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EDITOR'S NOTE
Barbara E. Luedtke

On several occasions during my term as Editor of the Bulletin I have experimented with grouping articles submitted separately into "theme issues". This time, all the articles were submitted together, by arrangement with the organizers of the symposium in which they were first presented. I am very pleased with the outcome of this experiment; it was a pleasure to share editorial duties with Chris and Linda, and the resulting issue provides new information on an especially interesting region of Massachusetts, as well as some thought-provoking ideas to be tested elsewhere in New England.

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CURRENT DIRECTIONS IN THE ARCHAEOLOGY OF CAPE COD AND THE ISLANDS
Compiled by
Christopher L. Borstel and Linda A. Towle

CURRENT DIRECTIONS: AN INTRODUCTION
Christopher L. Borstel

Long-time readers of the Bulletin will recall the frequency with which reports on the archaeology of the Cape Cod region have been carried in its pages. More than anything else, this is a product of archaeologists' continuing interest in the area. Indeed, interest in the archaeology of Cape Cod, Martha's Vineyard, and Nantucket long precedes the formation of the Massachusetts Archaeological Society. Henry David Thoreau (1961:97-98), for example, during his tours of Cape Cod in the late 1840's noted the presence of prehistoric archaeological sites. To judge from collections in private hands and in museums, by the end of the nineteenth century many avocational archaeologists were active on the Cape and Islands.

In the 1940's and 1950's the Bulletin often carried articles written by Provincetown artist and archaeologist Ross Moffett. Moffett summarized his view of the prehistory of Cape Cod in a 1957 article in this journal. Another significant figure in this period, whose contributions to the archaeology of coastal Massachusetts have perhaps never been fully appreciated, was Frederick Johnson. Johnson brought a multidisciplinary perspective to many of his projects, including his important work at the Boylston Street fishweir in Boston (Johnson 1942, 1949). On Cape Cod, Johnson collaborated with Moffett on several projects and, along with Douglas Byers, published a monograph on the archaeology of Martha's Vineyard (Byers and Johnson 1940).

In the 1960's the Cape and Islands played a central role in two studies that continue to have influence throughout the northeast. Dena F. Dincauze (1968) analyzed the Susquehanna tradition cremation cemeteries of eastern Massachusetts, and one of the major assemblages in her study was from the Coburn site in Orleans. Between 1962 and 1967 William A. Ritchie conducted excavations for his study of Martha's Vineyard archaeology, which allowed him to propose a relatively well-dated chronology for this section of New England's coast (Ritchie 1969).
Interest in the archaeology of Cape Cod, Martha's Vineyard, and Nantucket continues to grow. In the past few years at least two major projects, one on Martha's Vineyard and the other at Cape Cod National Seashore, have gotten underway; numerous smaller projects have also been undertaken, and the Cape Cod Museum of Natural History in Brewster has taken an active interest in archaeology. With so much new work going on, the time seemed ripe for an assessment of the directions being taken by this research. The papers in this issue of the Bulletin are a selection of those given at a symposium of the Northeastern Anthropological Association in April 1985. That session, in turn, had its origins at an earlier conference, the November 1984 meeting of the Eastern States Archaeological Federation, where Alison Dwyer, Linda Towle, and Fred Dunford hatched the idea for the symposium.

Even more so than the symposium itself, the papers in this issue represent only a sample of the archaeological research underway on Cape Cod and the Islands. Scheduling conflicts and time limitations did not allow us to invite everyone to the symposium who is active in the region, and space limitations further restricted the number of papers included in this issue. Notably absent is any representative from Martha's Vineyard, and readers may wish to consult Richardson (1985) for a recent summary of work there. The National Park Service's project on outer Cape Cod is also not specifically represented, although several of the articles in this issue do use data obtained by that project. McManamon (1984) has published a major interim report on the survey of the Cape Cod National Seashore, and Borstel (1985) provides the first of several site reports from the project. Also not represented is the current work on the Public Archaeology Laboratory, Inc., at the Oak Ridge site in Orleans; the results of excavation of this site will provide much new information about Susquehanna tradition stone tool manufacturing on Cape Cod. Finally, all of the articles restrict themselves to the prehistoric period. Historic period archaeological projects are also underway; for example, Synenki and Charles (1984) report on the recataloging of the collection from the Great Island Tavern site in Wellfleet.

From north to south the region extends about 100 km, from east to west about 80 km. The Cape and Islands share certain features of geography and geology, in that all are composed primarily of sands and gravels laid down by ice and meltwater during the last major episode of Pleistocene glaciation (Oldale 1982). Typically, the soils developed on these sediments are acidic and well-drained, and the elevation of groundwater, in some parts of the region, appears to be directly controlled by sea level. Today the sea dominates the Cape and Islands. The sea shapes the shorelines (Strahler 1966) and controls the climate (Trewartha 1981: 336-338). No spot is more than ten kilometers from the ocean, and as more than one article in this issue points out, coastal archaeology encompasses more than just those sites on the shoreline.

On a regional scale, the landscape extending from the Provincetown end of Cape Cod south and west to Nantucket and Martha's Vineyard has changed dramatically over the past 10,000 years. The most significant agent in modifying the landscape has been the rising sea level of the post-glacial period (Oldale and O'Hara 1980). The sea flooded the low-lying inner continental shelf, and waves and currents of the encroaching sea have eroded hundreds of millions of cubic meters of sand and gravel. Some of this sediment has been carried offshore, while currents have used some of it to build spits such as the Provincelands Hook, Monomoy Island, and Barnstable Neck. As Salwen (1965) emphasized more than 20 years ago, recognizing the effects of sea level rise along the northeastern coast of the United States is essential if the original environmental context of sites and the regional patterning of sites is to be properly interpreted.

In addition to changes in geography, the last 10,000 years have witnessed major changes in the region's vegetation. The most complete published data for the region is Winkler's (1985) study of a core from Duck Pond in Wellfleet. In greatly simplified terms,
her analysis traces the evolution of the forest from one dominated by northern conifers about 10,000 years ago through a mixed conifer-deciduous forest between 9500 and 7500 years ago and a pine barren woodland from 7500 to 2200 years ago to the mixed conifer-hardwood conditions of today. A number of factors were responsible for these changes, including climatic change, the post-glacial migrations of plants, the landscape changes resulting from sea level rise, and, perhaps, the land clearing and intentional forest fires of later prehistoric Indians.

It was within this dynamic environment that the region's prehistoric people lived. Although many of the changes took place at too slow a rate for a person to have noticed in a lifetime, the changes were great enough to have required cultural adjustments over time. Archaeologists are only beginning to identify what some of these adjustments were.

In the first article in this issue, Mahlstedt provides an overview of the region's cultural sequence, based upon a 1984 collections inventory conducted by the Massachusetts Historical Commission. Mahlstedt also describes a previously unrecognized projectile point type, with three variants, that dates to the Late Archaic and may extend into the Early Woodland.

Stillson's article explores a question already touched upon: in this coastal region, are there significant differences between artifact assemblages from shoreline and non-shoreline sites? Stillson's tentative answer in regard to ceramics is "yes," and this raises intriguing questions about how prehistoric people used the region as a whole.

Little and Andrew's article, more than any other in this issue, emphasizes the dynamic nature of the region's shorelines. They describe the variety of ways in which it is possible to take advantage of the bounty of foods offered by the sea. They further show how rapidly shellfish and other marine organisms can establish themselves in a new habitat. On this topic their observations are in striking contrast to the positions of some other students of coastal archaeology.

Towle's article provides an overview of a single phase of the region's prehistory: Fox Creek. This phase is best known in eastern New York, but Towle's summary of the scattered finds from Cape Cod and the Islands shows that the range of this phase encompassed a region extending into eastern Massachusetts.

The final article by Dunford focuses on an urgent problem in the region, the destruction of archaeological sites. While preservation of sites is the most desirable solution, practical considerations often mean that sites must be salvaged or their contents and structure will be entirely lost. Dunford proposes that interested archaeologists establish a regional research design to provide some guidance during short-notice salvage operations.

Along with these articles, the discussions during the 1985 symposium indicate that current archaeological research on Cape Cod and the Islands revolves around several themes:

1. Site loss. Although the destruction of archaeological sites is a common problem in New England, it is particularly acute in this region because of the tremendous growth in population during the past two decades. One of the consequences of this has been the construction of thousands of new houses, for both summer and year-round residents, often in places where prehistoric people once lived. Dunford's suggestions, particularly the development of strong public education programs and the establishment of a regional research design, merit archaeologists' serious consideration.

2. Regional sequences. As both Mahlstedt's and Towle's articles indicate, archaeologists have a great deal to learn about the region's cultural sequence and how it relates to those of adjoining parts of New England. Despite the impressive number of collections known from the area, there are relatively few that have radiocarbon dates and come from well-controlled contexts.
3. Site formation. In excavating sites there is a strong need to better understand how the site was formed, so that the strengths and weaknesses of the artifact assemblage can be better assessed and so that new facets of past human activities can be revealed. Dunford mentions this issue in relation to shell middens, but it is just as important in non-midden sites (Borstel 1985: Chapter 2).

4. Coastal adaptations. Stillson, Little and Andrews, and Dunford all address aspects of this problem. The role of estuarine and marine resources in the lifeways of prehistoric people requires much investigation. Such studies need to look not only at the shoreline sites themselves, but sites in all kinds of settings to delineate the entire pattern of use. The implications of the variation of resources in time and space for prehistoric economies and socio-political systems also deserve attention. This theme implies the need for more intensive collaboration between archaeologists and those skilled in the natural sciences.

All of these themes, and others, will remain important in the years ahead. If the papers in this issue of the Bulletin are any indication, archaeological research on Cape Cod, Martha's Vineyard, and Nantucket is headed in some interesting directions. Future work in the region will continue to influence archaeologists throughout New England.

ACKNOWLEDGMENTS

The compilers are pleased to acknowledge the assistance of several people in the assembling of these articles. We especially wish to thank the Bulletin editor, Barbara Luedtke, for her help, encouragement, and patience. The contributors all provided copies and revisions of their papers with good cheer despite erratic communication from us. Frank McManamon, Chief of the Division of Cultural Resources, North Atlantic Region, National Park Service, lent his support in the interests of furthering Cape Cod archaeology and of maintaining the professional competence of his staff. Debbie Chapman of the Eastern Archeological Field Laboratory (NPS) in Charlestown competently provided help with copying and collating manuscripts and with mailings and other communications matters. Finally, one of us (CB) would especially like to thank Alison Dwyer, who helped with the preparation of one of the symposium presentations and who agreed to take over supervision of a field crew, causing her to miss the 1985 Northeastern Anthropological Society meeting.

