | | | | | | | | | | | X | Bernard Islands |
| 44 AC 466 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #1 |
| 44 AC 467 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #2 |
| 44 AC 468 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #3 |
| 44 AC 469 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | X | X | | Butcher Creek #4 |
| 44 AC 470 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | X | | | | Butcher Creek #5 |
| 44 AC 471 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #6 |
| 44 AC 472 | Pungoteague | | | | | ? | ? | ? | | | | | | Butcher Creek #7 |
| 44 AC 473 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #8 |
| 44 NH 436 | Townsend | ? | ? | ? | ? | ? | ? | ? | | | | | | Butlers Bluff |
| 44 AC 492 | Parksley | | | X(?) | X(?) | ? | ? | ? | | | | | | Cals Hammock |
| 44 AC 493 | Parksley | | | | X | | | | | | | X | X | Cedar Island |
| 44 NH 433 | Cape Charles | ? | ? | ? | ? | ? | ? | ? | | | | | | Cherrystone Inlet #1 |
| 44 AC 507 | Jamesville | | | | | | | X | | | | | | Craddock Creek #1 |
| 44 AC 508 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Craddock Creek #2 |
| 44 AC 509 | Jamesville | | | | | | | | | ? | ? | ? | ? | Craddock Creek #3 |
| 44 AC 489 | Chesconessex | ? | ? | ? | ? | ? | ? | ? | | | X | X | | Deep Creek #1 |
| 44 AC 490 | Chesconessex | | | | | | X | X | | | | | | Deep Creek #2 |
| 44 AC 494 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | Deep Creek NW |
| 44 AC 495 | Parksley | | | | X | | | | | | | | | Dix Cove |
| 44 AC 496 | Parksley | | | | | X | X | X | | | | | | East Halfmoon #1 |
| 44 AC 497 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | X | X | | East Halfmoon #2 |
| 44 AC 520 | Tangier Island | ? | ? | ? | ? | ? | ? | ? | | | | | | East Watts Island |
| 44 NH 278* | Fishermans Is. | | | | | | | | | | | | X | Fisherman's Island |
| 44 AC 526 | Saxis | | | | | | X | X | | | | | | Fishing Creek |
| 44 AC 525 | Great Fox Is. | X | X | X | X | X | X | X | | | | | | Great Fox Island |
| 44 AC 498 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | Guilford Creek #1 |
| 44 AC 499 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | Guilford Creek #2 |
| 44 AC 500 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | X | X | Halfmoon Island |
| 44 NH 426 | Franktown | | | | | | | | | | | | X | Hungars Creek Island |
| 44 AC 501 | Parksley | | | | | | | | | | | X | | Hunting Creek #1 |
| 44 AC 502 | Parksley | | | | | | | | | ? | ? | ? | ? | Hunting Creek #2 |
| 44 AC 510 | Jamesville | | | | X | X | X | | | | | | | Hyslop Marsh |
| 44 AC 474 | Exmre & Pungo | ? | ? | ? | ? | ? | ? | ? | | | | | | Interior Nandua #1 |
| 44 AC 475 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Interior Nandua #2 |
| 44 AC 476 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Interior Nandua #3 |
| 44 AC 488 | Exmore | | | | | | | X | | X | | | | Interior Nandua #4 |
| 44 AC 503 | Parksley | | | | X | X | | | | | | | | Island Field Cove |
| 44 AC 504 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | Jacks Island |
| 44 AC 505 | Parksley | | | | | ? | ? | ? | | | X | X | | Jobes Island |
| 44 NH 427 | Franktown | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | Mattawoman-Hungars |
| 44 AC 527 | Saxis | | | | | X | X | X | | | | X | X | Messongo Creek #1 |
| 44 AC 528 | Saxis | | | | | X | X | X | | | | X | X | Messongo Creek #2 |
| 44 AC 529 | Saxis | | | | X | X(?) | | | | | | | | Messongo Creek #3 |

Appendix I: Table A.3
Archaeological Sites Recorded During the Virginia Eastern Shore Survey

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Site Name: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 532 | Nandua Creek | | | | | ? | ? | ? | | | | | | Nandua Creek #1 |
| 44 AC 533 | Nandua Creek | | | | | | | X | | | | | | Nandua Creek #2 |
| 44 AC 534 | Nandua Creek | | | | | | | X | | | | | | Nandua Creek #3 |
| 44 AC 535 | Nandua Creek | ? | ? | ? | ? | ? | ? | ? | | | | | | Nandua Creek #4 |
| 44 AC 536 | Nandua Creek | | | | X | | | | | | | | | Nandua Creek #5 |
| 44 AC 511 | Jamesville | | | | X | | | | | | | | | Nandua Creek #6 |
| 44 AC 512 | Jamesville | | | | X | | X | X | | | | | | Nandua South #1 |
| 44 AC 513 | Jamesville | | | | | X | X | | | | | | | Nandua South #2 |
| 44 AC 514 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | X | X | | Nandua South #3 |
| 44 AC 52* | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | X | | Nandua South #4 |
| 44 AC 515 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | X | | Nandua South #5 |
| 44 AC 516 | Jamesville | | | | | | | | | | | X | | Nandua South #6 |
| 44 AC 517 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Nandua South #7 |
| 44 AC 518 | Jamesville | | | | | X | | | | | X | X | | Nandua South #8 |
| 44 NH 428 | Franktown | ? | ? | ? | ? | ? | ? | ? | | ? | ? | ? | ? | Nassawadox Crk. #1 |
| 44 NH 429 | Franktown | | | | | X | X | X | | | | | | Nassawadox Crk. #2 |
| 44 NH 430 | Franktown | | | | | X | X | X | | | | | | Nassawadox Crk. #3 |
| 44 NH 8* | Franktown | | | | | | | | | X | | | | Nassawadox Crk. #4 |
| 44 NH 431 | Franktown | | | | X | X | X | X | | | | | | Nassawadox Crk. #5 |
| 44 NH 432 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | Nassawadox Crk. #6 |
| 44 AC 506 | Parksley | | | | X(?) | X(?) | X(?) | X(?) | | | | | | NE Halfmoon Basin |
| 44 NH 438 | Elliotts Creek | | | | X(?) | X | X | X | | | | | | N. Old Plantation Crk. |
| 44 AC 524 | Goose I. & Tang | X | X | X | X | X | X | X | | | | | | NW Tangier Island |
| 44 NH 192* | Jamesville | ? | ? | ? | X(?) | ? | X(?) | ? | | | X | X | | Occohannock Crk. #1 |
| 44 NH 420 | Jamesville | | | | X | | | | | | | | | Occohannock Crk. #2 |
| 44 AC 356* | Jamesville | | | | X | | X | X | | | | | | Occohannock Crk. #3 |
| 44 NH 3* | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Occohannock Crk. #4 |
| 44 NH 65* | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Occohannock Crk. #5 |
| 44 NH 421 | Jamesville | | | | | | X | | | | | | | Occohannock Crk. #6 |
| 44 NH 422 | Jamesville | | | X(?) | X(?) | | | X(?) | | | | | | Occohannock Crk. #7 |
| 44 NH 43* | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Occohannock Crk. #8 |
| 44 NH 423 | Jamesville | | | | | ? | ? | ? | | | | | | Occohannock Crk. #9 |
| 44 AC 519 | Jamesville | | | | | | X | X | | | | | | Occohannock Crk. #10 |
| 44 NH 424 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Occohannock Neck #1 |
| 44 NH 425 | Jamesville | | | X(?) | X(?) | | | X(?) | | X | X | X | | Occohannock Neck #2 |
| 44 AC 530 | Saxis | | | | X | | | | | | | | | Pig Point |
| 44 AC 477 | Pungoteague | | | X | X | | | | | | | | | Pungoteague Creek #1 |
| 44 AC 478 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Pungoteague Creek #2 |
| 44 AC 479 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Pungoteague Creek #3 |
| 44 AC 480 | Pungoteague | | | | | ? | ? | ? | | | | | | Pungoteague Creek #4 |
| 44 AC 481 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | X | X | Pungoteague Creek #5 |
| 44 AC 482 | Pungoteague | | | | | | X | X | | | | | | Pungoteague Creek #6 |
| 44 AC 537 | Nandua Creek | | | | | | X | | | | | | | Pungoteague Creek #7 |
| 44 AC 161* | Pungoteague | | | | | | | | | | X | X | X | Pungoteague Creek #8 |
| 44 AC 483 | Pungoteague | ? | ? | ? | X(?) | ? | ? | ? | | | | | | Pungoteague Creek #9 |
| 44 NH 434 | Cape Charles | | | | | | X | X | | | | | | Savage Neck #1 |
| 44 NH 435 | Cape Charles | | | | | X | | | | | | | | Savage Neck #2 |
| 44 AC 484 | Pungoteague | | | | X | | | | | | | | | Sound Beach #1 |
| 44 AC 485 | Pungoteague | | X | X | X | | | | | | | | | Sound Beach #2 |
| 44 AC 486 | Pungoteague | | | | | | X | | | | | | | Sound Beach #3 |
| 44 NH 437 | Townsend | X | X | | | | | | | | | | | South Kiptopeke |

