NANTUCKET ARCHAEOLOGICAL STUDIES #1.
3

INITIAL PREDICTIVE MAP FOR PREHISTORIC SITES ON NANTUCKET.

by Elizabeth A. Little, 1983

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Elizabeth A. Little, Fall 1982
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INITIAL PREDICTIVE MAP FOR PREHISTORIC SITES ON NANTUCKET.

In a predictive archaeological survey, one tries to identify the types of archaeological sites present in a given area, and one looks for associations between these site types and natural features of the landscape. If such associations are found, extrapolation to similar landscape features in the entire survey area provides predictions as to where different types of sites will occur (King, Hickman, and Berg 1977:147).

A chief benefit of this procedure is that predictions based on even a small amount of data can be used as a basis "for identifying preservation opportunities" and "for recognizing potential conflicts between preservation needs and modern land-use requirements" (King, Hickman, and Berg 1977:147). At the same time one must bear in mind that predictions can only be as good as the data on which they are based. To emphasize this caution, I include the term "Initial" in the title for the map, and urge further archaeological testing in order to support, or reject, these predictions.

NANTUCKET SURVEY AND INITIAL PREDICTIVE MAP.

In 1978 the Nantucket Historical Association sponsored a survey* of prehistoric sites excavated or surface collected in the past on Nantucket Island (Little 1979). From this data base, I have tabulated key geographical attributes of the sites, and constructed an initial predictive map.

* This project was funded with the assistance of a matching grant-in-aid from the Department of the Interior, Heritage Conservation and Recreation Service through the Massachusetts Historical Commission, under the provisions of the National Historic Preservation Act of 1966.

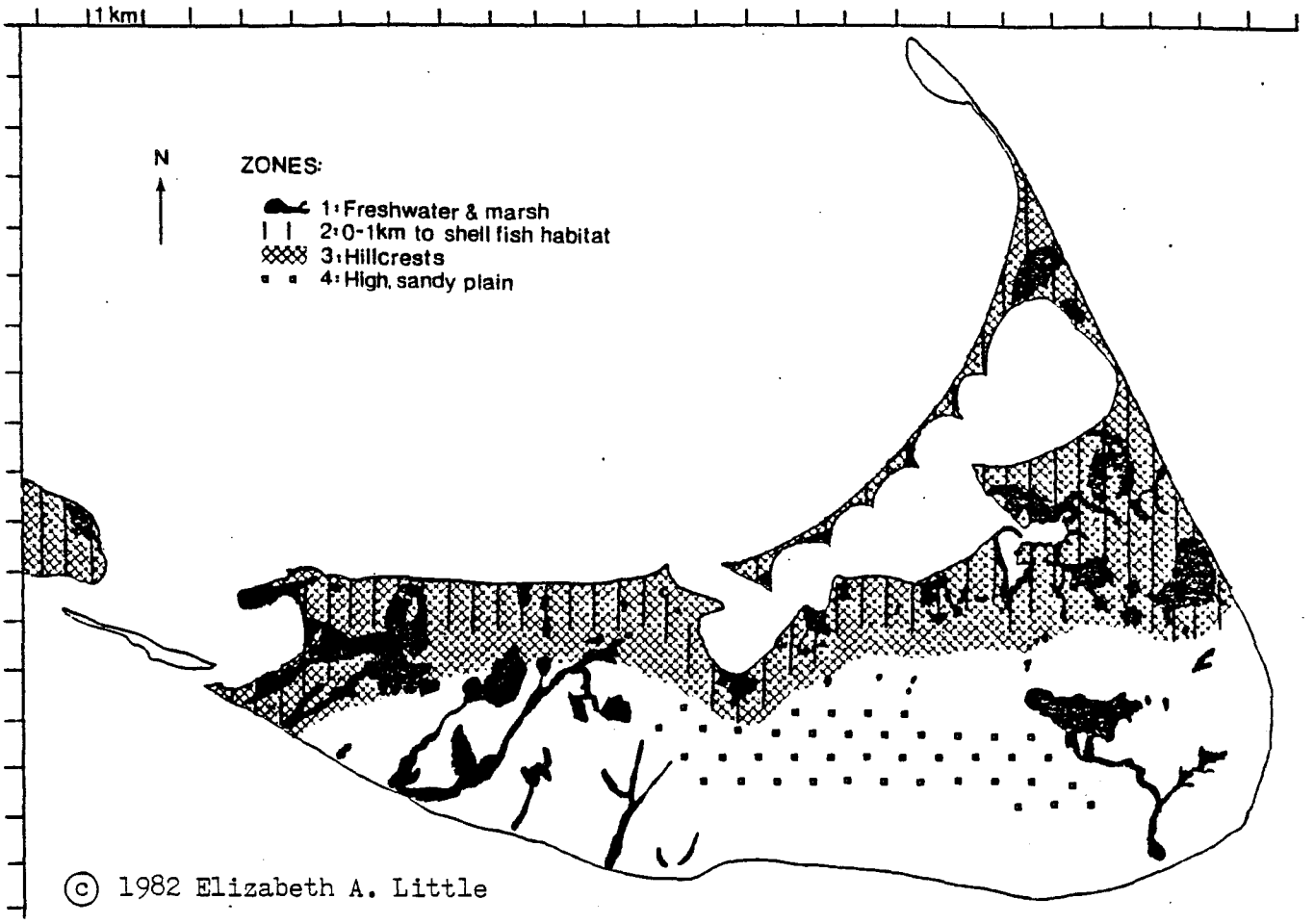


Figure 1. Initial predictive map for prehistoric site density on Nantucket. Zone 1 consists of a 200 meter margin around the freshwater and marsh shown on the map. Zones 1, 2, 3, 4, and 5 (the remainder) are defined and discussed in the text, and in case of any disagreement between the map and the text, the text is more accurate than the map (base map after Chisholm et al. 1974).

METHODOLOGY.

Site Locations Not Published.

At Cape Cod (McManamon 1981; Pochon and Derry 1979), and at Maui, a resort similar to Nantucket, the site locations have been published, which has, in the case of Maui, resulted in vandalism to some of the sites. Since it is nearly impossible to remove maps, once published, from the public domain, we do not show specific site locations in this report.

Site Zones of Initial Predictive Map.

The initial predictive map does not show the location of any prehistoric site on the island, nor whether or not there is a site on any given piece of land. It does, within its preliminary limitations, show different kinds of land which differ in terms of archaeological site density and types of sites expected (Figure 1; Table 1A).

In order to find associations between geographic features of the land and site locations, the 106 inventoried sites were plotted on the General Soil Map of Nantucket (U.S. Department of Agriculture 1979:70; Appendix 1), and on the surficial geology map (Oldale 1981:15; Appendix 2). However, because an important cultural zone, proximity to shellfish habitat, cut across soils and geological regions, I have not finally used the soils or geology base maps, but constructed a predictive site map from the simplest elements of the U.S.G.S. Topographical Quadrant Maps for Nantucket Island, as fitted together and reduced by Chisholm et al. (1974). Further analysis of site distributions will require close comparison of site zones, soils, and geology.

Zone 1: Less than 200 meters from Freshwater (Wetlands and Ponds).

If we exclude burial sites and some shell midden sites along the harbor

TABLE 1 A. A Comparison of Site Densities on Nantucket, This Paper.