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Since 1979 the Massachusetts Historical Commission (MHC) has been engaged in a statewide survey of prehistoric resources. The primary goal of the survey is to develop a standardized filing system and data base upon which informed decisions concerning the management and preservation of prehistoric resources in the state can be formulated. The method of accumulating this information is through the analysis of local and regional museum...
collections as well as private collections of various sizes. To date, close to one quarter of a million artifacts have been inventoried and several hundred previously unrecorded sites have been identified in eastern and central Massachusetts. The findings of the survey are slowly helping to fill in the landscape with archaeological sites, as many sites are now known where none existed before. The increased number of sites, along with cultural/temporal associations often provided by the presence of diagnostic artifacts in site assemblages, has produced new evidence concerning settlement patterns for the Early Archaic period (Johnson 1984) as well as for the end of the Late Archaic and Early Woodland periods in eastern Massachusetts (Mahlstedt 1983).

During the summer of 1984 the survey focused on Cape Cod, Martha's Vineyard and Nantucket. In a four month period over 120 unrecorded sites were identified, and exciting new information concerning the prehistoric occupation of the region was recognized for the first time. It must be remembered that this evidence is based primarily on collections analysis; in only a few cases does it draw on contextual data from systematically excavated sites and therefore there are many biases, which have been discussed elsewhere (e.g. Johnson and Mahlstedt 1984:6-36). Biases notwithstanding, the results of the survey have been more rewarding than anticipated.

Those readers who are familiar with the prehistory of the Cape and Islands will find that the results of the MHC's survey, which are summarized in the first half of this paper, help to fill in some of the gaps in the existing archaeological record of the region as the title of this paper suggests. However, the second portion of the discussion will add new gaps too, for the 1984 survey provided evidence of a new projectile point with three variants in the region. The type appears to be associated with the Late Archaic and Early Woodland periods.

SURVEY OVERVIEW

The MHC survey and related studies have for the first time documented Paleo-Indian and Early Archaic sites on the mainland of Cape Cod and on Nantucket. However, Early Archaic occurrences have yet to be identified on the Vineyard (Mahlstedt in press; Richardson 1985). The lack of early prehistoric sites in the region has been attributed to the effects of postglacial isostatic rebound and increased sea levels, which are presumed to have drowned sites located on the low lying continental shelf (Dincauze and Mulholland 1977; Barber 1979). Coastal erosion, particularly on the outer Cape and in some places on the Islands, has also contributed to the loss of early sites. It is now apparent that the landforms known to us today as Cape Cod, Martha's Vineyard and Nantucket were occupied, albeit sparsely, as early as 12,000-8000 years ago. At this time several sites on the Bass and Herring Rivers on the mid-Cape, two sites in Eastham on the outer Cape, and occurrences on the Islands were all situated in the uplands, well over 20 miles (32 km) from the coast, where they were adjacent to the headwaters of freshwater streams.

The results of the survey also suggest that the prehistoric occupation of the region increased sharply during the Middle Archaic period, approximately 8,000-6,500 years ago. Middle Archaic materials (Neville-like, Neville Variant and Stalk-like points) were recorded in the assemblages of at least 34 different sites on the Cape, 25 on the Vineyard and 12 on Nantucket, indicating a marked acceleration in activity from the preceding periods. This is a pattern recognized throughout most of New England. At this time several sites appear to have been reutilized, and the high site densities on the Bass and Herring Rivers on the mid-Cape suggest that centers of Middle Archaic upland activity may have developed there. The sheer quantity of diagnostic artifacts from some of these sites is remarkable. From one site alone over 60 Middle Archaic points (primarily Neville-like) have been inventoried. Because of the lack of context, as well as other biases, artifacts
inventoried from collections provide no reliable information concerning the activities which were performed at these sites or how they were related to one another. But Richardson's excavations on Martha's Vineyard suggest that marine resources were already becoming important supplements to the diet as early as the Middle Archaic period (Richardson 1985).

Collections analysis reveals that all three traditions of the Late Archaic period (the Laurentian, Susquehanna and Small Stemmed) are present throughout the region. However, the results of the survey indicate that the nature of the Small Stemmed Tradition on the Cape is different from that of its contemporaries on the mainland. Additionally, several new tool forms may have developed locally toward the end of the Late Archaic period, which is a topic to be discussed more fully below. As elsewhere in southern New England, Late Archaic period sites are found in virtually every habitat on the Cape and Islands, and there is some evidence for incipient semi-sedentary residence based on the exploitation of shellfish (McManamon 1984:408).

The number of site assemblages containing diagnostic artifacts suggests that the intensity of occupation in the region increased progressively through the Early and Middle Woodland periods. Site frequencies are so high for the Late Woodland period that they suggest that populations may have reached their maximum levels during this time. Although the Late Woodland period is highly visible in eastern and central Massachusetts, only on Cape Cod and the Islands does the number of sites with Late Woodland materials exceed that of any other period, including the Late Archaic period.

THE CAPE STEMMED TRADITION

Several forms of stone bifaces that did not satisfy the criteria for any defined diagnostic type (Johnson and Mahlstedt 1984) were repeatedly encountered during the course of the collections analysis in 1984. These specimens were recorded as "untyped points", and a series of morphological and metric traits were entered on computerized code sheets. Since many collections from eastern and central Massachusetts had already been analyzed, it appeared that there might be a prehistoric manifestation on Cape Cod and the Islands which was not present elsewhere. The population size of these "untyped points" was sufficiently large (several hundred specimens) to indicate that they were not aberrant forms but represented a distinct type of lithic artifact unto themselves. Some of the salient characteristics of these artifacts are as follows (more detailed descriptions and statistically derived data will be presented in a forthcoming article [Mahlstedt in preparation]):

1. They have thick cross sections with stems which are large (both in width and length) in relation to their overall size.

2. Their shoulders range from non-existent to weakly developed to sharp and acutely angled.

3. The incidence of breakage in the vicinity of the shoulder is high. Frequently only a large basal fragment is all that remains of the broken artifact.

4. There is a high incidence of edge retouch and reutilization. The stems were often reworked to create severely truncated working ends, forming what may be more appropriately described as "stubby stemmed scrapers" or some other form of bifacial implement.

5. They are made almost exclusively of quartz and quartzite, and felsite was used very rarely.
6. They are typically manufactured by steep angled percussion flaking, with occasional retouch to regularize the working edge, and often resemble bifacial cores or preforms.

Despite their rather crude appearance, these points are finished tools which differ considerably from the predominate quartz projectile points of southern New England. Distinct morphological attributes of the stem suggest that two and possibly three mutually exclusive, though related, variants make up this new type of stone artifact. Because the variants appear to be related in both time and space, and for lack of better nomenclature, they have been combined as part of the newly defined "Cape Stemmed Tradition". Whether these artifacts represent a distinct cultural tradition or are merely minor innovations within the indigenous industries, as has been suggested for the Susquehanna Tradition (Cook 1976), remains to be clarified. Currently the Cape Stemmed Tradition as proposed here includes three variants: the Cape Broad Stem, the Cape Expanding Stem, and the Cape Contracting Stem (Fig. 1).

It is proposed that the Cape Stemmed Tradition, with its three variants, is analogous to the Small Stemmed Tradition with its various Small Stemmed and Small Triangular (or Squibnocket) points. Additionally, it is proposed that the Cape Stemmed Tradition, like the Small Stemmed Tradition, is an indigenous lithic technology and that the two may be related in some manner.

A major difference between the two traditions is the limited geographic distribution of the Cape Stemmed Tradition. Whereas the Small Stemmed Tradition is ubiquitous in southern New England, the Cape Stemmed Tradition is much more localized and parochial, and it tends to be confined to coastal central and southeastern Massachusetts, the Cape, the Islands, and Narragansett Bay. The southern and western extent of its distribution are not fully known at present. Luedtke reported untyped points from the Boston Harbor area which are identical to Cape Broad Stems (Luedtke 1980:39). Therefore the variants which comprise the Cape Stemmed Tradition could be expected to appear as a minor constituent assemblages all along the coast of southeastern Massachusetts. The MHC inventory encountered no Cape Stemmed points from sites north of the Boston Basin, which further suggests a distribution south of Boston. Although the emerging site distribution indicates that they were not a unique group-specific tool used only by inhabitants of the Cape and Islands, Cape Stemmed points are much more spatially restricted than most other artifact types in New England. Typically they occur as minor constituents at sites that are situated today in coastal settings, but they have also been found at interior fresh water ponds on the Mid-Cape. For some inexplicable reason,
only on the outer Cape do they achieve quantitatively significant numbers; one assemblage alone, from High Head in Truro, contained over 20 specimens.

Although this paper is the first to formally identify the Cape Stemmed Tradition, the variants which make up this proposed tradition were initially recognized in the 1940’s by Ripley Bullen. Bullen worked closely with many well known avocational archaeologists on the outer Cape, and reported that these strange artifacts occurred "...in (such) appreciable quantities that they were used much more than was previously realized" (Bullen 1946:77). The following year, reporting on the Clarke Collection, which was derived from a number of sites on the north side of Buzzards Bay, Bullen recalled that "...three large and thick quartz knives..." were similar to those he had seen from a collection in Eastham on the outer Cape (Bullen 1947:47). It was, however, through the frequent Bulletin articles by Ross Moffett that the variants of the Cape Stemmed Tradition were made visible to the archaeological community. In reports on nine sites from the outer Cape (Moffett 1949; 1951; 1957; 1959), Moffett illustrated and often described what are defined here as the three variants of the Cape Stemmed Tradition.

A number of these anomalous quartz artifacts were also recovered from excavations on Nantucket and were described by Stephen Perlman (1970), who called them Marshall Points after the site from which they came. The use of a name which has a regional connotation such as Cape Stemmed as opposed to a "type site" name is proposed here because the distribution of these artifacts suggests that they are most numerous on the Cape, particularly on the outer Cape which may have been the focus of the tradition.

Just as the identification and definition of the Cape Stemmed Tradition are tentative, so too is any attempt to determine its place in local and regional prehistory. Several lines of evidence currently suggest that the Cape Stemmed Tradition is an indigenous Late Archaic and possibly Early Woodland coastal manifestation in southeastern Massachusetts. The first line of evidence comes from a reinterpretation of Moffett's articles and analysis of his collections at the R.S. Peabody Foundation Museum in Andover. At many sites, Moffett attributed Cape Stemmed variants to preceramic cultural horizons; however, his photographs and the existing site assemblages indicate that they were also present in later occupational levels. They were recovered from horizons which were so inextricably mixed with artifacts of the Small Stemmed Tradition, as well as with Early and Middle Woodland artifacts, that they could have been related to any or all of the various occupations (e.g. Moffett 1951; 1957). More recently, several specimens which would probably be classified as Cape Broad Stemmed points were recovered in Late Archaic contexts at Calf Island in the Boston Harbor (Luedtke 1980:39) and at 19BN281 on the outer Cape (Borstel 1985). Jim Richardson (personal communication) has also indicated that they occurred in a Late Archaic context at the Frisby Butler and Hornblower II sites on Martha's Vineyard, whereas Perlman (1970) suggested an Early Woodland association for his Marshall points on Nantucket.

