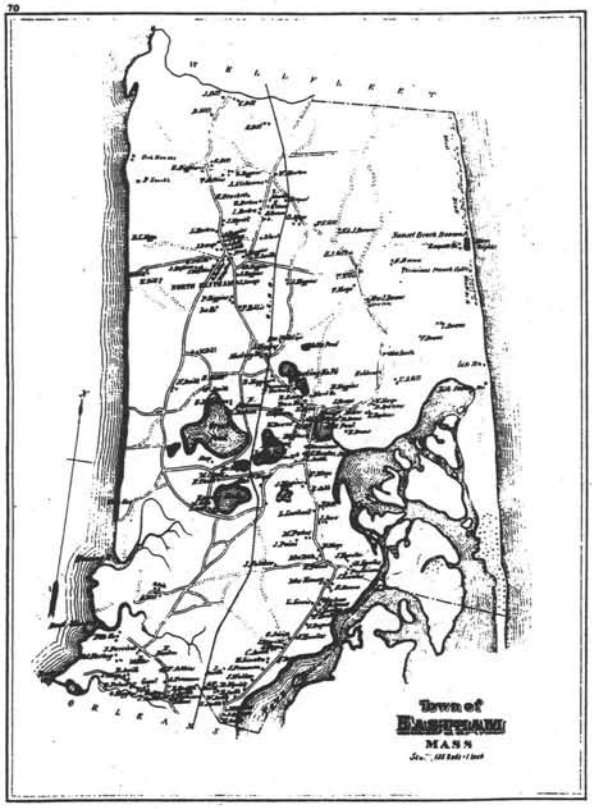


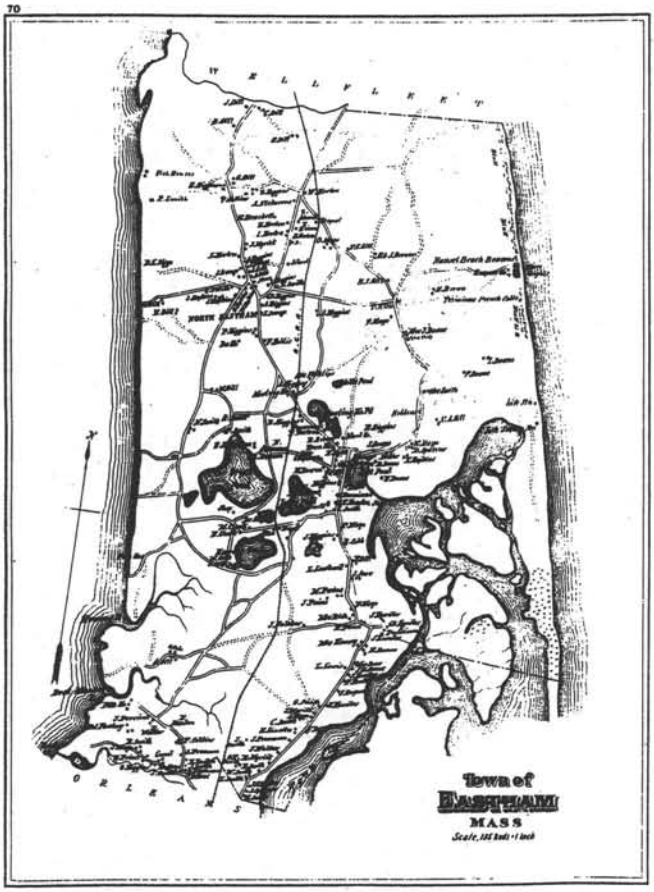
CHAPTERS IN THE ARCHEOLOGY OF CAPE COD, III:

The Historic Period and Historic Period Archeology

Cultural Resource Management Study No. 13

Division of Cultural Resources
North Atlantic Regional Office
National Park Service
U. S. Department of the Interior

1985



Cover Illustration: Town of Eastham, Massachusetts,
Walker Atlas of Barnstable County, 1880

Chapters in the Archeology of Cape Cod, III:

The Historic Period and Historic Period Archeology

Cultural Resources Management Study No. 13

Francis P. McManamon, Editor

with contributions by

Patricia E. Rubertone, S. Terry Childs,

and Francis P. McManamon

Division of Cultural Resources

North Atlantic Regional Office

National Park Service

U. S. Department of the Interior

Boston, MA 1985

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The physical production of this manuscript results largely from the diligent and careful work of Toni Lo Coco who has transformed rough text and tables into the clean, clear format presented here. The cover design and figures are the work of George Stillson. Irene Duff was helpful in a hundred, or more, matters concerning this entire project.

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PART I

RESEARCH ON THE HISTORIC PERIOD AND HISTORIC PERIOD ARCHEOLOGY

Research on the Historic Period and Historic Period Archeology

Francis P. McManamon

Introduction

Outer Cape Cod is among the areas settled earliest by English colonists in North America. In 1644, less than a quarter century after the establishment of the colony at Plymouth, a settlement at Nauset, mainly along the western shore of Town Cove in present-day Eastham, became the first permanent Euroamerican settlement on the outer Cape.

Even before the Plymouth colony settlement,the Cape was a prominent landmark and sometime stopping point for explorers, traders, and fishermen. It is mentioned with varying degrees of detail in accounts of the voyages of Verrazzano, Pring, Gosnold, Smith, and Champlain (see Morison 1971 for the references to the earliest voyages, McManis 1972 for detailed summaries and comparisons of the later ones, and Quinn 1967 for a fascinating revision of the common interpretation of the Pring voyage; Smith 1624; Champlain 1922). In November and December of 1620 the Pilgrams spent their first days in North America on the outer Cape. After making landfall, they sailed into what is today Provincetown Harbor where they remained for about one month. During that time groups of explorers reconnoitered the outer Cape searching for a location with good fresh water and soil where the colony might be planted (Bradford 1961; Mourt 1963). Plymouth, rather than the outer Cape, was the initial settlement, although during the early years of the Euroamerican frequent trips were made to Nauset and other parts of the outer Cape for a variety of purposes (Winslow 1841). Eventually, as mentioned above, the outer Cape was settled permanently by Euroamericans. The pattern and effects of Euroamerican settlement and subsequent development are described in Patricia Rubertone's report, Part II of this volume. Some of the incidents of discovery, settlement, and development are related in Clemensen's Historic Resource Study (1979).

Interest in the history of Cape Cod becomes apparent in the early 19th century, about the time that American history was beginning to be pursued as a serious avocation. Timothy Dwight included historical information along with other observations in his description of Cape Cod made during a trip to Provincetown in 1800 (Dwight 1969). The published Collections of the Massachusetts Historical Society include reports on the present and historical conditions on the outer Cape (e.g., Whitman 1794, 1802). Henry David Throeau's famous musings and ponderings during

his journeys up and down the outer Cape include many historical references (Thoreau). As the 19th century wore on, town and county histories typical of that period were produced (e.g., Freeman 1858; Pratt 1844; S. Rich 1884). The 20th century has seen the production of two popular accounts of Cape Cod history. Kittredge's Cape Cod: Its People and their History (1968, originally published 1930) is the only 20th century book length treatment of Cape Cod history. Cape Cod Pilot (1985, originally published 1937) by Joseph Berger includes many historical antedotes, along with a variety of fables and contemporary information. It was written as part of the Federal Writer's Project of the Works Progress Administration and published originally in the American Guide Series.

Two history reports of limited circulation address the affect that human use of the Cape has had on the natural environment. Altpeter (1939) provides a history of Cape Cod forests, while McCaffrey (1973) focuses on the Provincelands. Two other reports record and analyze the extensive geomorphic changes that have occurred on the outer Cape during historic times. Leatherman, Geise, and O'Donnell (1981) describes marine cliff erosion and Speer, Aubrey, and Ruder (1982) describe changes at Nauset Inlet. Both studies made substantial use of historic maps and photos. Speer et al. provides a particularly lengthy list of available maps and photos for the Eastham and Orleans areas.

With increased tourism in the 1960s and 1970s, antecdotal histories, reprints as well as original collections, on specific historical topics have became popular (e.g., Dalton, n.d.; Hinshaw 1969; Small 1967). More recently, professional historians, anthropologists, and archeologists have turned to aspects of Cape Cod history in their research and writing (e.g., Bragdon 1982; Clarke 1975; Deetz 1968; Dickey 1968; Murdoch 1964; Stilgoe 1980; Waters 1976; Yentsch 1977a, 1977b, in press). Since the establishment of Cape Cod National Seashore, which also is described in two historical treatments (Burling 1978; Foster 1985), the National Park Service has conducted historical research about the outer Cape. These efforts and studies are summarized in the following section.

Summary of NPS Historical Archeological Research

Along with other aspects of planning for the proposed Cape Cod National Seashore in the late 1950's, research was conducted on the archeology, history, and historic architecture of the area. Except for historical architecture the information used was gathered from secondary sources and interviews with knowledgeable local residents or scholars. The reports are very brief, highlighting what were perceived as the major events or historical themes relevant to the outer Cape. Regional Historian Frank Barnes (1958) emphasized the Pilgram connection, earlier exploration by Champlain and others, maritime economic pursuits,

especially Provincetown whaling during the 19th century, the 1644 settlement of Eastham, the wreck of the Revolutionary War British ship Somerset and other historic shipwrecks, the Marconi wireless station, and the shelling of Nauset Beach during World War I by a German submarine. Regional Archeologist John Cotter (1958) dealt mainly with prehistoric archeology, but included in his list of sites and potential sites some associated with the Pilgram reconnaissances of November and December 1620. Historical Architect Ernest Allen Connelly (1958) undertook the research on architectually significant structures within the area proposed for the new National Seashore as part of a project for the Historic American Building Survey (HABS). His first goal was to determine "...the number, location, and condition of any historic structures which might lie within the limits of the proposed Cape Cod National Seashore". The other goal of Connelly's project was to determine whether there were sufficient architecturally significant structures in the area to justify a summer HABS recording project. This project necessarily involved field research. Connelly spent several weeks on the outer Cape looking at structures, making contacts with owners, and in some cases seeing the interiors of structures as well. About 70 historic buildings with "architectural-historical value" were identified within the proposed boundary.

Soon after the creation of the Seashore, a position for a Park Historian was established. From the early 1960's to the mid-1970's the position was held by Edison P. Lohr. Lohr had a strong interest in the history of the outer Cape and in interpreting it through the interpretive programs at the Seashore. He and his staff did considerable documentary research and interviewed local residents on a variety of historical topics and specific historical resources. Lohr also was deeply interested in the archeological record of the Seashore. Given the purpose of this report I shall focus on his work with the archeological record and mention only in passing the documentary research, interviewing, and interpretation that I am aware of.

Lohr's concern for prehistoric archeological resources involved mainly preserving significant sites from destruction and looting, and thesecuring of artifacts from sites within the Seashore for exhibit and interpretation. In a long report, submitted by the Superintendent to the Regional Director, Northeast (Memorandum, 31 August 1964, ref. H 2219), Lohr described a number of planned construction projects at the Seashore that might affect archeological sites, using Moffett's 1962 report as a guide. He visited at least some of these sites with Moffett, as illustrated by the slides that accompany the report. Projects at Fort Hill, Pilgrim Springs, Small's Swamp, Coast Guard Beach, Skiff Hill, Doane Rock, Salt Pond, and the Provincelands are reviewed and their likely impacts discussed in the report.

Lohr's interest in historic period archeology extended beyond his preservation and interpretation responsibilities. One senses

in the avialable files that Lohr saw archeological data as a vital component in understanding the historical past of the outer Cape. One specific example is an interpretive trail that he planned for the Fresh Brook village site in South Wellfleet. The planning for this trail and its interpretation involved documentary research and interviews. The trail was to wind through the site of a settlement that had been established in the early 19th century and abandoned early in the 20th century. Lohr viewed the village site as a large in situ archeological exhibit. In July 1968 Lohr and two assistants went so far as to partially excavate one of the house foundations in the site.

In May of 1969 a purchase order was issued to Plimouth Plantation for archeological testing on Great Island and South Wellfleet. The order directed "...the salvage of data at the site of a potential 18th century trading post located on Great Island [in Wellfleet]...and at the site of Fresh Brook village, a small 18th and 19th century extinct community [in South Wellfleet] (Purchase Order #950-379)". In November of 1962 another purchase order was issued to supplement the work at the Great Island site which had taken on greater significance based upon the summer's work. The investigators now believed the site to be earlier, i.e., late 17th or early 18th century, and a whaling station. A preliminary report by Eckholm and Deetz (1969) completed the work described by the first purchase order. Although more fieldwork in 1970 and additional laboratory work were undertaken, a formal final report was never completed on the Great Island site. There are publications that describe and interpret the results of this investigation (Eckholm and Deetz 1971; Synenki and Charles 1984). The site is well known among historical archeologists, primarily because of Deetz's association with it. Data from the site have been used in a variety of other analyses and publications (e.g., Bragdon 1977; Deetz 1980: 33-36; Rockmore and Rothschild 1984).

Although the second purchase order issued to Plimouth Plantation for the Great Island work did not mention investigations at Fresh Brook, Regional Archeologist Cotter continued to plan for this study. On 21 September 1971, in a letter to Eckholm, he wrote, "we shall be looking forward to receiving an estimate for requirements to do investigations of the village site on Cape Cod". As late as April 1972 he expressed hope to the Superintendent of the Seashore that the "Plimouth Plantation team" would do the Fresh Brook site investigation (Memorandum, Archeologist-DSC Eastern US to Superintendent, Cape Cod NS, 18 April 1972). The inability of the Plimouth Plantation investigators to complete a final report of their work at Great Island, however, probably made work by them at the other site impossible.

Lohr and Cotter obviously were working in concert on an archeological program for the Seashore. In 1971 Lohr prepared four proposals for professional service projects that were archeological investigations. One of these called for the systematic excavation of seven or more sites at Fresh Brook, "...a

valuable, relatively undisturbed farm-fishing village site with a history from mid-18th century to 1930, when the last house was moved away. The sites are unquestionably rich in Colonial artifacts which could be compared with material from Plymouth and Great Island...The archeological approach is essential to supplement the meager historical record (Professional Service Proposal, 6 July 1971)". At the same time three other proposals were prepared, submitted, and approved. These included: a proposal for the excavation of a probable 18th century house site on Great Island, one for the investigation of historic and prehistoric sites at Fort Hill in Eastham, and one for the excavation of a prehistoric site near Pilgrim Spring in North Truro. That Cotter endorsed this program is clear from his 20 July 1971 memo to the Superintendent of the Seashore in which he recommended moving the Fresh Brook study forward from fiscal year 1974 to fiscal year 1972.

A memorandum from Cotter to the Office of Archeology and Historic Preservation in Washington dated 1 December 1972 indicates the archeological program for the Seashore as of that date:

Package 132, Archeology, Colonial House site, Great Island: $4,600

Package 133, Archeology, Indian Camp Site, Pilgrim Spring: $2,300

Package 116, Fresh Brook Village: $2,000

Package 122, Fresh Brook Village: $7,000

Package 117, Fort Hill Camp Site: $2,000

It is clear from Cotter's memo that the first two packages listed have the highest priority for funding and that the others are ranked lower. None of these packages ever were implemented. Perhaps the problems with the completion of the Great Island work prevented any further movement on the program. From the perspective of 1986, the program as developed by Lohr and Cotter covered some of the major individual sites within the Seashore. The program that they proposed, however, lacked a component of the program that would have provide a more solid, quantified description of the overall archeological record and its significance. Lohr and Cotter were content with Moffett's (1962) initial park archeological base map to provide this perspective.

At this point in the history of historical and archeological efforts at the Seashore the files that I have available contain a hiatus. For whatever reason, the archeological program set up by Lohr and Cotter was not implemented. In 1976 a new Park Historian, Fahy Whitaker prepared a new proposal for a Historic Resource Study, that was designated Package 168. The resource study was to include: "...identification and evaluation of

resources, recommendations for Land Classification, and a recommended List of Classified Structures". It was to encompass both archeological resources and standing structures. The proposal noted that the 1962 Moffett survey was "preliminary...[and needed] review, update, evaluation, etc." Regarding the historical research the proposal stated that a review was needed of previous studies (e.g., 1958 Field Investigation Report, 1962 Master Plan, Historic Base Map, and 1970 Master Plan) and information discovered through the years, probably Lohr's research and interpretaion files. An evaluation of the historic research was called for, along with an in-depth study to identify further historic research that was needed.

Historical research and evaluation for the study was done by Historian Berle Clemensen of the Denver Service Center. His report was completed in 1977, but not printed until 1979 (Clemensen 1979). This report, using a mix of primary and secondary sources, was written "...to provide a general history and historic base map of the National Seashore area (Clemensen 1979:vi)". It fluctuates between providing an overall description of the historical patterns that occured in the area, e.g., Chapter IV-White Settlement and the Destruction of Cape Cod Resources, and more antecdotal treatment, e.g., Chapter VIII-Provincetown Harbor Defense and Chapter IX-Shipwrecks. There is no discussion in the text of the study of an evaluation of the existing historical research that had been done at the Seashore and there is no indication of what future research needs remain to be addressed.

In late 1977 the archeological portion of the study envisioned by Whitaker was revised and redescribed as a separate study entitled Package 168, Archeological Investigations, this was subsequently redesignated as Package 300.

Historical Research and Historical Archeology for the Archeological Survey

The planning stage for the archeological survey recognized the need for historical background information. There were two reasons that such information was required. First, historical information could identify locations where historical archeological sites might be found. Second, historical information could provide contextual information with which to evaluate the historic sites that were found, as well as to explain modifications that had been made to the land during the historic period and had affected the archeological record in some areas.

The two main reports on archeology and history at the National Seashore did not contain these kinds of information. Moffett's report on archeological resources and the archeological base map that was derived from it provided information on those sites with which Moffett was familiar (Moffett 1962; Map #NS CC 3016, July 1962). Moffett drew up his annotated list of sites

based upon his extensive knowledge of the outer Cape and its history and archeology. He focused mainly on the prehistoric archeology, however, and the historic period sites that are listed mainly are spectacular or unique types such as shipwrecks and abandoned Life Service stations. Moffett's information also focused on known sites and did not provide any estimates of the liklihood of sites occurring in various parts of the Seashore.

The second source on historical information was the report by Clemensen (1979). Unfortunately, Clemensen's research was completed before research for the archeological survey got underway and no direct coordination between his effort and those for the survey were possible. Since Clemensen did not identify many specific sites or identify likely locations for sites, the report was not useful for initial planning of the archeological survey.

In 1978 Historian Marlene Rockmore began a documentary study of the historic period archeology on the outer Cape, focusing on the area within the boundaries of the National Seashore. Her task was to review briefly the social and economic histories of the outer Cape towns, identify any historic period sites that were mentioned in the documentary records that she checked, and identify areas that the documents indicated might contain historic period sites. With limited time that she had to devote to the project, she had to concentrate her effort on the review of secondary sources. Rockmore's report, completed in June of 1979 includes an overview of the social and economic history of the outer Cape, a listing of specific and probable historic period sites within the Seashore, and a set of vellum sheets designed to be overlayed on U.S.G.S topographic maps on which are marked the locations of the sites and potential sites that she identified (Rockmore 1979).

Rockmore's report and map overlays were used throughout the archeological survey by field supervisors to identify potential or known sites that might occur within the sample units being surveyed by crews. A standard practice was for the field supervisor to check each sample unit against the map overlays and note for the crew chief any historic sites that were expected within or nearby the sample unit. Rockmore's overview also was used as a basis for interpreting the social and economic history of the outer Cape, general topics that are treated antecdotally by Kittredge (1968) and not at all by most of the popular available histories (e.g., Dalton n.d., Hinshaw 1969).

Throughout the fieldwork of the survey historic sites were subjected to the same discovery and initial site examination method and techniques as prehistoric sites (McManamon 1984). In addition, observations of nearby surface features, such as, roads, building foundations, and standing structures, by crew chiefs provided extra information about the possible function of historic period sites. Survey data from the first year of fieldwork was analysed using similar techniques for both historic and

prehistoric sites. Two reports were made on the historic period site analysis (Childs 1981; McManamon and Childs 1981). These reports have been combined and modified for presentation in this volume as Part III.

At the beginning of the second year of fieldwork it became apparent that intensive site examination involving probability, systematic, or judgmental sampling were going to be time-consuming. They could not be applied at all sites, so it became necessary to decide which sites would be intensively examined. Considering the money and time available, it was decided to focus intensive work upon a sample of prehistoric sites. The justifcation for this decisions had four elements:

1) Less was known about prehistory and there was no source of information besides the archeological record for this information.
2) The expertise of the principal investigator and the staff of the survey project was mainly in prehistory.
3)More comparative archeological data were available to assess and interpret prehistoric remains.
4) A large body of documentary source would have had to have been scrutinized prior to intensive site examination of the historic sites.

Further analysis of the archeological data from the historic period sites has not been attempted, but the analysis reported in Part III of this volume suggests at least one avenue that is possible with the data on hand; surely, others exist. Further fieldwork of the historic period sites in the Seashore also is possible if management or interpretive needs arise.