Appendix I: Table A.3
Archaeological Sites Recorded During the Virginia Eastern Shore Survey

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Site Name: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 521 | Tangier Island | | X | | | | | | | | | | | SE Watts Island |
| 44 AC 531 | Saxis | ? | ? | ? | ? | ? | ? | ? | | | | | | Starling Creek |
| 44 AC 487 | Pungoteague | | | | X | X | | | | | | | | Thicket Point |
| 44 AC 214* | Tangier Island | X | X | X | X | | X | | | | | | | Watts Island #1 |
| 44 AC 522 | Tangier Island | | | | | | | | | X | X | | | Watts Island #2 |
| 44 AC 523 | Tangier Island | ? | ? | ? | ? | ? | ? | ? | | | | | | Watts Island #3 |

**KEY:**

**PI:** Paleoindian; **EA:** Early Archaic; **MA:** Middle Archaic; **LA:** Late Archaic; **EW:** Early Woodland; **MW:** Middle Woodland; **LW:** Late Woodland; **Cnt:** Contact; **17th:** 17th Century; **18th:** 18th Century; **19th:** 19th Century; and **20th:** 20th Century.

**X:** Cultural Component Present
**?:** Unknown if Cultural Component Present
**X(?):** Possible Cultural Component Present
"Unmarked": Cultural Component Absent or Not Documented

**PI EA MA LA EW MW LW** (all marked with **?**): Unknown Prehistoric Component

**17th 18th 19th 20th** (all marked with **?**): Unknown Historic Component

**EA MA LA** (all marked with **?**): Unknown Archaic Component

**EW MW LW** (all marked with **?**): Unknown Woodland Component

Table A.3 Archaeological Sites Recorded During the Virginia Eastern Shore Survey

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Site Name: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 460 | Pungo & Ches | ? | ? | ? | ? | ? | ? | ? | | | | | | Back Creek #1 |
| 44 AC 461 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | X | | Back Creek #2 |
| 44 AC 462 | Pungoteague | | | | X | X | | | | | | | | Back Creek #3 |
| 44 AC 463 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | X | X | | | Back Creek #4 |
| 44 AC 464 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | X | X | | Back Creek #5 |
| 44 AC 465 | Pungoteague | | | | | | | X | | | | | | Back Creek #6 |
| 44 AC 136* | Parksley | ? | ? | X | ? | ? | ? | ? | | | | | | Beasley Bay |
| 44 AC 491 | Parksley | | | | | | | | | | | | X | Bernard Islands |
| 44 AC 466 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #1 |
| 44 AC 467 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #2 |
| 44 AC 468 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #3 |
| 44 AC 469 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | X | X | | Butcher Creek #4 |
| 44 AC 470 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | X | | | | Butcher Creek #5 |
| 44 AC 471 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #6 |
| 44 AC 472 | Pungoteague | | | | | ? | ? | ? | | | | | | Butcher Creek #7 |
| 44 AC 473 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Butcher Creek #8 |
| 44 NH 436 | Townsend | ? | ? | ? | ? | ? | ? | ? | | | | | | Butlers Bluff |
| 44 AC 492 | Parksley | | | X(?) | X(?) | ? | ? | ? | | | | | | Cals Hammock |
| 44 AC 493 | Parksley | | | | X | | | | | | | X | X | Cedar Island |
| 44 NH 433 | Cape Charles | ? | ? | ? | ? | ? | ? | ? | | | | | | Cherrystone Inlet #1 |
| 44 AC 507 | Jamesville | | | | | | | X | | | | | | Craddock Creek #1 |
| 44 AC 508 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Craddock Creek #2 |
| 44 AC 509 | Jamesville | | | | | | | | | ? | ? | ? | ? | Craddock Creek #3 |
| 44 AC 489 | Chesconessex | ? | ? | ? | ? | ? | ? | ? | | | X | X | | Deep Creek #1 |

Table A.3 Archaeological Sites Recorded During the Virginia Eastern Shore Survey

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Site Name: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 490 | Chesconessex | | | | | | X | X | | | | | | Deep Creek #2 |
| 44 AC 494 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | Deep Creek NW |
| 44 AC 495 | Parksley | | | | X | | | | | | | | | Dix Cove |
| 44 AC 496 | Parksley | | | | | X | X | X | | | | | | East Halfmoon #1 |
| 44 AC 497 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | X | X | | East Halfmoon #2 |
| 44 AC 520 | Tangier Island | ? | ? | ? | ? | ? | ? | ? | | | | | | East Watts Island |
| 44 NH 278* | Fishermans Is. | | | | | | | | | | | | X | Fisherman's Island |
| 44 AC 526 | Saxis | | | | | | X | X | | | | | | Fishing Creek |
| 44 AC 525 | Great Fox Is. | X | X | X | X | X | X | X | | | | | | Great Fox Island |
| 44 AC 498 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | Guilford Creek #1 |
| 44 AC 499 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | Guilford Creek #2 |
| 44 AC 500 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | X | X | Halfmoon Island |
| 44 NH 426 | Franktown | | | | | | | | | | | | X | Hungars Creek Island |
| 44 AC 501 | Parksley | | | | | | | | | | | X | | Hunting Creek #1 |
| 44 AC 502 | Parksley | | | | | | | | | ? | ? | ? | ? | Hunting Creek #2 |
| 44 AC 510 | Jamesville | | | | X | X | X | | | | | | | Hyslop Marsh |
| 44 AC 474 | Exmre & Pungo | ? | ? | ? | ? | ? | ? | ? | | | | | | Interior Nandua #1 |
| 44 AC 475 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Interior Nandua #2 |
| 44 AC 476 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Interior Nandua #3 |
| 44 AC 488 | Exmore | | | | | | | X | | X | | | | Interior Nandua #4 |
| 44 AC 503 | Parksley | | | | X | X | | | | | | | | Island Field Cove |
| 44 AC 504 | Parksley | ? | ? | ? | ? | ? | ? | ? | | | | | | Jacks Island |
| 44 AC 505 | Parksley | | | | | ? | ? | ? | | | X | X | | Jobes Island |
| 44 NH 427 | Franktown | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | Mattawoman-Hungars |

Table A.3 Archaeological Sites Recorded During the Virginia Eastern Shore Survey

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Site Name: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 527 | Saxis | | | | | X | X | X | | | | X | X | Messongo Creek #1 |
| 44 AC 528 | Saxis | | | | | X | X | X | | | | X | X | Messongo Creek #2 |
| 44 AC 529 | Saxis | | | | X | X(?) | | | | | | | | Messongo Creek #3 |
| 44 AC 532 | Nandua Creek | | | | | ? | ? | ? | | | | | | Nandua Creek #1 |
| 44 AC 533 | Nandua Creek | | | | | | | X | | | | | | Nandua Creek #2 |
| 44 AC 534 | Nandua Creek | | | | | | | X | | | | | | Nandua Creek #3 |
| 44 AC 535 | Nandua Creek | ? | ? | ? | ? | ? | ? | ? | | | | | | Nandua Creek #4 |
| 44 AC 536 | Nandua Creek | | | | X | | | | | | | | | Nandua Creek #5 |
| 44 AC 511 | Jamesville | | | | X | | | | | | | | | Nandua Creek #6 |
| 44 AC 512 | Jamesville | | | | X | | X | X | | | | | | Nandua South #1 |
| 44 AC 513 | Jamesville | | | | | X | X | | | | | | | Nandua South #2 |
| 44 AC 514 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | X | X | | Nandua South #3 |
| 44 AC 52* | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | X | | Nandua South #4 |
| 44 AC 515 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | X | | Nandua South #5 |
| 44 AC 516 | Jamesville | | | | | | | | | | | X | | Nandua South #6 |
| 44 AC 517 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Nandua South #7 |
| 44 AC 518 | Jamesville | | | | | X | | | | | X | X | | Nandua South #8 |
| 44 NH 428 | Franktown | ? | ? | ? | ? | ? | ? | ? | | ? | ? | ? | ? | Nassawadox Crk. #1 |
| 44 NH 429 | Franktown | | | | | X | X | X | | | | | | Nassawadox Crk. #2 |
| 44 NH 430 | Franktown | | | | | X | X | X | | | | | | Nassawadox Crk. #3 |
| 44 NH 8* | Franktown | | | | | | | | | X | | | | Nassawadox Crk. #4 |
| 44 NH 431 | Franktown | | | | X | X | X | X | | | | | | Nassawadox Crk. #5 |
| 44 NH 432 | Franktown | ? | ? | ? | ? | ? | ? | ? | | | | | | Nassawadox Crk. #6 |
| 44 AC 506 | Parksley | | | | X(?) | X(?) | X(?) | X(?) | | | | | | NE Halfmoon Basin |