Zone 5	less than .03/km^2	Area not Zones 1,2,3,4.
Zone 3	.6/km^2	Woodland Burials
Whole Island	.8/km^2	All sites
Zone 4	1.2/km^2	Cremation burials
Zone 2	1.7/km^2	Shell Midden
Zone 1	high, not yet measured	200 m deep along edge of wetlands and ponds.
Quaise	more than 14/km^2 * (Little 1979) almost 100% of the area has cultural remains- * (Luedtke 1981)	The highest density ever surveyed on Nantucket.

TABLE 1 B. A Comparison of Site Densities in Massachusetts.

Location	Date	Density	Reference	Remarks
Nantucket	1967	.02/km^2	Zube and Carlozzi 1967	3 sites
Greater Boston	1974	.13/km^2	Dincauze 1974	established a minimum
Nantucket	1979	.8/km^2	Little 1979	inventoried sites-more sites are known
Hadley	1978	1.8/km^2	Dincauze 1978a	on Connecticut River
Cape Cod, shore	1981	57/km^2 *	McManamon 1981	Less than 200 m from shore edge.

* Definition of sites at high densities becomes blurry.

shores, 81% of the 79 remaining sites lie less than 100 meters from fresh water, and 97% less than 200 m from fresh water (Figure 2). The sites further than 200 m from fresh water are the outer portions of large areas said to contain sites, but at present untested.

Although shellfish processing sites may not have required fresh water, the lack of fresh water close to some harbor sites may be a recent phenomenon. Because of the rising sea level, shore-line erosion, and ditching activities of the Mosquito Control Commission in the 1930's, salt marsh may occur where once there was fresh marsh. On the other hand, outwash ponds on the south-east shore (Q_{su} in Q_{no1}(Appendix 2)) are excluded from Zone 1 with the argument that their water tables may have been increased by rising sea level.

Although I have not yet measured the area of Zone 1, defined as all the land up to 200 m from wetland or ponds, its archaeological sensitivity, as measured by its site density, will be given by 79 divided by the area of the zone in square kilometers, and will be one of the highest densities on the island. On Cape Cod, and at Concord, Massachusetts, over 80% of reported prehistoric sites were located within 200 m of a fresh water source or a tidal marsh (McManamon 1981:201). Because of the sensitivity of this zone, I would not define it on a map, but on the ground as 200 m to wetland vegetation. In addition, the comments of J. Clinton Andrews and William Klein (1982) about known or possible changes in Nantucket's water table will need careful study.

Zone 2: Access to Shellfish Habitat.

This zone can be defined from a study of 50 inventoried shell middens, together with the Quaise survey (Luedtke 1980,1981), as the area, up to one kilometer deep, along the edge of shellfish habitat (Appendix 3). This shore land also provides good access to shore bird and fin fish habitat (Zube and

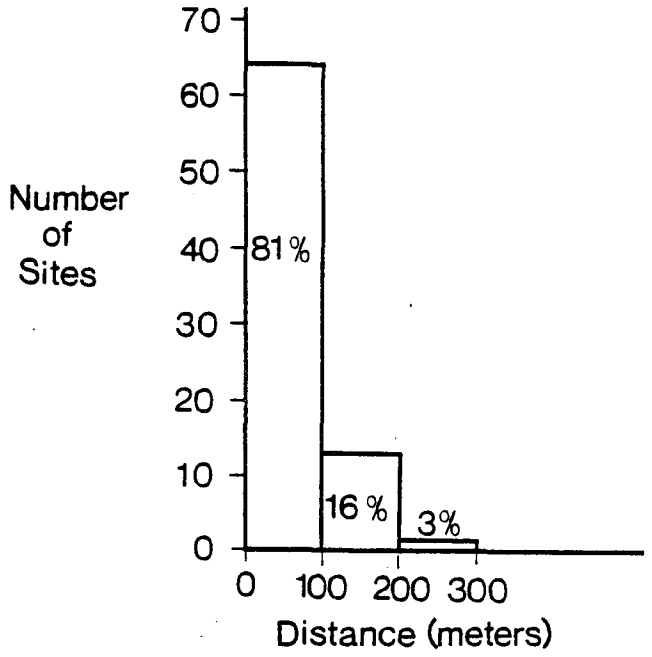


Figure 2. Number of inventoried sites (non-burial, non-cremation, and with the exception of 12 shell middens) plotted as a function of their distance from freshwater, today. The freshwater table may have changed during the past 10,000 years of human occupation of the island. Possibly because of this phenomenon, there are 12 shell midden sites today located on salt marsh, with no nearby freshwater apparent. They have been ommitted from Zone 1, but can be found in Zone 2.

Carlozzi 1967:31,53). As yet there have been no prehistoric shell middens inventoried outside of this zone. The density of shell midden within this zone is high, at least 1.7/km^2, as presently known.

Some of the shell middens in Zone 2 are more than 200 m away from fresh water, but this attribute may have resulted from changes in the fresh water drainage in the marshes.

Zone 3: Hillcrests, Knolls, and Cliffs.

From newspaper reports and the reports of collectors, we have inventoried 25 burials (Little 1979), and all were located on elevations,- overlooks, hill crests, knolls, cliff edges, etc. These sites were found throughout Zone 2 and approximately one kilometer south of Zone 2, where there are hills, and are shown as Zone 3 in Figure 1.

Although some of the burials were in shell midden, many were not (NHA files). Therefore, one cannot attribute the skeletal preservation solely to the shell, i.e., because of their good preservation, these are probably Woodland (less than 2500 years old) burials. All shell middens for which age estimates by C-14 dating or typology have been made, date from the Woodland Period on Nantucket. Therefore, the relationship between the presently known bounds of Zones 2 and 3 is reasonable and interesting.

Zone 4: High Sandy Plain.

This zone, defined on the basis of six cremation burials near the Nantucket High School, belonging to the Susquehanna Tradition of the Late Archaic Period (4500-3000 years ago), can be defined at present as land lying above 33 feet above mean sea level on the northern half of the outwash plain, which extends geologically to the east as far as Gibbs Pond (Appendix 1, Appendix 2).