More detailed background data for interpretation seemed an essential first step in the potential future use of the historic period archeological data. None of the existing historic treatments seemed to provide the kind of social and economic contextual information with which archeological data can be used most easily. Providing a beginning for such contextual background was within the means of the survey project. For this purpose a research project was developed to investigate the historic period settlement and socio-economic characteristics of outer Cape Cod. The goal of this project was to reconstruct, using primary data when feasible and possible, particularly census data and historic period maps, the social and economic situations of the inhabitants of Eastham, Wellfleet, Truro, and Provincetown from the settlement by Europeans through the mid-20th century (NARO Purchase Order #PX1600-0-0817).

This project was undertaken by Dr. Patricia E. Rubertone of the Department of Anthropology, Brown University. Rubertone, focusing her efforts on the 17th through 19th centuries, has aimed to provide an ecnomic and social history of the outer Cape. Primary in her treatment is an attempt to understand the

relationships between population, resources, and economic strategies. The product of her efforts is Part II of this volume.

Summary

In this part of the volume, I have attempted to trace the concern for the history and historic archeological resources of Cape Cod National Seashore by the National Park Service from the beginning of planning for the Seashore through the completion of the Cape Cod National Seashore Archeological Survey. A consistent and strong concern is demonstrated throughout the period of Park Service involvement. At times the concern has not been operationalized effectively, but it always been there. Further use of the archeological data that have been collected through the survey is possible and should be encouraged. Additional specific historical research envisioned by Park Historian Lohr into an interpretive program that tells the rich story of the life of past inhabitants of the outer Cape remains an unattained goal, but one that is within reach.

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PART II

CHANGES IN THE COASTAL WILDERNESS: HISTORICAL LAND USE PATTERNS ON OUTER CAPE COD, 17TH-19TH CENTURIES

Patricia E. Rubertone

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I alone, however, accept responsibility for the contents. Over the course of the last few years I have engaged in archeological research projects that have ranged the gamut from a seventeenth century Contact period burial site to a nineteenth century urban-industrial block. In the process, I have had been exposed to new and exciting publications that have made me aware of the breadth of concern shared by scholars from different disciplines on the transformation of New England. I have the opportunity to meet a wide range of individuals from academia to just plain folks who have shared their enthusiasm for the subject with me. In preparing this manuscript, I have drawn on all of these experiences. I only hope that the weaknesses that lie therein will encourage further research and will result in a better understanding of the things that have come to pass.

CHAPTER 1

Introduction

The aim of this study is to examine the interrelationships among people, resources, and economic strategies on outer Cape Cod during the historical period. Its focus, therefore, is to look at the ways in which people chose to interact with their surrounding environments, both natural and social, and to evaluate what effects these decesions had on the ecosystem through time. In comparison to previous studies of Cape Cod, from scholarly studies to more antiquarian, even folksy accounts, that have tended to emphasize one or another aspect of its history such as social institutions or cultural lifeways or the environment itself, the approach that is presented here is one that views these different realms as inextricably linked together.

During the historical period, defined here as ranging from the seventeenth through the nineteenth century, the outer Cape provided the backdrop across which many human actors passed. In their passage, they made decisions concerning where they would place their settlements, and how when they would utilize different resources. These decisions altered existing circumstances, sometimes to the point of accelerating the natural ecological processes affecting plant and animal populations or even changing their course altogether. Subsequent generations were forced to devise new ways of dealing with these conditions, often involving a basic reorganization in the ways in which they conducted their lives and interacted with each other.

In attempting to account for these changes, one is tempted to seek answers simply in terms of the region itself, that is, by alluding to local events recorded, albeit imperfectly in various town records, testimonials, and similar accounts, and local environmental circumstances. To do so, however, would be to fall into the situation that has so often entrapped the local historian and the anthropologist alike. It is one in which the object of study is delimited in such a way so that both cause and effect are

perceived as occurring within a very narrow locale. As a consequence, the unit of study, be it the historian's "town" or the anthropologist's "village", begins to take on a false sense of importance as a discrete, bounded entity.

While local environmental conditions do affect, but do not necessarily determine, how people conduct their lives, and local events do have consequences that are felt locally, there are broader factors to consider. Put quite simply -- non-local events may very well have local consequences. These, in fact, may be just as important, and at times even more so, in attempting to understand the transformation of a region through time, especially in the modern period. As many social scientists have come to realize, the modern world, i.e., that since 1492, has been one in which the forces of European commercial expansion and industrial capitalism have propelled people to engage in relations that extend well beyond the boundaries of their local ecosystem (Wolf 1982). In turn, these non-local relations affect the local ecosystem and become very much a part of it.

Viewed in this light the changes that unfolded on the outer Cape from the time of its original exploration and settlement by Europeans through the nineteenth century begin to make sense. The colonization and subsequent developments which led to the ecological transformation of this outer portion of Cape Cod is very much a frontier process. As such the events and the developments which occurred there must be set in a larger systemic context since in any frontier situation there must be prior conditions that stimulated the influx of the colonizing population as well as circumstances that eventually dictate the emergence of regional hegemony.

Having set up this theoretical framework, I attempt in the following chapters to construct a history of the ecological relationships that have existed on the outer Cape from about the seventeenth century through the nineteenth century. In Chapter 2, I begin by presenting the views held by many European visitors about the Cape's environment prior to the time of settlement and compare these often disparate views of this area as one of abundance or destitution to what modern ecologists tell us about the area's natural history. In Chapter 3, the nature of the precolonial landscape, that is, the actual conditions that existed when the European colonists first arrived on the outer Cape's shores is examined. The following chapter contrasts the relationships of the local Indians and the European colonists to the land and its resources. As the relations that evolved between these respective groups were an important aspect of the frontier process itself, an understanding of them sets the stage for examining the expansion of Euroamerican settlement that is explored in Chapter 5. In Chapters 6 and 7 respectively, the processes of ecological change that resulted from European settlement, and the ways in which the Euroamerican inhabitants of the outer Cape attempted to deal with these changes are discussed. The final chapter presents a summary and attempts to offer some

thoughts on the changes that occurred.

In structuring this analysis, I have tried to incorporate the use of primary sources wherever possible. Those that have been examined include documents such as census manuscripts, Massachusetts tax valuations, land evidence records, town meeting notes and other town records, compendiums of statistical information on industry, and modern soil studies. In addition to these documents, other primary sources such as early accounts by European explorers, treatises on the environment made by contemporary observers, later accounts by travelers and naturalists like Thoreau and Timothy Dwight, and various reports on the outer Cape towns contained in the Collections of the Massachusetts Historical Society from the late eighteenth and nineteenth centuries were reviewed. Although these sources were the basis for the research, I also have had to rely on secondary works produced by scholars in my own field, anthropology, and those from a variety of other disciplines in the natural sciences and the humanities. These works have been indispensable in attempting to bridge the gaps in the primary research and in trying to identify broad trends in political and economic history that provided the context for interpreting local phenomena.

Nevertheless, in using these various lines of evidence some caution had to be exercised. The most difficult aspect was in attempting to draw connections between local events or actions and some local consequence which may or may not have been precipitated by the former. Moreover, some things that have been recorded were perhaps inconsequential and therefore, may not be significant to the research. Alternatively, there are some important things that have occurred for which there is simply no historical evidence. Yet, in spite of these difficulties, one finds in the sources an incredibly rich record with which to construct a scenario of the ecological relationships that once existed on the outer Cape. But before presenting these interpretations, it is necessary to set the stage upon which this scenario was acted "...for as Geography without History seemeth a carkasse without motion; so History without Geography, wandreth as a Vagrant without a certaine habitation" (Captain John Smith, quoted in Jennings 1984:25).

CHAPTER 2

The Coastal "Wilderness"

Many early European visitors to New England inevitably charted a course which brought them in view of Cape Cod. Extending eastward from the New England mainland for 35 miles before it takes a sharp turn northward for the same distance (Figure 2.1), this landmass forms an outstretched arm which more than likely beckoned these navigators to its shores. By the early seventeenth century, the Cape as well as other points along the North Atlantic coast had become a series of familiar landmarks sighted during the course of a voyage, and for some, places of refuge along the way. Written accounts of these voyages have left us with observation which in no small part were responsible for shaping the opinions held by arriving Europeans about the land which they would come to inhabit.

Views of the Precolonial Coastal "Wilderness"

For the Cape, these accounts present us with a basic contradiction concerning the nature of its environment. On one hand the Cape is presented as treacherous and untamable "coastal wilderness" (Stilgoe 1980), while on the other, there are statements praising its riches. Undoubtedly, sighting of the coast must have brought great relief to the early European visitors who crossed the North Atlantic in the sixteenth and seventeenth centuries. Yet, New England's coast, particularly in the vicinity of Cape Cod, the offshore islands of Nantucket and Martha's Vineyard, and the adjacent shoals, was extremely difficult to navigate. More than one European expedition was threatened by sudden storms or beached by blocked channels and shallow water. Kittredge (1930:15) notes that the early seventeenth century navigator Bartholomew Gosnold narrowly escaped running his ship aground on shoals extending off a point at Eastham which was referred to thereafter as "Point Care" and the surrounding surf as "Tucker's Terror." A French expedition which carried among its crew Samuel de Champlain ran into such

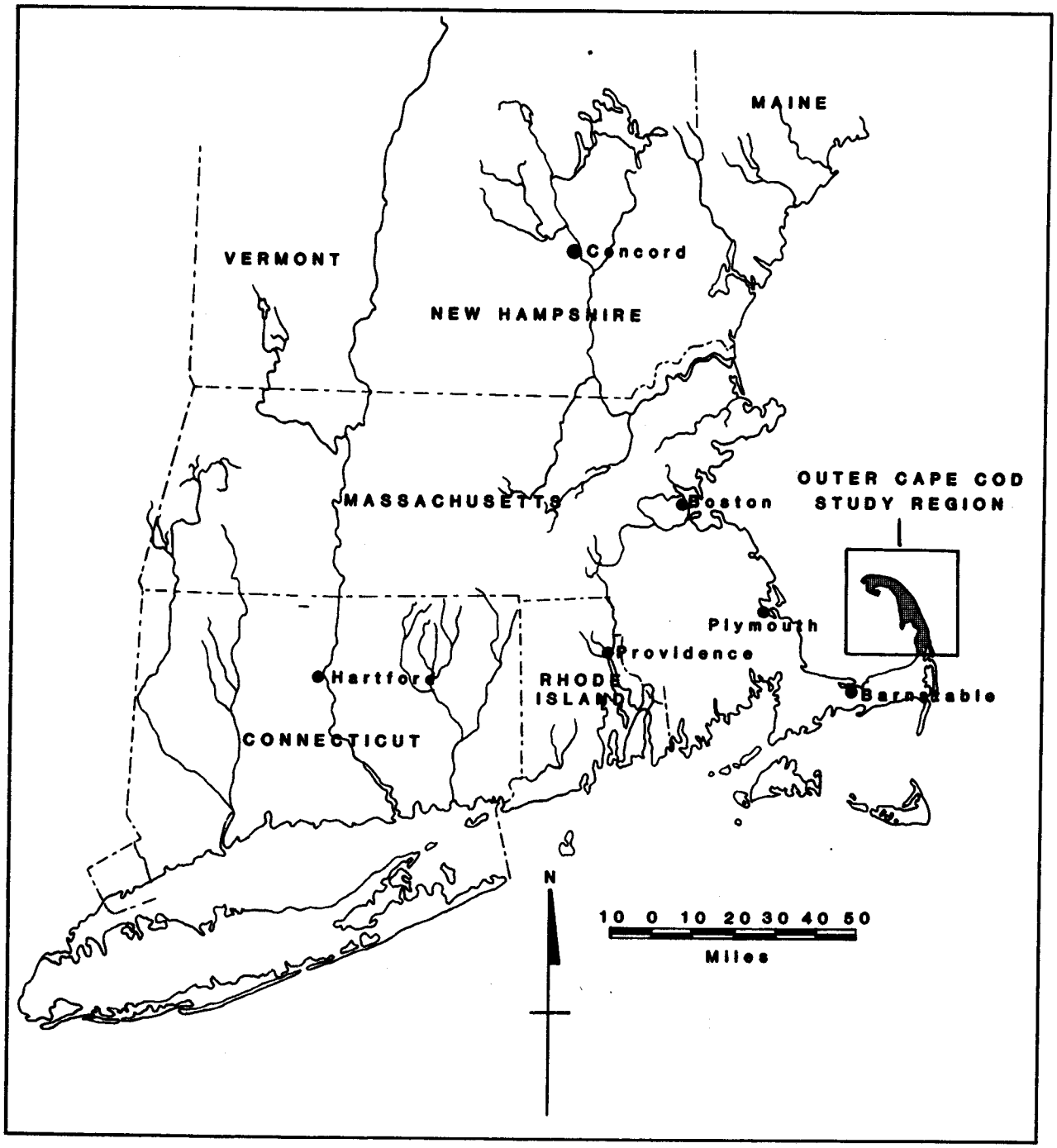

FIGURE 2.1. Map of Southern New England Indicating Outer Cape Cod Study Area.

difficulties near the Monomoy shoals along the Cape Cod coast that pounding surf smashed their ship's rudder (Champlain 1907:94-97).

To Captain John Smith, whose account "A description of New England" was published in 1616, the Cape was "onely a headland of high hils of sand overgrowne with shrubbie pines, hurts, and such trash" (Arber 1910). The land itself was suspect, its patterns and cycles unknown; it was a wilderness where many were fearful to remain. The Cape's inhabitants and their customs were strange to the Europeans. While curious at one level, the Europeans were more often than not suspicious of the Indians' actions, and were not adverse to using force to quell their doubts about their motives in any given instance.

Yet, despite such negative views, other explorers provide glowing accounts of certain characteristics of the environment which seem to minimize the apparent dangers presented by others, as well as the Europeans' own personal fear. For the most part, these accounts read more like inventories in which desirable and commercially profitable resources are listed. These resources were those which could be transported back to Europe which is not surprising given that at least a partial goal of these missions was finding new sources of wealth for European economy. The historian William Cronon (1983) suggests that many of these "merchantable commodities" were exactly those resources which were scarce, yet in demand, in Europe at the time such as beaver for felt hat production, cod for salting and export and sassafras. In fact, the abundance of sassafras in southern New England played a major role in threatening the monopoly held by Sir Walter Raleigh over its importation from the middle Atlantic region of North America. The return of the Gosnold expedition in 1602 with its cargo of sassafras collected from the Elizabeth Islands in Buzzard's Bay cut a huge dent into Raleigh's profits which have been estimated somewhere in the neighborhood of a thousand percent (Carroll 1973). Although the price of the commodity began to taper off with the arrival of new shipments, it did not fall far enough to discourage others from flocking to southern New England where it was found in great abundance.

Timber resources also figured into these assessments of the region as is illustrated in the following account of the Elizabeth Islands made by the English promoter Brereton (quoted in McManis 1975:12):

> This island is full of high timbered oakes, their leaves thrise so broad as ours; Cedars, straight and tall; Beech, Elme, hollie, Walnut trees in abundance, the fruite as bigge as ours, as appeared by those we found under the trees, which had lein all the yeere ungathered; Haslenut trees, Cherry trees. . . Sassafras trees great plentie all the Island over; a tree of high price and profit; also divers other fruit trees, some of them with strange barkes, of an Orange colour, in feeling soft and smoothe like velvet...

Given the depletion of England's woodland in the late sixteenth century, it is not difficult to comprehend the attention given to timber resources in the accounts of these early explorers. Although conditions at home forced England to seek sources of timber products from abroad, it must be kept in mind that transportation costs were high. Apparently, the costs involved in shipping timber from the New World at this time were too high for it was not collected to any great extent on these early expeditions despite its abundance.

While these accounts may have emphasized, and at times exaggerated, the richness of the Cape and its environs, they represent only a subset of the environmental elements which actually existed. Those resources which the early explorers noted were those which potentially could figure into subsequent decision-making concerning commercial ventures or future settlement, yet neither their patterns of seasonal availability nor spatial distribution were known beyond the most superficial level. At the time when these observations were made, these resources were not being exploited in the manner or to the extent envisioned by the European recorders. The consequences of such activities were unknown, and would only be discovered later. Clearly, the image of the landscape emerging from these accounts did not give those who came to settle on the Cape in the seventeenth century an accurate picture of its natural environment or of its long-term ecological viability.

Cape Cod as a Natural Area

In reality, the Cape probably never was, in terms of its terrestrial resources, neither a virtual wasteland nor a Garden of Eden. Its surrounding waters, while treacherous to navigators, also contained some of the world's richest fishing areas. As a natural region, the Cape is part of the New England coastal plain. Its terrain and that of the nearby islands have been affected greatly by the ice sheets of the last glaciation. The major physiographic features of the Cape are formed by large deposits of glacial drift-- boulders, gravel, and other accumulated debris-- that form the hilly parts of the upper Cape. From Eastham to northern Truro, is the remnant of an outwash plain formed by glacial meltwater. This outwash plain which comprises most of the land surface of the outer Cape is quite porous; its mostly sandy soils tend to dry quickly since many of the smaller water- holding particles of clay were removed in suspension by the glacial meltwater (Jorgensen 1978). Its surface is pitted with natural depressions called kettleholes formed when blocks of ice buried under the outwash gravel melted. Rising sea levels following the melting of the ice sheets forced the water table on Cape Cod to rise and in the process many of the kettleholes were transformed into ponds or bogs depending on their depth and their elevation above sea level (Patterson and O'Keefe 1980).

The retreat of the last glaciation did more than transform the surficial geology of the Cape, it gradually transformed the frozen tundra of New England into a series of vegetation communities which ecologists have divided into three broad zones to reflect these differences. For southern New England, palynological evidence suggests that tree species which began colonizing the area about 11,500 years ago migrated from other parts of the country at different rates and by following very different routes (Jorgensen 1978). In the course of these migrations, the forests were transformed from primarily coniferous to mixed coniferous-deciduous ones as birches, maples, hemlocks, oaks, and other hardwoods migrated into the area. Termed an oak-chestnut forest the modern southern zone of the New England forest had most of its chestnut trees virtually eliminated almost a century ago due to a fungal disease, referred to as the "chestnut blight". As with the other forest zones farther to the north, this vegetation region contains considerable internal diversity resulting from differences in soil fertility, available moisture, slope, other natural factors and human agents. This diversity resulted in a wide range of habitats supporting different mixes and percentages of fauna and flora.

Although geographically the Cape falls within the oak-chestnut region, its vegetation contrasts to that found in most New England oak forests. Its vegetated landscape appears as a scrubby woodland in which pitch pine and oaks are dominant along with shrubs like holly and bayberry. This vegetation pattern is characteristically found on sandy and gravelly soils of outwash plains in other parts of coastal southern New England, eastern Long Island, and the pine barrens of southern New Jersy. Recent studies of pollen cores from the Pamet Cranberry Bog in North Truro (Patterson and O'Keefe 1980) and Duck Pond in South Wellfleet (Winkler 1982) suggest that oak and pine have been the primary components of the Cape's vegetation in the post-glacial period. Unlike other parts of southern New England, there is little evidence that mesic species like beech, maple, hickory, birch, and chestnut have been important to the vegetation composition during the past 7,000 years (Patterson and O'Keefe 1980:23).

Through time, however, pitch pine increased at the expense of white pine and other species rendering the composition of the Cape early forests similar to the modern-day forests familiar to today's visitors (Winkler 1982:97-100). The reason pitch pine became dominant may be related to the Cape's dryness. This dryness is due in part to the soil porosity, rather than inadequate rainfall. Rainwater generally passes through the upper layers of soil until it is well beyond the depths of most root systems. Pitch pine produces a very deep root system which enables it to extract soil moisture from depths below that of other trees. Although it previously had been postulated that fluctuations in the ground water levels, presumably resulting from similar fluctuations in the sea level during the past 5000 years, were responsible for the increase of pitch pine at the expense of

other species during this period (Deevey 1948), recent studies have shown that this was not the case as sea levels rose steadily throughout the period.

The more likely factor to account for the increase in pitch pine in the Cape's post-glacial landscape is forest fire. Whether ignited by lightening or caused by human agents, forest fires have been a major factor for the Cape's forests. During the summer months, strong southwestern winds render conditions on the Cape drier than usual, making forest fires more likely. These fires virtually destroy the humus layer of the soil and dessicate any available soil moisture. Several studies (Patterson and O'Keefe 1980; Winkler 1982) have indicated that the period for which the pollen record shows an increase in pitch pine in the Cape's post-glacial forests corresponds to the time when prehistoric populations may have contributed to increasing the frequency of fires by regularly burning the forest understory (e.g., Day 1954; Wood 1977). Pitch pine unlike many other tree species has the ability to thrive under these conditions. After a fire, pitch pine can sprout from dormant buds at the base of their trunk (Thomson 1958). Older trees retain this ability to sprout from stumps for many years; their thick bark also affords protection from fires of medium intensity (Jorgensen 1978). Regular forest fires seem to maintain a pitch pine forest in another way. The cones of mature trees growing in areas where fires have been especially severe will remain closed until they are heated by a subsequent fire. A forest fire both releases the seeds for germination and creates an open seedbed for these shade-intolerant species.