Table A.3 Archaeological Sites Recorded During the Virginia Eastern Shore Survey

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Site Name: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 NH 438 | Elliotts Creek | | | | X(?) | X | X | X | | | | | | N. Old Plantation Crk. |
| 44 AC 524 | Goose I. & Tangier | X | X | X | X | X | X | X | | | | | | NW Tangier Island |
| 44 NH 192* | Jamesville | ? | ? | ? | X(?) | ? | X(?) | ? | | | X | X | | Occohannock Crk. #1 |
| 44 NH 420 | Jamesville | | | | X | | | | | | | | | Occohannock Crk. #2 |
| 44 AC 356* | Jamesville | | | | X | | X | X | | | | | | Occohannock Crk. #3 |
| 44 NH 3* | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Occohannock Crk. #4 |
| 44 NH 65* | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Occohannock Crk. #5 |
| 44 NH 421 | Jamesville | | | | | | X | | | | | | | Occohannock Crk. #6 |
| 44 NH 422 | Jamesville | | | X(?) | X(?) | | | X(?) | | | | | | Occohannock Crk. #7 |
| 44 NH 43* | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Occohannock Crk. #8 |
| 44 NH 423 | Jamesville | | | | | ? | ? | ? | | | | | | Occohannock Crk. #9 |
| 44 AC 519 | Jamesville | | | | | | X | X | | | | | | Occohannock Crk. #10 |
| 44 NH 424 | Jamesville | ? | ? | ? | ? | ? | ? | ? | | | | | | Occohannock Neck #1 |
| 44 NH 425 | Jamesville | | | X(?) | X(?) | | | X(?) | | X | X | X | | Occohannock Neck #2 |
| 44 AC 530 | Saxis | | | | X | | | | | | | | | Pig Point |
| 44 AC 477 | Pungoteague | | | X | X | | | | | | | | | Pungoteague Creek #1 |
| 44 AC 478 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Pungoteague Creek #2 |
| 44 AC 479 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | | | Pungoteague Creek #3 |
| 44 AC 480 | Pungoteague | | | | | ? | ? | ? | | | | | | Pungoteague Creek #4 |
| 44 AC 481 | Pungoteague | ? | ? | ? | ? | ? | ? | ? | | | | X | X | Pungoteague Creek #5 |
| 44 AC 482 | Pungoteague | | | | | | X | X | | | | | | Pungoteague Creek #6 |
| 44 AC 537 | Nandua Creek | | | | | | X | | | | | | | Pungoteague Creek #7 |
| 44 AC 161* | Pungoteague | | | | | | | | | | X | X | X | Pungoteague Creek #8 |
| 44 AC 483 | Pungoteague | ? | ? | ? | X(?) | ? | ? | ? | | | | | | Pungoteague Creek #9 |

Table A.3 Archaeological Sites Recorded During the Virginia Eastern Shore Survey

| Site #: | Quad: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Site Name: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 NH 434 | Cape Charles | | | | | | X | X | | | | | | Savage Neck #1 |
| 44 NH 435 | Cape Charles | | | | | X | | | | | | | | Savage Neck #2 |
| 44 AC 484 | Pungoteague | | | | X | | | | | | | | | Sound Beach #1 |
| 44 AC 485 | Pungoteague | | X | X | X | | | | | | | | | Sound Beach #2 |
| 44 AC 486 | Pungoteague | | | | | | X | | | | | | | Sound Beach #3 |
| 44 NH 437 | Townsend | X | X | | | | | | | | | | | South Kiptopeke |
| 44 AC 521 | Tangier Island | | X | | | | | | | | | | | SE Watts Island |
| 44 AC 531 | Saxis | ? | ? | ? | ? | ? | ? | ? | | | | | | Starling Creek |
| 44 AC 487 | Pungoteague | | | | X | X | | | | | | | | Thicket Point |
| 44 AC 214* | Tangier Island | X | X | X | X | | X | | | | | | | Watts Island #1 |
| 44 AC 522 | Tangier Island | | | | | | | | | X | X | | | Watts Island #2 |
| 44 AC 523 | Tangier Island | ? | ? | ? | ? | ? | ? | ? | | | | | | Watts Island #3 |
| | | | | | | | | | | | | | | |
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Table A.3 Archaeological Sites Recorded During the Virginia Eastern Shore Survey

KEY:

Prehistoric Cultural Periods:
**PI**: Paleoindian; **EA**: Early Archaic; **MA**: Middle Archaic; **LA**: Late Archaic; **EW**: Early Woodland; **MW**: Middle Woodland; **LW**: Late Woodland; **Cnt**: Contact;

Historic Cultural Periods:
**17th**: 17th Century; **18th**: 18th Century; **19th**: 19th Century; and **20th**: 20th Century.

**X**: Cultural Component Present
**?**: Unknown if Cultural Component Present
**X(?)**: Possible Cultural Component Present
"Unmarked": Cultural Component Absent or Not Documented

**PI EA MA LA EW MW LW** (all marked with ?): Unknown Prehistoric Component

**17th 18th 19th 20th** (all marked with ?): Unknown Historic Component

**EA MA LA** (all marked with ?): Unknown Archaic Component

**EW MW LW** (all marked with ?): Unknown Woodland Component

Appendix I: Table A.4
Site Erosion Assessment Based on Field Observations

| Site #: | Site Name: | Mild Erosion (<1 foot per year): | Moderate Erosion (1<>3 feet per year): | Heavy Erosion (>3 feet per year): | Erosion Section: (see Figure23) |
|---|---|---|---|---|---|
| 44 AC 460 | Back Creek #1 | | X | | 3 |
| 44 AC 461 | Back Creek #2 | X | | | 3 |
| 44 AC 462 | Back Creek #3 | X | | | 3 |
| 44 AC 463 | Back Creek #4 | X | | | 3 |
| 44 AC 464 | Back Creek #5 | X | | | 3 |
| 44 AC 465 | Back Creek #6 | X | | | 3 |
| 44 AC 136* | Beasley Bay | | | X | 2 |
| 44 AC 491 | Bernard Islands | | X | | 2 |
| 44 AC 466 | Butcher Creek #1 | X | | | 5 |
| 44 AC 467 | Butcher Creek #2 | X | | | 5 |
| 44 AC 468 | Butcher Creek #3 | X | | | 5 |
| 44 AC 469 | Butcher Creek #4 | X | | | 5 |
| 44 AC 470 | Butcher Creek #5 | X | | | 5 |
| 44 AC 471 | Butcher Creek #6 | X | | | 5 |
| 44 AC 472 | Butcher Creek #7 | X | | | 5 |
| 44 AC 473 | Butcher Creek #8 | X | | | 5 |
| 44 NH 436 | Butlers Bluff | | X | | 12 |
| 44 AC 492 | Cals Hammock | X | | | 2 |
| 44 AC 493 | Cedar Island | | X | | 2 |
| 44 NH 433 | Cherrystone Inlet #1 | X | | | 10 |
| 44 AC 507 | Craddock Creek #1 | X | | | 6 |
| 44 AC 508 | Craddock Creek #2 | | X | | 6 |
| 44 AC 509 | Craddock Creek #3 | X | | | 6 |
| 44 AC 489 | Deep Creek #1 | X | | | 2 |
| 44 AC 490 | Deep Creek #2 | | X | | 2 |
| 44 AC 494 | Deep Creek NW | X | | | 2 |
| 44 AC 495 | Dix Cove | X | | | 2 |
| 44 AC 496 | East Halfmoon #1 | | X | | 2 |
| 44 AC 497 | East Halfmoon #2 | | X | | 2 |
| 44 AC 520 | East Watts Island | | | X | 1 |
| 44 NH 278* | Fisherman's Island | X | | | 12 |
| 44 AC 526 | Fishing Creek | | X | | 2 |
| 44 AC 525 | Great Fox Island | | | X | 1 |
| 44 AC 498 | Guilford Creek #1 | X | | | 2 |
| 44 AC 499 | Guilford Creek #2 | X | | | 2 |
| 44 AC 500 | Halfmoon Island | | X | | 2 |
| 44 NH 426 | Hungars Creek Island | | X | | 9 |
| 44 AC 501 | Hunting Creek #1 | X | | | 2 |
| 44 AC 502 | Hunting Creek #2 | X | | | 2 |
| 44 AC 510 | Hyslop Marsh | | | X | 6 |
| 44 AC 474 | Interior Nandua #1 | X | | | 6 |
| 44 AC 475 | Interior Nandua #2 | X | | | 6 |
| 44 AC 476 | Interior Nandua #3 | X | | | 6 |
| 44 AC 488 | Interior Nandua #4 | X | | | 6 |
| 44 AC 503 | Island Field Cove | X | | | 2 |
| 44 AC 504 | Jacks Island | X | | | 2 |
| 44 AC 505 | Jobes Island | | X | | 2 |
| 44 NH 427 | Mattawoman-Hungars | X | | | 9 |
| 44 AC 527 | Messongo Creek #1 | | X | | 2 |
| 44 AC 528 | Messongo Creek #2 | X | | | 2 |