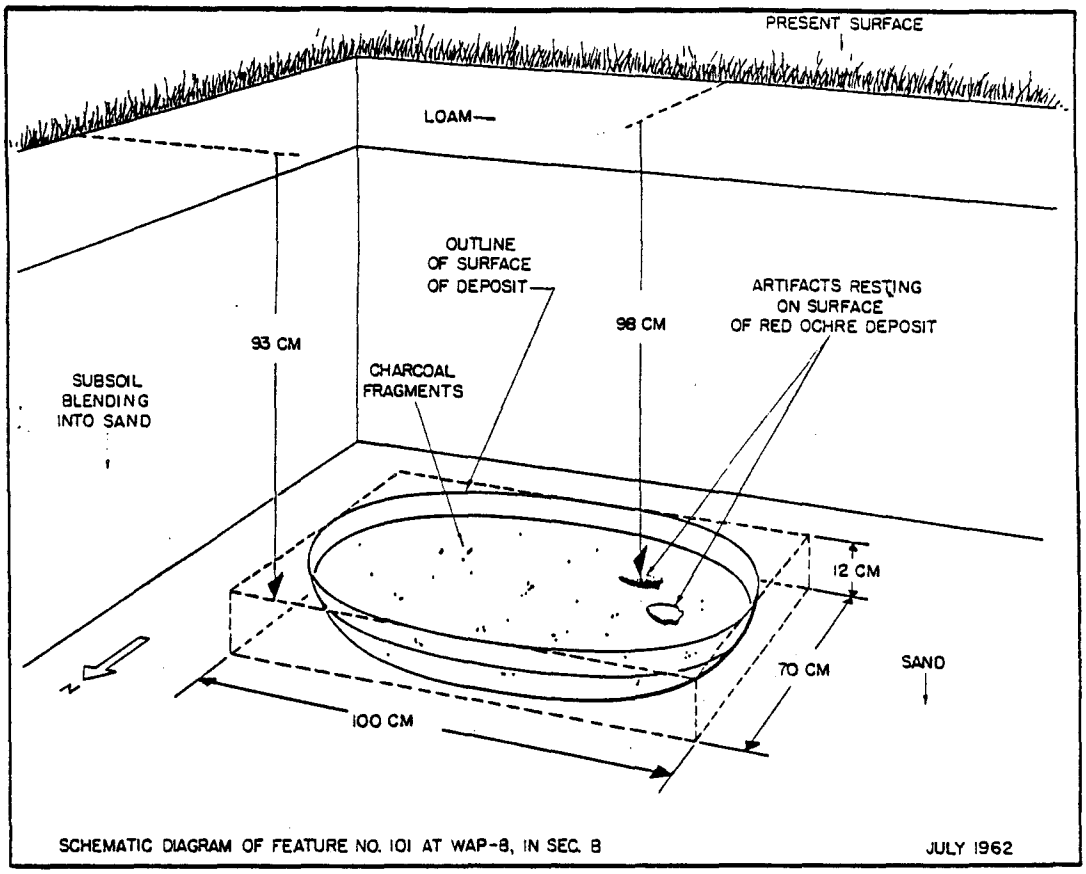


Figure 3. Schematic diagram of cremation burial pit of the Archaic Period (Robbins 1968:27), reproduced with permission of Maurice Robbins

DISCUSSION.

In order to illustrate the meaning and use of this initial predictive map (Fig. 1), let us consider Zone 4. The inventory of 1979 contains four reports of what appear to have been Late Archaic cremation burial assemblages from a region of high, sandy outwash plain near the High School. On the basis of similar geology and soils, the zone can be extended east to Gibbs Pond (Appendix 1 & 2). In order to test this prediction, subsurface testing will be required. Unfortunately, this kind of site (see Figure 3) is small and not easy to locate by shovel testing (Talmage 1977). Nevertheless, indications that they are to be found in Zone 4 are well known (see Figure 4), and two additional sites have recently been documented.

The site density, or number of sites per square kilometer, for different kinds of land gives a measure of archaeological sensitivity. In Table 1B site densities for several areas of the state are given, and demonstrate an increase in site density with time, as general awareness of prehistoric resources has increased in the past 15 years. Zube and Carlozzi (1967) in 1967 show only three prehistoric sites on Nantucket (Appendix 4) for a density of $0.02/km^2$, which is well below the minimum established in 1974 for coastal Massachusetts of $0.13/km^2$ (Dincauze 1974; Table 1B). The 1978 survey of Nantucket documented 106 sites, which corresponds to a density for the island of $0.8/km^2$. Although the actual density of sites on Nantucket is known to be larger than this, we are still not in a position to estimate this number. The National Seashore survey (McManamon 1981) is measuring densities for geographic zones on Cape Cod which may apply at Nantucket. For the 200 meter deep shore edge near tidal flats, McManamon found a density of $57/km^2$ (Table 1B), which, like the $14/km^2$ density at Quaise, Nantucket (Table 1A),

Ceremonial spearhead found near Surfside Road

A spearhead, dating back to the late archaic era, sent its founder Victor Reed, Jr. of Miacomet Avenue into an exhilarating state last week. This particular piece, delicately fashioned from a slate-like material, measures 7-inches long by 2-inches wide.

Reed, who boasts quite a collection of ancient arrowheads somewhere in the neighborhood of 30 points, said he stumbled upon this one by chance while driving on the Surfside Road.

"A piece of it was sticking out of a dirt pile near the Thurston property," said Reed, who promptly took the spade-shaped blade to Paul Morris, a marine historian and amateur archaeologist.

Morris examined the hand-crafted point, remarking that it dates somewhere in the 3000 B.C. - 500 B.C. class. From its thin construction, Morris deduced that it was probably a ceremonial point, labeling the piece a "corner removed No. 7 typified by the Susquehanna blade".

Of its maker, Morris said, the archaic people were socialized, semi-sedentary villagers who practiced cremation, hunting and some primitive forms of agriculture.

Reed is expected to notify the Bronson Museum in Attelboro of his find.

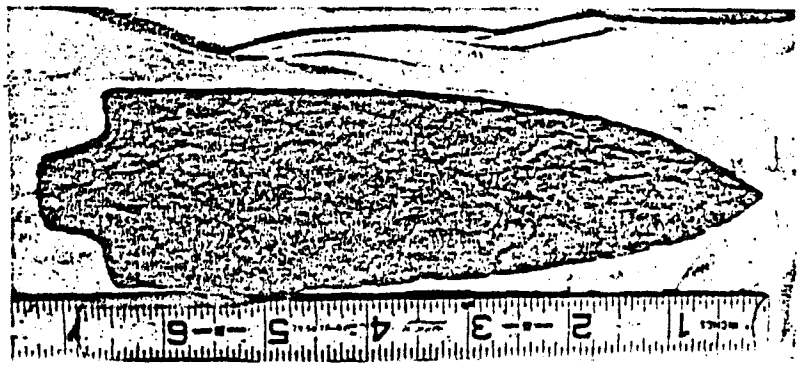


Figure 4. Occasional Late Archaic ceremonial (i.e., burial) artifacts are reported from Zone 4, as illustrated by this example (Inquirer and Mirror, July 7, 1977), reproduced with permission of Marie Giffin.

is an intensity of land use which requires us to rethink the definition of site (Little 1979; Luedtke 1980; Dincauze 1978b).

We are confident that considerable improvement of this predictive map is not only possible, but may produce additional surprises in settlement pattern analysis. One of our known biases is that the source of our inventory data is through interviews with collectors. These sites will tend to cluster near a person's home, and thus, in developed parts of the island. Erosion is another source of site discovery, and many parts of the island are neither eroding, nor developed, and thus, our present data are both biased and incomplete. Another area which could be considerably improved is that of distinguishing the cultural remains of prehistoric inhabitants of different time periods. During the 10,000 or so years that Nantucket has been inhabited, the lifeways of the people underwent several significant changes (Appendix 5), and the changes in site distributions with time have not yet been studied. Also, since the map (Fig. 1) is based on modern landforms, ecozones, and sea levels, it is likely to be a poor predictor for sites more than 5-6000 years old.

SUMMARY AND RECOMMENDATIONS.

The implications of the apparent relations between archaeological resources and environmental factors on the island are exciting. First, we appear to be able to distinguish highly sensitive archaeological environments from those of low sensitivity. Secondly, that the site zones can be defined geographically implies a causal relationship between the geography and the cultural land use. Understanding these relationships is an important step in the analysis of prehistoric cultures (King, Hickman, & Berg 1977:146).

Although the 1979 survey of Nantucket Indian sites was biased and in-

complete, it has given us some much needed and very valuable data, and the one or two dozen collectors whose collections have never been catalogued need to be interviewed, records should be made of their collections and site locations, and the sites should be inventoried on the MHC forms.