Negative evidence can also be used cautiously to further suggest cultural/temporal associations. At the same time that the Cape Stemmed variants were recognized in collections it was also observed that the nature of the local Small Stemmed Tradition was different than in other surveyed portions of Massachusetts. Although Small Stemmed points and Small Triangles were ubiquitous, as elsewhere in Massachusetts, on the Cape they were significantly less abundant than in other portions of the state. Seldom did they quantitatively dominate site assemblages from the Cape like they did in other parts of the state. Bullen (1948:43) was the first to note the low frequency of Small Stemmed points from sites on the Cape, in comparison to other portions of southeastern Massachusetts. The low visibility of Small Stemmed points, and the appearance of the Cape Stemmed Tradition in the same region may indicate a relationship between the two. A technological relationship between the Cape Stemmed and Small Stemmed Traditions is
suggested because the two are essentially quartz industries (at least in southeastern Massachusetts). Additionally, contextual data from a few excavated sites reveal that the Cape Stemmed Tradition was a part of the Late Archaic tool kit. However, since a number of recent radiocarbon dates for Small Stemmed points in eastern Massachusetts have produced Early Woodland dates (Mahlstedt 1985; Wamsley 1984; Cox 1982; Huntington 1982), it is probable that the Cape Stemmed Tradition extends into the Early Woodland as well.

Lacking better contextual data it is not possible to discuss with any degree of certainty what the relationship between the two traditions may have been. It is possible that on the Cape and the Islands the various Cape Stemmed variants were substituted for, and used in place of, Small Stemmed points. Conversely they may have been grafted onto the Small Stemmed Tradition tool kit where they were used for special tasks or a special resource. Currently the known distribution of these large quartz stemmed points is decidedly coastal. The greatest density of sites at which they occur clusters on the Cape and Islands and they become decreasingly numerous the further the distance from the Cape, implying that the Cape may have been the center of development for the Cape Stemmed Tradition. The coastal pattern of the site distribution at which Cape Stemmed points occurs makes it easy to speculate (perhaps too easily so), that they were a technological adaptation related to the exploitation of abundant marine resources. The record of human habitation on Cape Cod and the Islands is one of resiliency and adjustment to the continuously changing environment. As the habitats of the region evolved, new economic opportunities were created, and they were rapidly recognized and exploited by the prehistoric occupants of the region. The Cape Stemmed Tradition may have been such an adaptation. Large, heavy tools such as those which make up this proposed Tradition may have been well suited for processing and preparing marine mammals such as stranded pilot whales and gray and harbor seals, the bones and teeth of which are quite evident in shell middens throughout the region.

Although contextual data, preferably with preserved faunal remains and radiocarbon dates, are needed to establish the validity much less the significance of the Cape Stemmed Tradition in southern New England, collections inventory has again demonstrated its utility as an analytical tool. The MHC's study has added to the growing evidence that the Cape and Islands possess considerable research potential for those who are interested in Late Archaic and Early Woodland period cultural adaptations, and suggests that inquiries into those of the Paleo-Indian and Early and Middle Archaic periods may be fruitful as well.

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For at least the century and a half since Thoreau visited Cape Cod, it has been a mecca for the vacationing artifact hunter. Its mild winters, warm summers, and pleasant spring and autumn seasons have drawn an ever increasing number of visitors. Many of these vacationers have, like Thoreau, bent to the ground to pick up and put in their pockets curiosities of a time gone by. The problem is alluded to by Ross Moffett, part-time archaeologist and artist who studied Cape Cod archaeology from the 1930's to the early 1960's. In his field notes for the Rose Site Moffett (1950) talks about marking his five foot squares as unobtrusively as possible because anyone who was willing to pay the owner the required fee was welcome to dig at the site. Despite the heavy activity by collectors and artifact hunters, the Cape until two decades ago was of only marginal interest to the professional archaeologist. With the advent of Ritchie's investigations on Martha's Vineyard and their importance for understanding the prehistory of the area, the Cape became a respectable place for the archaeologist and since then serious archaeological activity has mushroomed.

A common thread which runs through the work of Moffett, Ritchie and those that followed is that many of their findings have relied on the data obtained from the excavation and analysis of shell middens. The excellent preservation and somewhat better stratigraphy of shell middens is quite an attraction for anyone who has tried to recover information in the thin acidic podzols of the Northeast. It concerns me, though, that this reliance on shell midden data for studying the larger picture of prehistoric coastal adaptation may result in somewhat biased interpretations. How many of our conclusions, for example, are site-type specific? This paper represents the beginning of research into comparisons of artifact assemblages from shell midden and non-shell midden sites by looking at one particular artifact class, pottery.

This paper will briefly summarize the previous chronologies which have been proposed for the ceramic assemblages of Cape Cod and the Islands. It will then take a look at the pottery from the Cape which is associated with radiocarbon dates, some pottery which has not been dated, and the context in which they have been found. It will then take a look at an essentially non-shell midden area on the Bass River in the Mid-Cape. Finally it will try to explain some of the differences we see synchronically and diachronically in this class of artifact.

Perhaps the first person to propose a seriation for the area was William Fowler (1948; Rivard, 1976), who classified prehistoric pottery into a series of four stages. Stage One of his system includes relatively thick grit tempered vessels with cord marking.
inside and out, the standard definition of Vinette I pottery. These vessels are rarely decorated but he recognized exceptions in the form of incising and linear dentate stamping. His Stage Two pots are tempered with either medium grit or shell, are wiped or smoothed inside, and are often cord marked outside. Decoration includes trailing, push-pull, rocker stamp, dentate, and cord wrapped stick. Stage Three pots are tempered with fine grit or shell, and infrequently with vegetable fibers. They are smoothed or wiped inside and smooth or cord marked and smoothed-over outside. Decoration includes incising, dentate, cord wrapped stick and punctate. Design motifs are more elaborate than Stage Two pots. Stage Four pots are tempered with fine grit or shell, or infrequently with vegetable fibers. The necks of such vessels are sometimes castellated, sometimes have added bosses, and are decorated on the collar with incising or line dentate markings. Fowler's system is necessarily broad since he meant it to be used as a reference for all of southern New England.

In 1957 Ross Moffett (1957) proposed a chronology which he admitted was only applicable to the outer Cape since the archaeology of the rest of the Cape was at the time relatively unknown. Moffett's Early Woodland, or first ceramic period, is characterized by the presence of Vinette 1 pottery. His second ceramic period, or Middle Woodland, is characterized by grit tempered stamped pottery, with some carry over of Vinette 1 vessels. Much of the decoration was dentate or scallop shell stamped, either in a rocker, push pull, or linear fashion. He notes an occasional filed collar, and occasional interior cord marking. Decoration usually extended from the rim for some distance down the body of the vessel. The third ceramic period, or Late Woodland I, is characterized by coarse shell tempered vessels with no decoration other than cord marking, which covers the entire outside of the vessel. Walls are thicker than in the preceding period and interiors are often roughly channelled. The second type characterizing this period has a smooth exterior and decorations of cord wrapped stick impressions. Horizontal lines are almost always present which are in turn crossed by one or more series of oblique lines. Occasionally scallop shell impressions are found. The fourth ceramic period, or Late Woodland II period, is characterized by thin finely shell tempered vessels which usually have cord marked surfaces. Many are incised with a multitoothed implement by combing or trailing.

Both Fowler's and Moffett's classification systems provided much-needed syntheses and their chronological ordering of pottery generally has stood the test of time. Fowler's, as we said above, is necessarily all-encompassing. Moffett's system is, as he said, limited to the part of the Cape about which the most was known at the time. Both systems lack the element of context, though, and it is that element which I would like to introduce. It is generally assumed that shell-tempered pottery increases through time. Lavin (1980:25) in her analysis of the pottery from the Ben Hollister collection found that over fifty percent of the final Niantic pottery vessels were tempered with grit. She also found in her survey of the lower Connecticut River valley that there was a positive correlation between where pottery was found and its temper type. Pottery from a site far inland was more likely to be grit tempered than shell tempered. It is doubtful that any site on the Cape or Islands could be considered to be an inland site during the ceramic period when sea level rise was within several meters of its present-day levels. However there does seem to be a correlation between site type, in this case shell midden versus non-shell midden, and the type of pottery found. Let's look now at some of the dated and undated pottery from the Cape and Islands and add the element of context. Refer to Figure 2 and Table 1 for dates and references.

The first five dates are all associated with Vinette I pottery in the classic sense, i.e. interior and exterior cord marked, grit tempered pottery. All five of these sites are from Ritchie's Martha's Vineyard work (Ritchie 1969). The first date is from stratum 2B of the Peterson site, which contains no other pottery, and is associated with five quartz Small Stemmed points and a number of side notched points that look like short
Figure 2. Radiocarbon Dates from Cape Cod and the Islands.
See Table 1 below for References.

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>DATE (B.P.)</th>
<th>MATERIAL</th>
<th>-13 CORR.</th>
<th>LAB #</th>
<th>SITE</th>
<th>REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2540 ±105</td>
<td>CHARCOAL</td>
<td></td>
<td>I 3101</td>
<td>PETE RSON (STR 2B)</td>
<td>RITCHIE (1969:192-3)</td>
</tr>
<tr>
<td>2</td>
<td>2470 ±120</td>
<td>CHARCOAL</td>
<td></td>
<td>Y 1531</td>
<td>PRATT (STR 3)</td>
<td>RITCHIE (1969:85)</td>
</tr>
<tr>
<td>3</td>
<td>2380 ±80</td>
<td>CHARCOAL</td>
<td></td>
<td>Y 1532</td>
<td>PRATT (STR 2)</td>
<td>RITCHIE (1969:85)</td>
</tr>
<tr>
<td>4</td>
<td>2310 ±100</td>
<td>CHARCOAL</td>
<td></td>
<td>I 3102</td>
<td>PETERSON (STR 2A)</td>
<td>RITCHIE (1969:192-3)</td>
</tr>
<tr>
<td>5</td>
<td>2050 ±80</td>
<td>CHARCOAL</td>
<td></td>
<td>Y 1812</td>
<td>VINCENT (STR 2)</td>
<td>RITCHIE (1969:160-1)</td>
</tr>
<tr>
<td>6</td>
<td>1570 ±120</td>
<td>SHELL</td>
<td>YES</td>
<td>GX 9551</td>
<td>HBN274/339</td>
<td>BORSTEL (1984:255)</td>
</tr>
<tr>
<td>7</td>
<td>1550 ±80</td>
<td>CHARCOAL</td>
<td></td>
<td>Y 1533</td>
<td>CUNNINGHAM (STR 3)</td>
<td>RITCHIE (1969:122)</td>
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<td>8</td>
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<td>I 13463</td>
<td>HBN308</td>
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<tr>
<td>9</td>
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<td></td>
<td>I 13691</td>
<td>HBN274/339</td>
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<td>YES</td>
<td>GX 9552</td>
<td>HBN274/339</td>
<td>BORSTEL (1984:256-7)</td>
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<tr>
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<td>I 13461</td>
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<td>CHARCOAL</td>
<td></td>
<td>GX 9590</td>
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<td>BORSTEL (1984:253-5)</td>
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<td>I 13460</td>
<td>HBN308</td>
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<td>14</td>
<td>800 ±80</td>
<td>CHARCOAL</td>
<td></td>
<td>Y 1652</td>
<td>CUNNINGHAM (STR 2)</td>
<td>RITCHIE (1969:122)</td>
</tr>
<tr>
<td>15</td>
<td>790 ±80</td>
<td>CHARCOAL</td>
<td></td>
<td>Y 1653</td>
<td>HORNBLOWER II (STR 1B)</td>
<td>RITCHIE (1969:52)</td>
</tr>
<tr>
<td>16</td>
<td>720 ±80</td>
<td>CHARCOAL</td>
<td></td>
<td>Y 1852</td>
<td>VINCENT (STR 1B)</td>
<td>RITCHIE (1969:160-1)</td>
</tr>
<tr>
<td>17</td>
<td>570 ±80</td>
<td>CHARCOAL</td>
<td></td>
<td>Y 1538</td>
<td>HORNBLOWER II (STR 1A)</td>
<td>RITCHIE (1969:52)</td>
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<tr>
<td>18</td>
<td>385 ±90</td>
<td>CHARCOAL</td>
<td></td>
<td>I 3100</td>
<td>PETERSON (STR 1)</td>
<td>RITCHIE (1969:192-3)</td>
</tr>
</tbody>
</table>