Appendix I: Table A.4
Site Erosion Assessment Based on Field Observations

| Site #: | Site Name: | Mild Erosion (<1 foot per year): | Moderate Erosion (1<>3 feet per year): | Heavy Erosion (>3 feet per year): | Erosion Section: (see Figure23) |
|---|---|---|---|---|---|
| 44 AC 529 | Messongo Creek #3 | X | | | 2 |
| 44 AC 532 | Nandua Creek #1 | X | | | 6 |
| 44 AC 533 | Nandua Creek #2 | X | | | 6 |
| 44 AC 534 | Nandua Creek #3 | | X | | 6 |
| 44 AC 535 | Nandua Creek #4 | | X | | 6 |
| 44 AC 536 | Nandua Creek #5 | | X | | 6 |
| 44 AC 511 | Nandua Creek #6 | | X | | 6 |
| 44 AC 512 | Nandua South #1 | | X | | 6 |
| 44 AC 513 | Nandua South #2 | | X | | 6 |
| 44 AC 514 | Nandua South #3 | | X | | 6 |
| 44 AC 52* | Nandua South #4 | | X | | 6 |
| 44 AC 515 | Nandua South #5 | X | | | 6 |
| 44 AC 516 | Nandua South #6 | | X | | 6 |
| 44 AC 517 | Nandua South #7 | | X | | 6 |
| 44 AC 518 | Nandua South #8 | | X | | 6 |
| 44 NH 428 | Nassawadox Crk. #1 | X | | | 8 |
| 44 NH 429 | Nassawadox Crk. #2 | | | X | 8 |
| 44 NH 430 | Nassawadox Crk. #3 | X | | | 8 |
| 44 NH 8* | Nassawadox Crk. #4 | | | X | 8 |
| 44 NH 431 | Nassawadox Crk. #5 | | X | | 8 |
| 44 NH 432 | Nassawadox Crk. #6 | X | | | 8 |
| 44 AC 506 | NE Halfmoon Basin | | X | | 2 |
| 44 NH 438 | N. Old Plantation Crk. | | X | | 11 |
| 44 AC 524 | NW Tangier Island | | | X | 1 |
| 44 NH 192* | Occohannock Crk. #1 | X | | | 7 |
| 44 NH 420 | Occohannock Crk. #2 | X | | | 7 |
| 44 AC 356* | Occohannock Crk. #3 | | | X | 7 |
| 44 NH 3* | Occohannock Crk. #4 | | X | | 7 |
| 44 NH 65* | Occohannock Crk. #5 | | X | | 7 |
| 44 NH 421 | Occohannock Crk. #6 | X | | | 7 |
| 44 NH 422 | Occohannock Crk. #7 | | X | | 7 |
| 44 NH 43* | Occohannock Crk. #8 | X | | | 7 |
| 44 NH 423 | Occohannock Crk. #9 | X | | | 7 |
| 44 AC 519 | Occohannock Crk. #10 | X | | | 7 |
| 44 NH 424 | Occohannock Neck #1 | | X | | 7 |
| 44 NH 425 | Occohannock Neck #2 | | X | | 7 |
| 44 AC 530 | Pig Point | | X | | 2 |
| 44 AC 477 | Pungoteague Creek #1 | X | | | 5 |
| 44 AC 478 | Pungoteague Creek #2 | X | | | 5 |
| 44 AC 479 | Pungoteague Creek #3 | X | | | 5 |
| 44 AC 480 | Pungoteague Creek #4 | X | | | 5 |
| 44 AC 481 | Pungoteague Creek #5 | X | | | 5 |
| 44 AC 482 | Pungoteague Creek #6 | | X | | 5 |
| 44 AC 537 | Pungoteague Creek #7 | | X | | 5 |
| 44 AC 161* | Pungoteague Creek #8 | X | | | 5 |
| 44 AC 483 | Pungoteague Creek #9 | X | | | 5 |
| 44 NH 434 | Savage Neck #1 | | X | | 10 |
| 44 NH 435 | Savage Neck #2 | | X | | 10 |
| 44 AC 484 | Sound Beach #1 | X | | | 3 |
| 44 AC 485 | Sound Beach #2 | | X | | 3 |

Appendix I: Table A.4
Site Erosion Assessment Based on Field Observations

| | | Mild Erosion | Moderate Erosion | Heavy Erosion | Erosion Section: |
|---|---|---|---|---|---|
| **Site #:** | **Site Name:** | **(<1 foot per year):** | **(1<>3 feet per year):** | **(>3 feet per year):** | **(see Figure23)** |
| 44 AC 486 | Sound Beach #3 | **X** | | | 4 |
| 44 NH 437 | South Kiptopeke | | **X** | | 12 |
| 44 AC 521 | SE Watts Island | | | **X** | 1 |
| 44 AC 531 | Starling Creek | | **X** | | 2 |
| 44 AC 487 | Thicket Point | **X** | | | 4 |
| 44 AC 214* | Watts Island #1 | | | **X** | 1 |
| 44 AC 522 | Watts Island #2 | | | **X** | 1 |
| 44 AC 523 | Watts Island #3 | | | **X** | 1 |

Table A.4 Site Erosion Assessment Based on Field Observations

| | | Mild Erosion | Moderate Erosion | Heavy Erosion | Erosion Section: |
|---|---|---|---|---|---|
| **Site #:** | **Site Name:** | **(<1 foot per year):** | **(1<>3 feet per year):** | **(>3 feet per year):** | **(see Figure 23)** |
| 44 AC 460 | Back Creek #1 | | **X** | | 3 |
| 44 AC 461 | Back Creek #2 | **X** | | | 3 |
| 44 AC 462 | Back Creek #3 | **X** | | | 3 |
| 44 AC 463 | Back Creek #4 | **X** | | | 3 |
| 44 AC 464 | Back Creek #5 | **X** | | | 3 |
| 44 AC 465 | Back Creek #6 | **X** | | | 3 |
| 44 AC 136* | Beasley Bay | | | **X** | 2 |
| 44 AC 491 | Bernard Islands | | **X** | | 2 |
| 44 AC 466 | Butcher Creek #1 | **X** | | | 5 |
| 44 AC 467 | Butcher Creek #2 | **X** | | | 5 |
| 44 AC 468 | Butcher Creek #3 | **X** | | | 5 |
| 44 AC 469 | Butcher Creek #4 | **X** | | | 5 |
| 44 AC 470 | Butcher Creek #5 | **X** | | | 5 |
| 44 AC 471 | Butcher Creek #6 | **X** | | | 5 |
| 44 AC 472 | Butcher Creek #7 | **X** | | | 5 |
| 44 AC 473 | Butcher Creek #8 | **X** | | | 5 |
| 44 NH 436 | Butlers Bluff | | **X** | | 12 |
| 44 AC 492 | Cals Hammock | **X** | | | 2 |
| 44 AC 493 | Cedar Island | | **X** | | 2 |
| 44 NH 433 | Cherrystone Inlet #1 | **X** | | | 10 |
| 44 AC 507 | Craddock Creek #1 | **X** | | | 6 |
| 44 AC 508 | Craddock Creek #2 | | **X** | | 6 |
| 44 AC 509 | Craddock Creek #3 | **X** | | | 6 |