The Cape's oaks, like pitch pine, can sprout vigorously from burned stumps making them well adapted to conditions which have existed there for thousands of years. Of the Cape's oaks, including bear, black, scarlet, and white oaks, there are some species that are better suited to these conditions than others. White oak followed by black and scarlet oaks will tend to be eliminated by repeated forest fires. The distribution of fire-sensitive species such as beech, hemlock, white pine, and others is restricted only to a few protected locations on the outer Cape such as near ponds, swamps, and other freshwater wetlands where the available moisture is greater and provides some protection from fire. The available moisture of these various wetland habitats also supports a range of different herbaceous plants and shrubs, including cranberry which flourshes in its bogs. The area's salt marshes which are dominated by a variety of grasses such as Spartina patens and Spartina alterniflora which served as pasture for colonial livestock.

Conclusions

The fact is that the outer Cape like other parts of New England is not a homogeneous landscape -- it is neither homogeneously lush nor barren. Natural factors such as glaciation

have created much diversity across its land surface. Dynamic processes have continued to mold its surface long after deglaciation. Wave action has worn away its shoreline, but also has deposited sand to form beaches and spits of land jutting into the sea. Rising sea levels have inundated beaches and low-lying landforms, but also have stimulated salt marsh development in coastal locations and their accompanying vegetation communities. Forest fires have destroyed extant vegetation, but in their aftermath have resulted in the new growth of diverse vegetation communities as the forest begins to regenerate. In all, these factors not only have created but continue to maintain a diversity of habitats on the outer Cape. In attempting to understand the local ecology and the relationship between human population and resources, this diversity and the maintenance of it through time is of prime interest.

Chapter 3

The Precolonial Landscape

The importance of the environmental diversity of Cape Cod is that it presented for historical populations a wide range of terrestrial and marine resources which they could utilize. Their selection and utilization of these resources was affected largely by seasonality and distribution. Seasonality regulates when different resources are available during the yearly cycle; distribution concerns where and how these resources are available across the landscape. Each is important to understanding the nature of relationships between population and resources on the outer Cape.

Seasonal Cycles

It is fair to say that the early English settlers were ignorant of New England's long-term climatic pattern and the characteristics of seasonal precipitation (McManis 1975). Few of the European expeditions to the region and none of the English explorers prior to the establishment of Plymouth in 1620 had experienced the passage of a complete cycle of seasons. While many unrecorded voyages from the sixteenth century or perhaps earlier may have brought European sailors who fished in the Cape's coastal waters or raided its shores, these visits were in all likelihood brief and ostensibly of little consequence in understanding the region's environment.

Beginning in the seventeenth century, several expeditions resulted in visits to the Cape which were of somewhat longer duration. Sailing from England in March 1602, Bartholomew Gosnold arrived at a point somewhere along the New England coast, probably around southern Maine, in May. The expedition sailed south and anchored off of Provincetown and stayed there for a short period of time before heading south around the outer side of the Cape. Before the end of the month, they arrived at the islands in Buzzards Bay where Gosnold decided to establish an outpost on the island of Cuttyhunk which he named Elizabeth's Isle. Here the

crew is said to have built a house and fort, cut cedar and sassafras, dried fish and collected other supplies by trading with Indians from the mainland. Although several members of the crew were assigned to spend the winter at the post, they refused and insisted on returning with the rest of the expedition which set sail for England on June 17, roughly two months after their initial sighting of the New England coastline.

The following year Captain Martin Pring sailed to the New England coast arriving somewhere near the islands east of Penobscot Bay and subsequently following a southward course to Massachusetts Bay. The expedition anchored at an inlet on Cape Cod Bay near the site of Plymouth which Pring called Whitson's Bay. Here they lingered for seven weeks collecting a cargo of sassafras and experimenting with the planting of English crops on New England soil. The seeds sprouted before the expedition departed which led Pring to judge the area's climate as suitable for future English settlement.

Not until the summer of 1605, when Samuel de Champlain accompanied an expedition that had sailed south along the New England coast from an outpost on the St. Croix River near the Bay of Fundy, is there any record of further European exploration in southern New England. The severe cold and harsh conditions experienced by the French expedition on the St. Croix River island forced them to seek a site with a warmer climate. Their search brought them to Cape Cod where they explored the coast along the bayside as far as Wellfleet Harbor before sailing around the tip of the Cape down to Nauset Harbor in late July, 1605. Here the expedition spent three or four days during which they ventured inland and saw fields that had been planted by the Indians and a village. There the French inquired whether the area received much snow. The Indians' responded that the snow reached about a foot in depth, perhaps less according to some, and that the harbor never froze. Although Champlain was unable to determine how long the snow lasted, he concluded that the "region is of moderate temperature, and the winter not severe" (1907:71). Curiously, during their stay in Eastham, there was a northeasterly storm which brought with it overcast skies and cold temperatures. The unpleasant weather did little to change Champlain's assessment of the region's climate as he dismissed the cold as a freak out of season occurrence.

Undaunted Champlain returned to Cape Cod in October 1606 with an expedition led by Poutrincourt (Champlain 1922:402-433). The expedition anchored in Wellfleet Harbor which they named Port aux Huistres because of its abundant oysters. The next day, October 2, they continued their voyage around the Cape to arrive once again off Eastham. Rough seas compounded the difficulties of navigating along this portion of the Cape and forced the expedition to seek the aid of an Indian who guided them safely to Stage Harbor in Chatham. Here they made frequent excursions to the shore, observing evidence of the Indians' way of life, the disposition of the landscape and even constructing ovens in order

to replenish their supply of bread.

After about two weeks time, a small party of several Frenchmen who remained on shore were attacked by Indians. Shortly after an unsuccessful attempt by other members of the crew to avenge the attack, their ship once again drew anchor and sailed in sight of Martha's Vineyard and Buzzards Bay, but failed to anchor at either place due to strong winds and the imminent approach of winter. Their intention was to return to Chatham to seek the revenge for murder of their men. While their plan to capture Indians failed, they did manage to kill a portion of them in an attack. The French soon withdrew to Eastham where they remained until the 28th day of October when they set sail for their settlement to the far north. The French expedition spent less than a month during this voyage to the Cape.

These expeditions as well as others that brought European explorers to New England before 1620 resulted in impressions of the region's climate that were distorted by the simple fact that none had experienced the lean part of the year in southern New England. Clearly, others like Champlain, notably George Popham and Raleigh Gilbert who had established a colony at Sagadahoc, an estuary of the Kennebec River, in 1607, had experienced winter conditions in northern New England. Their attempts at establishing economic outposts there failed as a result. In the more southerly latitudes, the European visitors' accounts were based on observations made in the spring, summer, and early fall -- seasons in which both terrestrial and marine resources were most abundant. Many later settlers surely had their views of southern New England as a region of perpetual abundance molded by these accounts (Cronon 1983:35). For many, this region was considered "the Paradise of all those parts" as John Smith proclaimed following his explorations along the New England coast in 1614.

In reality, New England's seasonal cycles were not very different from those of England, although its winters were more severe and its summer temperatures warmer. Having a temperate climate, its natural environment is characterized by periodicity which governs adjustments made by each plant and animal species at various times during the annual cycle. There is a time of year when sap flows from maple trees, when the oysters grow plump in the bays, when berries ripen on the vines, when the waterfowl pass through on their migratory routes, and when deer begin to rut. In the absence of a widespread, rapid interregional food transportation network or an effective, long-term food storage system the periodicity of the annual cycle affects the ways in which people obtain their food and conduct their livelihood since their subsistence is largely dependent on the availability of locally available plant and animal foods. This was as true for New England as it was for England; and likewise it was valid for the pre-colonial Indian populations and the later European settlers.

The periodicity in the annual cycle reported by the early European explorers and experienced by modern inhabitants, involves a basic pattern of cold winters and warm, mild summers. Average temperatures for January range from 25 degrees F(-4 degrees C) inland to 36 degrees F(4 degrees C) in coastal areas; the figures for July are around 70 degrees F(22 degrees C). The arrival of fall frosts and spring warming, however, varies across New England. On the Cape where the surrounding ocean has a moderating affect, the climate is generally warmer than in other parts of the region. Mild weather usually extends well into the fall and killing frosts rarely occur earlier than in inland areas.

These average statistics are not very informative in terms of understanding the environmental conditions and the adjustments that people consequently made whether successful or not. Although it is generally expected that human adaptation represents adjustments to long-term environmental conditions, there is increasing interest in how populations deal with the problem of short-term fluctuations in resources. The rainfall pattern in New England provides an excellent case to illustrate this kind of variability. While the average annual precipitation is around 40 inches (100 centimeters), there is considerable fluctuation on a year-to-year basis. Both wet and dry years have been known to occur. Although there is no dry season -- precipitation is distributed evenly throughout the year -- there are dry and wet periods during part of every year. These fluctuations in annual and seasonal precipitation patterns, and also in temperature, directly affect resource availability. Summer droughts, for example, can destroy or seriously retard the growth of young shallow-rooted plants and leave larger ones unprepared for the rigors of winter (Jorgensen 1978).

On the Cape the ocean has an ameliorating effect making its climate generally milder compared to that of the rest of New England; however, the ocean also produces some rigorous conditions. In addition to extending pleasant weather into the late fall and delaying the arrival of spring, the ocean is responsible for coastal fog and strong off-shore winds which are characteristic of the Cape's weather pattern. During a windy spring, turbulence postpones the development of a thermocline in the Cape's cold waters. When warm, moisture-laden air blows over these waters, fog results. Frequent fog can limit the amount of sunlight that reaches growing plants. Strong winds coming off the ocean make the climate harsher in the more exposed areas than would be expected from the temperature averages. These winds as were discussed earlier increase the risk of forest fires on the Cape, especially during the summer months.

Resource Distribution

In addition to seasonality, the variations in geographical distribution of resources across the landscape is a major factor affecting resource availability. Although the Cape already has

been described as a mosaic of diverse habitats, this statement provides little information about the pattern of distribution, i.e., where resources occur spatially. Along with seasonality, spatial distribution is an important criterion in determining how people interact with the environment. Given the patchiness of the environment, the options are for any group simple -- either move the people to the resources or move the resources to the people, or perhaps persue some combination of strategies (Thorbahn 1984).

For New England's Indian populations, current interpretations are that groups moved in order to exploit seasonally available plant and animal resources located in spatially dispersed habitats (Snow 1980). In an environment in which a variety of resources are closely spaced, like the outer Cape, where it would be possible for a human group to exploit these resources from a single year-round settlement, this assumption has been challenged. Recent research on prehistoric land use on Cape Cod (McManamon 1982, 1984) has suggested that from at least the Middle Woodland period onward (roughly 2,000 years ago) Indian habitations were occupied year-round. This interpretation is based on the presence at a number of sites of dense midden deposits containing a wide variety of shell and other remains. This pattern of resource utilization suggests that prehistoric populations on the Cape from the Middle Woodland onward exercised an option in which resources not readily available at the habitation site were moved to it, perhaps by task groups that left scant evidence of their activities in the archeological record.

The option of moving resources to the population is the one generally followed by European settlers. Yet, the existence of this economic strategy among the Cape's Indian populations does not seem to have been the result of European contact. In devising strategies to move resources to the locus of settlement, however, the Euopean practice was to create order out of the disorder perceived to exist in nature. Unlike the Indians, the Europeans viewed the patchwork of resource communities distributed across the land in a seemingly random manner as a wilderness that had to be molded and changed (Stilgoe 1982). By bounding open space, apportioning land to community members, constructing buildings and laying out roads, the colonial settlers sought to impose order on nature's chaos. Through cultural artifices, resource inequities perceived in space could be altered and the landscape re-ordered into one that conformed to their own sense of order. These allerations to the existing landscape were essential to their establishment of economic and social life. The layout of roads, for example, facilitated not only the movement of people between places, but enabled resources to be transported between places of extraction and places of consumption. The construction of permanent housing and storage facilities enabled people to overcome disparities in the distribution of natural resources and in seasonal availability, while at the same time fostering potential economic and social inequalities within the community. Even cultivation a cultural artifice through which desirable plants could be moved from their natural habitats and raised in

locations that fit their perceptions regarding spatial order.

In the evolution of the colonial landscape, initial decisions regarding settlement location, land use, and architectural investment were critical and set the stage for subsequent changes. In this decision-making process, the early English settlers held the expectation that they would continue to earn their livelihoods as they had done in England, but would be more successful at it. As many were farmers, they sought to place their settlement in a locale suitable for agricultural pursuits.

The Pilgrims who established the first permanent English settlement in New England had little prior knowledge of the distribution of resources in the region. Arriving at Provincetown harbor in early November, 1620, their ship remained anchored there for a month before they reached a decision concerning where they would settle. During this time, they initiated three exploratory surveys on the Cape in order to find a suitable site for their colony (Heath 1962; McManis 1975).

Their first scouting mission ashore noted harvested cornfields, fallow fields, caches of corn, and "the crust of the earth a spit's depth excellent black earth..." (Heath 1963:19). In their subsequent wanderings on the outer Cape, around the Pamet River and in the vicinity of Wellfleet Harbor, which they described "as good a harbor as Cape Cod [i.e., Provincetown harbor where the Mayflower was anchored]", they noted additional evidence of habitation and land use. Of these locations, they said: "we on the land found it to be level soil, though none of the fruitfullest. We saw 2 becks [brooks] of fresh water, which were the first running streams that we saw in the country..." (Heath 1963:33). After their second scouting expedition, they decided to meet as a group and evaluate the locations visited in terms of the resources these offered to a future colony:

> Having thus discovered this place, it was controversal amongst us, what to doe touching our... setting there; some thought it best for many reasons to abide there. As first, that there was a convenient Harbour for Boates, though not for ships. Secondly, Good Corne ground readie to our hands, as we saw by experience in the goodly corne it yeelded... Thirdly, Cape Cod was like to be a place of good fishing, for we saw daily great Whales of the best kind for oyle and bone, come close aboard our Ship... Fourthly, the place was likely to be healthful, secure, and defensible, but the last and especial reason was, that now the heart of Winter and unseasonable weather was come upon... .
>
> Others againe urged greatly going on to Anguum or Angoum, a place twentie leagues off to the Northwards, which they had heard to be an excellent harbor for ships; better ground and better fishing. Secondly, for any thing we knew, there might be hard by us a farre

> better seate, and it should be a great hindrance to seate where we should remove againe. Thirdly, the water was but in pondes, and it was thought there would be none in Summer, or very little. Fourthly the water there must be fetched up a steep hill; but to omit many reasons and replies used heere abouts; It was in the end concluded, to make some discovery within the Bay...(Heath 1963:30-31).

It was at the end a third exploratory mission that the survey party entered Whitson's Bay where the Pring expedition had been stationed seventeen years earlier. After exploring the area around the bay, the Pilgrim survey party returned to Provincetown to persuade the others that this site was the best place to locate their settlement (McManis 1975). The new site of Plymouth in their view had much to recommend it -- a sheltered bay, cleared land indicating soil fertility, expanses of nearby uncut forest, adequate surface water sources and an elevated vantage point for the colony's protection. On December 6, 1620, the Pilgrims entered Plymouth Harbor and began the task of establishing their settlement.

Although Plymouth colonists decided against settling on the outer Cape at that time, it was a decision that was to be reversed less than a quarter of a century later. The Plymouth colonists soon realized that Plymouth harbor was too shallow to accomodate large ocean-going vessels used in overseas commerce. Its available acreage and the quality of its soil also were less than had been expected, at least in terms of supporting the colony's future growth. During the 1630's, some colonists, aware of the market presented by the waves of more recent immigrants for their agricultural surplus, began to leave the town in order to obtain more farm land and pasturage necessary to sustain economic growth. In the process, several towns were founded within Plymouth Colony -- Duxbury, Scituate, Marshfield, Sandwich, Barnstable, and Taunton.

The end of the Great Migration (ca.1640) and the economic boom that accompanied it, however, did not bring an end to the drive to leave Plymouth. Plymouth Church records show a division between those who wanted to leave and those who wanted to stay (Dickie 1978). Heeding to this pressure the Church at Plymouth agreed to a move. The site selected was Nauset, an area encompassing much of the territory on the outer arm of the Cape between the modern towns of Orleans and Wellfleet. It was an area that they knew and had visited on various occasions since their initial venture in 1620. This familiarity, however, brought with it additional knowledge about the place. Reconfirmed through surveys undertaken specifically to access its suitability as a location for a relocated settlement, the place in their judgement was "...not capable of containing more than twenty or twenty-five families" (Massachusetts Historical Society Collections 1802:164).

After roughly a generation of their landing at Provincetown, some of the Plymouth colonists returned to settle on the outer Cape. In the interim, they had experienced the passage of numerous seasonal cycles in New England. They had their successes and failures in adapting traditional agricultural practices to the rhythm of New England's natural environment. Their knowledge of the region's resources and its ability to sustain them, albeit limited to the areas of settlement and interaction, had increased significantly. Land was still quite plentiful and provided them with an important kind of insurance against environmental risk and uncertainty. Faced with soil depletion, crop failure, or population pressure, unoccupied land (i.e., land which could be "purchased" from the Indians) presented an option -- migration.

It was an option that was exercised many times throughout the period of colonial history. Even within the coastal zone best known to the European settlers, not all vacant land contained desirable resources. Preferred land types were not ubiquitous. With increasing population however, some less desirable land types, perhaps even marginal ones, eventually were used and became part of the cultural landscape. This was certainly to be the situation at Nauset.

Like the rest of New England, the distribution of resources there is best characterized as a mosaic. This means that resource distribution is not even or gradual across space. According to the latter pattern, resource availability would be uneven but it would be expected to deteriorate with increasing distance from the mainland. For example, it has been suggested that soil quality declines as one proceeds from the upper to the lower Cape (Deetz 1968). While there are differences in soils along the extent of the Cape, these differences are not best represented as an environmental gradient.

The amount of potentially arable soil on the outer Cape, that is, soil types which modern soil scientists have defined as having agricultural potential (Table 3.1) is presented by town in Figure 3.1. The data show that the percentage of potentially arable soil does not steadily decrease as one goes farther out along the outer Cape. Both Wellfleet and Truro, for example, have more potential agricultural land than Eastham, although much of it is sandy and light. There is, however, a sharp difference in the amount of potential agricultural land available in these three towns compared to Provincetown where only 1% or 98.3 acres is potentially suitable for agriculture.