* = indicates if date has been corrected for C\(^{13}\). ** = date is on file at National Park Service, North Atlantic Regional Office, 15 State St., Boston, Massachusetts.
fat Orient fishtail points (see Mahlstedt, this volume). Shell was discontinuous but seems to be definitely associated with the stratum. The second date is from stratum 3 of the Pratt site. No pottery other than Vinette I was found and the associated points included nine of the short side notched points mentioned above, two quartz Small Stemmed points, a possible Rossville, a Brewerton eared notched and five Lagoon points. While there was sparse shell reported in the stratum it is possible that this could be the result of mixing with the shell stratum above. That stratum, dated by the third date on the chart, contained heavy shell and was associated with eight Lagoon and two Rossville points. Again no pottery was found other than Vinette I sherds. The fourth date is from stratum 2A at the Peterson site. In this stratum there is pottery other than Vinette I. Other vessels are morphologically similar to the Vinette I but are roughly smoothed in one case, and smoothed on the interior and corded on the exterior in another case. There is also reported from this stratum a shell tempered vessel which has the same shape as Vinette I pottery but which is cord marked on the outside and channeling on the interior. It has a simple incised design. The overall characteristics, including cord marking outside and channeling inside, are very similar to what one might expect to find in a Late Woodland pot except that these latter vessels are much larger than the Vinette I ware. What this stratum may represent, then, is the beginning of experimentation with shell tempering in the Cape and Islands area. This is a stratum with heavy shell content. Projectile points are all early types, including three Rossvilles, two Lagoons, one Small Stemmed and one small triangle. The final date which has Vinette I sherds associated is from stratum 2 at the Vincent site. This stratum had a heavy shell content and the pottery was predominantly grit tempered. Other than Vinette I there were grit tempered sherds which were plain on both sides, smoothed on the interior and cord marked on the exterior, or smoothed-over cord marked on the outside. One with a cord marked body had two horizontal lines just below the rim executed with a coarse cord. Shell tempered sherds from this stratum were smooth on the interior and either cord marked, smoothed-over, or smooth on the exterior. The associated points are Rossvilles and a Lagoon.

We will skip the sixth date temporarily and go on to the seventh date. This date is from stratum 3 at the Cunningham site on Martha's Vineyard. The pottery in this level is predominantly shell tempered. The shell tempered pottery is cord malleated with either channeling on the interior, or with smooth or wiped interiors. The sherds are decorated with scallop shell impressions. The grit tempered sherds are rocker stamped with a shell edge, rocker stamped with a dentate stamp, and in one case cord marked on the exterior with lightly incised wide lines. A group of sherds with mixed grit and shell temper have coarse fragments of shell and are deeply incised. The shell in this stratum is described as light but regular. Points include five Jack's Reef corner notched, one pentagonal, three Greene and three Fox Creek stemmed points.

We skipped the sixth date because this date is from the same general context as dates 9, 10, and 12. Date number 6 seems early in comparison to the others and it may just be an oddball date. These dates are from the Nauset Marsh area in Eastham. This site, on the south side of Salt Pond, is a Kipp Island-type component very similar to the Cunningham date just discussed. It is not itself a shell midden but is very near the heavy Middle Woodland shell concentrations surrounding Nauset Bay. It is also near a shell feature from which two of the dates are taken. Of seven vessel lots, six are shell tempered and one is mixed shell and grit. Decoration includes cord wrapped stick and incising.

Another site from the Nauset Bay area is represented by dates number 8, 11 and 13. This is a stratified shell midden at Fort Hill (Childs n.d.). Date number 8 is from stratum 2 and is associated with six vessel lots. Five of the lots are shell tempered and one is mixed shell and grit. Decorations are cord wrapped stick and punctations. There is heavy shell in this stratum. Dates 11 and 13 are from stratum 3 of the same
midden. The three vessel lots assigned to this stratum include two shell tempered and one mixed shell and grit tempered lot. Again the decoration is cord wrapped stick and punctations, and also scallop shell and fingernail impressions. A dark organic shell-free lens separates this stratum from a dated Late Archaic shell deposit. Five vessel lots have been assigned to this lens and they include one shell and four grit tempered lots. The predominance of grit tempering in these lots differs quite a bit from the above stratum but decorative techniques are virtually the same: cord wrapped stick, punctate, and scallop impressed.

As we cross over into the Late Woodland we go back out to Martha's Vineyard to stratum 2 at the Cunningham site, date number 14. One Jack's Reef corner notched and a pentagonal point, five Levannas, two Lagoons and one Fox Creek are the points assigned to this stratum. Pottery is predominantly shell tempered with coarse to medium shell. Decorations are scallop shell impressed, incised, cord wrapped stick and punctate. One mixed temper group is cord malleated and incised. Grit tempered sherds include one with a corded exterior and plain interior and one with rocker dentate. The overall impression is that this stratum is badly mixed.

Date number 15 is from stratum 1B at the Hornblower II site. Shell tempered sherds are cord marked on the exterior and channeled on the interior. There are cord wrapped stick decorations on a smooth vessel. Grit tempered sherds include a combed decoration and a group slightly channeled outside and scallop shell scraped inside. Interior scallop shell scraping is a treatment found most often on shell tempered vessels. Punctations are also present. Date number 16 is from stratum 1B of the Vincent site. Pottery is predominantly shell tempered with plain and cord marked exteriors, and smooth and scraped interiors. Decoration is cord wrapped stick. Points associated with this stratum are Levannas. Date number 17 is from stratum 1A at the Hornblower II site. All pottery is shell tempered with cord marked exterior and smooth interior. Oblique cord wrapped stick impressions and punctations are the decorations. Points associated are Levannas and one Jack's Reef pentagonal. The final date, number 18, is from stratum 1 at the Peterson site. All pottery is shell tempered with cord marked exteriors and smooth interiors. Decoration is cord wrapped stick. Points associated are Levannas and one Jack's Reef pentagonal.

These data seem to be telling us several things. For one thing shell may have been used as a tempering agent well before the Middle Woodland period. By about AD 500, shell is being used for temper more often than grit. However grit temper continues as a minor form all the way through the Late Woodland period. Individual decorative techniques and some combinations of techniques remain in vogue for long periods of time. Several caveats must be issued along with these data, though. There are large gaps in the chart for which we have no dated material. For example, does Moffett's Second Ceramic Period fit into the first large gap? Most likely it does. It would be nice if we could follow the apparent cultural continuity between the cluster of Middle Woodland dates and the Late Woodland dates. Another problem with the chart is that a shell midden is not the neat little layer cake it is sometimes assumed to be. Many factors both natural and cultural can accomplish a great deal of mixing, and it does not necessarily follow that if a stratum is dated everything found within that stratum belongs there. This fact is brought home if we look at the two dates for the Cunningham site and the remarkable similarity in artifact assemblages after a supposed hiatus of five or six centuries. But perhaps the most serious problem with these data lies in the fact that virtually all these dates are taken from excavations at shell midden sites. Let's look at some undated sites for a minute.

Most of Ross Moffett's work was involved with shell middens. At two sites where he found Vinette I pottery, though, it was clearly in strata which underlay the shell bearing strata above. At the time that those artifacts were discarded by their makers
the site was not yet a shell midden site, perhaps because sea level had not risen sufficiently to change a fresh water environment into a salt or brackish environment. At the Rose Site Moffett dug down through heavy shell bearing strata to a non-shell stratum and found pottery with various types of rocker and other stamping covering much of the body of the vessels (Moffett 1951). This is probably a typical early Middle Woodland assemblage and it was entirely grit tempered. A large number of sites are located on the Bass River in the town of Dennis. The river is today a tidal river which at its headwaters is about equidistant from Cape Cod to the north and Nantucket Sound to the south. There are a few shell middens which line its banks but they are relatively small and discrete and seem to be fairly recent prehistoric deposits. Large artifact assemblages are in the hands of a few collectors who have dug or surface collected on the Bass River for decades. An archaeological survey was done on a 23 acre (9.3 ha) parcel of land on the river and follow-up excavation was done in two areas within the parcel. Pottery recovered during survey and excavation and pottery from local collectors is being studied. The vast majority of this pottery is grit tempered. The only shell tempered pottery I have run across has come out of several shell middens which have long since been destroyed by development. Based on technological and decorative traits this pottery seems to represent the entire span of the ceramic period. Vinette I pottery is not uncommon in collections. Other grit tempered sherds from the Bass River include linear dentate stamped, various incised designs, checkerboard designs, dentate punctate, scallop shell decorated with very faint dragged dentate extending down from the neck, and many, many more designs.

In sum, then, there seems to have been a dramatic divergence in tempering technology around the end of the early Middle Woodland period. People at shell midden sites by this time were using crushed shell more often than not in making their pots. But they also seem to have been using grit for a minor percentage of the pots. At non-shell midden sites pottery seems to have been made predominantly with grit as a tempering agent well into the Late Woodland. In the Late Woodland period grit tempered pottery is still to be found at shell midden sites.