Table A.4 Site Erosion Assessment Based on Field Observations

| | | Mild Erosion | Moderate Erosion | Heavy Erosion | Erosion Section: |
|---|---|---|---|---|---|
| **Site #:** | **Site Name:** | **(<1 foot per year):** | **(1<>3 feet per year):** | **(>3 feet per year):** | **(see Figure 23)** |
| 44 AC 489 | Deep Creek #1 | **X** | | | 2 |
| 44 AC 490 | Deep Creek #2 | | **X** | | 2 |
| 44 AC 494 | Deep Creek NW | **X** | | | 2 |
| 44 AC 495 | Dix Cove | **X** | | | 2 |
| 44 AC 496 | East Halfmoon #1 | | **X** | | 2 |
| 44 AC 497 | East Halfmoon #2 | | **X** | | 2 |
| 44 AC 520 | East Watts Island | | | **X** | 1 |
| 44 NH 278* | Fisherman's Island | **X** | | | 12 |
| 44 AC 526 | Fishing Creek | | **X** | | 2 |
| 44 AC 525 | Great Fox Island | | | **X** | 1 |
| 44 AC 498 | Guilford Creek #1 | **X** | | | 2 |
| 44 AC 499 | Guilford Creek #2 | **X** | | | 2 |
| 44 AC 500 | Halfmoon Island | | **X** | | 2 |
| 44 NH 426 | Hungars Creek Island | | **X** | | 9 |
| 44 AC 501 | Hunting Creek #1 | **X** | | | 2 |
| 44 AC 502 | Hunting Creek #2 | **X** | | | 2 |
| 44 AC 510 | Hyslop Marsh | | | **X** | 6 |
| 44 AC 474 | Interior Nandua #1 | **X** | | | 6 |
| 44 AC 475 | Interior Nandua #2 | **X** | | | 6 |
| 44 AC 476 | Interior Nandua #3 | **X** | | | 6 |
| 44 AC 488 | Interior Nandua #4 | **X** | | | 6 |
| 44 AC 503 | Island Field Cove | **X** | | | 2 |
| 44 AC 504 | Jacks Island | **X** | | | 2 |

Table A.4 Site Erosion Assessment Based on Field Observations

| | | Mild Erosion | Moderate Erosion | Heavy Erosion | Erosion Section: |
|---|---|---|---|---|---|
| **Site #:** | **Site Name:** | **(<1 foot per year):** | **(1<>3 feet per year):** | **(>3 feet per year):** | **(see Figure 23)** |
| 44 AC 505 | Jobes Island | | **X** | | 2 |
| 44 NH 427 | Mattawoman-Hungars | **X** | | | 9 |
| 44 AC 527 | Messongo Creek #1 | | **X** | | 2 |
| 44 AC 528 | Messongo Creek #2 | **X** | | | 2 |
| 44 AC 529 | Messongo Creek #3 | **X** | | | 2 |
| 44 AC 532 | Nandua Creek #1 | **X** | | | 6 |
| 44 AC 533 | Nandua Creek #2 | **X** | | | 6 |
| 44 AC 534 | Nandua Creek #3 | | **X** | | 6 |
| 44 AC 535 | Nandua Creek #4 | | **X** | | 6 |
| 44 AC 536 | Nandua Creek #5 | | **X** | | 6 |
| 44 AC 511 | Nandua Creek #6 | | **X** | | 6 |
| 44 AC 512 | Nandua South #1 | | **X** | | 6 |
| 44 AC 513 | Nandua South #2 | | **X** | | 6 |
| 44 AC 514 | Nandua South #3 | | **X** | | 6 |
| 44 AC 52* | Nandua South #4 | | **X** | | 6 |
| 44 AC 515 | Nandua South #5 | **X** | | | 6 |
| 44 AC 516 | Nandua South #6 | | **X** | | 6 |
| 44 AC 517 | Nandua South #7 | | **X** | | 6 |
| 44 AC 518 | Nandua South #8 | | **X** | | 6 |
| 44 NH 428 | Nassawadox Crk. #1 | **X** | | | 8 |
| 44 NH 429 | Nassawadox Crk. #2 | | | **X** | 8 |
| 44 NH 430 | Nassawadox Crk. #3 | **X** | | | 8 |
| 44 NH 8* | Nassawadox Crk. #4 | | | **X** | 8 |

Table A.4 Site Erosion Assessment Based on Field Observations

| | | Mild Erosion | Moderate Erosion | Heavy Erosion | Erosion Section: |
|---|---|---|---|---|---|
| **Site #:** | **Site Name:** | **(<1 foot per year):** | **(1<>3 feet per year):** | **(>3 feet per year):** | **(see Figure 23)** |
| 44 NH 431 | Nassawadox Crk. #5 | | **X** | | 8 |
| 44 NH 432 | Nassawadox Crk. #6 | **X** | | | 8 |
| 44 AC 506 | NE Halfmoon Basin | | **X** | | 2 |
| 44 NH 438 | N. Old Plantation Crk. | | **X** | | 11 |
| 44 AC 524 | NW Tangier Island | | | **X** | 1 |
| 44 NH 192* | Occohannock Crk. #1 | **X** | | | 7 |
| 44 NH 420 | Occohannock Crk. #2 | **X** | | | 7 |
| 44 AC 356* | Occohannock Crk. #3 | | | **X** | 7 |
| 44 NH 3* | Occohannock Crk. #4 | | **X** | | 7 |
| 44 NH 65* | Occohannock Crk. #5 | | **X** | | 7 |
| 44 NH 421 | Occohannock Crk. #6 | **X** | | | 7 |
| 44 NH 422 | Occohannock Crk. #7 | | **X** | | 7 |
| 44 NH 43* | Occohannock Crk. #8 | **X** | | | 7 |
| 44 NH 423 | Occohannock Crk. #9 | **X** | | | 7 |
| 44 AC 519 | Occohannock Crk. #10 | **X** | | | 7 |
| 44 NH 424 | Occohannock Neck #1 | | **X** | | 7 |
| 44 NH 425 | Occohannock Neck #2 | | **X** | | 7 |
| 44 AC 530 | Pig Point | | **X** | | 2 |
| 44 AC 477 | Pungoteague Creek #1 | **X** | | | 5 |
| 44 AC 478 | Pungoteague Creek #2 | **X** | | | 5 |
| 44 AC 479 | Pungoteague Creek #3 | **X** | | | 5 |
| 44 AC 480 | Pungoteague Creek #4 | **X** | | | 5 |
| 44 AC 481 | Pungoteague Creek #5 | **X** | | | 5 |

Table A.4 Site Erosion Assessment Based on Field Observations

| | | Mild Erosion | Moderate Erosion | Heavy Erosion | Erosion Section: |
|---|---|---|---|---|---|
| **Site #:** | **Site Name:** | **(<1 foot per year):** | **(1<>3 feet per year):** | **(>3 feet per year):** | **(see Figure 23)** |
| 44 AC 482 | Pungoteague Creek #6 | | **X** | | 5 |
| 44 AC 537 | Pungoteague Creek #7 | | **X** | | 5 |
| 44 AC 161* | Pungoteague Creek #8 | **X** | | | 5 |
| 44 AC 483 | Pungoteague Creek #9 | **X** | | | 5 |
| 44 NH 434 | Savage Neck #1 | | **X** | | 10 |
| 44 NH 435 | Savage Neck #2 | | **X** | | 10 |
| 44 AC 484 | Sound Beach #1 | **X** | | | 3 |
| 44 AC 485 | Sound Beach #2 | | **X** | | 3 |
| 44 AC 486 | Sound Beach #3 | **X** | | | 4 |
| 44 NH 437 | South Kiptopeke | | **X** | | 12 |
| 44 AC 521 | SE Watts Island | | | **X** | 1 |
| 44 AC 531 | Starling Creek | | **X** | | 2 |
| 44 AC 487 | Thicket Point | **X** | | | 4 |
| 44 AC 214* | Watts Island #1 | | | **X** | 1 |
| 44 AC 522 | Watts Island #2 | | | **X** | 1 |
| 44 AC 523 | Watts Island #3 | | | **X** | 1 |