Abrupt discontinuities in the distribution of arable soils become apparent only when soil quality is taken into consideration. Figure 3.2 indicates the distribution of soils having good to fair agricultural potential. Here there is a sharp discontinuity in the pattern of soil distribution among the towns. Eastham has the greatest number of acres (266.3 acres) of good-to-fair agricultural land among the towns on the outer Cape. Assuming that the early colonists, like their fellow Englishmen,

TABLE 3.1

Soil Types and Their Agricultural Potential

Agricultural Potential	Soil Series	Description
Good	Merrimac	fine sandy loam, 3-8% slope
	Paxton	fine sandy loam, 3-8% slope
	Woodbridge	sandy loam, 3-8% slope
Fair	Deerfield	loamy course sand, Ø-3% slope
	Windsor	loamy sand, 3-8% slope
Marginal	Carver	coarse sand, Ø-8% slope
Steep Slope	Merrimac	fine sandy loam, 8-15%
	Windsor	loamy sand, 8-2Ø% slope
	Carver	coarse sand, 8-15% and 15-35 slopes

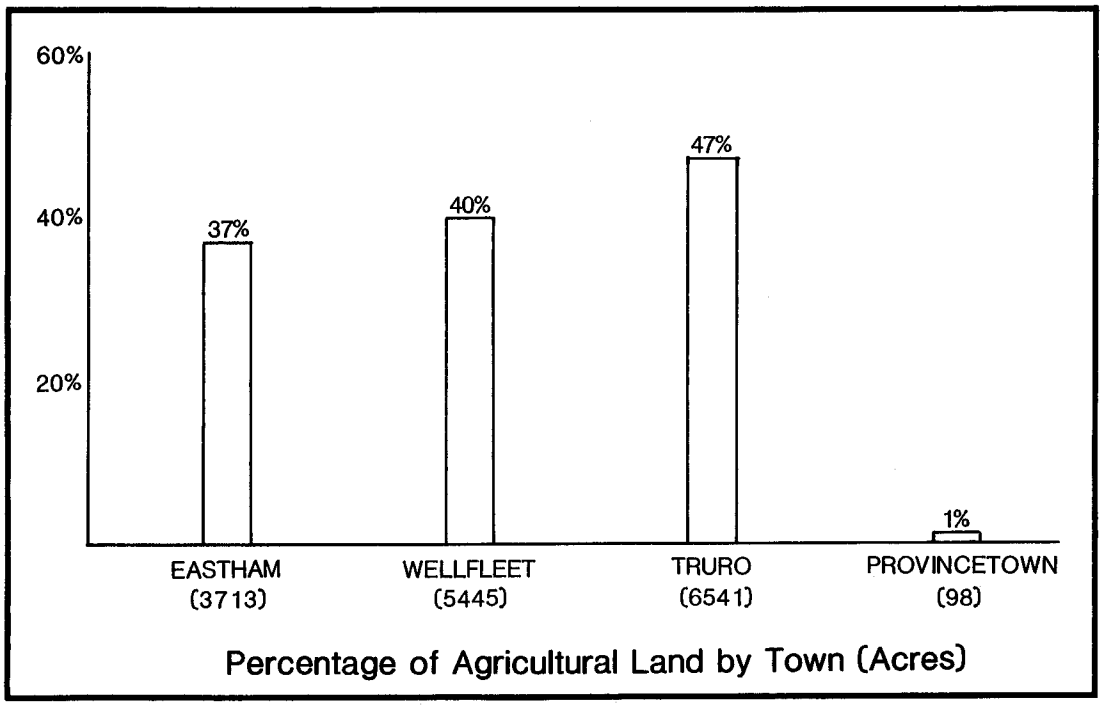

FIGURE 3.1

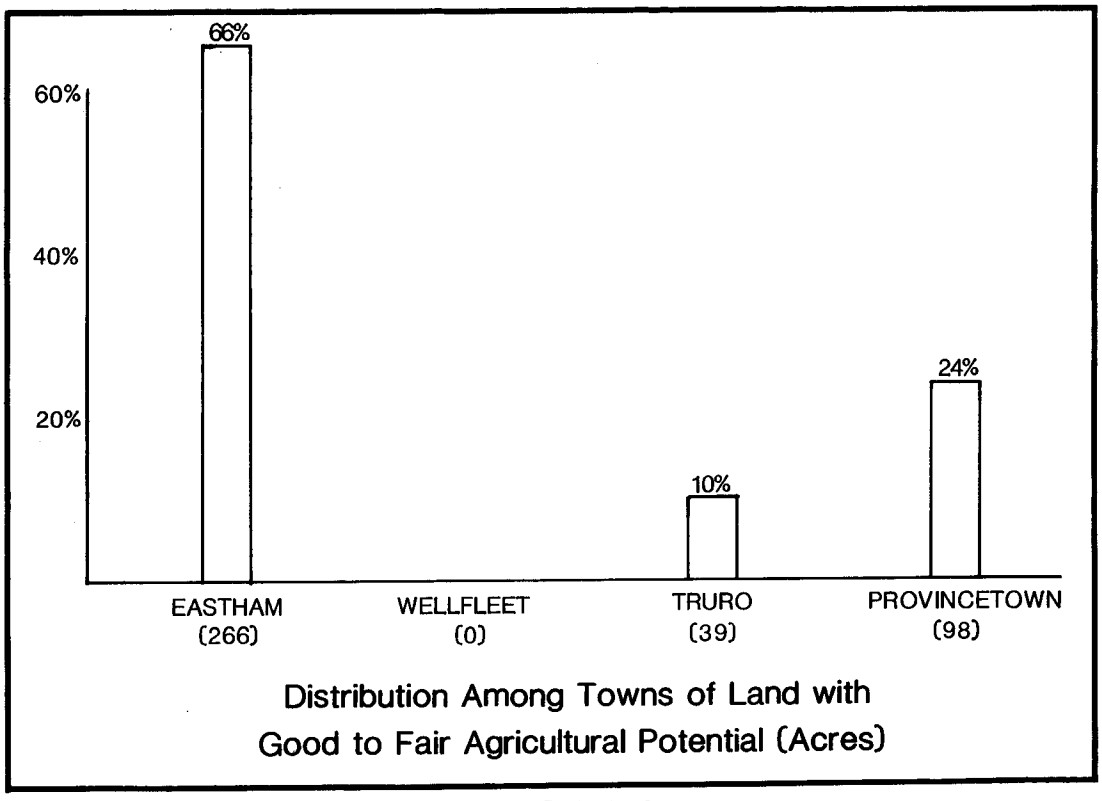

FIGURE 3.2

employed a system of soil classification that evolved during the time of medieval agriculture in which soils that were "black, fat yet porous, light" were preferred to those that were "sandy, hot and dry" (Evelyn 1678:289-292), then it is reasonable to assume that it was the availability of this acreage that attracted them to the place. A later account describes this land in Eastham as among the best 200 acres or so in the country (Massachusetts Historical Society Collections 1802). Farther out on the Cape, Truro has a small portion of this more fertile soil (38.6 acres) situated among its sand hills. Surprisingly, Provincetown which is located at the tip of the Cape has about a quarter of this land located within its borders, more than occurs in both of the two intervening towns. In terms of its distribution across the outer Cape, the amount of arable soil available does not follow any clearly defined gradient.

The examination of the actual pattern of soil distribution, especially those soils having the best agricultural potential (i.e., those rated as good to fair), indicated that these occur in patches. In Eastham, for example, the best agricultural soils occur in concentrated, adjacent pockets located in the south-central part of the town. In Provincetown, the good-to-fair agricultural soils are distributed in several small non-contiguous pockets (mean size, 16.4 acres), surrounded by beach and dune land incapable of supporting other than sacattered herbaceous vegetation. These few pockets of arable soil were the only available soils suited for agriculture in the town.

The diversity of soil distribution in Nauset and areas farther out on the Cape certainly would be a factor in agricultural adaptation. The success of English plow agriculture in New England seems to have been dependent on availability of continguous tracts of decent arable land. Indian subsistence with its system of hoe cultivation and/or exploitation of naturally available foods had no such limitation. This reasoning would seem to be especially pertinent in the colonial period since little improvement of less desirable soils would have been possible given the limited use of fertilizers and the nature of agricultural practices in use at that time.

While sections of Nauset contained some of the best agricultural land on the outer Cape, much of it lacked facilities to fully utilize the sea (Dickie 1978:335). Many of its harbors were considered to be poor and were plagued by silting which often blocked the mouths of the harbors. An 1802 account (Massachusetts Historical Collections 1802:156) describes "a small harbor at Nauset with a narrow, obstructed entrance and which is not more than 8 feet deep at full sea." This harbor was divided into two arms, one extending north, and the other to the southwest. The latter, which was 14 feet at its deepest part in high water, is described in the same account as "secured from wind, if passage could be opened to ocean, it would be an excellent harbor." The enormous amount of sand carried by the current along the eastern shore of the Cape created a problem of

constant drift which deposited silt at the harbor's mouth.

Along Eastham's western shore, there were no good harbors. At high water, several creeks were said to admit the passage of small vessels (Massachusetts Historical Society Collections 18Ø2:156). Many, however, were unnavigable for even small vessels.

Although too shallow for navigation, the bay side of the town contained a wealth of shellfish. The area also contained a number of salt marshes which were as important as the shore itself. One extended from the mouth of Boat Meadow River to within several rods of the Town Cove. Nearby close to Eastham's boundary with modern Orleans was the area referred to as Jeremiah's Gutter. Here the land was described as "so low that the tides have flowed entirely across from bay to ocean" (Freeman 1858:353). Although this low, inundated area was not a navigable channel across the Cape and thereby did not eliminate the need to make the journey around the tip of Provincetown, it and similar marshy areas could serve as grazing areas for livestock, potentially reclaimable land for cultivation and habitats for sea fowl.

In contrast, the northern section of Nauset, referred to as Billingsgate, which was to become the town of Wellfleet, had some of the finest harbors on Cape Cod. This opinion was held by the early Pilgrim explorers upon their first sighting of the bay in 162Ø (Heath 1962:33). In contrast to the other harbors contained in the Nauset purchase, the main harbor at Billingsgate was always open, deep, and easy to navigate. A 1794 account describes the harbor as "large, indented with many creeks, where vessels of seventy or eighty tons may lie safe" (Whitman 1794:117). In addition, there were several other harbors described as equally deep located at River Harbor and Duck Creek (Pratt 1844). The natural features of Wellfleet made it unsuited for farming, but equipped it well to harvest the sea (Dickie 1978:336). The author of a 1794 account remarks that "there are few towns so well supplied with fish of all kinds as Wellfleet" and that "no part of the world had better oysters" (Whitman 1794:119).

The mouth of the Pamet River in what was to become Truro also was considered to be a good harbor for fishermen. A description of Truro, published in 1794, indicates that the small shoal harbor at East Harbor near present day High Head, was of little use. Although there was a certain ambiguity in terms of locating historical place names on the ground, it is probable that East Harbor and its nearby salt marsh refer to a former eastern portion of Provincetown Harbor now enclosed by a dike and called Pilgrim Lake. Here moving sand was a problem; it would bring about changes in the shoreline by extending beaches inland and blocking channels, resulting in the loss of marine resources by engulfing the salt marshes with sand. Yet, despite these natural hazards, the sea and coast contained resources important to the area's future economy. Cod and mackerel could be exploited in local waters. Salt could be processed from sea water and used in

preserving the catch for export. The grassy salt marshes, too, provided alternative pasture for livestock.

Provincetown's harbor and coastal resources were by far the richest on the Cape. Situated at the tip of the Cape, its harbor occupied a uniquely strategic location. It was this harbor where the Pilgrims dropped anchor on November 1, 1620, describing it as "pleasant bay, circled round, except in the entrance which is about 4 miles over from land to land" (Heath 1962:16). To these observers, the harbor was one "wherein a thousand sail of ships may ride safely" (Heath 1962:16). It was of sufficient depth to accommodate ships of any size (Hayward 1849); its water at anchoring ground was between 3 to 14 fathoms deep (Massachusetts Historical Society Collections 1802:198).

While as a facility, Provincetown's harbor afforded it the potential for accommodating a large fishing fleet and commercial vessels, it also provided the town with a variety and abundance of fish and sea fowl. Herring, bass, and mackerel were all available in the harbor, and cod off Wood End. The town's harbor and nearby coastal waters also contained sturgeon, eels, and, in great abundance, haddock, tom-cod, pollock, flounder, halibut, drummer, menhaden, horse-mackerel, and dog-fish among others. A number of shellfish including mussels, sea-clams, and quahaugs were available in the harbor, and lobsters off Race Point. Oysters, whose size and abundance were noted by many early seventeenth Europeans at various points on the Cape such as Barnstable and Wellfleet, did not thrive in Provincetown's harbor.

Thus, like arable land, marine resources -- harbors and salt marshes -- which created a series of distinct habitats for fish, shellfish, and waterfowl -- were not equally available across the outer Cape. For the Europeans, many of these resources became valued not simply for themselves, but for what they could be exchanged for in the market. From the early colonial period, marine resources -- fish, like cod and later mackerel which could be preserved with salt for export, and whales which yielded oil essential to many colonial industries -- were among the resources prominent in commercial ventures. The market relationships that developed would set apart those who engaged in them from the rest of the population.

Conclusions

The complexity in resource distribution which faced the early settlers at Nauset was the product of both the natural environment and Indian land use practices. In the evolution of the post-glacial landscape, natural catastrophes -- fire ignited by lightning, hurricanes, and disease -- served as continuous disturbances in altering the region's habitats. Whether occurring on a large scale or on a smaller one, these events also have played a major role in the evolution of the region's natural environment.

When human populations entered the scene around 10,000 years ago, they too became a part of New England's ecological history. It is probable that by at least 1000 years ago, these populations had developed a system of land use which involved the use of fire to clear areas for cultivation and to selectively rid the forest of undergrowth in order to facilitate hunting and travel. William Wood, in the seventeenth century, noted that contrary to popular opinion not all of the New England was covered by vast expanses of dense forests. Many coastal areas, especially in southern New England had been cleared

> "for it being the custom of the Indians to burn the wood in November, when the grass is withered, and leaves dryed, it consumes all the underwood, and rubbish, which otherwise would overgrow the country, making it impassable, and spoil their much affected hunting" (Wood 1977:38).

The result was open, park-like areas scattered across the pre-colonial landscape. At Provincetown, for example, the Pilgrims noted woods which they depicted not as a mere cluster of stunted trees or as a scraggly thicket (Carroll 1973:46), but as a "wood for the most part open and without under-wood, fit either to goe or ride in."

The outer Cape's fallow horticultural fields noted by seventeenth century explorers and colonists produced in succession a series of shrublands and young woodlands as different species reappeared at different stages in the regeneration sequence. Compared to the open, park-like conditions which resulted from repeated burning of forested areas, abandoned fields would eventually become areas of dense vegetation similar to that encountered by the Pilgrims at Truro where thick, jungle-like growth of vines and brush tore their armor.

While repeated burning may have been aimed at clearing underbrush in the precolonial forests, some ecologists have suggested that it resulted in the disappearance of fire-sensitive species from many parts of southern New England (Jorgensen 1978). Instead, fire-resistant species populated the precolonial forest. Yet, repeated burning affected the composition of resources and their spatial distribution in another way. By stimulating extensive growth areas, regular fires would have produced ideal habitats for a range of wildlife species. This situation is referred to by ecologists as an "edge effect" because conditions are created which resemble the boundary areas between forests and grasslands attractive to a variety of herbivorous species, like beaver, deer, and especially turkey whose variety and abundance so impressed the Europeans from Champlain's time onward. The attractiveness of these habitats to these species, however, also would have drawn a range of carnivorous species that would have contributed to the ecological makeup of these habitats (Cronon 1983:51).

These human activities along with natural processes created a patchwork of diverse habitats across the precolonial New England landscape. Yet, for the most part, the changes that the Indians wrought were nowhere near as drastic as those which the Europeans with whom they came to share this landscape with during the seventeenth century would bring about. To the Indians who inhabited the outer Cape prior to the time of European settlement, the region's ecological diversity allowed them to pursue a way of life in which abundant resources necessary for their survival, available in close proximity, fostered a relatively sedentary existence on a year-round basis.

It was a sedentary existence that did not go hand in hand with any of the trappings which accompanied European sedentism. Whereas the Europeans through artificial means tended to reorder ecological habitats, the Indians followed a way of life that was more or less governed by nature. The availability of resources on a seasonal basis and across space determined how the New England Indians lived. For many precolonial Indian populations, this meant a fair degree of settlement mobility; for others, like those inhabiting the outer Cape, it did not. To the Indians, the maintenance of this diversity was the very basis of their existence, whether mobile or sedentary. To the early European settlers who came to Nauset, this ecological diversity also was important. It presented them with a range of habitats and resources to utilize or to modify. It was this diversity that was to be of major significance in shaping the character of settlement and future development.

CHAPTER 4

Establishing the Colonial Frontier

While the availability of necessary resources on the outer Cape was, and is presently, governed largely by nature, its perceived riches and limitations on the part of the European colonists were mediated through their cultural values and social institutions. Their cultural values defined their role as improvers of the land (St. George 1982). This was their socially-designated occupation as yeomen as well as their moral obligation. Accordingly, they ranked the environment which they came to inhabit. The land that they altered or could improve in carrying out God's will was that which they came to value most. The land they valued most, they also sought to acquire most, since the world inhabited by the seventeenth century yeoman was one in which social position and power were based increasingly on ownership. It was this reasoning that morally justified their taking of the land from its existing occupants -- the Indians-- and their establishment of the colonial settlement at Nauset.

To the seventeenth century Englishmen, the New England Indians had done little to improve the land. From the time of their initial reconnoitering on the outer Cape, they had encountered evidence of Indian's interaction with the environment and had benefitted greatly from it. Here they found harvested corn fields, numerous caches of corn, and places of habitation. It was because of the Indians' successful subsistence strategies that the colonists at Plymouth were able to fend off starvation duing their first few years in New England. Yet, despite this evidence, the Europeans perceived the Indian condition to be one of poverty and misery (Cronon 1983:33,54). The coastal Indians' practice of planting only a minor portion of the land with maize in unplowed, hilled fields while leaving the rest for foraging and hunting, of shifting the location of their community periodically, and of moving between seasonal residences within the course of a year were foreign and condemned by Europeans (Thomas 1976).

More importantly, the distinctive land use practices adhered to by the Indians were used as justification for legitimizing colonists' claims to Indian land. According to the world view of seventeenth century Englishmen, this land was underutilized since it did not show traditional European markings of improvement. There were no plowed fields and no miles of fences to indicate that someone had invested time in the preparation and upkeep of the land. Following this argument, the Europeans believed that the Indians had no claims to the ownership of the land (Cronon 1983). For them, the more the earth could be transformed along the continuum from waste to improvement, the more thoroughly could one understand nature and, of course, God's will (St. George 1982:61). This reasoning was a convenient ideology for justifying their occupation of the lands that the Indians had inhabited for thousands of years. It set the stage for the settlement and the eventual transformation of the indigenous landscape into one dominated by populations of European ancestry.

The Nauset Purchase

The Nauset area of the outer Cape had figured into the Plymouth colonists deliberations concerning migration to a new settlement after the limitations of the Plymouth site became apparent, especially to those seeking land which would yield greater riches. In 1644 a committee was appointed by the Church to survey this area. The committee reported that Nauset was "soe straight as it would not be Competent to Receive the body much less to be Capeable of Any addition or increase soe as att leeast in a shor time they should be worse there then they were now heer" (Plymouth Colony, Church Records, 1920/1923, p. 84). In their opinion, Nauset could not accomodate the needs of the entire Church body. If Nauset was not to be the choice, then there were few places convenient to the settlement at Plymouth to move to unless they considered splitting the group. This was a decision they eventually made as "this place... about 50 miles from hence... att an outside of the Country Remote from all societie" (Plymouth Colony, Church Records, 1920/1923 p. 84) seemed to be their only alternative.

With these considerations in mind a committee was chosen and sent on another reconnaissance mission to Nauset. This committee consisted of Thomas Prence, John Doane, Nicholas Snow, Josiah Cooke, Richard Higgins, John Smalley, Edward Banges, and Governor William Bradford, all of whom eventually either migrated or acquired substantial interest in the area (Dickie 1978:254). Having made an accurate survey of the place, the second committee also judged that it was not large enough to accomodate the whole Church membership, much less afford room for future growth (Massachusetts Historical Society Collections 1802:164). Nevertheless, they "thought it proper to purchase the soil of the natives" (Massachusetts Historical Society Collections 1802:164) which they proceeded to do since it at least could accomodate a portion of the Church body.

Through these transactions with the Indians, the colonists believed that they had fairly and honestly obtained through purchase the lands included in what was to become the plantation of Nauset. The lands which they bought included:

> "A tract of land called Pochet, with two islands lying before Potanumaquut, with a beach and small island upon it; also all the land called Namskeket, extending northward to the bounds of the territory belonging to George, the Sachem, excepting a small island which was purchased afterwards. These tracts were brought to the Sachem of Monamoyick, Mattaquason, who laid claim to them. Of George, the sachem, probably the immediate successor as Aspinet, they bought at the same time all the lands belonging to him; extending northward from the bounds of the territory claimed by Mattaquason, excepting a small neck of land lying by the harbor on the east side of the tract; which the Indians might use it as a cornfield." (Massachusetts Historical Society Collections 1802:164-165)

In these same transactions, the Indians were allowed to collect shellfish and were given rights to a portion of the blubber of the blackfish washed ashore. When at the same time the English inquired about who owned Billingsgate which was understood by both parties to be "...all the land in the bay, north of the territory purchased of George, the sachem. The answer was, there was not any who owned it. Then, said the committee, that land is ours. The Indians answered, it was." (Massachusetts Historical Society Collections 1802:165).

The account of the transaction between the English and Indians for the tract of land referred to as Billingsgate is most revealing. Although use of Wellfleet harbor and its resources by Indian population dates back into prehistoric period on the basis of archeological evidence (Borstel 1984; McManamon 1984), why did the Indians not claim ownership to this land which lay within its territory? Obviously, unlike the English who believed that use and improvement of land gave them rights of tenure to that property, the Indians did not share this view. To them the land was not something to be possessed; nor was it something to be accumulated or to be sold. The land was something that yielded resources during various seasons of the year. It was these resources to which the Indians laid claim and not the land itself (Cronon 1983:65).

This concept of land rights and property directly contrasted to that held by seventeenth century Englishmen to whom the acquisition and accumulation of material things, including the land itself, was the emerging directive. What happened when the issue of Billingsgate's ownership was raised by the survey committee reveals the lack of understanding of the English concerning Indian attitudes toward the land. Yet, it also suggests that the Indians had little awareness of what the English

had in mind which was not simply to gather the resources of the land, but to possess the land itself along with its resources.

This discussion suggests that not only the Englishmen's claims to Billingsgate but to the other lands at Nauset were based on incorrect premises. The Indians were granting or "selling" the rights to use the land at Nauset, not the land itself. Just as they maintained rights to cultivate cornfields, to collect shellfish, and so on, so the Englishmen would be too. To the English, many of these uses of the land afforded an undeniable right to ownership, yet one that was trivialized in respect to the Indians. For through the act of purchase, they secured what they believed to be their rightful claim to the Nauset territory which like other land in Plymouth Colony was considered to have been justly obtained from the Indians.

After the land had been purchased, the leadership of Plymouth allowed those who wished to move to Nauset the liberty to do so. Those who did -- all of the members of the survey committee and their families except for William Bradford -- were issued a grant to the land by the General Court in whose name the land had been purchased:

> The court doth grant unto the church of New Plymouth, or those that go to dwell at Nauset, all the tract of land lying between the sea and sea, from the Purchasers bounds at Namskaket, to the Herring brook at Billingsgate, with said Herring brook, and all the meadows on both sides of the said brook, with the great bass pond there, and all meadows and islands lying within the said tract (Massachusetts Historical society Collections 1802:166).