What are the reasons for this divergence in technology? A number of possibilities suggest themselves. Ease of acquisition of tempering material, technological advantages of shell over grit, and functional differentiation are some of the possibilities. Ease of acquisition of tempering material could very well explain the beginning of experimentation with shell as temper, but the presence of grit tempered pots at late shell midden sites suggests that crushed grit was just as accessible. Shell likewise was certainly easily accessible to the inhabitants of the non-shell midden sites. Quite a bit of experimental archaeology has been done in the last few years using shell as a tempering agent and it has been concluded that shell does offer certain advantages over grit (Childs 1984). For example, expansive and contractive properties of shell are very close to that of clay. The temperature inversions of quartz can cause a pot tempered with it to crack during the firing process. But if shell were perceived by the prehistoric potter as being better than grit, why would he or she have continued to make grit tempered pots? If shell was perceived as a better tempering material, certainly the inhabitants of the non-shell midden sites could have easily acquired and used it. It may be that the third possibility, functional differentiation, is the more plausible. Many more shell tempered than grit tempered pots are found at shell midden sites. In an essentially non-shell midden area the only shell tempered pottery so far encountered has been in the shell middens that do exist.

This paper suggests that shell was used as a tempering agent not because it was more accessible or technologically superior, but because shell tempered pots during the Middle and part of the Late Woodland period served a purpose directly related to activities carried out at shell midden sites. Future research should be aimed at strengthening or
refuting this contention since, if it is true, it may have important ramifications for understanding settlement-subistence patterns and cultural differences among coastal and near-coastal peoples. It is hoped that study of other artifact classes from sites such as those mentioned in this paper will shed more light on this topic.

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PREHISTORIC SHELLFISH HARVESTING
AT NANTUCKET ISLAND

Elizabeth A. Little and J. Clinton Andrews

Because of the high visibility of shell, shell middens tend to dominate coastal studies in archaeology, and there is always a question of what their contents can tell us about prehistoric lifeways. To approach this question from a new direction, we have

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used personal experience with commercial (Andrews) and family (Andrews, Little) shellfish gathering at Nantucket, along with historic sources, to study the harvesting of the shellfish found in prehistoric middens at Nantucket (Little n.d.). We will document variation in the geographic distribution of shellfish habitat in space and time, and describe present-day seasons of harvesting shellfish and "low-tech" collecting methods. Our evidence for shellfish harvesting opportunities after storms and for unstable, episodic shellfish habitat has interesting implications for models of settlement patterns and lifestyles of prehistoric Nantucketers. Data on sea level rise and on the effects of storms on the island shorelines allow a preliminary analysis of the distribution and age of prehistoric shell middens.

**HABITAT AND HARVESTING OF SHELLFISH AT NANTUCKET TODAY**

Many of the shellfish species at Nantucket differ in their geographical distribution. Figure 3 shows the 1967 distribution in the sheltered and shallow inshore waters and marshes of quahogs, oysters, soft shell clams, and scallops, which are the twentieth century's commercially important local shellfish (Ingersoll 1881; Belding 1909; Rehder 1981; for common and Latin names, see Table 2). Waters protected from winds and waves also provide habitat for carnivorous shellfish such as channelled and knobbed whelk, oyster drills, and moon shell snails, and for hitchhikers such as the boat shell and the common jingle shell, which often attach themselves to oysters and scallops. The ribbed mussel and mud basket snail live in the salt marsh peat and mud at the edge of the harbors, and a few blue mussels live attached to rare boulders in the shallows. Blue mussels also form large mats in water up to 12 meters deep south of the island. The surf clam also lives off the south shore, and some quahog, whelk, and scallops inhabit deep water beds north of the island.

![Figure 3](image-url)
Table 2.
Shellfish Species Used (+) At Nantucket (Names After Abbott (1974)).

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
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<tbody>
<tr>
<td>Mercenaria mercenaria (quahog)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Crassostrea virginica (oyster)</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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</tr>
<tr>
<td>Mya arenaria (softshell clam)</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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</tr>
<tr>
<td>Busycon carica &amp; B. canaliculatum (knobbed and channelled whelk)</td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Argopecten irradians (scallop)</td>
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<tr>
<td>Crepidula fornicata (boat)</td>
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<td>+</td>
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<td>+</td>
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</tr>
<tr>
<td>Spisula solidissima (surf clam)</td>
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<td>+</td>
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<tr>
<td>Polinices duplicatus, Lunatia triseriata, Lunatia heros (moon)</td>
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<td>Mytilus edulis (blue mussel)</td>
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<td>Geukensia demissa (ribbed mussel)</td>
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<tr>
<td>Urosalpinx cinerea (oyster drill)</td>
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<tr>
<td>Buccinum undatum (waved whelk)</td>
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<td>+</td>
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<tr>
<td>Anomia simplex (common jingle)</td>
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<tr>
<td>Ilynassa obsoleta (mud basket shell)</td>
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</table>

Not only does the availability of different shellfish species vary in space, it also changes with time (Table 2; Figs. 3,4). According to Belding (1909), in the nineteenth century pollution and overfishing accounted for substantial reductions in shellfish production in Massachusetts. At Nantucket, in addition to these stresses shellfish are subject to predators, and the shellfish beds with their unstable sandy substrate are subject to erosional and depositional storm damage, to changes in water temperature and salinity due to changes in shorelines and currents, and to ice damage in shallow water (Massachusetts Census 1915:639). Oysters at Nantucket are especially variable in abundance.

Additional variability is provided by storm waves carrying shellfish larval forms which overwash or breach barrier beaches into freshwater ponds. Valuable chronological data have been recorded for the past 37 years on episodes of saltwater shellfish
Figure 4. Inshore shellfish habitat at Nantucket in 1909 (from Belding 1909). Quahog beds shown by crosses; softshell clams by dots; oysters by diagonal lines; scallops by horizontal dashes. Note the absence of shellfish in Sesachacha and Coskata Ponds.

in at least six freshwater ponds on Nantucket (Andrews' records 1947-1985). For example, the outlet at Coskata Pond, a fresh water pond flowing into the upper harbor at Nantucket, was enlarged by a storm in 1944 and by 1946 had stabilized to allow a regular influx of salt water. After 1947, the pond was dominated sequentially by a florescence of quahogs (1947-1951), oysters (1950-1951, 1954-1957), and, with the establishment of eelgrass, scallops (1951-1957). Some soft shell clam seed was observed, but few mature clams. Since 1975, thick eelgrass and a developing shoal at the entry have inhibited salt water circulation and essentially terminated the 30 years of shellfish habitat. Ancient salt and fresh marsh peat in this pond testifies to previous salt water incursions. Sesachacha Pond may have had a similar history (Fig. 4).

Shellfish can be gathered in the shallow waters of Nantucket Sound and harbors by hand collecting, diving, using dip nets and rakes, or digging (Ritchie 1969; Braun 1974). In addition, shellfish living in deep water habitat, such as scallops, surf clams, mussels, whelk and quahog, can be gathered in sometimes considerable numbers from beaches where they have been cast up alive by storms (Little n.d.). In the fall the eelgrass leaves die, and the first large fall or winter storms drive great quantities (wagon loads [Belding 1909:85] or tons [D.C. Edwards 1984, personal communication]) of scallops onto downwind harbor shores in windrows. Similarly, high onshore winds and waves cast up surf clams and mussels on the south shore. With the exception of
scallops, most shellfish close their shells when disturbed and can survive out of water for many hours.

Harvesting the seafood (Little and Andrews 1982; Little n.d.) cast up by the sea has not always been considered seriously in the archaeological literature (Osborn 1977), nor is it well documented. However, William Wood at Lynn in 1634 mentioned surf clams, "as big as a pennie white loafe, which are great dainties amongst the natives", and reported that the sea, at Nahant, "after storms, casts up great store of great Clammes, which the Indians taking out of their shells, carry home in baskets" (Wood 1865:38, 44). Here is ethnohistoric evidence of a method of shellfish harvesting still practiced at Nantucket Island.

As to the question of seasonality, oysters, soft shell clams, and quahogs may be harvested any time of the year (Little n.d.; Wood 1865:35; Williams 1963:139), while others have a specific season of abundance. Whelk come inshore at Nantucket in early summer to spawn, and are easily available in numbers only at that time. As Roger Williams reported in 1643, the Indians of Narragansett Bay used to "...store up [whelk] shells in Summer against Winter whereof to make their money" (Williams 1963:180). Scallops spend the warm months in deep water protected in eelgrass, and together with surf clams and mussels, are most easily gathered near shore after the first big storm after a period of calm. Although storm dates are unpredictable, large storms usually arrive during the fall and winter. These findings do not support the summer shellfishing hypotheses of the literature (Snow 1980:230; Perlman 1973). Note that since it is possible to obtain shells of any of these species from beaches at any time of the year, the presence of certain shells in a shell midden cannot be used as absolute evidence for the season of collection.

The response of shellfish and shellfish habitat to storms has important implications for prehistoric lifestyles at Nantucket. Unstable shellfish habitat requires post-storm, seasonal, and annual monitoring. The episodic availability of shellfish can provide an explanatory mechanism for Ritchie's model of episodic prehistoric use of certain shell middens at Martha's Vineyard (Ritchie 1969:234). We also note that modern Nantucketers have sometimes dug temporary channels through barrier beaches to allow fish and shellfish larval forms to enter the ponds, a practice which might have ancient roots.

PREHISTORIC SHELL MIDDENS AT NANTUCKET

The most abundant shellfish species found in most prehistoric Nantucket middens (Table 2) are generally the same as today's commercial species: quahogs, oysters, soft shell clams, whelk and scallops. Although all the shellfish in Table 2 are edible, the presence of predator shellfish and hitchhikers in middens may be adventitious, and surf clam, scallop, whelk, and quahog shells had uses in addition to being food by-products (Little n.d.). Another source of variation in use may be cultural; bay scallops and blue mussels have not always been considered edible in New England (Table 2 and Little n.d.).

Nantucket's prehistoric shell middens, of which 56 have been inventoried, are found on the northerly shores of the island near the protected and shallow bodies of salt or brackish water which provide shellfish habitat today (Figure 3 and 5; Little n.d.: Fig. 1). The correlation of shell midden with sheltered waters makes sense. Shell is heavy to carry far from water. The north shores of the island with hills for winter wind protection (Little 1985), fresh water springs, and easy access to protected estuarial shellfish waters are richer in many resources than the plains of the south half of the island with their deep water ocean frontage. If we assume, however, that the south
shore was sometimes used for fishing, shellfishing and hunting, as it is today, where are the shell middens of the south shore?

![Graph showing number of sites vs distance to shellfish habitat](image)

Figure 5. Number of inventoried prehistoric shell midden sites per 100 m (Little 1979) as a function of their distance to salt water, showing the decrease in number with distance from salt water. Site discovery at eroding bluffs contributes to the shape of this graph.