In order specifically to test the predictions made here, subsurface field testing will be necessary. As recommended by King, Hickman, and Berg (1977:145-173), predictive survey involves, in a sequential process, survey, analysis, drawing conclusions, formulating hypotheses, and then repeating the entire process until the match between data coming in and your predictions is as good as you wish it to be. In other words, for the planning process, predictive survey may not save either time or money. However, it is very good science, and could provide a framework for coordination of archaeological field survey on Nantucket.

Archaeological surveys, mandated by the National Environmental Protection Act of 1969 with amendments, and the National Historic Preservation Act of 1966 with amendments (Talmage et al. 1979), could contribute to the ongoing process of refinement of the predictive map, through coordination of survey and analysis.

The initial predictive map, based on real site data, can be used as a preliminary guide in planning land use projects, as well as in developing open-space and archaeological resource preservation plans (Derry et al. 1977; Kramm 1981; King 1978; State Plans and Grants Division 1980). The Nantucket Planning and Economic Development Commission, as part of its present efforts to prepare a Comprehensive Growth Management Plan for the island, is looking into the idea of a Land Bank, whereby unique land resources are purchased in order to protect them for the island's future (Nantucket Inquirer and Mirror, Dec. 9, 1982). Open space around ponds is one of the categories considered valuable for access to the ponds. As I have shown in this

paper, land up to 200 meters around the border of ponds would have a high predicted archaeological site density. Therefore, cultural resource protection would be well served by the purchase of land, or of preservation restrictions, around ponds (Kramm 1981).

One of the aims of this paper was to contribute data on the locations of prehistoric sites and means of protecting them to the proposed Growth Management Plan. Another aim was to share the survey results of 1978 with cultural resource managers, without endangering sites by publicizing locations. In the final analysis, the identification of prehistoric resources is done for the purpose of wise use (Knudson 1982:165-166).

ACKNOWLEDGEMENTS.

In 1955 Nelson Olney Dunham, past Sheriff of Nantucket County, made an archaeological site sensitivity map of Nantucket, based on his extensive knowledge of the archaeological resources of the island. Much of what I've learned about Nantucket's Indian heritage I owe to Mr. Dunham's lifelong interest in Nantucket Indians, and to his willingness to share his knowledge for the preservation of archaeological sites on the island.

I also thank Duncan Ritchie, Public Archaeology Laboratory, Brown University, who did archaeological subsurface testing for the 1982 Sewer Project and reported another cremation burial, for encouraging me to draft a cremation burial zone.

REFERENCES CITED.

Chisholm, C., R. Holzheimer, and J. Robinson

1974 Nantucket Island, an analysis of the natural and visual resources. Harvard Graduate School of Design, Cambridge.

Derry, A., H. W. Jandl, C. D. Shull, and J. Thorman

1977 Guidelines for Local Surveys: A Basis for Preservation Planning. Office of Archeology and Historic Preservation, U. S. Department of the Interior, Washington, D.C.

Dincauze, Dena F.

1974 An Introduction to Archaeology in the Greater Boston Area. Archaeology of Eastern North America 2(1):39-67.

1978a Prehistoric Archaeological Resources in Hadley, Massachusetts: A 1978 Assessment with Recommendations for Protection. Report submitted to Massachusetts Historical Commission.

1978b Teaching Prehistoric Archaeological Survey in the Northeast. In Essays in Northeastern Anthropology in Memory of Marian E. White, W. E. Engelbrecht and D. K. Grayson, editors, Occasional Publications in Northeastern Anthropology 5:22-40.

Dincauze, D. F., and J. W. Meyer

1977 Prehistoric Resources of East-Central New England: A Preliminary Predictive Study. Cultural Resources Management Studies, National Park Service, U. S. Department of the Interior.

King, Thomas F.

1978 The Archeological Survey: Methods and Uses. Heritage Conservation and Recreation Service, U. S. Department of the Interior.

King, T. F., P. P. Hickman, and G. Berg

1977 Anthropology in Historic Preservation: Caring for Culture's Clutter. Academic Press, New York.

Knudson, Ruthann

1982 Basic Principles of Archaeological Resource Management. American Antiquity 47(1):163-166.

Kramm, Deborah

1981 Preservation Restriction Guidelines. Massachusetts Historical Commission, Office of the Secretary of the Commonwealth, Boston.

Little, Elizabeth A.

1979 An Inventory of Indian Sites on Nantucket. Report submitted to the Massachusetts Historical Commission and the Nantucket Historical Association.

Luedtke, Barbara

1979 Report on the Archaeological Survey of the University of Massachusetts Nantucket Field Station. Report submitted to the Massachusetts Historical Commission and the Nantucket Historical Association.

1980 Survey of the University of Massachusetts Nantucket Field Station. In Widening Horizons, Curt Hoffman, editor, pp. 95-129. Massachusetts Archaeological Society, Attleboro.

McManamon, Francis P.

1981 Probability Sampling and Archaeological Survey in the Northeast: An Estimation Approach. In Foundations of Northeast Archaeology, edited by Dean R. Snow, pp. 195-227. Academic Press, New York.

Oldale, Robert N.

1981 Pleistocene Stratigraphy of Nantucket, Martha's Vineyard, the Elizabeth Islands, and Cape Cod, Massachusetts. In Late Wisconsinan Glaciation of New England, Grahame J. Larson and Byron D. Stone, editors, pp. 1-34. Kendall/Hunt Publishing Co., Dubuque, Iowa.

Pochon, P. M., and L. Derry

1979 Archaeological Resources. In Cape Cod Environmental Atlas, edited by

A. H. Brownlow, pp. 19-24. Boston University.

Robbins, Maurice

1968 An Archaic Ceremonial Complex at Assawompsett. Massachusetts Archaeological Society, Attleboro.

State Plans and Grants Division

1980 New Directions in Rural Preservation. Preservation Planning Series, Heritage Conservation and Recreation Service, U. S. Department of the Interior.

Talmage, Valerie

1977 Phase I Cultural Resource Reconnaisance Study and Phase II Intensive Survey of Nantucket Teen Center and Nantucket Elementary School Site. Report 13/16 of Institute for Conservation Archaeology, Harvard University, Cambridge.

Talmage, V., J. Orfant, and E. Durfee

1979 Public Planning and Environmental Review: Archeology and Historic Preservation. Office of the Secretary of State, Commonwealth of Massachusetts, Massachusetts Historical Commission.