Appendix I: Table A.5
Comments About Coastal Archaeological Sites Previously Recorded In Accomack County, Virginia

| Site #: | Located: | Not Located: | Condition (if known): | Comments: |
|---|---|---|---|---|
| 44 AC 2 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 4 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 6 | | X | Not Known | Site May Be Completely Eroded Away. |
| 44 AC 10 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 14 | | X | Not Known | Site Not Located. |
| 44 AC 48 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 49 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 50 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 51 | | X | Not Known | Redeposited Sediments Adjacent to Shore. |
| 44 AC 52 | X | | Moderately Eroded | Redeposited Sediments Adjacent to Shore. |
| 44 AC 54 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 71 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 126 | | X | Not Known | Bulkheaded Shoreline. |
| 44 AC 136 | X | | Heavily Eroded | Site Needs Immediate Attention! |
| 44 AC 137 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 152 | | X | Not Known | Rip-Rapped Shoreline with Coastal Dunes. |
| 44 AC 153 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 160 | | X | Not Known | Shoreline Developed & Non-erosive. |
| 44 AC 161 | X | | Mildly Eroded | Shoreline Bulkheaded & Developed. |
| 44 AC 162 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 177 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 178 | | X | Not Known | Redeposited Sediments Adjacent to Shore. |
| 44 AC 188 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 213 | | X | Not Known | Redeposited Sediments Adjacent to Shore. |
| 44 AC 214 | X | | Heavily Eroded | Site Needs Immediate Attention! |
| 44 AC 271 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 277 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 341 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 355 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 356 | X | | Heavily Eroded | Site Needs Immediate Attention! |
| 44 AC 357 | | X | Not Known | Site May Be Completely Eroded. |
| 44 AC 397 | | X | Not Known | Site Has Been Completely Eroded Away! |

Table A.5 Comments About Coastal Archaeological Sites Previously Recorded in Accomack County, Virginia

| Site #: | Located: | Not Located: | Condition (if known): | Comments: |
|---|---|---|---|---|
| 44 AC 2 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 4 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 6 | | X | Not Known | Site May Be Completely Eroded Away. |
| 44 AC 10 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 14 | | X | Not Known | Site Not Located. |
| 44 AC 48 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 49 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 50 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 51 | | X | Not Known | Redeposited Sediments Adjacent to Shore. |
| 44 AC 52 | X | | Moderately Eroded | Redeposited Sediments Adjacent to Shore. |
| 44 AC 54 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 71 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 126 | | X | Not Known | Bulkheaded Shoreline. |
| 44 AC 136 | X | | Heavily Eroded | Site Needs Immediate Attention! |
| 44 AC 137 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 152 | | X | Not Known | Rip-Rapped Shoreline with Coastal Dunes. |
| 44 AC 153 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 160 | | X | Not Known | Shoreline Developed & Non-erosive. |
| 44 AC 161 | X | | Mildly Eroded | Shoreline Bulkheaded & Developed. |
| 44 AC 162 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 177 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 178 | | X | Not Known | Redeposited Sediments Adjacent to Shore. |
| 44 AC 188 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 213 | | X | Not Known | Redeposited Sediments Adjacent to Shore. |

Table A.5 Comments About Coastal Archaeological Sites Previously Recorded in Accomack County, Virginia

| Site #: | Located: | Not Located: | Condition (if known): | Comments: |
|---|---|---|---|---|
| 44 AC 214 | X | | Heavily Eroded | Site Needs Immediate Attention! |
| 44 AC 271 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 277 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 341 | | X | Not Known | Uneroded Inland Site. |
| 44 AC 355 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 AC 356 | X | | Heavily Eroded | Site Needs Immediate Attention! |
| 44 AC 357 | | X | Not Known | Site May Be Completely Eroded. |
| 44 AC 397 | | X | Not Known | Site Has Been Completely Eroded Away! |

Appendix I: Table A.6
Comments About Coastal Archaeological Sites Previously Recorded in Northampton County, Virginia.

| Site #: | Located: | Not Located: | Condition (if known): | Comments: |
|---|---|---|---|---|
| 44 NH 3 | X | | Moderately Eroded | Redeposited Sediment Along the Shore. |
| 44 NH 5 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 8 | X | | Heavily Eroded | Redeposited Sediment Along the Shore. |
| 44 NH 10 | | X | Not Known | Stable Shoreline. |
| 44 NH 34 | | X | Not Known | Inland Site. |
| 44 NH 41 | | X | Not Known | Stable Shoreline. |
| 44 NH 42 | | X | Not Known | Inland Site. |
| 44 NH 43 | X | | Mildly Eroded | Redeposited Sediment Along the Shore. |
| 44 NH 44 | | X | Not Known | Stable Shoreline. |
| 44 NH 47 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 48 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 49 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 59 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 60 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 63 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 64 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 65 | X | | Moderately Eroded | Exposed Shoreline with Coastal Dunes. |
| 44 NH 75 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 76 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 85 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 115 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 116 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 118 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 158 | | X | Not Known | Inland Site. |
| 44 NH 166 | | X | Not Known | Developed Shoreline with Coastal Dunes. |
| 44 NH 167 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 176 | | X | Not Known | Inland Site. |
| 44 NH 179 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 181 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 192 | X | | Mildly Eroded | Redeposited Sediment Along the Shore. |
| 44 NH 194 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 197 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 221 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 222 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 223 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 224 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 225 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 255 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 270 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 277 | | X | Not Known | Developed Shoreline. |
| 44 NH 278 | X | | Mildly Eroded | Thick Coastal Dune Formations. |
| 44 NH 336 | | X | Not Known | Inland Site. |
| 44 NH 337 | | X | Not Known | Non-erosive Shoreline. |
| 44 NH 343 | | X | Not Known | Stable Shoreline. |
| 44 NH 346 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 347 | | X | Not Known | Stable Shoreline. |
| 44 NH 348 | | X | Not Known | Stable Shoreline. |
| 44 NH 351 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 354 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 359 | | X | Not Known | Inland Site. |
| 44 NH 360 | | X | Not Known | Inland Site. |

Appendix I: Table A.6
Comments About Coastal Archaeological Sites Previously Recorded in Northampton County, Virginia.

| Site #: | Located: | Not Located: | Condition (if known): | Comments: |
|---|---|---|---|---|
| 44 NH 361 | | X | Not Known | Inland Site. |
| 44 NH 383 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 384 | | X | Not Known | Uneroded Inland Site. |

Table A.6 Comments About Coastal Archaeological Sites Previously Recorded in Northampton County, Virginia

| Site #: | Located: | Not Located: | Condition (if known): | Comments: |
|---|---|---|---|---|
| 44 NH 3 | X | | Moderately Eroded | Redeposited Sediment Along the Shore. |
| 44 NH 5 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 8 | X | | Heavily Eroded | Redeposited Sediment Along the Shore. |
| 44 NH 10 | | X | Not Known | Stable Shoreline. |
| 44 NH 34 | | X | Not Known | Inland Site. |
| 44 NH 41 | | X | Not Known | Stable Shoreline. |
| 44 NH 42 | | X | Not Known | Inland Site. |
| 44 NH 43 | X | | Mildly Eroded | Redeposited Sediment Along the Shore. |
| 44 NH 44 | | X | Not Known | Stable Shoreline. |
| 44 NH 47 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 48 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 49 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 59 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 60 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 63 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 64 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 65 | X | | Moderately Eroded | Exposed Shoreline with Coastal Dunes. |
| 44 NH 75 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 76 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 85 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 115 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 116 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 118 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 158 | | X | Not Known | Inland Site. |
| 44 NH 166 | | X | Not Known | Developed Shoreline with Coastal Dunes. |

Table A.6 Comments About Coastal Archaeological Sites Previously Recorded in Northampton County, Virginia

| Site #: | Located: | Not Located: | Condition (if known): | Comments: |
|---|---|---|---|---|
| 44 NH 167 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 176 | | X | Not Known | Inland Site. |
| 44 NH 179 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 181 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 192 | X | | Mildly Eroded | Redeposited Sediment Along the Shore. |
| 44 NH 194 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 197 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 221 | | X | Not Known | Thick Coastal Dune Formations. |
| 44 NH 222 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 223 | | X | Not Known | Bulkheaded and Developed Shoreline. |
| 44 NH 224 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 225 | | X | Not Known | Redeposited Sediment Along the Shore. |
| 44 NH 255 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 270 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 277 | | X | Not Known | Developed Shoreline. |
| 44 NH 278 | X | | Mildly Eroded | Thick Coastal Dune Formations. |
| 44 NH 336 | | X | Not Known | Inland Site. |
| 44 NH 337 | | X | Not Known | Non-erosive Shoreline. |
| 44 NH 343 | | X | Not Known | Stable Shoreline. |
| 44 NH 346 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 347 | | X | Not Known | Stable Shoreline. |
| 44 NH 348 | | X | Not Known | Stable Shoreline. |
| 44 NH 351 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 354 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 359 | | X | Not Known | Inland Site. |