This grant, dated March 1644/45 collectively gave them legal rights to the land and established them as the founding proprietors. Soon after the grant was obtained, these seven families left to settle Nauset, the founding colony for the settlement of the lower part of Cape Cod, whose territory included the area now divided into the modern towns of Orleans, Eastham and Wellfleet (Figure 4.1). It became one of four towns founded on Cape Cod by people from Plymouth in the 1640s.

Colonial Settlement

Little is known of the earliest years of the Nauset settlement; town records did not begin to be kept in with any regularity prior to the middle of the 1650s. Those who initially migrated from Plymouth were said to be among its most respectable inhabitants (Massachuetts Historical Society Collections 1802). As a group, they also were motivated by a desire for greater personal wealth than they were able to accumulate at Plymouth. Their association began in Plymouth as all of the seven original settlers can be shown to be resident there by 1635 (Dickie 1978).

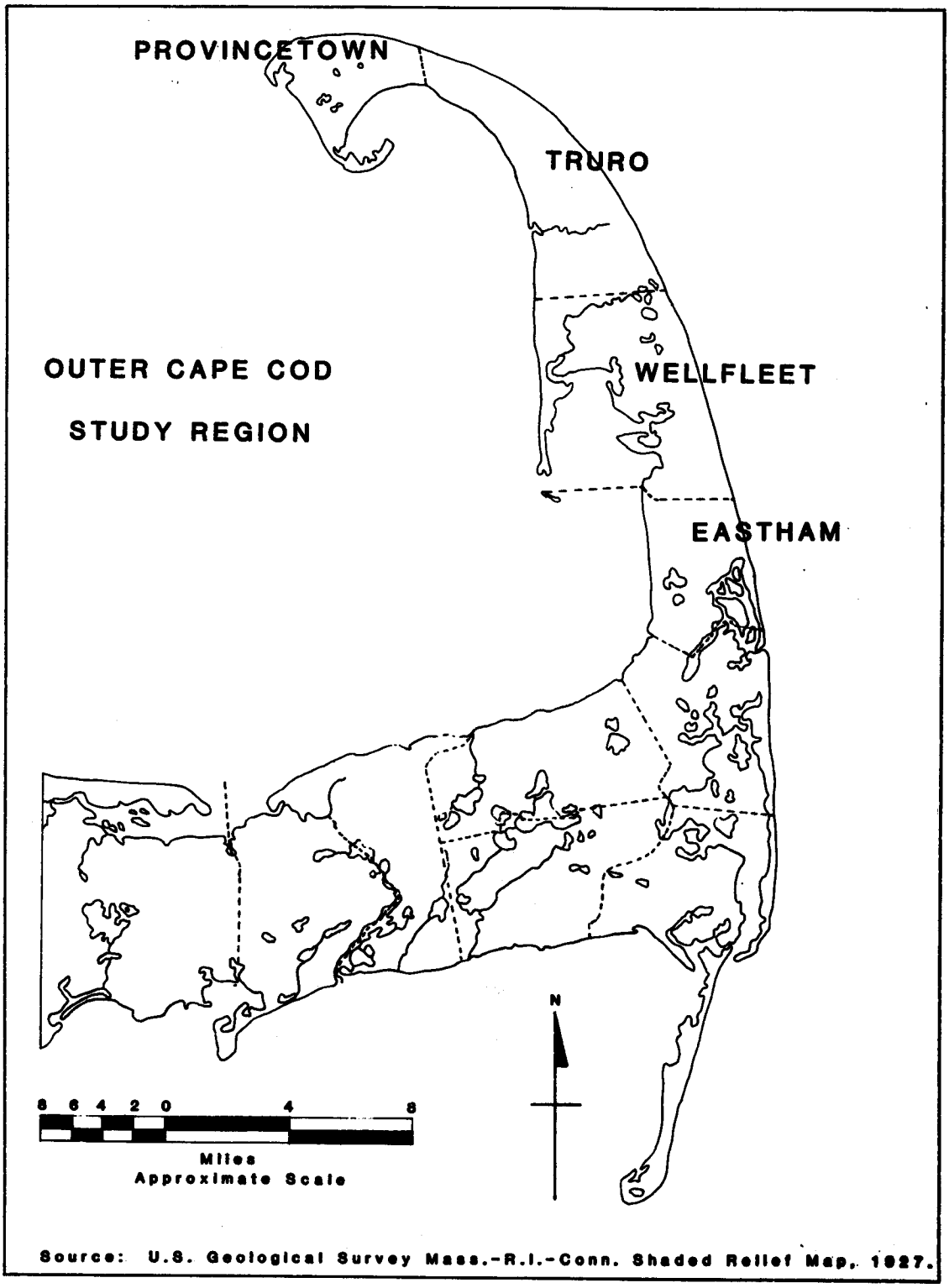

FIGURE 4.1. Map of Outer Cape Cod with Town Boundaries.

Several, in fact, had immigrated to New England aboard the same ship. Both Nicholas Snow and Edward Banges, for example, were listed as passengers on the "Anne" which arrived at Plymouth in July of 1623 (Massachusetts Historical Society Collections 1802:168). Through these types of personal networks established on the basis of co-residence, marriage, and friendship, others eventually moved to the Nauset colony. By 1646, the colony's population was sufficient enough for it to petition incorporation as a township. This request was granted by the General Court and the Nauset plantation became the township of Nauset, one of the many towns which by the middle of the seventeenth century comprised Plymouth Colony.

Although no dated list of the early inhabitants exists in the Eastham records, it has been estimated that there were 209 residents by the year 1659 (Dickie 1978). This is based on a recorded population of 136 listed in various town records (e.g., land transactions, "bull companies," registers of birth, death, and marriages) plus an unrecorded population gauged at 73 persons. It is estimated that by 1703 the population of Eastham was 948 individuals (Rockmore 1979) indicating a growth rate of 3.52% for the period. Using this estimated population growth rate to reconstruct Eastham's population between the years 1660 and 1700 (Table 4.1) and information collected on births and deaths from the town's vital records (Plymouth Colony, Miscellaneous Records 1633-89, pp. 15, 26-28, 30, 56-58; Births and Marriages 1659-1710), it has been possible to assess the factors responsible for growth in the town's population. By comparing estimated annual population change to numbers of recorded births and deaths (Table 4.1), it is clear that these figures alone do not account for the change. While there are deficiencies in colonial vital records, notably the underenumeration of deaths, which may account for some of these discrepancies, it is reasonable to suggest that immigration also was a contributing factor, especially in this early settlement period.

Interestingly, it is within this early period that the town began to consolidate its boundaries as well as divide the land within the township that had until that time been held in common. Experiencing the "inconvenience of having the natives at both ends of their township" (Massachusetts Historical Society Collections 1802:169), Eastham's inhabitants sought to acquire several parcels of land which would consolidate the town's holdings and further extend its borders. In these transactions, which took place within twenty years of initial settlement, much of the land excluded in the original Nauset purchase was acquired. These tracts include a small neck of land described as being located on the eastern side of the town near the mouth of the harbor that initially had been allocated to the Indians for use as a cornfield, and the fertile island of Pochet near the southern portion of the town (Massachusetts Historical Society Collections 1802:169). In 1666, an Indian claim to the land at Billingsgate, which the townsmen held without paying from the time of the original purchase, was settled. Through this purchase, the town

TABLE 4.1

Population Reconstruction for the Nauset Purchase

(Eastham, Wellfleet and Orleans) for the 17th Century

Year	Estimated Growth Rate	N	Estimated Annual Change	Births	Deaths	Difference (migration not recorded)
1659-60	.0352	209	7	2	3	+8
1669-70	.0352	297	10	12	2	0
1679-80	.0352	422	12	10	1	+5
1689-90	.0352	600	21	12	2	+11
1699-1700	.0352	853	29	27	3	+5

The estimated growth rate is calculated as r= ln (N2/N1)/t
r= rate of growth, N2 = population size at time 2, N1 = population size at time 1, and t = number of years between N1 and N2

The source for the 1659-60 data is Dickey 1978.

extended its northern borders to a brook referred to by the English as Bound Brook.

Having obtained possession of the land through a grant by the General Court and through purchase, the proprietors of Eastham began the process of dividing this land into private holdings. As for other New England communities, these decisions were fundamental in shaping the most basic characteristics of life for themselves and for their children. Through time, the cumulative effects of these decisions regarding such matters as the locations of residences, the size and proportions of individual allotments and their location would contribute largely to determining the configuration and character of the town for future generations.

The intentions or assumptions which quided the townsmen in making these decisions about the land in the first decade or two after their initial settlement of a place remain unknown as no such explicit statements exist for Eastham or any other New England town (cf., Greven 1970, Powell 1963). Surely, their traditional farming practices and the nature of resource distribution across the landscape were considerations. But in addition, these decisions must have been influenced by the prevailing attitudes concerning the economic and social order in this society. According to an anonymous essay from that period "The Ordering of Towns" (Stilgoe 1982:44), the land divisions were to be made "in such a manner as every man may have his due proportion, more or less according to his present or apparent future employment, and the mean ones not be neglected." In this way, allotments of land were to confirm the social hierarchy which the Puritans believed to be divinely sanctioned. The amount of land allocated would depend on an individual's means; those having greater resources, therefore, would have the ability to make improvements to greater proportions of the land. Yet to the Puritans, this goal of improving the land meant more than just physically transforming the landscape, it was a way of modelling God's kingdom on earth. The more that one could do to achieve this, the closer one was to spiritual perfection. Thus, the same philosophy which governed the taking of lands from the Indians was to justify the allocation of these lands into private hands (Cronon 1983:73).

Between 1644 and 1659, very little land in Eastham was granted to individual townsmen; only about 144 acres is known to have come into private hands during this period (Dickie 1978:287). Given the town's population in 1659, the amount of land allocated would have been approximately two-thirds of an acre per person. Even assuming an average family size of five, this acreage would have been insufficient for anything other than a houselot and perhaps a garden. This initial ratio between land and population suggests that the land held in common by the community formed the basis of the colonial economy during this early period.

Judging from this system of land holding, it may be inferred that the initial settlers of Eastham conformed to an open-field

farming system, despite their desire to attain greater personal wealth than they had in Plymouth. Following this system of land use, they would have lived in houses clustered together in a village, rather than in dispersed and distant dwellings, and maintained parcels of land of varying sizes and shapes distributed in large, open fields, rather than owning enclosed, consolidated holdings. Obviously, it was this latter field system, based on privately held, enclosed fields, that was more suited to the aspirations of the seventeenth century Eastham settlers as they soon came to realize. Not only was improved land valued more than unbroken land, but "fenced lands" were to be valued at twice that of "unfenced lands" (St. George 1982:161).

The reasons it took them approximately a decade and a half to begin the division of the public common land are unclear. Perhaps, like other New England towns founded at about the same time, its population was maturing. Many of those who belonged to the same generation as that of the first settlers were reaching old age, while those who come to Eastham as children or who were born soon after its settlement were coming of age (Dickie 1978:288). This situation may have caused the townsmen to begin considering the land needs of the second generation. From adolesence, sons provided labor that was essential to working the land. By adulthood, sons needed land to set up their own homes and start their own families. This was the situation in many of the Puritan settlements of the Massachusetts Bay Colony such as Sudbury (Powell 1963), Andover (Greven 197Ø), Dedham (Lockridge 197Ø) and others at the time when they embarked on their major land divisions. In dividing Eastham's common land into private parcels, the settlers would be able to acquire sizable holdings in perpetuity which would allow them to ensure the continuity of their lineage in the town (Dickie 1978:288). In doing so, the biological life cycle and the system of agricultural production were interlocked tying the land and its possessors together through the generations. Thus the nature of human-land relations that had previously existed in New England was altered conclusively.

Yet, until the process of dividing the common land began in 1659, the transformation of the landscape into a characteristically Euroamerican one hardly had begun. In the initial years of settlement, the model of the ideal plantation presented in the anonymous contemporary essay "The Ordering of Towns" (Stilgoe 1982:43) may have provided the basis for establishing order in the town. In the model town of the essay, land is ordered into a series of concentric zones in which houses are surrounded by rings of intensive to extensive land use much in the manner of agricultural strategies practiced throughout the Old World (Thomas 1976). Lying beyond the common fields cultivated with maize, rye, barley, and other cereal grains familiar to the English, and the pasturage, where livestock held in common grazed on indigenous grasses until these later were seeded with English ones believed by the colonists to have higher nutritional value, were the unimproved zones. Here beyond the area of settlement the

colonists were given use-rights to natural resources by the governing bodies of the towns. Here where they did not possess the land, they nevertheless could have access to the land's resources -- its drift whales, forest resources, marsh and meadow grasses, fish, and shellfish -- albeit regulated by the town's government.

It is unknown how closely early Eastham adhered to this ideal model, although it is likely that some form of clustered dwellings and common field system was followed at least initially. Nevertheless, long before the close of the seventeenth century, this ideal of the small-scale, nucleated village with outlying common fields failed to be sustained. These settlers for reasons already discussed sought private land in greater amounts than they had been assigned at the time of settlement; this eventually resulted in the end of the common field system and the allocation of land according to principles rationalized in terms of Puritan ideology.

In the grants of 1659, 1308 acres of land were divided among forty Eastham townsmen making each grant on the average slightly more than 30 acres. This land, classified into functional categories based on its topography and intended use, was apportioned in ratios which were to constitute the basic composition of private holdings until the 1700s (Dickie 1978:289). Most of the grants consisted of houselots, upland, and meadow. The houselot as the nucleus of the domestic farmstead was the locus from which the seventeenth century yeoman would have begun the massive task of ordering the landscape (St. George 1982). It was here that he placed the house, barn, other outbuildings, and the kitchen garden which constituted the main components of the farmstead. Land designated as upland in these divisions was generally cultivated; and that referred to as meadow served as pasturage for livestock.

Although woodland also was essential to the colonial farmer (Russell 1982:42), land of this type was not included in the 1659 grants but remained held in common until the 1670s when its division began. It has been estimated (Dickie 1978:290) that between 1659 and 1700 the percentage of all private holdings averaged 81.9% for upland, 17.7% for meadow and .3% woodland. Given the importance of woodland resources and meadow grazing areas to Eastham's domestic economy, it may be inferred that rights to land held in common, and not private holdings, continued to serve these needs.

Once land came into private hands, it was a commodity that was readily retraded. Many of those who received land in the grants of 1659 are known to have redivided their lots and traded them among themselves. From Dickie's analysis of the acreage traded, it seems that individual townsmen were able to increase or decrease their net holdings through these transactions. Those who sold land generally decreased their ranking in the town; whereas, those who bought land increased their social position in terms of

land holdings. Many of those whose position in the social hierarchy was enhanced through these transactions acted as traders, that is, they both bought and sold land. Included in this group were five of the original proprietors: Thomas Prence, Richard Higgins, Nicholas Snow, John Doane, and Edward Banges (Dickie 1978:305). These men who were at the top of the social hierarchy had their positions enhanced as a result of these transactions. By becoming a commodity for speculation, land became a material possession whose acquisition could enhance one's position in the social hierarchy. As something which could be possessed, land for the colonists had become another resource which they could bound, package, or other wise treat as an element divorced from the ecosystem, and as well trade for a profit.

Ecological Implications of Colonization

In sum, the Euroamerican colonization of Nauset resulted in significant changes in the nature of human-land relations compared to what had existed previously. In the years between 1644 and the early eighteenth century, the settlers added to their colony's territory by acquiring additional parcels of land from the Indians. Through land divisions beginning in 1659, they began to define the order of the landscape by granting acreage defined by functional categories which more or less coresponded to their expectations concerning its use. As a result, individual holdings were composed of a sampling of habitat types (e.g., upland, meadow) in which various aspects of colonial agriculture could be pursued. Much of the colony's woodland as well its salt meadows remained undivided and were used as a common pasturage for livestock which in Eastham's economy were as important as the planted fields. The Indians who cohabited Nauset with the colonists during this period effectively had lost rights to much of the land. They retained a few, limited pockets of land to cultivate and theoretically continued to have use-rights to many of the land's resources.

In areas where two populations are using the same microenvironments, compatibility is possible if different resources are being exploited, or commonly exploited resources are sufficent to support both groups. One group need not displace the other, nor expand its activities at the expense of the other. This, however, was not the situation on the outer Cape. For the most part, the European settlers attempted to monopolize the land and its resources. They acquired the most productive acreage located near Nauset Marsh where the land and its resources had been used by the Indians for centuries as has been suggested by recent archeological findings (Borstel 1984:268-282; McManamon 1984). In return, the Indians were relegated to cultivate less desirable areas within the town.

Allowing animals open pasturage in the uncultivated sections of the town must have promoted competition with the Indians over the same resources. In the salt marshes, for example, many of the

same grasses fed on by cattle were those collected by the Indians for use in basketry and textiles. Swine, which presented a nuisance to the Englishmen's planted fields, eventually were driven to the unimproved zones of the colonial settlement. Along the coast, their digging and rooting were destructive to Indian shellfish collecting areas (Cronon 1983; Thomas 1976).

Moreover, free-ranging livestock in uncultivated portions of the town would have resulted in the eventual competition between the colonists' domesticated animals and the wild species for the same resources (Thomas 1976). In the ensuing struggle, colonial livestock were to gain. Eastham's economy during this period placed considerable emphasis on animal husbandry. Horses and to a lesser degree cattle appear to have been especially important as there are numerous entries in the seventeenth century town records for their registration by owners for the purpose of having them pasture with others in the town's common herd. For these animals to prosper, human intervention was required in order to ensure adequate food, protection against predators and selective reproduction. By aiding the successful adaptation of domesticates to the New World, the colonists were able to maintain these animal populations in concentrations denser than those of the other large herbivores which existed in the wild. In so doing, they were responsible for indirectly diminishing the Indian's food supply.

As the European colonists settled into their new environment during the course of the seventeenth century, they increasingly came into competition with the Indians over resources. The Indians were the losers in this ecological struggle. By the end of the seventeenth century, their numbers were dwindling. In a letter written in 1693 by Samuel Treat, the Harvard-educated minister of Eastham the number of Indians dwelling in the township of Eastham is estimated at around 500 adults (Massachusetts Historical Society Collections 1802:171).

A census taken a mere five years later in the summer of 1698 under the direction of the "commissioners for the propagation of the gospel in New England to examine the state of the praying Indians in Massachusetts" reports that Indian villages on the outer Cape contained not more than 90 families (Massachusetts Historical Society Collections 1802:173). If it is assumed that each family contained at the most between 5-6 individuals, although this figure is probably much too high given the high rate of childhood mortality and other biological stresses being experienced by these Indian populations in the seventeenth century, the population size would be around 450-540 individuals. Moreover, if the Indian villages only within Eastham proper are considered -- Monimoy in Chatham and Sahquatucket in Harwich were areas whose spiritual needs were administered by Eastham although in a formal civil sense they were outside of the town -- the number of Indians in Eastham is further reduced. While we may never obtain an exact account of the numbers involved, the pattern is nevertheless all to clear. One astute observer predicted that before another century had passed "...the red man will probably

become as rare as the beaver: which is known to have been common in New England by the vestiges of its labours." (Massachusetts Historical Society Collections 1802:175).

The Indians who survived the demographic disruptions caused by diseases linked to European settlement were forced to make ecological adjustments. With their land taken, wildlife reduced, and their collecting areas limited, the returns netted from the pursuit of their traditional subsistence strategies declined. The range of responses available to them was severely constrained by colonial settlement, and by the disadvantaged demographic situation that they found themselves in at the close of the seventeenth century. Like the corn that they had traded to the English decades earlier, the Indians at Nauset now had little more than their labor with which they could bargain. Salisbury (1982, 1985) notes that it was not uncommon for southern New England Indians to act as servants in Euroamerican households, to provide day labor in building stone walls or as field hands, or to perform other services for the colonists. Killing wolves, for example, was a task that eventually became delegated to the Indians. An Eastham town order of May 1686 is written in such a way as to imply that the Indians would do the actual hunting and killing of wolves for the benefit of the English (Dickie 1978:354).

On the other hand, there were others who may have responded in other ways. Dickie (1978:419) notes that the Eastham Town Records indicate that one local Indian, Munshaso, cared for a horse pastured in Eastham by a Robert Finney of Plymouth in 1659; and in 1660, had two horses belonging to a Mr. Lathrop of Barnstable under his care. Munshaso, who also was an Indian preacher, later purchased these horses since the town records show that his animals' earmarks were entered into the town registry. By marking livestock, notably horses and cattle which were allowed to graze freely in common herds in the unimproved zones of the town, individuals were able to document ownership. In this situation, Munshaso as a horse owner must have gained some rights to using the town's common pasture. By engaging in herding, Munshaso and others who altered the way they obtained their livelihood began to utilize Eastham's meadows and woodlands in a way that sharply contrasted with the ways of their ancestors.

The disparities that evolved over the course of the seventeenth century created an ever-widening gap between the colonists and the Indians. In their relations, the two groups were not simply viewed as different, but as adversaries; one group clearly sought to dominate the other. In seventeenth century Eastham, this is evident in the geographical separation of the Indians at the fringes of the colonial settlement. Indian villages were located on woodland tracts which in the seventeenth century were not deemed suitable for English habitation and were formally outside of the governable landscape.