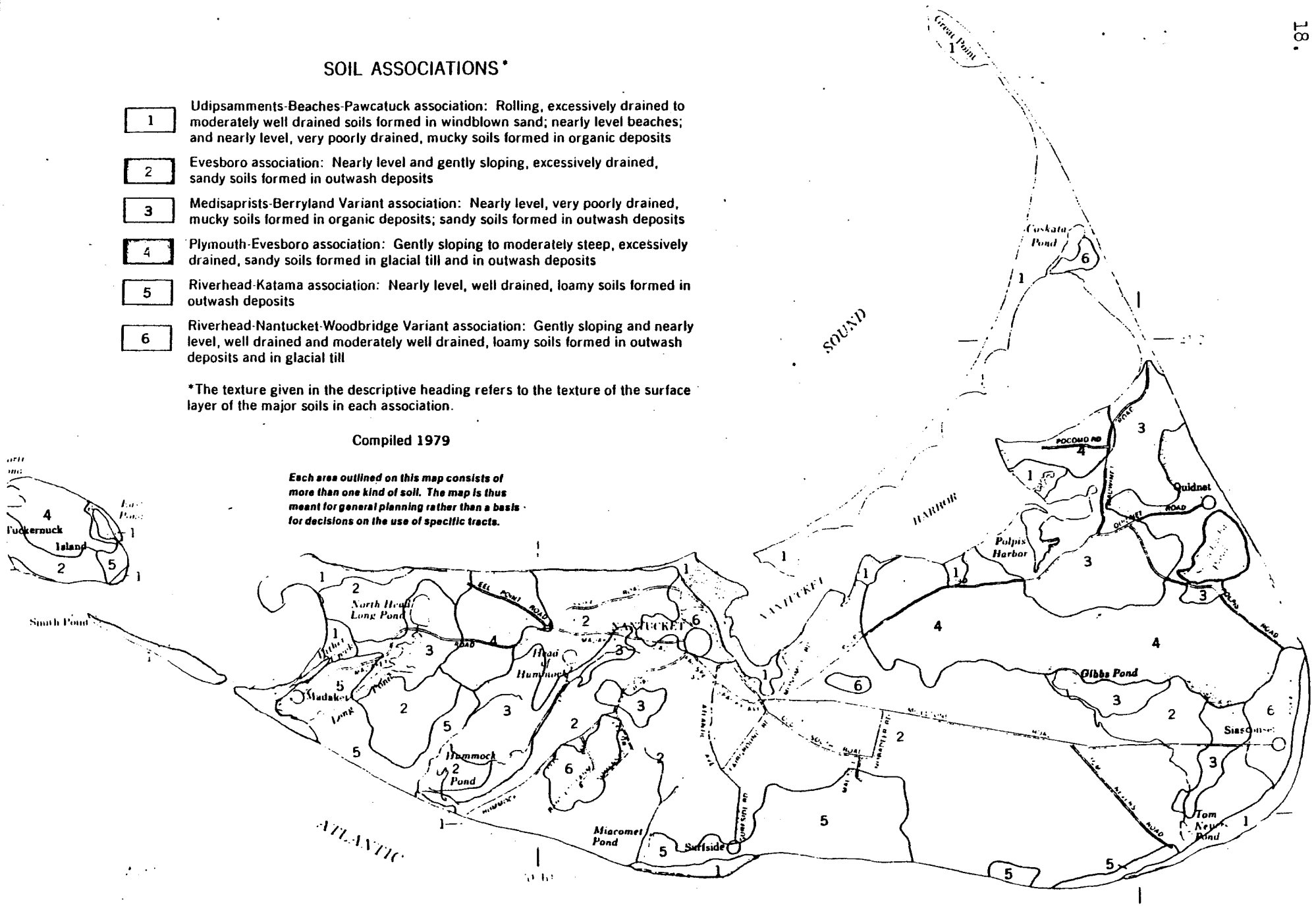
U. S. Department of Agriculture

1979 Soil Survey of Nantucket County, Massachusetts. United States Department of Agriculture, Soil Conservation Service, in cooperation with Massachusetts Agricultural Experiment Station.

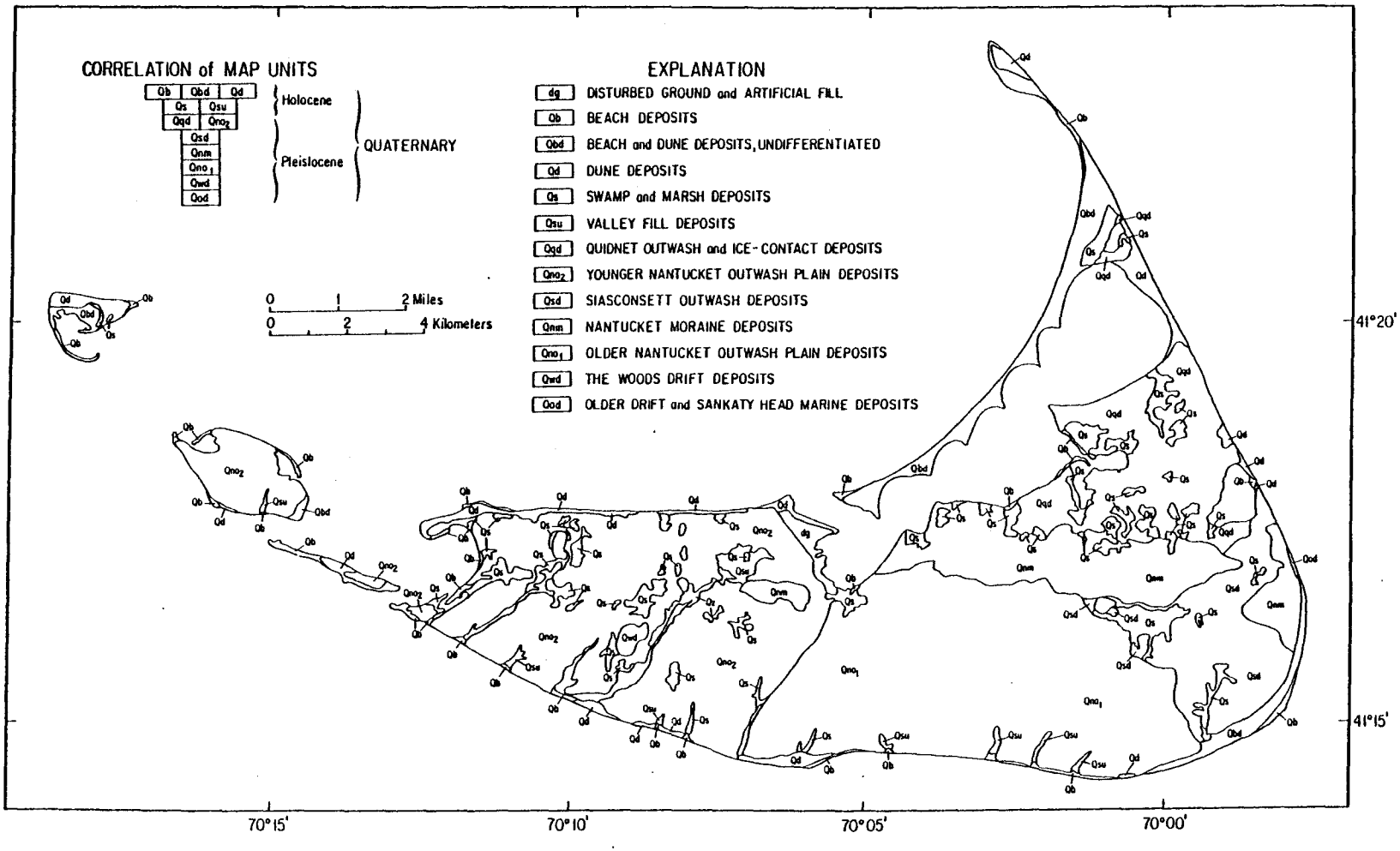
Zube, E. H., and C. A. Carlozzi, editors

1967 An Inventory and Interpretation: Selected Resources of the Island of Nantucket. Publication No. 4, Cooperative Extension Service, University of Massachusetts.

APPENDICES.