Table A.6 Comments About Coastal Archaeological Sites Previously Recorded in Northampton County, Virginia

| Site #: | Located: | Not Located: | Condition (if known): | Comments: |
|---|---|---|---|---|
| 44 NH 360 | | X | Not Known | Inland Site. |
| 44 NH 361 | | X | Not Known | Inland Site. |
| 44 NH 383 | | X | Not Known | Uneroded Inland Site. |
| 44 NH 384 | | X | Not Known | Uneroded Inland Site. |

Appendix I: Table A.7

A Comparison Between the Previously Recorded Site Chronological Data and the Chronological Data Documented During the 2000 Survey

| Site #: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Notes: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 52 | | | X | X | | | | | | | | | 1978 Survey Data |
| 44 AC 52 | ? | ? | ? | ? | ? | ? | ? | | | | X | | 2000 Survey Data |
| 44 AC 136 | | ? | ? | ? | | | | | | | | | 1980 Survey Data |
| 44 AC 136 | ? | ? | X | ? | ? | ? | ? | | | | | | 2000 Survey Data |
| 44 AC 161 | | | | | | | X(?) | X(?) | X(?) | | | | 1980 Survey Data |
| 44 AC 161 | | | | | | | | | | X | X | X | 2000 Survey Data |
| 44 AC 214 | ? | ? | ? | ? | ? | ? | ? | | | | | | 1981 Survey Data |
| 44 AC 214 | X | X | X | X | | X | | | | | | | 2000 Survey Data |
| 44 AC 356 | | | | | ? | ? | ? | | | | | | 1983 Survey Data |
| 44 AC 356 | | | | X | | X | X | | | | | | 2000 Survey Data |
| 44 NH 3 | | ? | ? | ? | ? | ? | ? | | | | | | 1978 & 1985 Survey Data |
| 44 NH 3 | ? | ? | ? | ? | ? | ? | ? | | | | | | 2000 Survey Data |
| 44 NH 8 | | | | | | | | | X | | | | 1973 Survey Data |
| 44 NH 8 | | | | | | | | | X | | | | 2000 Survey Data |
| 44 NH 43 | | | | X | | X | | | | | | | 1978 Survey Data |
| 44 NH 43 | ? | ? | ? | ? | ? | ? | ? | | | | | | 2000 Survey Data |
| 44 NH 65 | | | | | | | | | ? | ? | ? | ? | 1980 Survey Data |
| 44 NH 65 | ? | ? | ? | ? | ? | ? | ? | | | | | | 2000 Survey Data |
| 44 NH 192 | | | | | | | | | | | X | | 1983 Survey Data |
| 44 NH 192 | ? | ? | ? | X(?) | ? | X(?) | ? | | | X | X | | 2000 Survey Data |
| 44 NH 278 | | | | | | | | | | | X | X | 1991 Survey Data |
| 44 NH 278 | | | | | | | | | | | | X | 2000 Survey Data |

**KEY:**

**PI:** Paleoindian; **EA:** Early Archaic; **MA:** Middle Archaic; **LA:** Late Archaic; **EW:** Early Woodland; **MW:** Middle Woodland; **LW:** Late Woodland; **Cnt:** Contact; **17th:** 17th Century; **18th:** 18th Century; **19th:** 19th Century; and **20th:** 20th Century.

**X:** Cultural Component Present
**?:** Unknown if Cultural Component Present
**X(?):** Possible Cultural Component Present
"Unmarked": Cultural Component Absent or Not Documented

**PI EA MA LA EW MW LW** (all marked with **?**): Unknown Prehistoric Component

**17th 18th 19th 20th** (all marked with **?**): Unknown Historic Component

**EA MA LA** (all marked with **?**): Unknown Archaic Component

**EW MW LW** (all marked with **?**): Unknown Woodland Component

Table A.7 A Comparison Between the Previously Recorded Site Chronological Data and the Chronological Data Documented During the 2000 Survey

| Site #: | PI | EA | MA | LA | EW | MW | LW | Cnt | 17th | 18th | 19th | 20th | Notes: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 AC 52 | | | X | X | | | | | | | | | 1978 Survey Data |
| 44 AC 52 | ? | ? | ? | ? | ? | ? | ? | | | | X | | 2000 Survey Data |
| 44 AC 136 | | ? | ? | ? | | | | | | | | | 1980 Survey Data |
| 44 AC 136 | ? | ? | X | ? | ? | ? | ? | | | | | | 2000 Survey Data |
| 44 AC 161 | | | | | | | X(?) | X(?) | X(?) | | | | 1980 Survey Data |
| 44 AC 161 | | | | | | | | | | X | X | X | 2000 Survey Data |
| 44 AC 214 | ? | ? | ? | ? | ? | ? | ? | | | | | | 1981 Survey Data |
| 44 AC 214 | X | X | X | X | | X | | | | | | | 2000 Survey Data |
| 44 AC 356 | | | | | ? | ? | ? | | | | | | 1983 Survey Data |
| 44 AC 356 | | | | X | | X | X | | | | | | 2000 Survey Data |
| 44 NH 3 | | ? | ? | ? | ? | ? | ? | | | | | | 1978 & 1985 Survey Data |
| 44 NH 3 | ? | ? | ? | ? | ? | ? | ? | | | | | | 2000 Survey Data |
| 44 NH 8 | | | | | | | | | X | | | | 1973 Survey Data |
| 44 NH 8 | | | | | | | | | X | | | | 2000 Survey Data |
| 44 NH 43 | | | | X | | X | | | | | | | 1978 Survey Data |
| 44 NH 43 | ? | ? | ? | ? | ? | ? | ? | | | | | | 2000 Survey Data |
| 44 NH 65 | | | | | | | | | ? | ? | ? | ? | 1980 Survey Data |
| 44 NH 65 | ? | ? | ? | ? | ? | ? | ? | | | | | | 2000 Survey Data |
| 44 NH 192 | | | | | | | | | | | X | | 1983 Survey Data |
| 44 NH 192 | ? | ? | ? | X(?) | ? | X(?) | ? | | | X | X | | 2000 Survey Data |
| 44 NH 278 | | | | | | | | | | | X | X | 1991 Survey Data |
| 44 NH 278 | | | | | | | | | | | | X | 2000 Survey Data |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Table A.7 A Comparison Between the Previously Recorded Site Chronological Data and the Chronological Data Documented During the 2000 Survey

KEY:

Prehistoric Cultural Periods:
**PI**: Paleoindian; **EA**: Early Archaic; **MA**: Middle Archaic; **LA**: Late Archaic; **EW**: Early Woodland; **MW**: Middle Woodland; **LW**: Late Woodland; and **Cnt**: Contact.

Historic Cultural Periods:
**17th**: 17th Century; **18th**: 18th Century; **19th**: 19th Century; and **20th**: 20th Century.

**X**: Cultural Component Present
**?**: Unknown if Cultural Component Present
**X(?)**: Possible Cultural Component Present
"Unmarked": Cultural Component Absent or Not Documented

**PI EA MA LA EW MW LW** (all marked with ?): Unknown Prehistoric Component

**17th 18th 19th 20th** (all marked with ?): Unknown Historic Component

**EA MA LA** (all marked with ?): Unknown Archaic Component

**EW MW LW** (all marked with ?): Unknown Woodland Component

Appendix I: Table A.8

Exotic "Non-Local" Materials Observed at Some Prehistoric Sites Located on the Virginia Eastern Shore