Several natural phenomena, especially storm waves and a rising sea level, may explain the shell midden distribution on Nantucket. The rapid erosion of unsheltered shores of the island by storm seas (Figure 6) eliminates any accumulation of shell midden on those shores. The eight meter rise of local relative sea level during the past 4000 years (Figure 7) also contributes to shore erosion. By its horizontal advance (transgression) on the land, the rising sea can also account for a lack of shell midden along the shores of the harbors which can be identified through typology or by radiocarbon dates as being more than 3000 years old (Little 1979, 1983, 1984; Luedtke 1980b; Ritchie 1969; Ingersoll 1881:14). Not only would the rising sea have drowned older sites, but if the transgressing sea did not reach the harbor until 3000 years ago, shell middens older than that may never have existed here (Snow 1980:180).

Evidence for rapid shellfish expansion into newly-available habitats raises the question of whether shellfish have always occupied the sea/land interface in southern New England. Although the floor of Nantucket South has changed since the early Holocene, its present depths (NOAA 1975) would suggest an average rate of transgression as high as four meters per year between 5000 and 3000 years ago. In other words, whereas Braun (1974) has proposed coastal stabilization for Vineyard sound about 3000 years ago as the rate of sea level rise decreased, in Nantucket South shoreline destabilization may have continued. Under the conditions associated with rapid transgression of the sea, Braun (1974) and Oldale (1985) suggest there might have been no shellfish.
This hypothesis would seem to require a sterile sea, since Andrews' records (1947-1985) provide evidence for rapid shellfish growth, with from less than three years to 13 years required for spawn to reach maturity in new and unstable habitats such as those which may have always accompanied the rising sea level in Nantucket Sound (Dincauze 1981).

Figure 6. Storm damage and shoreline changes at Nantucket since 1896 (reproduced with permission from Zube and Carlozzi 1967:75). For shoreline changes since 1846 see Gutman et al. (1979).

SUMMARY

We have shown that shellfish are harvested at locations, seasons, and with methods which vary with the species. The unstable sandy substrate, acted on by storm winds and waves, provides both cast-up shellfish on beaches and transient episodic shellfish habitat in shore ponds.

Prehistoric shell middens on Nantucket appear to be limited to a zone less than one kilometer from the borders of today's sheltered waters, and appear to be no older than 3000 years. We suggest that beach erosion patterns and a rising sea level can account for the observed midden distribution and ages. The model thus established requires testing.

Unstable shellfish habitat probably has characterized the leading edge of the transgressing sea near Nantucket Island for the past 4000 years. Thus geographical, chronological and cultural data obtainable at Nantucket today demonstrating rapid changes in shellfish distributions can contribute to an understanding of prehistoric geography and settlement patterns, similar to but with interesting variations from those being reported...
for other New England coastal localities (Ceci 1982; McManamon 1984; Luedtke 1980a; Barber 1982; Yesner 1980; Sanger 1982; Spiess, Bourque, and Cox 1983).

\[\text{CARBON-14 YEARS BEFORE 1950 } \times 10^3\]

\[
\begin{array}{cccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\
\end{array}
\]

\[
\begin{array}{cccccccc}
0 & 2 & 4 & 6 & 8 & 10 & 12 & 14 \\
\end{array}
\]

\[
\begin{array}{cccccccc}
16 & 18 & 20 & \text{METERS BELOW MEAN SEA LEVEL} \\
\end{array}
\]

- Nantucket (Redfield 1967)
- Barnstable (Redfield & Rubin 1962)
- Vineyard Sound (Oldale & O'Hara 1980)

\[\pm \sigma\]

Figure 7. Relative sea level as a function of time for the past 7000 years on the coast of Southeastern Massachusetts. The tidal range at Nantucket is 0.7m or less.

ACKNOWLEDGMENTS

We thank Ken Kelley, Shellfish and Marine Department, Town of Nantucket, and D. Craig Edwards, Zoology Department, University of Massachusetts, Amherst, for guidance to the habitat and names for shellfish, and Barbara Luedtke, University of Massachusetts, Boston, for helpful editorial advice. Dena F. Dincauze and Robert N. Oldale have been generous with advice and support.

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INVESTIGATING THE FOX CREEK PHASE ON CAPE COD

Linda A. Towle

Fox Creek points have been identified at many sites in eastern Massachusetts, including Cape Cod and the Islands. These points are considered diagnostic of the Middle Woodland period, based primarily on Robert Funk's definition of this phase in eastern New York (1968, 1976). However, very little research has been undertaken in Massachusetts to better understand the Fox Creek phase here.

One of the largest concentrations of Fox Creek points in eastern Massachusetts was collected from three sites in Wellfleet in the 1920's by Howard Torrey. These sites are now part of the Massachusetts Audubon Society's Wellfleet Bay Wildlife Sanctuary, where I conducted an archaeological survey in 1984. The survey was funded by a matching grant from the Massachusetts Historical Commission, the Department of the Interior and the Massachusetts Audubon Society. This paper will present the results of that survey, and compare the major characteristics of Fox Creek sites on Cape Cod with those which have been investigated in coastal and interior New York state.

Torrey's collection from the three Audubon sites was donated to the R. S. Peabody Foundation in Andover, Massachusetts. The lithic assemblages from these sites included Fox Creek, Greene, and Jack's Reef points (Table 3) as well as point styles diagnostic of the Late Archaic, Early Woodland and Late Woodland periods. This suggests multi-component and possibly stratified sites, although one of the sites has been plowed. Torrey collected only eight small ceramics sherds from the Audubon sites, and these were all undecorated. Additional Fox Creek points, including unfinished ones, have been collected recently from the garden at the sanctuary. The Fox Creek points from the Audubon sites comprise one of the largest concentrations of Fox Creek material on the Cape, comparable to the Rose site in Truro. Although we probably have only surface finds from these sites, they suggest that a significant Fox Creek component existed here.

My survey of the sanctuary in 1984 tested all of the previously recorded site areas as well as other portions of the sanctuary. I recovered 100 prehistoric artifacts: 99 flakes and one complete Fox Creek stemmed point (Figure 8). Seventeen flakes of the same material, a grey-brown quartzite, were found in association with this point. This suggests strongly that at least the final sharpening of this point was done here, and that earlier stages of tool manufacture may have occurred at this site also. Quartzite was the material used for 85% of the artifacts recovered during my survey, although it accounted for only 25% of the Torrey collection artifacts. No prehistoric pottery, features or shell middens were found during this survey, and no radiocarbon dates were obtained.
### Table 3

<table>
<thead>
<tr>
<th>Coastal Mass. Sites</th>
<th>Greene</th>
<th>Fox Creek</th>
<th>Jack's Reef</th>
<th>Levanna Triangle</th>
<th>C-14 Dates</th>
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<td>Torrey Collection:</td>
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<td>8</td>
<td>104</td>
<td>A.D. 400±80</td>
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<td>5</td>
<td>6</td>
<td>2</td>
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<tr>
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<td>4</td>
<td>1</td>
<td>6</td>
<td>A.D. 630±65</td>
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<tr>
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<td>8</td>
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<tr>
<td>Tufano</td>
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My interpretation of the Fox Creek sites at the Audubon sanctuary is that they are probably one large occupation area, focused primarily along the north side of Silver Spring Brook, extending west to the bluffs overlooking the salt marsh adjacent to Wellfleet Bay. I have renamed these sites the Austin site, in recognition of the Austin Ornithological Research Station, which consolidated this property in the 1930's.

The site probably represents repeated occupations during the Fox Creek phase, and only small portions of the site may have been used each time. Although there is no archaeological evidence from which to determine seasons of occupation, a multitude of plant, fish, animal and bird resources would have been available from the salt marsh, the bay and the brook during most seasons. Shellfish would have been available during most seasons. Shellfish would have been available during the winter when other resources were in short supply.
In order to assess the significance of the Fox Creek component at the Audubon sanctuary, I undertook a review of other Fox Creek sites from the region. I discovered that only two stratified, excavated and published sites contained identifiable Fox Creek components. These were the Rose site in Truro, excavated by Ross Moffett in 1950 (Moffett 1951), and the Cunningham site on Martha's Vineyard, excavated by William Ritchie in 1965 (Ritchie 1969).

At the Rose site, located four and one half miles (7.2 km) north of the Austin site, the middle stratum contained the Fox Creek component. The basal level at this site contained a single component Orient Fishtail occupation, while the top stratum was a shell midden with Late Woodland Levanna triangles. At the time of Moffett's work in 1950 these point types had not been defined, but Moffett recognized the importance of the distinctly different point styles in each level.

It is fortunate that Moffett's collection, which contains approximately 6,000 artifacts from the outer arm of Cape Cod (Anthony et al:n.d.), is available for study at the R. S. Peabody Foundation, where the artifacts from the Rose site were re-examined by George Stillson and myself. The Massachusetts Historical Commission inventory of the Middle Woodland artifacts from the Rose site is presented in Table 3 (MHC Prehistoric Site Files).

Moffett presented a detailed ceramic analysis in his 1951 report. Stillson's re-examination of the Rose site sherds showed that Moffett's analysis was essentially correct. Moffett recovered 49 sherds from the Fox Creek component, of which 45 were medium to coarse mineral tempered (Moffett 1951:103). The main types of decoration were dentate stamping, incising, rocker stamping and cord wrapped stick impression (George Stillson, personal communication 1985). Moffett observed that deer was the most important game animal at the site, although he did not propose the seasons of occupation for this site.

Ritchie's excavations at the Cunningham site on Martha's Vineyard produced 14 Middle Woodland points (Table 3), 14 features, and a radiocarbon date of A.D. 400 ± 80 for the Fox Creek component (Ritchie 1969:122). The basal (Fox Creek) level of this stratified site on the west shore of Lagoon Pond in Tisbury was "a dark zone...with or without variable quantities of whole and broken shell" (Ritchie 1969:96). The Middle Woodland artifact assemblage was similar to that found at the Rose and Austin sites on the Cape. However, the lithics at the Cunningham site were more varied, with chert, quartz, and felsite being the most common. Quartzite, which was characteristic of the lanceolate points (i.e., Fox Creek) at the Rose site (Moffett 1951:103) and at the Austin site, was poorly represented among the Middle Woodland points at the Cunningham site. Felsite, which was the primary raw material in Torrey's collection from the Austin site, was of secondary importance at the Rose site.

The ceramics from the basal level of the Cunningham site were predominantly shell tempered, although grit tempered and mixed grit and shell tempered sherds were also found (Ritchie 1969:109). This contrasts markedly with the Rose site where very few shell tempered sherds were recovered from the Fox Creek stratum (Moffett 1951:103). Rocker stamping, dentate rocker stamping, cord marking, and incising were the main decorative techniques found on the Cunningham ceramics, similar to the Rose site ceramics.