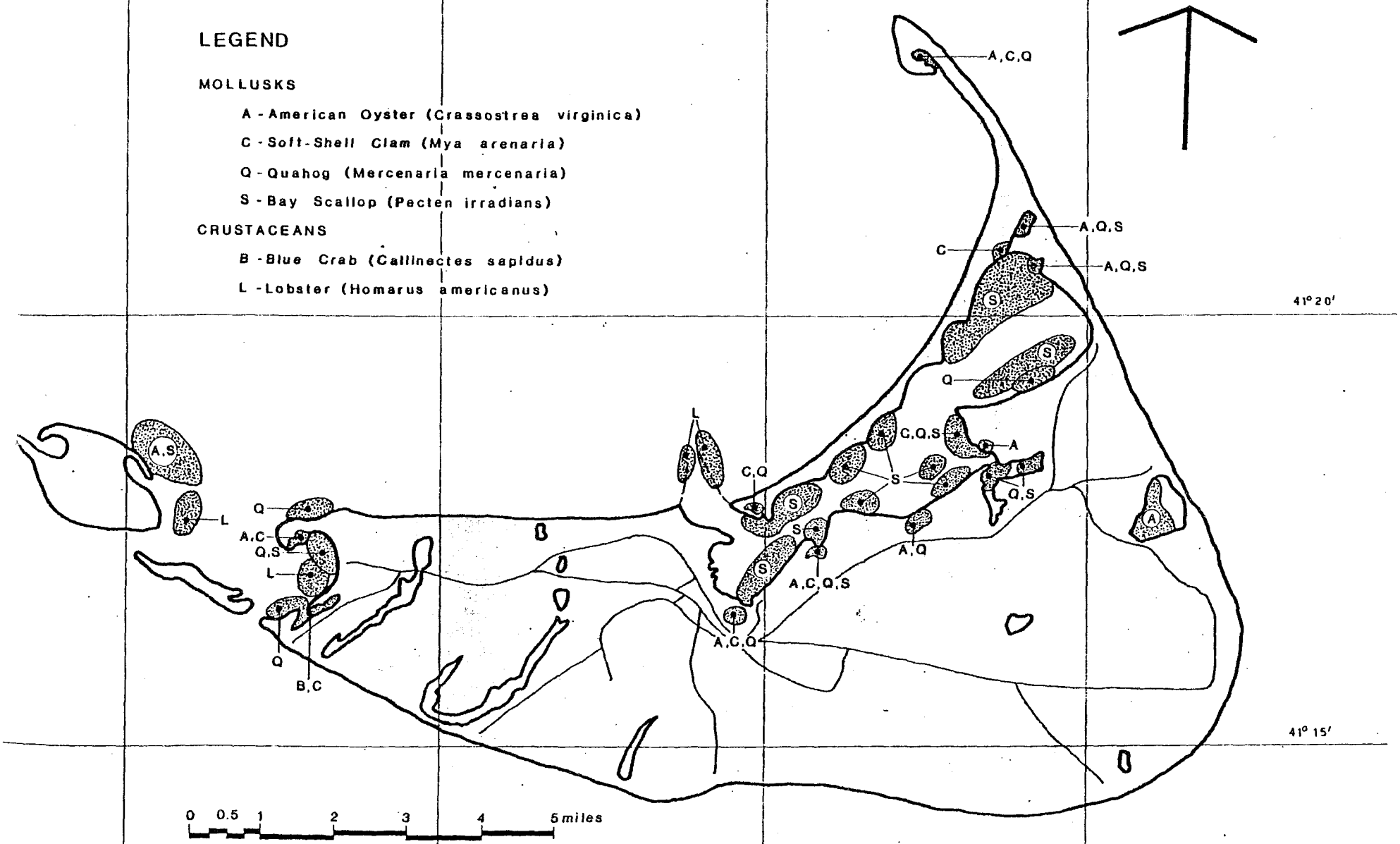


Appendix 1. General Soil Map of Nantucket (U.S. Department of Agriculture 1979:70), reproduced with permission of National Cooperative Soil Survey.

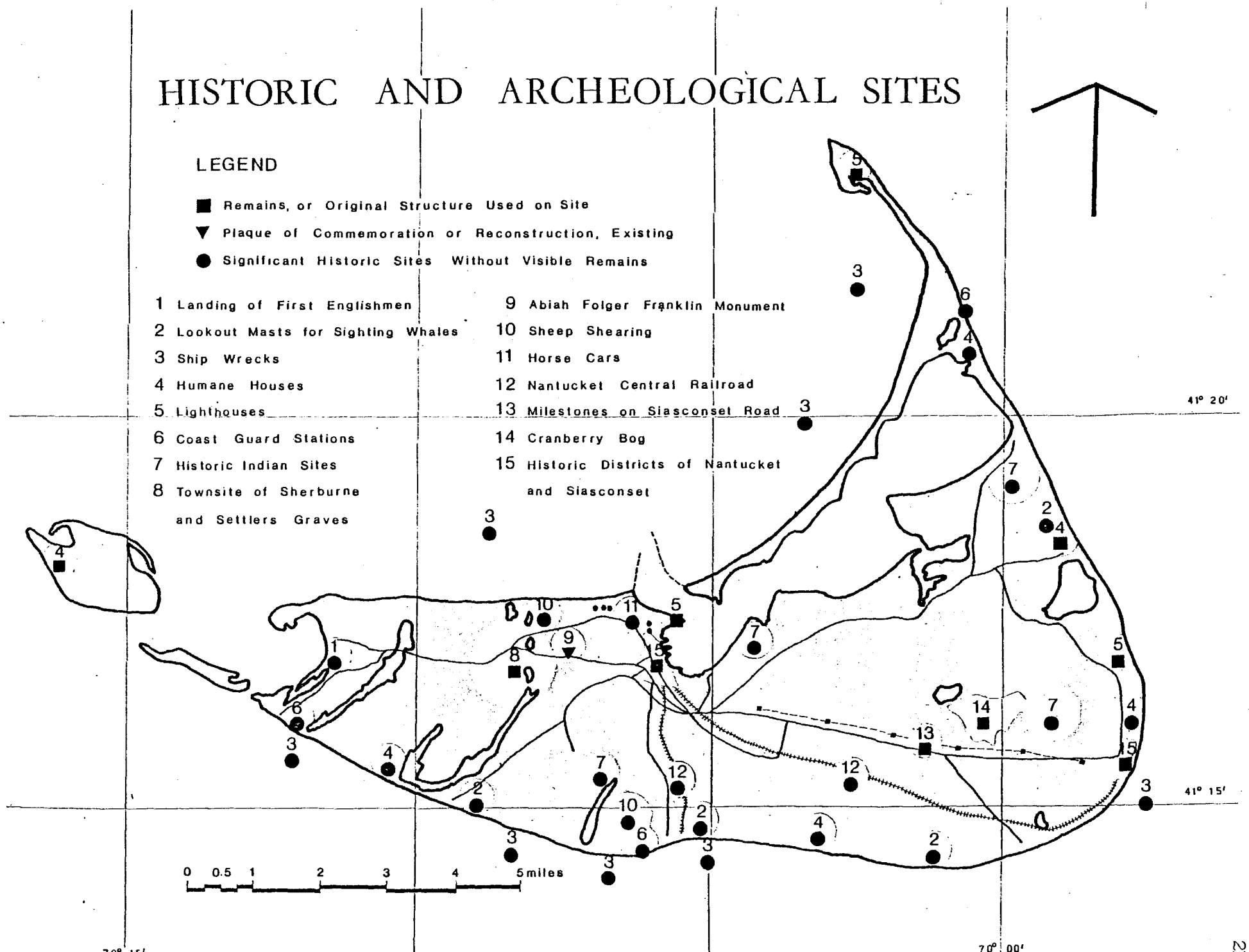


Appendix 2. **Generalized geologic map of Nantucket Island, Massachusetts. Modified from 1:24,000-scale geologic quadrangle maps.** (Oldale 1981:15), reproduced with permission of Robert N. Oldale.