While we do not know the full range of strategies employed by the Nauset Indians in attempting to deal with the threat of

colonial domination, it is clear their dwindling numbers created a situation not unique among other New England Indians whose forces had declined. Whereas they outnumbered the English forty years earlier, the English now surpassed them. By losing their land, the Nauset Indians found that there was no firm place for them in the emerging colonial society of Eastham. Yet, it is doubtful whether they ever ceased to define themselves, or be defined by others, as Indians despite the changes which had occurred in other aspects their lives and in their environment. As with other New England Indians, the end result was that they came to be classified as a separate people who had no place in Euroamerican the order of seventeenth century society (Salisbury 1982:239).

CHAPTER 5

Expansion of Settlement

At the turn of the eighteenth century, Eastham's settlement pattern probably had not diverged much from its original plan. Since private holdings, where the colonists located their houselots and planted their fields, were composed principally of upland and meadow in a 80% to 20% ratio (Dickie 1978:321), it is not unreasonable to assume that these were concentrated in the south-central part of the town where some of the best acreage of these types are known to occur. Following this line of reasoning, the fact that woodland was almost entirely undivided at this time would suggest that there were few, if any, Euroamerican habitations located in the parts of the town where this land-type occurred. Over the course of the next century, this pattern would be altered dramatically as this land type and others which initially were bypassed in favor of prime argicultural locations were brought into the land pool and settled by Euroamericans. In the process, they shaped the character of settlement on the outer Cape and transformed this "coastal wilderness" to such a degree that it bore little similarity to that which their Pilgrim forebearers encountered more than a century and a half earlier.

Land Divisions

In the northern section of Eastham the minor amount of land that was divided at the end of the seventeenth century was probably similar in composition to that comprising private holdings in the south. The Eastham town records indicate that a number of land grants of upland and meadow were made in the vicinity of Bound Brook and Griffin Islands in 1696 (Eastham Land Grants 1659-1710:141; 148-154). Of the 14 lots granted, twelve consisted of 6 acres of meadow and 2 acres of upland; two were composed entirely of meadow (Table 5.1). These were described as 8 acres of "sedgie" meadow on John Doane's Neck granted to John Doane and 8 acres of meadow at Little River Meadow, between Bound Brook and Griffith's Island, granted to Daniel Cole, son of John

TABLE 5.1

Land Divisions of Wellfleet Around
Bound Brook and Griffin Islands (1696)

LOT	DESCRIPTION	GRANTEE
1.	6 acres meadow, 2 acres upland Little Billingsgate and North of Herring River	Major John Freeman
2.	6 acres meadow, 2 acres upland Duck Creek	Jonathan Bangs
3.	6 acres meadow, 2 acres upland Little Round(?)Meadow	John Jenkins
4.	8 acres cf "sedgie" meadow John Doane's Neck	John Doane
5.	6 acres meadow, 2 acres upland Billingsgate, east of James' Neck	Mark Snow
6.	6 acres meadow, 2 acres upland Little River Meadow	Josiah Cook
7.	6 acres meadow, 2 acres upland Southside of Herring River	Daniel and Israel Cole
8.	6 acres meadow, 2 acres upland South side of Herring River	Samuel Hix
9.	6 acres meadow, 2 acres upland North side of Herring River	John Rogers (owned by James Rogers)
10.	6 acres meadow, 2 acres upland Head of Bound Brook Island	Thomas Mulford
11.	6 acres meadow, 2 acres upland Griffith's Island	Jonathan Higgins
12.	6 acres meadow, 2 acres upland East end of Bound Brok Island	Governor Prence (owned by Thomas Mayo)
13.	6 acres meadow, 2 acres upland Little River Meadow	Titus Wise
14.	8 acres meadow Little River Meadow between Bound Brook and Griffith's Island	Daniel Cole (owned by Richard Rich)

Cole, and owned by Richard Rich. Both John Doane and Daniel Cole as well as others who acquired land in these divisions were residents of Eastham who also figured in the land transactions of 1659. This suggests that the land they acquired at Billingsgate was not for immediate settlement, but for use as pasturage or perhaps for speculation in the future.

During the next few decades, however, this situation in which most of the private holdings were located in the south-central part of the town was to change as subsequent land divisions enabled the population to settle in the northern, hilly section of the town. Yet, it was not until 1703, forty-four years after its first general land division that Eastham embarked on a land division involving significant portions of its acreage. Compared to the 1308 acres divided in 1659, only 287 acres were involved in this later division (Dickie 1978:322). Since the acreage divided was almost entirely upland and meadow, it is doubtful if the settlement pattern was altered significantly at this time. In general divisions of 1711 and 1715, however, large amounts of land, including woodland, were taken out of the public land pool and divided into private hands. In the northern section of the town, per capita holdings rose from 1 acre to 9.7; and woodland from nearly 0 to 7.7 acres acres (Dickie 1978:323). As a result of these divisions, land in the northern section of the town like that to the south became privately owned instead of being held in common by the community. Clearly, this was significant in opening the area to settlement.

These land divisions had consequences that went beyond the expansion of settlement into areas that for the most part were previously unoccupied, except perhaps for those locations where the Indians had been permitted to settle. It placed virtually all land into private hands. Dickie (1978:323) shows that whereas only 28 percent of the available land -- that is, land purchased from the Indians in 1644 or acquired in subsequent transactions -- had been divided before 1703, ninety-four percent had been apportioned by 1715. This left a fairly small percentage of land held in common as surplus to accommodate the needs of future generations. Unlike the previous few generations of Euroamerican New Englanders for whom surplus land, presented a kind of insurance against which they could draw, Eastham's population from 1715 onward had no such reserve. Of the remaining common land, most (82% or 618 acres) was pasture and 18% or 136 acres were upland and woodland (Dickie 1978:323). The amount of land available, especially of the type considered appropriate for farming, could realistically accommodate only a few farms.

With most of the town's land held privately, there were few ways in which one could obtain land. One principal mechanism was inheritance or gift through which an individual could expect to receive the family farm or some share of the family's land holdings. One, of course, also could obtain land through purchase from another individual. In either case, the situation was clear. Eastham had moved beyond its frontier phase in which land was

abundant and readily available as common stock for future generations. Whereas a little more than a half-century earlier it had served as a frontier colonized by those from Plymouth who sought to migrate in the face of land shortages and population pressure, it now was a settlement that had to confront its own impending land problems. Its population had grown appreciably. It is estimated that it doubled itself at every 20 year interval until around 1700 (see Table 4.1). At around the time of the 1711 and 1715 land divisions, the town's population was well over a thousand persons. Faced with increasing population density and the possibility of future land shortages, Eastham's residents opted to divide the commonly held land located in the town's northern section among themselves.

With the division of land in the northern section of the town, the character of Eastham's settlement pattern began to emerge. Whereas it has been suggested that its original plan was focused around holdings in the south-central part of the town, Eastham emerged in the eighteenth century as a place in which there was no single town center. It was a series of neighborhoods which more or less corresponded to geographical areas of the town. To the north, the area around Blackfish Creek, was referred to as Billingsgate. To the south, there was Pochet; and in the center, the area which became Eastham proper. While the emergence of this pattern of settlement was in part a function of colonial Eastham's land policies, it also may have been influenced the nature of ecological diversity within the town.

The land that comprised the colonial settlement at Nauset exhibited considerable diversity in terms of environmental resources. Although at a much reduced scale, it was a patchwork of different microenvironments. Its soils were of variable productivity. The town's eastern side contained a tract of about 200 acres considered to be equal or superior to any in the country; to the north of this fertile tract, the soils were light and sandy (Massachusetts Historical Society Collections 1802). The land to the south, which corresponded to the area known as Pochet, contained soil of variable quality. One account describes this area as one in which "there is a portion of good land...; but the soil in the greatest part of it is light and sandy; and in some places absolutely barren" (Massachusetts Historical Society Collections 1802:189).

These areas or neighborhoods within the town also differed in terms of their harbor resources. While the south and center sections had some of the best agricultural acreage in the town, their harbor capabilities were limited. Nauset's eastern harbors suffered from severe silting problems caused by drifting sand which tended to build up at the harbors' mouth as well as create hazards for navigators in the near-shore areas. Yet, the bay side harbors in the northern section of the town at Billingsgate were excellent. They were deep, open, and easy to navigate. Undoubtedly, the colonial settlers of Nauset were aware of the suitability of this section. In naming it Billingsgate, they

recalled the great fish market of London.

While Nauset's neighborhoods may be viewed simply as residential components of the town's settlement order, their inter-relationship emerged as one in which their roles were not coequal. Outside of the town of Eastham proper, Billingsgate differed the most from the other neighborhoods as well as from the town itself. Although it did not become incorporated as the town of Wellfleet until 1763, Billingsgate sought independence from the rest of the town soon after its land had been divided and its settlement presumably had been achieved. As early as July, 1718, Billingsgate petitioned Eastham proper to become a separate town. The town denied Billingsgate's request at this date, but at some level recognized its autonomy by absolving it from its obligation to contribute to the town's payment in support of the county, school, and the ministers (Dickie 1978:328). The hamlet of Billingsgate as it was referred to at the time, however, continued to pursue its quest for independence from the town of Eastham. Another petition was presented to the town in 1721 requesting recognition as a precinct; it also was refused. The relationship between the town and the hamlet remained unsettled until the following year when Billinsgate finally was given legal status as a self-governing precinct of the town which it remained for the next forty years.

The reason why the neighborhood of Billingsgate sought to separate itself from the rest of the town while Pochet, which was to become the town of Orleans did not until a much later date, may be explained in terms of differences in the nature of each's economic relations within the broader colonial economy. Billingsgate, unlike Pochet and Eastham proper, exhibited the kind of natural features which made it a suitable locale from which to pursue maritime and pastoral activities. From the earliest period of colonial history, these activities, unlike agriculture which formed the economic mainstay of the south and central sections of Eastham, were focused on commercial enterprise.

At Billingsgate in the early eighteenth century, maritime activities were centered on blackfish, small whales ranging in size from four to five tons, that were driven onto the shore by boats so that they could be harvested after being stranded by the retreating tide (Whitman 1794). Each whale yielded on the average about one barrel of oil which could be sold for cash. Given that its sale was one of the few commercially profitable outlets for members of the Nauset colony, it is not surprising that the fathers of the town attempted to regulate this enterprise. A town order dated April 9, 1707 sought to restrict whaling by discouraging "whaling voyages at the Great Island or Lieutenants Island at Billingsgate" by persons from outside of the town. It was required that "the harpooner or steersman of every boat's crew" pay two shillings to the town for each outsider on the crew.

It seems that the marketabiility of this resource and the desire to keep profits in the hands of townsmen was very much a

concern, perhaps so much so that the ensuing tug-of-war between Billingsgate and Eastham over the former's independence begins to make sense. By gaining its independence, Billingsgate would have direct control over its own whaling industry. By granting Billingsgate its independence, Eastham would lose its share of the profits from this enterprise. Moreover, since Eastham's economy was based primarily on agriculture, maritime Billingsgate served as a market for its agricultural surplus. By granting Billingsgate its independence, the town may have feared the loss of this market due to outside competition and its loss of a ready source of cash from these exchanges.

Thus, while Billingsgate differed from the rest of Eastham in terms of its natural features, its separation from the rest of the town reinforced these differences by giving them significance that could only be understood in terms of relations that went beyond the boundaries of the local ecosystem. From the start, its economy was one that was based on external market relations made profitable by its woodlands for pasturage and its harbors for utilizing the sea. This placed individuals in the position of being more dependent on external ties than on communal ones as both livestock breeding and whale fishery were avenues to economic profitabilty for individuals during colonial times. Unlike agriculture which was labor intensive, often requiring the participation of neighbors in the performance of tasks, the economic activities important to Billingsgate's economy had no such prerequisites.

Stock breeding and herding, in fact, were one of the easiest ways for a colonist to obtain hard cash with a minimum of labor (Cronon 1983:140). The whale fishery centered on the collection of blackfish in nearby coastal waters was much less labor intensive than long-distance whaling. As a mode of production, whaling as conducted in Billingsgate during the first half of the eighteenth century shared much in common with herding. Archeological excavation of the Great Island Tavern site on Great Island in Wellfleet harbor dated from ca. 1690 to 1740 (Ekholm and Deetz 1971, Synenki and Charles 1984) suggests that this tavern served as a way-station for whalers waiting for the arrival of blackfish in the harbor at which point they would drive them ashore much "as cattle and sheep are driven on the land" (Whitman 1794).

These differences in economic orientation as they reflected attitudes regarding individualism versus communal interests may have had an effect on the system of landholding. In the seventeenth century, Eastham residents attempted to consolidate their holdings into compact farmsteads by acquiring parcels of land adjacent to acreage that they already owned, rather than sharing borders with blood kin (Dickey 1978). For seventeenth century Eastham, spiritual ties among all related individuals were the basis of the community and were perhaps more or just as binding as those between blood relatives. Consequently, the town's inhabitants did not consider it necessary to forge a system

of land-holding based overwhelmingly on kinship. Following the land divisions of 1703, 1711, and 1715, however, this pattern changed. Since these divisions involved most of the land in the northern section, where individualism emerged as a major force in shaping the character of the community, considerably more emphasis began to be placed on consolidation according to blood kin. Compared to the older settled areas of Eastham, the newly settled northern section exhibited individual farmsteads embedded in a matrix of blood kinship involving fathers and sons (Dickey 1978:409, Figure 9). On the basis of this evidence, one can suggest that here the stronger ties were between generational kin, i.e., parents and children, rather than between members of a spiritual alliance. The lineage became the basis for land-holding and thus, settlement congruence--reflecting individual concerns over those of the community-at-large.

By the early 1700s, other changes had taken place which also played a role in shaping the character of settlement not only within the township but beyond its borders as well. As early as 1689, a group of men from Eastham had begun negotiating with the Pamet Indians to purchase the land beyond Bound Brook where the northern boundary of Eastham had been set years earlier. Calling themselves the Pamet Proprietors, they sought to gain control of the land at Pamet from the Indians and to allot land for farms to new settlers. They appointed one in the group, Thomas Paine Jr., to act as their agent in these purchases in order to avoid problems resulting from land-grabbing propensities and to protect themselves from the chance of the Indians selling them the same property twice (Kittredge 1930:92).

By 1700, when enough land had been purchased to furnish each of the proprietors with a good-sized tract, the settlers left Eastham for Pamet. Here each proprietor was given a lot which transected the territory from the Atlantic Ocean to Cape Cod Bay. By obtaining rights to the land early in the settlement's history, the proprietors of Pamet, as Truro was then known, ensured for their descendants rights to the land through inheritance. Moreover, by instituting this system of landholding, they fostered future congruence in the town's settlement pattern. A century after the ten original proprietors had divided the land, the Truro town records showed continuous occupancy of the lots by their descendants (Rockmore 1979).

Five years after its settlement, the community, under the name of Dangerfield, obtained municipal privileges, and in 1709 was incorporated as the town of Truro. Perhaps in accord with the original proprietor's intentions, the town unlike Eastham did not have any common lands. It therefore did not have to go through the tedious process of land division that Eastham and other early New England towns were faced with a generation or two after their settlement. Whereas land in Eastham and other places, at least initially, could be readily obtained from the common reserve, land rights in Truro were determined from the start by ownership. Apparently, the establishment of common lands was reconsidered

many years later, as the issue was debated in 1745 but subsequently rejected (Deyo 1890).

Enclaves of Settlement

With proprietory rights established to the land, a discernable pattern of settlement emerged in each of these towns. As previously discussed, eighteenth century Eastham had no compact village as its focal point. Within the township itself, there were according to one account "several quarters of it distinguished by appropriate appellations" (Massachusetts Historical Society Collections 1802:158). The northeast part of the town retained the name of Nauset; in the northwest was an enclave referred to as Halfponds or Half-Way Ponds, presumbaly due to its location between the original Town Cove neighborhood and Billingsgate to the north. Another neighborhood called Great Neck is described as being located to the "...west of the meeting house, south of Great and Long ponds, and north of Great meadow..." (Massachusetts Historical Society Collections 1802:158). In addition, there were the neighborhoods of Skaket to the southwest and Pochet to the southeast in what became the town of Orleans in 1797.

Unlike Eastham, Billingsgate exhibited a pattern of settlement in which its western or bay side was preferred. This is reflected in the places mentioned in the land divisions of 1696 (see Table 5.1) and also in subsequent land transactions. In fact, the earliest settlements in the town, dated between 1690 and 1730, were located on Great Island, Billingsgate Island, Bound Brook Island and Duck Creek Harbor (Rockmore 1979).

The pattern of settlement which evolved in Truro during this time was one that was composed, more than any other township on the Cape, of scattered enclaves of settlement (cf. Hershey 1962:37). The principal ones were situated at East Harbor, Pond Village, the Highlands, and along the Pamet River. Although the location of the eighteenth century East Harbor Village is not known precisely, local tradition (Deyo 1890, Rich 1883) places it in the vicinity of High Head and Pilgrim Lake in what is now Provincetown. Pond Village was located on the bay side, one mile south of East Harbor and about three miles north of the Pamet River. The Highlands, traditionally called Tashmuit, meaning spring to the Indians, was located near the clay pounds on the western side of Truro. On the north side of the Pamet River, beyond the harbor mouth, there was the enclave referred to as the Head of the Pamet. Although the harbor at the Pamet River was considered a good one, it was not developed until the nineteenth century.

Provincetown, or "Cape Cod" as it was known, was at the time also considered a district of Truro. In 1714, it had been placed under the jurisdiction of the town which was responsible for collecting revenues from the area's rich fishing grounds that in

1654 had been set aside by the Royal Governor for the benefit of the colonial administration. Truro apparently did not enjoy the position it found itself in and petitioned the General Court "that Cape Cod be declared either a part of Truro or not a part of Truro, that the town may know how to act in regard to some persons" (Kittredge 1930:94). Having recently been incorporated, the burden of having to maintain a constable and revenue collector for the Provincelands from which it received no returns obviously was considered too burdensome. The matter regarding the proper disposition of the Provincelands finally was resolved in 1727 when Provincetown was incorporated as a separate township. Its situation was one that was unusual in that the inhabitants of the town could not establish legal claims to the land and were exempt from taxation. By this act, the colonial administration clearly affirmed its ownership of the land.

The location of eighteenth century settlements in Provincetown is not known for certain. It is known, however, that the original proprietors of Truro divided the section of land between Stout's Creek and the Provincelands into seven lots with the first lot beginning near the site of the Eastern schoolhouse. Unhappily, the owners, size of the lots, their occupancy, and the pattern of land use are unknown (Deyo 1890:965). With the extension of Provincetown's borders during the nineteenth century, land was annexed to Provincetown which presumably was involved in these early divisions as several individuals whose land tenure conceivably could date from this time became residents of Provincetown (Rockmore 1979). In addition to this location, it is likely that there were scattered settlements of a temporary and perhaps permanent nature closer to the harbor area itself. During the second and third quarters of the eighteenth century many of Provincetown's settlements had been abandoned due in part to the growing political difficulties between colonial America and England. Race Point was believed to have been all but deserted at the time of the Revolutionary War as it was then used as a station by the British Navy. The few inhabitants who remained in the harbor are reported by one observer to have "profited greatly" (Kendall 1809:151).

Conclusions

It is possible to characterize the nature of settlement on the outer Cape as it emerged during the course of the eighteenth century. Comparing Eastham, Wellfleet, and Truro, it is clear that simply in terms of the distribution of population across the landscape that there were differences. In Eastham, the core of settlement remained the area around the Town Cove lying adjacent to the township's best agricultural acreage. In Wellfleet, the harbor became the focal point of settlement as several coastal islands and nearby creeks are mentioned in eighteenth century land divisions (see Table 6.1; also Eastham, Lands and Ways 1711-1747). The apparent lack of coherence in Truro's settlement pattern is anything but incoherent. In fact, the town exhibits a high degree

of congruence between the pattern of diversity of its natural resources and the distribution of its population aggregates. Thus, in general way the systems of colonial and Indian settlement on the outer Cape were not all that different. Both were tied to the pattern of resource distribution across the landscape.

Yet, for the colonists, the situation was not one of total accord with the cycles and patterns of nature. Notions of property ownership and surplus accumulation eventually put them in a much more precarious position in that they were more closely and intimately tied into fixed places on the landscape. Given the nature of resource distribution on the outer Cape, this implies that marginal areas would have increasingly become the focus of attention as the eighteenth century progressed. Population increase, the desire to enlarge property holdings or the need to increase agricultural yields, all would have encouraged proprietors to incorporate marginal areas into the system of land holding and to transform them into fields and pastures. In the process of accomplishing this transformation, the landscape would be so altered that the boundaries of the ecosystem itself would eventually be redefined.

Chapter 6

Ecological Transformations

In assessing the ecological transformations evident on the outer Cape at the end of the eighteenth century, it is clear that the initial ways in which the settlers had organized themselves and their activities in respect to patterns of resource distribution had a profound effect on what would be available for future generations. Clearing the land of its trees, cultivating acreage for crops, raising livestock, and harvesting the coastal waters, all had major impacts on the outer Cape's ecosystem. In carrying out these activities, the colonists set in motion a series of ecological reactions that they and future generations were unable to forestall, let alone reverse.