Several post molds were found in stratum 3 of the Cunningham site. The post molds formed a possible oval house "together with about two-thirds of the pattern of a circular house approximately 16 feet in diameter" (Ritchie 1969:101). Ritchie suggested that these dwellings were similar to the ones used by New England Indians at the time of contact (1969:124). Other features included nine hearths, an "earth oven" and a platform of heavily burned granite cobbles (Ritchie 1969:97-101).
A detailed analysis of the faunal remains from this site was undertaken. Food sources from stratum 3, the Fox Creek component, included grey seal, harbor seal, dog, muskrat and white-tailed deer, which was the dominant species in all three levels of the site (Ritchie 1969:114). The faunal remains from stratum 3 provided good evidence for fall, probably winter, and spring occupation of the site, although summer use could not be ruled out (Ritchie 1969:116, 124). Ritchie observed that "very little fishing seems to have been done by any of the occupants, since fish bones are rare in all levels" (1969:124). However, the lack of fish bone may reflect the fact that apparently no flotation samples were taken, which could also account for the lack of floral remains.

The lithic, ceramic, and faunal assemblages from the basal level of the Cunningham site on the Vineyard are essentially the same as those from the middle stratum of the Rose site on the Cape. The Cunningham site is clearly the most informative of the three coastal Massachusetts Fox Creek sites since it contains features and a date of A.D. 400 ± 80 to supplement the lithic and ceramic data available at the Rose and Austin sites. This is nonetheless scant data upon which to interpret the Fox Creek phase in coastal Massachusetts. I therefore turned to Kaeser's work in coastal New York and Funk's work in eastern New York state where several stratified sites have yielded Fox Creek components with numerous features, radiocarbon dates and larger lithic and ceramic assemblages.

In 1976, Funk proposed a chronological sequence for the Middle Woodland in eastern New York using the data from nine sites (Table 3). Funk considered the Fredenberg and Westheimer sites the earliest in the sequence, dating from about A.D. 360 to 530. Fox Creek and Greene points and net-marked and corded ceramics were the diagnostic artifacts.

At the Ford site, Jack's Reef and Levanna points had been added to the earlier assemblage. Greene points had disappeared by the Weinman 4 site, and Fox Creek points were absent at the Black Rock site, radiocarbon dated to A.D. 850 ± 95. Levannas were left as the sole point type at the Turnbull site (Funk 1976:285). The ceramic sequence ranged from predominantly net marked sherds at the earlier Fox Creek sites to primarily corded exteriors at the later sites.

From Funk's eastern New York data we can derive the diagnostic elements of the Fox Creek phase: Fox Creek Stemmed and Lanceolate points along with Greene, Jack's Reef, and Levanna points; drills and scrapers on reworked Fox Creek points; and coarse grit tempered ceramics with net marked and corded surface treatment. This phase dated to the fourth and fifth centuries A.D., disappearing completely by A.D. 900 in eastern New York.

However, Funk's data were derived exclusively from sites in interior New York. Edward Kaeser, a member of the New York State Archaeological Association, is the primary source for Middle Woodland data from coastal New York. His research in museum collections and at excavated sites in the New York city area indicated that Lockatong argillite from western New Jersey was the predominant lithic used to manufacture Fox Creek points, which he had named CONY points, an acronym for Coastal New York (Kaeser 1968:24).

He also observed a consistent association of CONY points with ceramics "typologically similar to New Jersey's Abbott Zoned Incised, Abbott Zoned Dentate and Abbott Zoned net-impressed" (Kaeser 1968:18) as defined by Dorothy Cross at the Abbott Farm site in Trenton, New Jersey. The fact that argillite was available about 30 miles (48 km) from the Abbott Farm site in the Lockatong Creek area added support for a Delaware Valley connection.

Funk reviewed Kaeser's work and found many lithic and ceramic similarities with his interior New York sites. The ceramic traits differed primarily in that the coastal ceramics lacked rocker stamping and cord marking, which were important decorative techniques at the interior sites. Dentate stamped, incised and net impressed sherds were more common
at the coastal sites. Shell temper predominated in the coastal ceramics, while grit tempering was the norm at the interior sites. Flint replaced argillite as the primary lithic at the upstate New York sites.

The other major differences between the coastal and interior sites were the function and season of occupation. The interior sites were considered fall–winter camps where hunting and nut gathering were the primary activities. Inhabitants of the coastal sites, which Kaeser thought had been occupied during the summer months, focused on shellfish resources. None of the sites have been interpreted as year-round base camps, but rather as seasonal camps occupied during an annual subsistence round utilizing environmentally varying resources.

Both Funk and Kaeser mentioned Ritchie's excavations on Martha's Vineyard in 1965 as evidence of an eastern extension of New York's Fox Creek phase (Funk 1976:293; Kaeser 1968:24). Certainly the projectile point assemblages at the Fox Creek sites in New York and coastal Massachusetts are similar. Using the New York chronology as a model, the Greene points at the Austin, Rose and Cunningham sites would represent the earlier use of these sites, while the Jack's Reef points would represent the later part of the Fox Creek phase. This sequence was observed at the Cunningham site where Greene points were confined to the lower Fox Creek stratum, while a few Jack's Reef and Fox Creek points appeared in the upper levels with Levanna triangles (Ritchie 1969:111). Ritchie considered the two Levanna points also found in the Fox Creek stratum as "probably intrusive" (1969:107), but Levanna points were present at the New York sites; increasing in quantity as the Fox Creek points diminished over time (Table 3). The Massachusetts sites contained a much wider variety of lithic materials than the New York sites, but this probably reflects the availability of lithic sources rather than a cultural preference.

The association of coastal Fox Creek sites with shell middens, noted in New York, is not observed at the coastal Massachusetts sites. The Fox Creek components at the Rose and Austin sites were not shell middens, although the Rose site was later occupied by people who utilized shellfish. Although all of Cape Cod and the Islands would have been considered a "coastal" environment with access to marine resources during the Middle Woodland, these sites were obviously occupied to utilize resources other than shellfish.

The use of shell as the main tempering material for pottery at coastal New York sites is also not found at all coastal sites in Massachusetts. Shell was available at the Rose site, adjacent to Cape Cod Bay, but only a few shell tempered sherds were found at the site. At the Cunningham site, on the other hand, the majority of the sherds were shell-tempered. Stillson's article in this volume explores the possible correlation between shell midden sites and shell tempered ceramics in more detail.

Decorative techniques for ceramics at the Rose and Cunningham sites were similar to those used at the New York sites, except that net marked ceramics, which were common at both coastal and interior New York sites, were not present at the Rose or Cunningham sites.

The one radiocarbon date of A.D. 400 ± 80 which Ritchie obtained from stratum 3 of the Cunningham site is earlier than the dates from all the New York sites except Fredenberg (Table 3). The Tufano site, the latest which contained all four point types, was dated to A.D. 700 ± 100 (Funk 1976:285). Although it would be unwise to suggest that the Fox Creek phase in Massachusetts is earlier than in New York on the basis of only one radiocarbon date, this phase seems to be at least as early here. In the absence of radiocarbon dates for the Rose and Austin sites, a Fox Creek occupation of about A.D. 400 to 700 would be suggested by comparison with the Cunningham site and the New York sites.
Although the Fox Creek data from the New York sites contribute to a clearer understanding of the Fox Creek phase in coastal Massachusetts, there are still many unanswered questions about this phase generally and about the occupation of the Austin site in particular. Additional radiocarbon dates are needed to correlate the Fox Creek phase on the Cape with its occurrence on Martha's Vineyard and in New York. The stratigraphic relationship between Fox Creek, Greene and Jack's Reefs points needs further clarification. Are these chronologically significant tool types as suggested at the New York sites, or are they contemporaneous types which were used for different functions? Do the stemmed and lanceolate forms of Fox Creek points have any chronological significance, or are they contemporaneous but functionally different forms?

A field school was held at the Austin site during 1985 and another is planned for the summer of 1986. It is hoped that this field work will answer such questions as: Can distinct activity areas be detected at this site? What stages of tool making were performed here? Are hearths and post molds detectable here to provide data on group size and frequency of occupation? Can seasonality data for the occupation of the Austin site be determined from floral as well as faunal remains?

In summary, this paper has shown that the major characteristics of the Fox Creek phase in New York state included Fox Creek, Greene, Jack's Reef and Levanna points, with net marked and cabled ceramics. The three coastal Massachusetts sites (Cunningham, Rose, and Austin), all contained these point types. The lack of net marked ceramics, the less frequent use of shell temper, and the absence of shell middens associated with Fox Creek points in Massachusetts were the main differences from the New York sites. The one radiocarbon date from Martha's Vineyard suggests that this phase may have been contemporary at the Massachusetts and New York sites.

It is obvious that more sites with identifiable Fox Creek components need to be excavated on Cape Cod and in eastern Massachusetts to understand the origins of this phase. Was it introduced into this region from the south and west, or did it originate here? Are there significant differences between the coastal and interior Fox Creek sites in Massachusetts?

Funk had recognized a uniform Fox Creek culture "with a broad range of distribution from upstate eastern New York to the lower Delaware Valley and coastal New York" (Funk 1976:293). I believe that we can legitimately expand this distribution of the Fox Creek phase to include coastal, and probably all of eastern, Massachusetts.

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MHC PREHISTORIC SITE FILES
The destruction of archaeological sites has always been a major concern of the archaeological community. This is particularly the case at present, where outside of the jurisdiction of historic preservation laws, nature and the bulldozer are destroying the archaeological record at an alarming and nearly unchecked pace. On Cape Cod, where the housing industry enjoys considerable prosperity and where wind and waves relentlessly erode the coast, site loss is occurring at an alarming rate.

As site loss occurs, data collection (just ahead of, or more frequently, just behind the bulldozer or storm) is the only alternative to disgruntled acquiescence. However, those involved in archaeological salvage frequently find that serious time and money constraints produce haphazard and generally arbitrary data collection, producing data sets that are, in the end, of little information value. Good intentions aside, archaeological salvage remains a proposition that is somewhat like shooting in the dark; sooner or later, if enough shots are fired, something of significance will be hit. Yet the problem of site destruction remains and is of increasing concern.

The need for regional research designs

If archaeological salvage is to remain a viable strategy for dealing with site destruction, then archaeologists must center salvage efforts around a structure of research questions. Such a task would best be accomplished by the development of flexible, area-specific research designs, written and maintained by archaeologists with research interests in the area. These designs would allow for the meaningful integration of data from disturbed contexts with data from controlled excavations. At present, a number of institutions pursue such programs; one example is the Boston Harbor Archaeological Advisory Committee (Leslie Shaw, personal communication, 1985).

As individuals, institutions, and organizations come together to formulate research designs for such programs, they might keep the following thoughts in mind:

(1) The research design should be up-to-date in theory and method, and it should be frequently re-evaluated to keep it current.

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It must be flexible enough to accommodate a broad range of questions. For instance, specific methodological questions would be included as would questions pertaining to the problems of culture process.

While considering problems of interest to the discipline in general, research designs must also speak to the specific culture-historical and processual problems of the area in question. The development of chronology at as fine a scale as possible, the description of subsistence and settlement patterns, the elucidation of trade and social networks, and the reconstruction of the area's past environments should provide significant structure for the research design.