PRINCIPAL MOLLUSK & CRUSTACEAN AREAS



Appendix 3. Principal Shellfish (mollusk) habitat at Nantucket today (Zube and Carlozzi 1967:45).



Appendix 4. Historic and Archeological Sites on Nantucket (Zube and Carlozzi 1967:87).

APPENDIX 5. SUMMARY OF PREHISTORY (Dincauze and Meyer 1977:3-7).

Human occupation of New England began more than 10,000 years ago, when bands of hunters drifted into the region on the track of Ice Age game—caribou and mastodon. They came into a landscape very different from that of today. They hunted in spruce forests and tundra, and across the exposed continental shelf far to the east of the modern shoreline. Since that time, climate, vegetation, and topography have changed greatly. The melting of the continental glaciers released vast amounts of water into the sea, so that the sea level rose, inundating the continental shelves. The warmer climate permitted the northward spread of deciduous trees, berry bushes, and other nutritious plants of the temperate zone. Moose, and then deer, replace caribou, and large numbers of smaller animals spread and settled into the region.
spread of deciduous trees, berry bushes, and other nutritious plants of the temperate zone. Moose, and then deer, replaced caribou, and large numbers of smaller animals spread and settled into the region.

Successive human populations learned to adapt to new conditions, changing their lifeways in response to new opportunities and new restrictions. The story of human adaptation in New England is of interest not only to the region's current residents, but to students of human behavior everywhere, who use such information in comparative studies, seeking to learn about regularities in human behavior through time and space.

Methods

Knowledge of human life in New England before the sixteenth century A.D. can be recovered only through archaeological methods. Details of the native cultures of the sixteenth through the eighteenth centuries are inadequately recorded in written archives, and need to be further explored archaeologically. The methods of archaeology have developed toward scientific precision only within the present century; they are now being actively refined and expanded, so that techniques for researching the human past are improving constantly. The methods and techniques employed by archaeologists require access to many kinds of raw data, and demand ever greater precision in their applications. Archaeologists collaborate with geologists, zoologists, botanists, soils scientists, oceanographers, ecologists, physicists, chemists, and statisticians in addition to the social scientists who are their closest academic colleagues.

All of the specialized methods of measuring and segmenting time, reconstructing ancient landscapes, mapping long-buried community plans, and describing ancient subsistence and ceremonial activities eventually provide the archaeologist with the information he is seeking—reconstructions of past human lifestyles and understanding the development of cultures through time.

The native cultures and culture history of New England are being explored and studied by archaeologists using these special techniques. The task is a slow one under the best conditions, but in New England conditions are rarely optimal. Over three hundred and fifty years of expanding population and intensive land development has resulted in heavy destruction of ancient sites in the region and the pace of such destruction is accelerating. Archaeologists must make the best of the data that remain to them, and try to learn enough from extant sites to establish a basis for extrapolating about the destroyed ones. The brief

summary presented here is based upon research conducted throughout eastern New England since 1865; most of the data have been gathered since 1950 by a small corps of professional and volunteer archaeologists.

The Hunters and Gatherers

Living sites of the early caribou hunters are rarely found in New England, and the few that are known have not been subjected to careful archaeological study. This rarity is a product of at least two different factors—the populations were probably never very large, and in the time which has passed since the sites were occupied geological forces as well as residential and industrial development have, no doubt, effaced many of them. The largest site of the early hunters known in New England was found within the survey area on a high terrace above Bull Brook in Ipswich. There, a great many of the characteristic stone tools of these early inhabitants have been found in clusters indicating family camp sites grouped together on the high terrace. The location may have been chosen for the overlook it provided onto the low plains to the east and north of the site, so that the hunters could remain comfortably around their campfires while keeping an eye out for the movement of the caribou herds below. Other sites are known in the area, but none has been explored in any detail. Stray finds of the characteristic early hunter artifacts have been made in Maine, New Hampshire, and Middlesex and Essex counties in Massachusetts.

The end of the caribou hunter period was defined by the climatic changes which drove the caribou slowly north. Ultimately, the caribou hunters had to move also, or learn new habits of hunting and new ways of life. We still do not know whether the descendants of the caribou hunters stayed and made adjustments or whether they left and reoccupation of New England occurred again from the south.

After 7000 B.C., there are indications that peoples whose culture was related to others farther south and west had come into New England where they were perhaps hunting moose and elk in the early deciduous forest of that time. Known sites of the next millennium are all very small, none has been carefully excavated in any detail, and very little is known about the adaptive patterns, group size, or ultimate fate of the people who lived there. Our only record of their passage is a few stone tools scattered over the landscape. We would like to learn more about them. These sites, like the older ones, will be small and fragile, because even as late as eight thousand years ago, the landscape in New England differed from that of today.

We know a lot more about the people who lived here after about 6000 B.C. By that time, the people who lived in southern New England had relatives all along the Atlantic seaboard south as far as Florida. Similar artifacts of similar ages are found throughout this area. The New England population was showing strong adaptation to the seasonal changes of available resources. Near Manchester, New Hampshire, they had a large spring fishing camp where they gathered during the spring runs of salmon, shad, and alewives. In the Shawsheen River Basin of Essex and Middlesex counties in Massachusetts, and the Cochato valley southwest of Boston, many small sites of the same age occur. These may have been winter sites located along the sheltered margins of inland ponds, where ice fishing would provide food through the winter. Some of the sites are situated along extensive marsh and swamp lands which may have been somewhat wetter, boggy meadows at the time. These would have been good places to intercept the spring and fall bird migrations and obtain an abundance of meat and feathers. The seasonal adaptations which we see established by this time produced a large variety of sites; no two duplicate one another, each has something new to tell us about the way these people were utilizing the ancient New England environment. We know nothing about the occupations of this age in southern Maine, but we know from scattered artifacts and sites as far north as Labrador that Maine was inhabited at this time.

By 3000 B.C. New England enjoyed a climate warmer than that of today, and the forest cover in the southern part was more like that of the Chesapeake Bay now. In these rich forests human populations expanded to a density similar to that existing when the English settled the

area 4600 years later. By this time, New England inhabitants had become adept at exploiting the new resources of their habitat. Under the city of Boston, 20 feet below modern tide level, was found an ancient fish weir, constructed to intercept the spring runs of alewives, shad, and perhaps salmon. The construction of the weir required large amounts of labor expended over a short period of time each spring, when the weir had to be renewed from the ravages of winter storms. This indicates that the people, by this time, had very extensive knowledge of the seasonal resources and a large repertory of means for exploiting them. They were capable of cooperating in major tasks and probably lived together in fairly large numbers whenever the food supply was adequate in a particular place. They had, by this time, scattered over the entire landscape of southern New England. Sites may be found almost anywhere within that area, not only in the fertile floodplains of the rivers or along the seacoast, but upland into the hills near springs and ponds. Wherever food was available for any animal, human populations by this time had learned to exploit it. The diversity of lifestyles implied among the many sites is not understood, and needs to be examined in detail.