Deforestation

Of the ecological changes brought about by European settlement, deforestation was by all accounts the most visible consequence. As early as 1800, Timothy Dwight while travelling on the outer Cape recognized the insidious effect of timber cutting on its sandy soil. Observing fields abandoned to moving sand, fences buried in small dunes, and other evidence of barrenness, he reported on an ecological condition called desertification in which the shifting sands advance across the land due to the loss of the main protective barrier against wind erosion, the forests (Stilgoe 1980:101). This view of conditions on the outer Cape stands in stark contrast to those described by the Pilgrims in 1620. Whether these weary settlers, accustomed to the crowded quarters of London and Leiden, and the villages and hamlets of the English countryside with its denuded forests, had been prone to exaggerate nature's bounty, or simply were so glad to have reached the New England coast that in the words of Thoreau "everything appeared to them of the color of the rose, asnd the scent of junipers and sassafras" (cf. Carroll 1975:46-47), the effects of European settlement and land use practices cannot be underestimated. While the outer Cape was by no means a pristine

landscape at the time of the European's arrival in the seventeenth century, it was one that had been altered almost beyond recognition by 1800.

The deforestation of the outer Cape was accomplished in a variety of ways. Quite clearly, level wooded land was area that could potentially be cultivated. It could be enclosed within fixed property boundaries and cleared for planting. But the cutting of the forest was more than "a necessary adjunct of the rural economy" (Cronon 1983:108), it provided much of the raw material essential to colonial existence. Wood was the primary building material used in house and barn construction. Impressions of building laths in hundreds of plaster fragments recovered from archeological excavations at the Great Island Tavern site, dated ca. 1690-1740, indicate that it had been constructed of large sawn planks attached vertically to the building's wooden frame in the manner of other houses in Plymouth Colony (Deetz 1977:36). In contrast to their English prototypes which were roofed with thatch and were plastered on the exterior, colonial settlers soon began to use oak boards and cedar clapboards and shingles for the same purposes. Moreover, 50-100 years after the establishment of the colony at Nauset, the outer Cape experienced a rebuilding. Many were no longer satisfied with the houses that provided for their shelter during the colony's early years and constructed homes which were larger and architecturally more elaborate (cf. Kittredge 1930:76-79).

The houses built by these later generations of colonists on the outer Cape adhered to a standard architectural pattern which became known as the "Cape Cod house" (Connally 1960). Typically, when modifications to the house plan were deemed necessary by changes in the inhabitants' needs or circumstances, these changes were expressed in variations in which the size of the house was enlarged in more or less set increments. These standard variations of the type ranged from a house (one room wide), to a house-and-a-half (one large and on small room wide) to a double-house. The latter is described as having"...two liberal-sized front rooms, an immense kitchen, with two bedrooms and a buttery, or pantry, on the lower floor and a "square-chamber" upstairs (Rich 1883: 340-341). Structurally, these houses were similar to the earlier seventeenth century houses of Plymouth colony in that they were constructed of vertical planks and finished with clapboards and shingles. This method of construction along with enlargements in house size placed great demands on the local wood supply. Gradually, this building technique was replaced by conventional frame construction in which lighter timbers were used. Before the middle of the next century, if not earlier, houses were being built with pre-cut, ready-to-use timber, imported from Maine (Connally 1960).

While changes in architecture during the eighteenth century contributed to the demise of the forests, there were other factors as well. Wood also served as the main fuel source for cooking and heating. Given the harsh New England winters, the drafts created

by faulty construction and the heat drawn off by the chimneys of the large, open hearths which characterized colonial houses, it is not difficult to imagine that the demand for firewood was high. In fact, it is estimated that it took between 20-40 cords of wood to heat a colonial house for a year (Russell 1982:97). This would amount to the cutting of the equivalent of one acre of forest per year based on the yield of a mixed woodlot filled with white, red, and yellow oak, chestnut, and maple (Stilgoe 1982:199). Of these trees, some would have been preferred for firewood because they threw off more heat per unit volume. Hickory, for example, burned hotter than white oak; white oak gave off more heat than hard maple, hard maple more than soft maple, and so on. Given that many of these trees -- chestnut, maple, and hickory -- have not been important components of the outer Cape's forest during the past 7,000 years (see Chapter 2) while pitch pine and oak have, it is not unreasonable to predict that greater amounts of acreage would had to have been cut for household fuel since conifers such as pitch pine were considered to be the least desirable fuel sources.

While the earliest New England fences may have been fairly rudimentary, wood for fences came to consume greater portions of the forest as more and more fences were constructed during the course of the eighteenth century. Records from meetings of Truro's proprietors, for example, show an increasing number of requests to put up fences during the 1720s and 1730s. Like other material investments in rural areas, fences were a necessity. Not only did they separate one individual's land from another's, but they enclosed fields and pastures in order to prevent catastrophes caused by wandering livestock (Stilgoe 1982:191). They came to signify, much in the same way as other aspects of material life, an individual's worth -- good fences meant the achievement of order, poor fences disorder. Given the importance attached to fences in contributing to maintain order in the community, it is curious that wooden fences were so prevalent since wood as a fencing material certainly had its drawbacks. In a climate like New England's, posts and rails tended to decay within as little as a decade depending on the type of wood used. Moreover, yearly maintenance costs involved in repairing wooden posts damaged from frost heaving and spring thaws were quite high (De Crevecoeur 1981:266). While other parts of New England subsequently attempted to solve the problem of decaying fences by replacing them with walls constructed of stone gathered from successive seasons of plowing, the outer Cape's limited supply of stone continued to make wood the material sought for fencing until this was no longer feasible and alternative fencing methods were devised.

In addition to its use for domestic purposes, wood also was important to colonial industry. In fact, many of the outer Cape's maritime industries such as shipbuilding, fishing, and whaling involved the use of wood and wood by-products. Shipbuilding was one of the earliest industries on the outer Cape; Edward Banges, one of the founding proprietors of Eastham was a shipbuilder by

trade (Lowe 1968:31). The building of ships so heavily taxed the region's supply of white pine, white oak, and black oak that by the middle of the eighteenth century the timber needed for this industry had to be imported from Maine (Altpeter 1939:38).

Until 1778, salt essential to preserving fish for export, was obtained by boiling seawater. Approximately one cord of wood yielded 10-12 bushels of salt (Altpeter 1939:30). Try-houses which processed whale oil by boiling also were large consumers of firewood (Kittredge 1930: 170). Even the outer Cape's pitch pine furnished an important forest commodity -- its resin was used in making naval stores such as pitch, tar, and turpentine (Hindle 1975:5).

Perhaps more than any other activity, farming itself was responsible for the demise of the outer Cape's forests. While the earliest settlers may have taken advantage of using areas recently cleared by the Indians to locate arable areas to cultivate, subsequent settlement had no such advantages. There were, of course, visible clues which the settlers looked for such as soil color and extant vegetation which were said to indicate fertility. Tree cover, in fact, was noted by more than one observer to be attributed to the nature of the underlying soil. The presence of hickory, walnut, beech, ash, and other similar deciduous trees was taken as an infallible sign that the soil was rich and potentially profitable (Stilgoe 1982:144-145). Where chestnuts and oaks predominated, the soils were considered to be thinner and somewhat gravelly, although these too were adapted for husbandry. The least desirable soils were said to be found under conifers, where conditions were acidic and dry, as often was the case where pitch pine occurred (cf. Cronon 1983:115. Stilgoe 1982:145).

Judging from what is known about the patterns of resource distribution of the outer Cape (see Chapters 2 and 3), it is clear that most desirable soils, marked by stands of trees, such as hickory or beech that require moist conditions were available only in limited locations and quantity. Land lying under the outer Cape's extensive oaks, although not as valued, was still considered to be potentially suited to agriculture. There was a certain paradox presented to the outer Cape's settlers in using these convenient rules of thumb to guide decisions made about cultivation and planting. The most desirable soil locations figured into the initial land divisions made by the founders of Eastham. Subsequent generations of inhabitants had to expand settlement into areas where the apparent guideposts were less promising. Consequently, areas considered to be less desirable also were settled and utilized. In taking these forested areas, the colonists contributed to further deteriorating soil conditions. Robbed of its forest cover, the soil lost its principal source of enrichment. The crops and grasses that the settlers planted instead provided a poor substitute that could not replace what they had taken out. As a result, reduced soil fertility and problems related to soil dryness and erosion became more pronounced.

While it is more than likely that the colonists were aware of the benefits of the forest not only to the land, but to their livelihood, this awareness did not go hand in hand with measures to ensure its continued yield. What is so astonishing about this is how quickly they forgot lessons from the mother country where deforestation had created severe wood shortages from the sixteenth century onward. Forest management techniques, whether based on medieval lore, common sense, quesswork, or even simple trial and error, seems to have been ignored during the eighteenth century (Stilgoe 1982:198).

In the initial years of settlement at Eastham, the colonists continued to follow the Indians' practice of burning the forest undergrowth by setting aside certain days each spring for this task (Lowe 1968:26). This practice along with a technique known as girdling became the way in which the colonial farmer cleared the forest for agriculture. The technique, as described in a pamphlet written by Captain John Smith in 1625, advised them to "spoil the woods" by removing a band of bark from the tree (Stilgoe 1982:172-173). This prevented the tree from sprouting and in several years time killed it. The technique proved to be unpopular among Europeans used to open fields which could be easily plowed and was replaced by a technique which cleared the forest from an area immediately. The technique involved felling trees from their stump, and then burning the wood unsuitable for other purposes in piles scattered across the field. Under this system of clearance, the trunks could be removed from the field much sooner thereby permitting plowing to be done at a much earlier date.

Thus, felling, which became the more common method of forest clearance, adapted the use of fire, not simply to clear the underbrush, but to rid an area of its forest cover (Cronon 1983:118). It is likely that Eastham's residents were using this technique as early as the seventeenth century, although by the eighteenth century the practice was common among most New England towns. Comparing the two techniques, it is difficult to assess which had a more deleterious effect on the region's forests. Girdling destroyed trees at a slower rate, but since the work itself was less labor intensive wider areas could be affected. Tree-felling, on the other hand, involved intensive work which resulted in the rapid clearance of smaller sections of the forest. It is estimated that between one to three acres of forest a year could be cleared by a person working on a part-time basis, depending on the forest type and age (Stilgoe 1982:181).

While girdling is said to have wasted large amounts of wood (Cronon 1983:116), tree-felling did the same. Each technique accomplished this in different ways. With girdling trees were allowed to stand while their wood rotted away, thus making their timber unuseable for most purposes. Felling provided a ready source of useable timber for building, for fences, etc., although it may have created a kind of situation in which the sudden availability of large quantities of this commodity also resulted

in gross waste. Whether the unneeded timber was burned in the field or sold for profit, the end result was the same as sizeable portions of the forest were destroyed.

By the late seventeenth century, the colonists on the outer Cape awoke to the impending wood shortages created by their clearing activities and by their selective cutting. Eastham's town records from this period contain several references to restrictions aimed at conserving the forests. A 1690 ruling indicates that no wood was to be cut from the common lands except for export out of the town. In 1694, the ruling was extended to pertain not only to the town's common lands, but to wood from any source. One year later, the townsmen were prohibited from cutting wood for any purpose on the common (Altpeter 1939:31). These restrictions may have been ignored since Eastham's wood situation seems not to have improved but to have deteriorated as the town's rulings became more restrictive. What is interesting about these rulings, at least those of 1690 and 1694, is their exceptions. In both cases, wood for export was considered to be sufficiently important to the town's economy that the colonists still were allowed to cut timber for this purpose. Obviously, Eastham like other towns enjoyed the profits it gained from participation in the timber market to the degree that it resisted fully enacting the measures needed to ensure the forest's continuous yield.

Judging from this evidence, it has been surmized that much of Eastham's forest was clear-cut as early a 1700 (Altpeter 1939:31). The lack of agreement among farmers concerning proper approaches to forest management in the ensuing decades failed to remedy the situation. An early nineteenth century account indicates that Eastham was little improved by that time: "Except for a tract of pine and oaks adjoining the south line of Wellfleet and one which is one and a half miles wide, no wood is left in the township. The forests were imprudently cut down many years ago..." (Massachusetts Historical Society 1802:157).

This denuded landscape, however, extended well beyond Eastham. In Truro, for example, the situation was not any better. As early as 1701, the town proprietor's records mention an action regarding the taking of wood. Another entry dated February 28, 1711/12 indicates that individuals wanting to cut wood for fuel to use in processing building lime from shell left in mounds along the shore by the Indians must apply to the court for permission. These attempts by Truro to restrict the use of the forests was no more successful than elsewhere as the destruction of its woods left a plain extending between the Pamet River and Eastern Harbor nearly as barren as the dunes which existed beyond it (Hershey 1962:70).

What lay beyond was Provincetown where Plymouth colonists had been granted rights not only to its fishing grounds (see Chapter 5), but also to its timber resources. This act initiated the taking of the area's woodlands which continued throughout the eighteenth century and, in conjunction with overgrazing, created

the massive sand dunes of the present-day Provincelands. What early colonial accounts described as extensive acreage of timber (Altpeter 1939:13), existed only as a memory by 1800:

> "When the Pilgrims landed it was covered with large oak and walnut trees, which were used for ship timber and lumber, and pine-trees, which were tapped for turpentine. It was nearly a century after the landing before the destruction of the woods was interfered with; and from the name, Wood End, borne by the long and now barren sand spit which makes Provincetown Harbor, it appears that this once was a forest."(Nordhoff 1875:54)

Clearly, deforestation had a major impact on the outer Cape's ecosystem. With the destruction of the forests, cultivated areas had no protection against wind erosion. Soils became increasingly dry since the forests helped retain soil moisture. On the outer Cape where moisture retention was problematic due to sandy soils, conditions deteriorated. The consequences in terms of human interaction were profound. With the demise of the forests, substitute fuel sources had to be found. Peat from the wetlands which they had been taught to dry and prepare by Samuel Osborne, who had become Eastham's second minister in 1717, along with driftwood from the beaches, came to serve this purpose (Massachusetts Historical Society 1802: 191). Yet not all needs could be satisfied locally. With the loss of stands of large oaks and other mature trees preferred for construction, the timber needed for building ships and houses had to be imported from areas far from where it was needed. Thus, deforestation had the effect of extending the web of ecological relations by tying the outer Cape's inhabitants to alternative resources and linking them to new markets.

Soil Exhaustion

While deforestation clearly was the most dramatic ecological transformation apparent on the outer Cape by 1800, there were other natural resources which also were affected by colonial land-use practices. Once the land was cleared, fields planted in the manner of gardens with mattocks, spades, and hoes gave way to those which were plowed and harrowed. In the process, these tracts of land were planted solely with one or another crop or seeded with English grasses as fodder for their livestock. Over the years the ways in which these fields were managed had a major effect on the outer Cape's soils.

In the early years of settlement it is likely that the colonists planted corn in hills along with beans and squash in the manner that they had learned from the Indians. They soon abandoned this practice, in favor of English plow agriculture since they found that hilling the earth around the corn was not necessary either to the plant's growth or stability (Massachusetts Historical Society 1802:190). They were so successful in adapting

corn to the more intensive system of cultivation that it became one of the mainstays of the outer Cape's cereal crops during the seventeenth and eighteenth centuries (Russell 1982:69). Judging from the town records, the importance of the corn crop to the town's economy was such that as early as 1675 the town passed an "order in reference to the destroying of blackbirds and crows, which are very annoying to us in damaging our corn." Under this order, each property owner within a township was required to kill"...or cause to be killed, twelve birds a year...or else to forfeit six shillings in money to the town's use" (Eastham Records of the Town Meeting, 1648-1705 p.40). Periodically over the next sixty years, the ordinance continued to be issued or otherwise amended in order to protect the farmers' corn crops from the damage caused by these pests.

In addition to corn, Eastham's settlers planted other crops. These included rye, wheat, barley, and some flax. Of these "Indian corn", rye, wheat, and barley had their cash equivalents enumerated for tax purposes in town records in 1727 (Dickie 1978:319), although conversion rates for these grains as well as other produce also are noted in payment schedules for each of Plymouth Colony's towns as early as the seventeenth century. While there is little specific information available on farming in Eastham during the 1700s, one account suggests that "the raising of grain is the principal business to which the farmers attend" (Massachusetts Historical Society Collections 1802:157). Not only was enough grain produced for local consumption and for transfer into the public domain, but there also was enough surplus available for sale in the marketplace. Wellfleet, in fact, provided a ready market for about half of Eastham's corn whose yield per acre was so high that it is estimated to have produced upwards of a 1000 bushel surplus for export annually around 1800 and about three times as much a quarter of a century earlier (Massachusetts Historical Society 1802:157).

If the situation in the early 1800s holds any relevance for that which existed in the century just past, then it is possible to gain some insight into how particular parcels of land in the town were planted on the basis of observations made at that point in time. The town's best acreage -- the tract of about 200 acres lying on its eastern side -- along with the less fertile land to the north of it were planted with corn. To the south Pochet Island, Barley, and Toneset Necks in modern Orleans, all had corn fields. Seemingly less acreage was devoted to the other grain crops compared to corn. This is in all likelihood due to its greater yield per acre compared to other grain crops. The most productive land, for example, was said to yield, with manure, thirty-five and sometimes forty-five bushels of Indian corn to an acre, and from twenty to thirty bushels of rye (Massachusetts Historical Society 1802: 157).

In other sections of eighteenth century Eastham, the yields were somewhat lower. In Pochet, the yield was twenty bushels of Indian corn to the acre without manure; and for Barley Neck and

Toneset Neck, fifteen bushels. The so-called "light lands" of Eastham proper and what was to become Orleans produced ten bushels of Indian corn per acre without manure, although in some cases the yield could be increased to almost twenty with it (Massachusetts Historical Society 1802: 189). By planting these soils with rye, a farmer could hope to obtain from five to eight bushels per acre. No figures are given for similar yields of wheat and flax, although these crops were planted in more limited locations, particularly on the town's best agricultural acreage including some on Pochet Island (Massachusetts Historical Society 1802: 189). In general, the colonists had a more difficult time raising these crops on New England soil than they did with the other European cereal grains.

Judging from these assessments of agricultural productivity, it is clear that the farmers of Eastham were fully utilizing the agricultural acreage available to them. This included the town's best soils and those which under most modern soil classification systems would be considered of marginal productivity. Based on modern soil distribution patterns (see Chapter 3), Eastham had about 3713 potentially arable acres of which a quarter or third were said to have been planted annually in grains (Massachusetts Historical Society 1802:189). From this estimate, it seems reasonable to suggest that between roughly 928-1225 acres were cultivated for these crops. This figure is not too far from the 1769 acres of tilled land listed in the 1781 aggregate valuation for the town (Massachusetts State Archives, 1791: 470).

While Eastham's farmers were cultivating extensive portions of the agricultural acreage available to them, the manner in which they were using particular parcels of this acreage is of interest in attempting to understand its effect on the land. It was common practice to take "Three crops in succession... from the good land: the first year, Indian corn; the second, hill rye; the third, stubble rye". (Massachusetts Historical Society 1802:189). On the poorer soils, corn seems to have been the principal crop planted year after year. Unlike their Indian predecessors whose system of land use involved moving fields from time to time, the European settlers on the outer Cape were tied to a system of land use in which a plot of land once cleared and plowed was never left fallow, but was subject to successive plantings. In particular, the repeated planting of corn, with little or no rotation, proved to be extremely harmful to the soil. It not only consumed large qunatities of nutrients in its own right but did little to stop unused nutrients in plowed soil from washing away since, unlike the Old World grains it created relatively little groundcover (Cronon 1983:150).

Whether motivated by the need to counteract the loss of soil productivity or by the desire to increase crop yields, the eighteenth century farmers on the outer Cape apparently experimented with the use of a variety of fertilizers. Horse-shoe or king crab, chopped into pieces, was used to increase the yield of light, sandy soils. Due to its high oil content, it was said

to afford a "strong manure" which "...causes the land to exert itself so much that it cannot easily recover its strength" (Massachusetts Historical Society 1802:189). The use of these crabs as well as fish such as herring, and alewives presented other drawbacks among which were their attractiveness to scavengers. Toward the late eighteenth century, seaweed was collected from the shore and spread on the cornfields as a fertilizer. It also preserved corn against worm infestation which was quite destructive to the crop (Massachusetts Historical Society 1802:189). Where potatoes were to be planted, seaweed was placed in the holes for the potatoes. While it may have increased crop yields, many farmers later complained that the use of seaweed was harmful to crops like potatoes which tended to suffer from a mildew condition prevalent on the outer Cape often described as "rot".

The situation in the other outer Cape towns regarding agricultural land use is less clear. This probably is related to the fact that compared to Eastham less emphasis was placed on farming than other pursuits. In Wellfleet, where the land was considered at best marginal for agriculture, the inhabitants were more interested in harvesting the sea than cultivating the land. The 1791 Massachusetts State valuation for the town describes only 127 acres as "tillable land", i.e., land that was plowed and suitable for cultivation by European standards, and 58 acres of "pasture" (Massachusetts State Archives 1791: 473). In 1794, Rev. Levi Whitman noted that "many of the people of this town spend more than half their lives at sea and on shipboard", and complained that "navigation engrosses their whole attention: otherwise excellent gardens might be made" (1794:119). He proposed that "excellent garden" plots could be created if the residents initiated a land reclamation program in "swamps, near ponds and marshes, where the tide might be dyked out" (Whitman 1794:119-20). It is not known, however, to what degree the town's inhabitants heeded his proposal, although a nineteenth century account noted that low swampy areas were covered with sand and planted (Pratt 1844).