The research design should specify the kinds of data that are necessary to answer each of its questions. This will guide excavators when site salvage becomes necessary and little time is available for planning.

Finally, a research design of this nature should not and cannot take the place of a state plan. The two should complement each other. The research design should cover a smaller geographic area to supplement statewide planning and preservation.

THE MALUZO SITE

The Cape Cod Museum of Natural History's salvage excavation of a Late Woodland shell midden/habitation site in Chatham, Massachusetts, serves to illustrate the manner in which a standing research design can organize data recovery, thereby placing salvage archaeology into a problem-oriented context.

The archaeology program at the Cape Cod Museum of Natural History has three central objectives, comparable to those of the Museum as a whole: education, preservation, and research. Educational goals are met by offering courses in the prehistory and early history of Cape Cod, and by making the local community aware of the significance of historic and prehistoric resources and the need for the preservation of these resources. Preservation efforts are directed toward accepting and curating endangered archaeological collections, and toward locating, describing and recording threatened and disturbed archaeological sites. This information is reported to the Massachusetts Historical Commission, so it can be evaluated and incorporated into existing preservation plans. All too often, however, sites on private property are disturbed by development, and salvage archaeology, when permission can be obtained, becomes the only possible alternative to the complete loss of information.

The final aspect of the Museum's archaeology program is research. The existing research design of the archaeology program encompasses four general questions, pertinent both to the interpretation of the prehistory of Cape Cod and to the larger discipline of anthropology. These questions have emerged from an attempt to understand human adaptations in a theoretical framework that views human and natural history as an integrated whole. The following questions comprise the structure of the Museum's research effort:

1. What was the intensity of adaptation to coastal resources during the prehistoric period on Cape Cod, and how variable was that intensity over time?
2. Could reliance on coastal ecosystems, characterized in general as being stable, localized and productive, have produced sedentism, i.e., settled village life, prior to the introduction of agriculture?
(3) Would the fairly intensive utilization of coastal ecosystems have required territoriality, or might there have been other social and ecological processes that would have worked against the emergence of either social or territorial boundaries?

(4) Did the qualitatively variable resource structure of coastal ecosystems on the Cape provide varying constraints and advantages, thereby demanding of local populations differing adaptive strategies?

These four questions subsume many other questions. For example, questions pertaining to the relationship between the microstratigraphy of shell middens and microchronology, questions pertaining to paleoenvironmental reconstructions at both the regional and local scale, and questions pertaining to demography, population densities, social boundaries and networks are all components of this research design. Furthermore, each question demands certain data for its evaluation. For instance, consideration of the degree of intensification with regard to coastal resources requires the computation of ratios expressing the utilization of marine versus terrestrial resources for a large number of sites. Therefore, the intensive recovery of faunal and floral remains should remain a priority in all excavations.

Ultimately then these four general questions and associated component questions form a standing research design that can serve to direct both research and preservation efforts. Furthermore, where site salvage remains the only alternative to site loss, this framework guides data recovery, analysis and interpretation, minimizing time lost while maximizing information preserved for the future.

The opportunity to evaluate this system first presented itself in the summer of 1982, when construction disturbed a significant shell midden/habitation site in Chatham. The Maluzo site, 19BN468, is a Late Woodland site situated on a gentle rise on the west side of Ryder's Cove. The site lies on the property of Louis Maluzo of New York.

In the summer of 1982, excavation for a cellar disturbed shell concentrations and pit features. Mr. Maluzo contacted the Massachusetts Historical Commission, and a Commission staff member and other concerned archaeologists visited the site. They mapped the disturbed portion of the site and undertook a limited shovel test pit survey of the adjacent undisturbed area, which was scheduled for future development. Because the site was located on private property, the state's historic preservation laws provided it with little protection. However, concerned that an important site was being lost, Mr. Maluzo generously granted permission for site salvage, and members of the Cape Cod Museum of Natural History's archaeology program began intensive data recovery efforts in late August.

Testing in 1982 involved excavation within the midden area directly disturbed by construction, and thorough screening of the backdirt from the disturbed portion of the site. In the summer of 1983, field efforts concentrated on defining the site boundaries and on describing the nature of shell and artifact concentrations across the site. Soil coring and shovel test pits located at ten meter intervals were used to locate shell and artifact concentrations. Concentrations were then examined using isolated or contiguous one by one meter excavation units. Data processing and analysis was undertaken at the University of Massachusetts at Amherst, and is presently near completion.

Throughout the course of excavation at the Maluzo site, data were sought that could address the four questions specifically outlined in the Museum's research design. Excavation units within the midden were designed to locate discrete depositional episodes as a means of constructing a microchronology for the site. Isolated depositional episodes and features were collected for flotation. The undifferentiated midden matrix was excavated in 10 centimeter arbitrary levels, and screened through one quarter inch mesh. Particular attention was paid to the recovery of faunal and floral remains. Importantly, all shell was saved from both the undifferentiated midden matrix and from features and depositional episodes. Samples for radiocarbon dating were also obtained.
While analysis of the recovered materials is not yet completed, some preliminary conclusions may be drawn to illustrate the manner in which the Museum's research design directed data recovery and analysis. This is perhaps best accomplished by referring back to the questions specified in the research design.

Adaptation to coastal resources. The Maluzo site appears to have been a single component, Late Woodland habitation site, of apparently intensive, but relatively short-term duration. The refuse in the midden indicates the exploitation of a wide range of both floral and faunal resources, including domesticated plants. Furthermore, the preliminary quantification of faunal remains suggests a generalized subsistence strategy and not a specialized marine focus. Late Woodland people used the site because of its location. The site is at an important ecotone, thereby allowing for the easy exploitation of both marine and terrestrial resources. Specifically, the use of marine fishes, anadromous fishes, shellfish, waterfowl, and a wide variety of terrestrial fauna, particularly deer, is indicated by the faunal remains. The presence of both cultigens (corn), and wild plant foods (nuts) is further evidence for a generalized subsistence strategy. Importantly, the presence of corn suggests that people invested time and energy in food production, as well as in hunting, gathering and fishing.

Sedentism. Sedentism may be expressed in terms of the variety of residence patterns and sociocultural correlates. Here, sedentism is taken to mean permanent residence for a year or more at a single location. Sedentism at the Maluzo site cannot now be either confirmed or disproved. The preliminary analysis of the faunal remains and associated artifactual material suggests occupation during all four seasons. An analysis of the midden depositional pattern suggests that the midden was created over a relatively short period, but certainly more than a single year's time. It is hoped that the shellfish seasonality data and radiocarbon dates will shed more light on this problem. However, certain data are suggestive of fairly intensive utilization, if not sedentary occupation, of this site. For example, there was evidence of storage pits and stored materials, particularly carbonized corn and nut shells. The recovered lithic material manifests all stages of lithic reduction and includes both cores and blanks. The midden structure itself indicates that intensive activity occurred on the midden and at its periphery, including waste disposal, tool manufacturing and rejuvenation, food processing, and cooking. Finally, in the 1930's construction on the hill above the site disturbed five Late Woodland period burials. These burials suggest that late prehistoric people invested a significant amount of social energy within this immediate area.

Territoriality. The nature of the social boundaries between past human groups is particularly difficult to evaluate from archaeological evidence. Investigation of this problem requires the following steps. First, sedentary communities or socially significant and spatially limited areas must be identified. To date, sedentism has not been conclusively demonstrated for this or any other site on the Cape. Second, stylistic markers that indicate particular social or territorial boundaries must be identified in the material culture. Third, these boundaries must be correlated with the sedentary communities identified previously. Perhaps analysis of the archaeological record of Cape Cod can be approached with these concerns in mind in the future.

Local Adaptive Strategies. On the basis of the work at 19BN468 and several other Cape sites investigated by the Museum, it appears that the variable resource structure of the coastal ecosystems on the Cape resulted in a variety of human adaptive strategies. For example, the inhabitants of the Maluzo site appear to have adopted a generalized subsistence strategy because of their situation at an ecotone where multiple resource zones were present and easily exploited. The evidence from sites located on the north side of the Cape near extensive tidal flats, such as the Daniels site in Wellfleet or the John Hentry site in Brewster, is more indicative of short-term, intensive marine adaptations, perhaps focused on mammals.
CONCLUSIONS

In conclusion, data sets from site salvage are more meaningful when collected within the context of established research designs. Archaeologists working in an area where site loss is of profound concern can make the best of a bad situation by developing a number of important questions, articulated within the context of a research design, that can serve to guide field investigations when salvage archaeology remains the only viable alternative to a complete loss of information.

ACKNOWLEDGMENTS

I would like to thank all the Museum volunteers who made the excavation of the Maluzo site a possibility. I would also like to thank Mr. Maluzo for his generous cooperation in this endeavor. This paper benefited greatly from conversations with the following people: John Cross, Leslie Shaw, Dena Dincauze, Ron Johnson, Marcel Kornfeld, Dave Lacey, Marylou Larsen and Ken Sassaman. Funding for this project was generously provided by the Cape Cod Museum of Natural History. All errors of fact remain my responsibility.

IN MEMORIAM

MABEL BRUCE ROBBINS (1902-1985)

Philip Brady

The Massachusetts Archaeological Society lost a true friend and unflagging supporter with the passing on May 22, 1985, of Mabel (Bruce) Robbins, the wife of 62 years of Maurice Robbins, our Society's first president. Mrs. Robbins served for many years as the Society's Financial Secretary, a position notable for the vast number of hours of painstakingly accurate work it requires. When she finally relinquished her position, she said she'd miss not only taking care of the records, for she had enjoyed the work, but she'd miss even more the contact with the many friends she'd made over the years.

Mrs. Robbins was a true lady, deeply religious, who spoke softly, kept to the background knitting and reading, and was a friend to all; but her serenity concealed an inner strength that prevented anyone from mistaking her unfailing kindness for weakness. Cohannet Chapter members knew her well, for over many summers at many "digs," where Maurice went Mabel also delighted to go. She knew a great deal about archaeology, and was happy to applaud each new find, but deferred to others when opinions were solicited.

Her quiet presence, her keen interest in all things archaeological, and the strength and unfailing support she gave her family, husband, and numerous friends are gone, but will not be forgotten. Every Society member is the richer for Mabel Robbins' interest and work in support of archaeology in Massachusetts; Cohannet Chapter members are doubly bereft.

We shall miss her, always.
THE CONTRIBUTORS

CLINT ANDREWS, recently retired from the University of Massachusetts Field Station on Nantucket, was for many years a commercial fisherman. One of his current projects is to write a history of fishing at Nantucket.

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BETTY LITTLE, currently President of the Massachusetts Archaeological Society, has just (1985) completed an M.A. in Anthropology at the University of Massachusetts at Amherst. Her primary research focus is on Nantucket archaeology and ethnohistory.

TOM MAHLSTEDT is a doctoral candidate in the Department of Anthropology at Boston University, and is a consulting archaeologist for the Massachusetts Historical Commission.

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