The relatively high population density of this period, between 3000 and 1000 B.C., produced conditions in which the social skills of the inhabitants became very important. From within the survey area, we have some interesting evidence of fairly elaborate burial rites. Sites showing such ritualism have been recognized in southern New Hampshire and widely in eastern Massachusetts. Along the Sudbury river in Wayland a very large cemetery, the limits of which cannot be known because it's destruction, produced evidence for repetitive ritualism involving fairly large numbers of people, perhaps seasonally, in ceremonies which were somehow related to notions of afterlife and provision for the soul's journey. The ceremonies also reinforced the sense of community among the surviving members of the social group. New England populations by this time had learned enough about the natural environment to have begun to express preference for certain kinds of raw materials and to establish means whereby they could maintain supplies of these goods, even from very long distances. We suspect, in other words, the existence at this time of long-distance trade on a fairly regular basis.

Around 1000 B.C., a series of environmental and cultural changes transformed lifestyles in southern New England. The climate became a little cooler, and eventually, through the centuries, the forest composition changed toward that familiar to the early English settlers. Sea levels began to stabilize and estuaries began to form. Along the East Coast, the great clam beds of modern times developed. The Indians did not neglect this enlarged resource. The seashore had long been a dependable source of nutritious food for New England residents but about this time people began to rely more heavily upon coastal resources and to accumulate large shellheaps which were landmarks along the coast before modern destruction. The shellheaps which remain between Casco Bay and Boston Harbor are among our potentially most informative prehistoric remains, because the chemical conditions in shellheaps permit the preservation of objects of bone, antler, and shell, which are usually lost in the region's acid soil. There have been few systematic explorations of these shellheaps of east-central New England. We do not know when they began to accumulate, whether there was a time lag between Boston Harbor and southern Maine, what the seasons were of maximum exploitation of the clamflats, and what the activities were in these middens other than shellfish gathering and consumption.

Within the last millennium B.C. the old adaptive patterns of southern New England changed. Fewer people lived in the hilly interiors; they gathered at the shore more often, and perhaps for longer periods of time. The old trade routes broke down, and for a time people seemed to live in more parochial communities than they had before, with fewer outside contacts and more regional individuality than had been characteristic in the earlier millennia. In these same centuries, the craft of pottery-making was introduced into New England, apparently from the west—across the Hudson river. The economic and social importance of this change in cooking vessels is not known. For about a thousand years before,

people had been simmering their stews in bowls made of soft rock, "soapstone" or "steatite." Enormous quantities of this rock were quarried in Worcester County and other areas of central southern New England.

The Farmers

There is a possibility that, about the time of the settlement shift to the coast and the adoption of pottery, New England inhabitants began to experiment with the domestication of food plants. This is merely speculation, however, because we have no hard evidence about the beginning of horticulture or plant domestication in this region. We do know that by 1100 A.D., and therefore presumably beginning sometime before that, New England farmers were growing corn. Probably beans and squash were being raised at the same time. These three families of domestic plants were not native to temperate North America; they had been introduced from the sub-tropical areas of Mexico. Their adoption in New England represented a major native horticultural achievement—the acclimatization of semi-tropical plants to the northern temperate zone.

By the sixteenth and seventeeth centuries A.D., the European explorers and settlers of New England began to write about the life of the native inhabitants. It is clear that horticulture was well established south of the Saco River, and had a tentative foothold between the Saco and Kennebec Rivers. In 1605, Samuel de Champlain reported extensive gardens along the shore of southern Maine, New Hampshire, and eastern Massachusetts, as he sailed south toward Cape Cod. Champlain, and John Smith some nine years later, were impressed not only by the gardens but also by the heavy population density along the coast.

Some communities of the contact period were large villages, others, small seasonal camps. The introduction of domesticated plants did not make sedentary farmers out of the southern New England Indians, who retained some elements of the very old, seasonally shifting, lifestyle. Maps of the area of southeastern New England—eastern Massachusetts and Rhode Island—made in 1634, show several villages characteristically near the head of tide on major rivers. Archaeologists are familiar with large sites upriver, too, especially along major streams such as the Merrimack, the Concord, and the Saco. None of these late large sites, or for that matter any of the late small ones, have been adequately explored through excavation. Therefore, we are unable to say very much about the social organization, resource exploitation, or economic development of the southern New England Indians. Our knowledge depends almost entirely upon the reports of French and English explorers who knew these people in the sixteenth and seventeenth centuries. Most of the Europeans had their own reasons for reporting what they did, and for ignoring other aspects of culture which are of extreme interest to anthropologists and the modern inhabitants of New England.

Archaeological remains of the contact period itself are interesting, and full of intriguing puzzles. We know that Spanish and Portuguese fishermen were on the Grand Banks southeast of Newfoundland and possibly as far south as George's Bank southeast of Cape Cod, well before any permanent English or French occupation of the mainland. They surely met and traded with the Indians occasionally. However, they have left us very little in the way of records, and their presence itself could be overlooked except for the discovery of some interesting southwestern European artifacts in some Indian graves of this period.

The Seventeenth Century

The seventeenth century was a period of intense cultural disruption among the New England Indians. The new European trade goods, which the Indians coveted, caused some immediate economic and social changes. The Indians began to press each other for access to the goods and to wage wars with one another. This for the first time approached the European pattern of wars waged for economic gain. The result was that very early in the century native political and economic structures had been radically altered, long before the Europeans themselves were in close enough contact to describe these structures. In 1616 and 1617, a devastating plague raged throughout southern

New England, north at least as far as the Saco River, and south and west to Narragansett Bay. The populations in between were drastically reduced in number, over 90% in some areas. The Indians in the Boston area were almost entirely wiped out. The result was that when the English began to settle in southern New England, after 1620, the area was very lightly populated in contrast to what it had been, and the native lifestyle was in ruin.

The destruction of their own culture made the southeastern New England Indians more willing to accept the new cultural patterns offered by the English missionaries. Thus, it is not surprising that the first communities of Christian converts in New England were established in eastern Massachusetts, where the native populations have felt the brunt of the disrupting new conditions for several decades. Between 1650 and 1674, several villages of Christian "Praying" Indians were established near Boston, with five in the survey area itself: Natick at the present village of South Natick, Ponkapoag within the present boundaries of Canton and Stoughton, Wamesit near Lowell, Nashoba near Littleton, as well as a smaller late village called Okommakamesit near the present town of Marlboro. The Christian Indians were established in villages where they were expected to remain throughout the year and to adopt English styles of husbandry and economic and social structures. They were able to do this only partially, and even from village to village the degree of acculturation varied. The largest and most successful villages, at Natick and Ponkapoag, gradually came to look like poor English towns, with their central meeting house and school, and small English-style cottages gradually replacing the native dome-shaped wigwam. The Indians adopted at least the outward forms of English religion, and almost completely adopted Christian English modes of burial. By the end of the seventeenth century, they were burying their dead in pine planked coffins, with head and footstones, rarely engraved, superficially indistinguishable from those of their English neighbors. The experiment in Christianizing Indians and making good Englishmen out of them came to a tragic conclusion with the war of 1675—King Phillip's War. At the end of that eighteen month struggle, many of the Christian Indians were dead or scattered to the west and north with other refugees. Those who remained were weakened in numbers and health from winter isolation on the islands of Boston Harbor, where they had been interned at the insistence of the frightened English in the eastern towns. The plantations at Natick and Ponkapoag continued in existence for at least another fifty years. People of Indian descent still live in the Ponkapoag area.

Southern New England was not a wilderness when Europeans found it in the seventeenth century A.D. It had been a human habitation for at least eleven thousand years, and had been farmed for centuries, by people who considered it a comfortable and desirable place to live. The story of human life in New England cannot be known without archaeological investigations into those thousands of years of unwritten history.