| Site #: | Copper | Rhyolite | Argillite | Steatite | Notes or Comments: |
|---|---|---|---|---|---|
| 44 AC 214 | | 7 | 4 | | 1 arg. Fox Creek pt., 3 arg. flakes, 2 rhy. bifaces, & 5 rhy. flakes. |
| 44 AC 469 | | 1 | | | 1 green rhyolite scraper (tuff ???). |
| 44 AC 471 | | 5 | | | 5 green rhyolite flakes (tuff ???). |
| 44 AC 475 | | 1 | | | 1 rhyolite flake tool. |
| 44 AC 482 | | 1 | | | 1 rhyolite flake. |
| 44 AC 483 | | | | 1 | 1 large fragment of steatite (unworked). |
| 44 AC 484 | | | 1 | | 1 argillite Dry Brook Fishtail point. |
| 44 AC 486 | | 1 | | | 1 rhyolite Fox Creek point. |
| 44 AC 496 | | 11 | 1 | | 1 arg. Fox Creek pt.,1 rhy. biface, & 10 rhy. flakes. |
| 44 AC 512 | | | | 1 | 1 steatite bowl fragment. |
| 44 AC 513 | | 1 | 1 | | 1 argillite spall & 1 rhyolite flake. |
| 44 AC 519 | | 1 | | | 1 rhyolite flake. |
| 44 AC 527 | 1 | | | | 1 heavily patinated copper nugget (???). |
| 44 AC 529 | 1 | 1 | | | 1 heavily patinated copper bead frag. & 1 rhyolite spall. |
| 44 NH 192 | | 10 | | | 10 rhyolite flakes (4 unweathered & 6 weathered). |
| 44 NH 420 | | 1 | | | 1 large rhyolite Lehigh/Snook Kill Broadspear. |
| 44 NH 421 | | 1 | | | 1 rhyolite Fox Creek point. |
| 44 NH 423 | | 2 | | | 2 rhyolite flakes (weathered). |
| 44 NH 431 | | | | 1 | 1 steatite bowl fragment (grooved around fractured edge). |
| 44 NH 433 | | 2 | | | 1 rhyolite drill & 1 rhyolite flake tool. |
| | | | | | |
| **TOTAL:** | **2** | **46** | **7** | **3** | TOTAL: 20 sites (2 w/copper, 15 w/rhyolite, 4 w/argillite, & 3 w/steatite). |
| | | | | | |

Table A.8 Exotic "Non-Local" Materials Observed at Some Prehistoric Sites Located on the Virginia Eastern Shore

| Site #: | Copper | Rhyolite | Argillite | Steatite | Artifact Descriptions: |
|---|---|---|---|---|---|
| 44 AC 214 | | 7 | 4 | | 1 arg. Fox Creek pt., 3 arg. flakes, 2 rhy. bifaces, & 5 rhy. flakes. |
| 44 AC 469 | | 1 | | | 1 green rhyolite scraper (tuff ???). |
| 44 AC 471 | | 5 | | | 5 green rhyolite flakes (tuff ???). |
| 44 AC 475 | | 1 | | | 1 rhyolite flake tool. |
| 44 AC 482 | | 1 | | | 1 rhyolite flake. |
| 44 AC 483 | | | | 1 | 1 large fragment of steatite (unworked). |
| 44 AC 484 | | | 1 | | 1 argillite Dry Brook Fishtail point. |
| 44 AC 486 | | 1 | | | 1 rhyolite Fox Creek point. |
| 44 AC 496 | | 11 | 1 | | 1 arg. Fox Creek pt.,1 rhy. biface, & 10 rhy. flakes. |
| 44 AC 512 | | | | 1 | 1 steatite bowl fragment. |
| 44 AC 513 | | 1 | 1 | | 1 argillite spall & 1 rhyolite flake. |
| 44 AC 519 | | 1 | | | 1 rhyolite flake. |
| 44 AC 527 | 1 | | | | 1 heavily patinated copper nugget (???). |
| 44 AC 529 | 1 | 1 | | | 1 heavily patinated copper bead frag. & 1 rhyolite spall. |
| 44 NH 192 | | 10 | | | 10 rhyolite flakes (4 unweathered & 6 weathered). |
| 44 NH 420 | | 1 | | | 1 large rhyolite Lehigh/Snook Kill Broadspear. |
| 44 NH 421 | | 1 | | | 1 rhyolite Fox Creek point. |
| 44 NH 423 | | 2 | | | 2 rhyolite flakes (weathered). |
| 44 NH 431 | | | | 1 | 1 steatite bowl fragment (grooved around fractured edge). |
| 44 NH 433 | | 2 | | | 1 rhyolite drill & 1 rhyolite flake tool. |
| | | | | | |
| **TOTAL:** | **2** | **46** | **7** | **3** | TOTAL: 20 sites (2 w/copper, 15 w/rhyolite, 4 w/argillite, & 3 w/steatite). |

Appendix I: Table A.9
Marine Species Observed within the Prehistoric Shell Middens Located on the Virginia Eastern Shore

| Site #: | Oyster | Clam | Scallop | Whelk | Mussel | Periwinkle | Associated Diagnostics: |
|---|---|---|---|---|---|---|---|
| 44 AC 356 | X | X | | | | | Hell Island & Townsend ware. |
| 44 AC 465 | X | X | | | | | Potomac Creek ware. |
| 44 AC 472 | X | | | | | | Debitage and FCR. |
| 44 AC 480 | X | X | | | | | Debitage and FCR. |
| 44 AC 482 | X | X | | | | | Mockley & Townsend ware. |
| 44 AC 492 | X | X | | | | | Piney Island-like point, debitage, & FCR. |
| 44 AC 496 | X | X | | | | | Accokeek ware & Fox Creek point. |
| 44 AC 505 | X | X | | | | | Debitage, flake tools, and FCR. |
| 44 AC 512 | X | X | X | | | X | Mockley, Potomac Cr., & Townsend ware. |
| 44 AC 513 | X | X | X | | | | Popes Creek & Wolfe Neck ware. |
| 44 AC 527 | X | X | | X | | | Variety of Early to Late Woodland wares. |
| 44 AC 528 | X | X | | | | | Variety of Early to Late Woodland wares. |
| 44 AC 529 | X | X | | | | | Lehigh/Snook Kill Broadspear. |
| 44 AC 532 | X | X | | | | | FCR. |
| 44 AC 533 | X | X | | | | | Townsend ware. |
| 44 AC 537 | | X | | | | | Hell Island ware. |
| 44 NH 423 | X | X | | | | | Debitage and FCR. |
| 44 NH 429 | X | X | X | | X | | Wolfe Neck, Mockley, & Townsend ware. |
| 44 NH 431 | X | X | | X | | | Steatite bwl & Erly to Lte Woodlnd wares. |
| 44 NH 432 | X | | | | | | FCR. |
| | | | | | | | |
| **TOTAL:** | **19 sites** | **18 sites** | **3 sites** | **2 sites** | **1 site** | **1 site** | TOTAL: 20 sites (16 AC & 4 NH) |

Table A.9 Marine Species Observed Within the Prehistoric Shell Middens Located on the Virginia Eastern Shore

| Site #: | Oyster | Clam | Scallop | Whelk | Mussel | Periwinkle | Associated Diagnostics: |
|---|---|---|---|---|---|---|---|
| 44 AC 356 | X | X | | | | | Hell Island & Townsend ware. |
| 44 AC 465 | X | X | | | | | Potomac Creek ware. |
| 44 AC 472 | X | | | | | | Debitage and Fire-Cracked Rock (i.e., FCR). |
| 44 AC 480 | X | X | | | | | Debitage and FCR. |
| 44 AC 482 | X | X | | | | | Mockley & Townsend ware. |
| 44 AC 492 | X | X | | | | | Piney Island-like point, debitage, & FCR. |
| 44 AC 496 | X | X | | | | | Accokeek ware & Fox Creek point. |
| 44 AC 505 | X | X | | | | | Debitage, flake tools, and FCR. |
| 44 AC 512 | X | X | X | | | X | Mockley, Potomac Creek, & Townsend ware. |
| 44 AC 513 | X | X | X | | | | Popes Creek & Wolfe Neck ware. |
| 44 AC 527 | X | X | | X | | | Variety of Early to Late Woodland wares. |
| 44 AC 528 | X | X | | | | | Variety of Early to Late Woodland wares. |
| 44 AC 529 | X | X | | | | | Lehigh/Snook Kill Broadspear. |
| 44 AC 532 | X | X | | | | | FCR. |
| 44 AC 533 | X | X | | | | | Townsend ware. |
| 44 AC 537 | | X | | | | | Hell Island ware. |
| 44 NH 423 | X | X | | | | | Debitage and FCR. |
| 44 NH 429 | X | X | X | | X | | Wolfe Neck, Mockley, & Townsend ware. |
| 44 NH 431 | X | X | | X | | | Steatite bowl & Early to Late Woodlnd wares. |
| 44 NH 432 | X | | | | | | FCR. |
| | | | | | | | |
| **TOTAL:** | **19 sites** | **18 sites** | **3 sites** | **2 sites** | **1 site** | **1 site** | TOTAL: 20 sites (16 AC & 4 NH) |

# ARCHAEOLOGICAL SURVEY OF THE CHESAPEAKE BAY SHORELINES ASSOCIATED WITH ACCOMACK COUNTY AND NORTHAMPTON COUNTY, VIRGINIA

## VOLUME II

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# APPENDIX B

# ARCHAEOLOGICAL SITE DATA FORMS