In Truro, farming played a more important role than it did in Wellfleet. The town if fact was equally split among landed farmers and coastal fishermen (Rockmore 1979). In 1781, the town was assessed as having a total of 1594 acres of "tillable land" (Massachusetts State Archives, 1791: 474). In all likelihood this acreage was managed in a way similar to that described for Eastham. By the early 1800s, the situation was all to similar. Referring to a windblown field which had been abandoned as barren, Dwight (1969:59) wrote that "...these lands in ancient times are said to have produced fifty bushels of maize to the acre, and from fifteen to twenty bushels of wheat." In the process of raising their crops, Truro's farmers, like those on other parts of the outer Cape and elsewhere, treated their land as a resource which would be ever bountiful. During the colonial period, they used it intensively until they reached a point when they could reap no more from it.

In spite of attempts to improve the situation -- or perhaps to simply sustain a given yield -- it was too little too late. The settlers on the outer Cape were losing their battle against deteriorating soil conditions. Their own farming practices along with erosional problems led to a decline in agricultural productivity and the eventual loss of valuable farm land. These erosional problems were due to deforestation and plowing that removed the tree and ground cover which impeded the advance of blowing sands. But perhaps more than these factors, over-grazing was the most responsible for leaving fields and pastures vulnerable to wind erosion.

Over-Grazing

Like other coastal locations, the outer Cape was ideally suited for livestock raising. Its salt marshes provided readily available pasturage and its woodlands, prior to their destruction, served as areas where animals could roam freely. Its proximity to the coast also made it possible to transport animals to regional markets at Plymouth and Boston by sea which was cheaper and easier than driving them overland (Dickie 1978:418). Consequently, herds prospered and livestock raising as a commercial enterprise expanded from the 1650s to well into the 1700s. By the latter part of this century, the effects of overgrazing brought about by the increase of domestic animal populations were evident on the landscape that extended from Easham to beyond Truro.

Livestock were important to the outer Cape's economy from the early years of the Nauset Colony. In particular, breeding of horses and cattle became an important component of the domestic economy, as well as a market venture for Eastham's farmers. Horses provided transportation and were used in harrowing fields as the "...small Cape horse, somewhat larger than a goat" was said to "easily hoe three or four acres in a day." (Massachusetts Historical Society 1802:157). More importantly, horses were commodities that were sent to regional centers and exported to the West Indies and points along the southern Atlantic coast. Dairy cattle ("milch cows") provided colonial families with sources of milk, cheese, and butter which figured heavily into their diets. Dry cows provided meat that could be used by the household or salted for export. Although in the initial years of settlement these animals were allowed to graze freely, the townsmen soon began to require their registration which was a necessary precondition to the formation of common herds (Dickie 1978:276). Under this practice, dry cattle and horses were earmarked and sent to graze in areas of the town which were not yet under cultivation. In 1658, the town appointed "overseers of the towns good" to care for these herds and to maintain them over the winter months at a cost to the town (Dickie 1978:277).

The emphasis on these grazing animals in colonial Eastham was in large part related to the colonists belief that there was

adequate pasture available in the town. Their resources for stock-raising were considered so abundant that the town sold pasture rights to outsiders. Town records indicate that several individuals from Plymouth Colony pastured horses in Eastham between 1659 and 166Ø (Dickie 1978:419). In spite of the colonists' opinion that native grasses were inferior to English grasses and of poor nutritive value for their stock, their pragmatism caused them to put these views aside once they realized that a profit could be made from this resource. The natural salt hay growing near the islands and peninsulas around Town Cove in Eastham and south of Pochet was available in such abundance that problems caused by the overgrazing of other native grasses were not felt to the degree that they were in other towns. Many of these native grasses found in meadows and in formerly abandoned Indian fields, unlike English grasses, were not adapted to the harsh requirements of pastoralism and tended to be destroyed by intensive grazing (Cronon 1983:142). Consequently, these were replaced with English grasses planted by the colonists. In Eastham and the other outer Cape towns the cultivation of these grasses was never as important as it was elsewhere in New England due to the availability of salt hay.

The care that the colonists bestowed upon domestic stock, from guarding them from predators and providing for their needs during the harsh winter months, was substantial. Domestic animals were valued so much that at one point during the early eighteenth century a proposal was made to rid the region's livestock of its chief menace --wolves --that went far beyond bounty hunting. It was to build "a high fence of palisades or boards" across the neck of land near which it had been proposed to cut a ship-canal (possible Jeremiah's Gutter in Eastham), "to keep wolves from coming into the country" (Nordhoff 1875:56). Although this proposal was not acted upon, the outer Cape's farmers devised other ways of protecting their animals. The construction of fences and ditches was one such strategy, although it was more likely to have been used to protect cropland from wandering animals, than the animals from their predators. The alternative strategy was to confine livestock, especially those which required protection from predators and close human supervision, on coastal islands where they would be safe (Russell 1982:84). The presence of sheep bones recovered from archeological excavations on Great Island (Ekholm and Deetz 1971:56) suggests that its meadows may have served this purpose since at times in the past the peninsula which forms Great Island was separated from the Wellfleet mainland.

With such high value attached to livestock, it is not difficult to comprehend why domestic animals fared well on the outer Cape. Eastham continued to be the principal horse-breeding town on the outer Cape throughout the eighteenth century, although the number of animals accounted for in the 1781 assessor's valuation suggests that their significance had declined (Table 6.1). During the eighteenth century, Truro rivaled Eastham in terms of the number of cattle raised. Considering the acreage

TABLE 6.1

Number of Animals and Their Density per Acre by Town

Based on the 1781 Tax Valuations

	Eastham*		Wellfleet		Truro	
Horses	3.9	(115)	1.1	(24)	1.8	(39)
Oxen	6.7	(251)	2.6	(56)	7.9	(174)
Cows	12.7	(461)	3.7	(79)	14.Ø	(3Ø7)
Sheep /Goat	27.4	(1Ø17)	14.8	(314)	33.6	(736)
Swine	5.5	(2Ø4)	2.Ø	(42)	4.5	(99)

* Includes modern Orleans.
The actual numbers of animals are shown in parentheses.

available and suitable for grazing in each of the towns, however, Truro was supporting more animals per unit area (Table 6.1). Oxen, which were valued as beasts of burden due to their strength and endurance, were present in all of the outer Cape towns during the seventeenth and eighteenth centuries. On the farms, teams could be used in pulling plows and helping with other heavy farmwork; in the harbors, they helped haul loads and delivered timber for shipbuilding (Russell 1982:86). Comparing the number of oxen present in the towns in 1781 (Table 6.1), it appears that these animals continued to be used most extensively in farmwork as both Eastham and Truro account for the greatest number of these animals.

Swine, more than any other animal, quickly adapted to the New England environment. They readily reproduced and could feed on almost anything; they could be let to wander freely in places that did not necessarily provide suitable fodder for other animals. Cut into merchantable pieces and salted, barreled pork was a local medium of exchange as well as an export commodity (Russell 1982:83). While in the early years of the Nauset colony they were relegated to woodland areas where they were away from the core of European settlement, this was no longer the case after the woodland was divided and the northern section of Eastham was opened to settlement. As the population expanded and more acreage was transformed into farmland, straying swine quickly became a nuisance which colonists sought to avoid by penning them, putting them under the care of the pigkeeper, or simply eliminating them (Cronon 1983). The number of swine raised by outer Cape farmers in the late 1700s (Table 6.1) is said to have dropped considerably from the previous century (Yentsch 1977).

While most of New England was considered too untamed in the 1700s to serve as suitable pasture for sheep (Russell 1982:83), coastal regions such as the outer Cape with their wide expanses of marshes and grasslands were exceptions. More than just needing good pasturage, sheep more than any other animal required the greatest amount of human intervention to survive and prosper. In return they provided the colonists with wool for clothing and mutton for food. Although the number of sheep present on the outer Cape (Table 6.1) did not approach the size of flocks found in areas such as Nantucket and Martha's Vineyard where there were 15,000 and 20,000 sheep respectively in the late eighteenth century (Russell 1982:85), sheep were the most numerous type of livestock in each of the towns in the late eighteenth century. Their occurrence in probate inventories suggests that the number of sheep present may have remained relatively stable in that the number of households reporting sheep as stock changed very little from the seventeenth through the eighteenth century (Yentsch 1977).

The consequence of livestock raising was such that it eventually not only reduced the amount of grass available for the animals to graze on, but it deprived the land of so much of its ground cover that erosional problems were compounded. As early as

the 1730's, the neck of land in Eastham now called Nauset Beach ceased to be used as a pasture, but was reserved for mowing: "...beach, meadows, and sedge ground shall be kept and preserved and orderly improved by and for mowing and no other use...no Creatures, as neat cattle, horses, hogs, and sheep are allowed to go at large to any part of the Beach..." (Hershey 1962). By limiting the use of the area to mowing, the townsmen were attempting to take measures to prevent the damage caused by livestock to important natural pasturage. In mowing the area's salt hay, they were the managers who in effect were acting as improvers of the land. Yet by 1740, the situation caused by overgrazing and deforestation, had become so serious that Eastham petitioned the General Court that its taxes be abated on account of "the Damage done in and to said Town by the sea, fires, winds, and sands destroying such great quantities of their meadow ground and lands and firewood and fencing stuff" (Eastham, Records of the Town Meeting, 1706-1761, pp. 199, 128).

In Truro, the situation was especially severe as the density of grazing animals such as cattle and sheep was greater than in Eastham. The damage inflicted to the town was considerable. By the 1730s, blowing sands had encroached on the town's fields and meadows. In 1739 the Massachusetts General Court passed an act forbidding all grazing of cattle areas severely affected by overgrazing. Once again, enforcement may have been problematic as the law was restated many times. In fact, each inhabitant of the town was required to plant beach grass to slow the movement of sand (Hershey 162:8). Apparently, these measures were not all that effective as by 1760 Truro had to ask for an abatement of taxes due to great losses of productive acreage from sand blown onto fields and meadowlands (Rich 1883:247). Not surprisingly, Provincetown suffered similar problems as along with its being set aside as a fishing ground and a woodlot, it also was exploited as a grazing area for cattle. By 1744, regulations were passed regarding the pasture of cattle and the planting of beach grass to prevent the advance of duneland (Rockmore 1979).

Pasturage, even in locations outside of the coastal meadows, was affected by overgrazing. Whereas light grazing will tend to encourage the growth of many perennial grasses such as those introduced by the English colonists, overgrazing tends to affect species composition to such a way that it induces the spread of species found unpalatable by most animals (Jorgensen 1978:216). Thus, the net effect would be to further reduce potential grazing land. In sum, the pattern is all too clear. The interaction among colonists, livestock, and the land resulted in changes which were acute toward the end of the eighteenth century if not earlier. By this time, there was a decline in some livestock herds, a reduction in available pasturage, and widespread impacts that were affecting other parts of the ecosystem.

Depletion of Coastal Resources

Not all the ecological transformations wrought by the inhabitants of the outer Cape by the late eighteenth century were on the land. Coastal resources too were affected by the ways in which these people organized their activities. As early as the seventeenth century, the resources available in the near-shore areas of the coast had figured into the economic life of the outer Cape's settlers. As population grew and settlement expanded out beyond the original Town Cove enclave of the Nauset colony, marine resources came to play a role in each of the towns, albeit one different from the other. The result was that some of the resources available in near-shore locations, especially whales and shellfish reserves, much like the terrestrial resources already discussed, were depleted. These resources, like those of the land itself, were not available in unlimited supply.

As early as 1652, whales held special significance for the European colonists. Those cast upon the shore were interpreted as a sure sign of heavenly intercession in assisting the colonial goverment at Plymouth in its settling debts (Dickie 1978: 279). Accordingly, the Court ordered that

> Every town shall pay one barrell of marchantable oyle for every drift whale cast or brought on shore...within...their severall townshipes any whale...that shalbee...cast on shore in any place...out of the bounds of every particular township shall pay one full barrell of...oyle for every such whale which shallbee delived att Boston. (Shurtleff 1855-1861, vol. 11, p. 114 11:114).

As a result of this order, drift whales became the property of the colonial government, which could exchange the oil for cash in the Boston marketplace and in turn use this income to defray debts and other charges which it had incurred in the business of governing. In issuing this order, the colonial government did more than stake its claim of the drift whales: it defined the near-shore areas as being part of its domain, and not that of the towns (Dickie 1978: 279-280).

The implementation of this order was left to the discretion of the towns. In 1660, the town of Eastham set up a system whereby "whosoever shall find a whale within the township" was to inform the governor and then "his next neighbor...and so every man is to give notice to his next neighbor." Once being informed, all the townsmen were to gather at the house of the governor and then proceed to the place where the whale was cast ashore "to cut up the whale and try out its oil" (Eastham, Records of the Town Meeting, 1648-1705, p. 20). Only a month after being instituted, the system was found to be too inconvenient and was revamped. Under the new system, any individual had the rights to raise a company to deal with the matter of taking whale oil on the town's behalf (Dickie 1978: 280). Like the system under which the town

maintained its stock of horses and cattle, this system also ran into disfavor as individual concerns became paramount over those of the common good. By 1690, all towns in Plymouth Colony were required to appoint "inspectors of whales" to regulate the matter of beached whales and verify ownership by viewing marks made on them by their harpooners (Dow 1925: 9).

The outer Cape's involvement in the whale industry went beyond the harvesting of beached whales. In Eastham, the business of near-shore whaling was so important to the local economy that it was a major impetus for the development of political factions within the town, and in the eventual separation of Billingsgate (see Chapter 5). Yet, for most of the farmers in Eastham, whaling simply complemented their normal schedule of activities. When a whale was spotted offshore, the news was signaled to the townsmen. There was such rivalry among those who went out to capture the whale that town lore tells of an early Eastham minister who, upon hearing the report of a whale within sight of Nauset, abruptly ended his sermon, rushed down the aisle, and joined the men who were about to race to the scene, shouting "Now start fair" (Lowe 1968:31). The competition for whales became so intense that the colonists soon abandoned their passive tactics for more aggressive ones. Since most of those who tried their hand at whaling were farmers who were "more dexterous with a pitchfork than a harpoon", a method was devised whereby they would surround the whales in their boats and beat the water with the flat portion of their oars in order to drive them ashore (Kittredge 1930: 167). This method proved to be especially effective in the taking of a variety of whale known as blackfish.

Near-shore whaling as practiced in the seventeenth and eighteenth centuries bore little resemblance to the long-distance whaling that is the stuff of nineteenth century folklore and novels. Near-shore whaling was, for the most part, the domain of farmers who engaged in this activity after their spring and summer tasks had been completed on the farm, or at other times when the occasion presented itself. An individual rarely possessed the entire set of tools necessary to catch and try whales (Yentsch 1977: 8). Probate inventories from the towns suggest that instead individuals held shares in boats, and some owned a special tool or two that could be used in catching or processing the whale, or transporting its oil and portions of its bone from the shore.

Not all of those on the outer Cape who engaged in near-shore whaling, however, were farmers first. Whaling is said to have become so popular that some attempted to pursue it on a more regular basis. This was certainly the case in Wellfleet and Provincetown. All of the outer Cape towns, in fact, placed such a value on this enterprise that early in the eighteenth century they began to prevent the taking of whales by non-residents. The fact that the towns considered it necessary to place restrictions on whaling may very well be a sign that the near-shore schools of whales were beginning to decline. A newspaper account from Boston dated March 20, 1727 indicated that the whale industry had

experienced several disappointing seasons (Ekholm and Deetz 1971). By 1737, twelve vessels outfitted for whaling left Provincetown's harbor for the Davis Straits in Greenland (Dow 1925:28). Truro and Wellfleet residents also were early pioneers in the conversion to long-distance whaling. By the middle decades of the eighteenth century, these towns had men cruising the oceans in pursuit of whales since their appearance in local waters had become a rare occurrence. By the end of the century it had been noted of Wellfleet that "It is not however very often of late that these fish come into our harbor" (Whitman 1794).

The fate of the outer Cape's shellfish reserves was similar to that of whales in near-shore areas. The abundant shellfish found in most near-shore locations provided the local inhabitants with bait which could be used locally or sold, and food since many varieties of shellfish were not only edible, but considered to be delicacies. During the eighteenth century, the harvesting of clams for bait became an important business on the outer Cape, especially in places like Eastham which was said to furnish much of the bait used in Provincetown's fishing industry. These shellfish were so abundant in the southern portion of the town which became Orleans that the act of incorporation separating it from Eastham set conditions whereby the benefits of the shell-fishery were to be mutually shared (Massachusetts Historical Society 1802: 159).

The clam industry was said to be no more costly or labor intensive than cultivating Indian corn, although the former's harvests were said to be more lucrative; a thousand barrels of clams were equal in value to six or eight thousand bushels of Indian corn (Massachusetts Historical Society 1802:194). Yet, in spite of their richness, shellfish reserves on the outer Cape could be exhausted, if not used wisely. In fact, the local residents were advised on the use of measures to ensure the continued yield of clam beds since it took approximately two years after a bed had been dug up and almost all the clams collected for it to replenish itself. Many attested that it was necessary to stir the ground frequently "as it [was] to hoe a field of potatoes" since if this was omitted the clams would be crowded and growth inhibited" (Massachusetts Historical Society 1802:194). It is unclear to what extent the outer Cape's residents adhered to this advice since by the late eighteenth century, several of the towns had to take measures to protect the shellfish available in their local waters.

Among the outer Cape towns involved in the shellfish industry, the situation in Wellfleet is perhaps the most interesting. Here the variety of shellfish which most concerned the townsmen was the oyster that was harvested not as bait but as a delicacy. From the early sixteenth century, Europeans such as Champlain had been in awe of the size and quantity of the oysters in Wellfleet Harbor. It is not surprising, therefore, that the harvesting of oysters became an important industry. By around the 1770s oysters disappeared from the town's flats due in large part

to over-exploitation. The town's oystermen quickly responded to this crisis by bringing in seed oysters from other points in New England such as Wareham Harbor, the Taunton River, and Buzzard's and Narragansett Bays (Morison 1979: 302). Bivalves for reseeding Wellfleet's oyster beds were brought from as far south as the Chesapeake Bay. Compared to measures taken in response to the decline of other resources, those implemented to revitalize Wellfleet's oyster beds were successful--so much so that the town developed a wide reputation as an oyster-breeding center.

Compared to these other coastal resources, it is difficult to assess the situation of the local fisheries at the end of the eighteenth century. Fishing from the start had played a role in the economic life of the outer Cape's towns. Operating out of the harbors, the colonists could supply fish like cod, herring, bass, and mackerel for local consumption and for export, since once cured or salted these fish readily became trade commodities. Cod were taken by men working from boats using individual hooks, lines, and leads; bass, herring, and mackerel were caught using communal seines, large nets which were dropped into the water and dragged in toward the boat so that the open portion gradually narrowed and shut, enclosing large numbers of fish (Yentsch 1977: 7). The degree to which each town was dependent on the sustained availability of fish in local waters varied. Given the manner in which fishing was organized as part of the economic life of each town, some could voyage beyond the local harbors in pursuit of the catch, whereas others were more or less dependent on the yield of the local fisheries.

This was the situation in eighteenth century Eastham where the population was focused primarily on farming and animal breeding activities centered around the yearly agricultural cycle. Their utilization of the fisheries had to be scheduled so that it would not conflict with their farming activities. To them, the availability of near-shore resources made possible a life in which both subsistence modes could be carried out; depletion of the nearby marine resources meant that one would surely have to be forfeited. In Wellfleet, on the other hand, the sea was the mainstay of the town's livelihood. Without the emphasis placed on agriculture, many engaged in maritime pursuits on a regular basis. In this situation, not only could the townspeople exploit near-shore resources, but they also could participate in fishing expeditions which took them away from the town for extended periods. Therefore, the availability of local fisheries took on less significance; it was important, but given the level of the industry, the deep-sea fishing banks offered a more lucrative yield. The situation was in all likelihood quite similar in Provincetown.

In Truro, one could both cultivate the land and harvest the coastal fisheries like Eastham's settlers. Many of Truro's residents, however, decided to organize their activities around one or the other. The dichotomy which developed between those tied to the land and those dependent on the sea for their

livelihood made it possible for those who wished to engage in fishing to do so without having to be bound to the restrictive routine of an agricultural way of life. Consequently, near-shore fisheries may have played less of a role in the lives of the town's inhabitants compared to those off-shore.

Thus, more than any of the outer Cape towns, Eastham depended on hauls from near-shore fisheries to sustain a way of life in which farming and maritime activities were combined. This is reflected in a measure taken by the town during the eighteenth century to prevent the destruction of schools of fish in Cape Cod Bay by porpoises. By offering a bounty for each porpoise tail brought in, the townsmen attempted to eliminate what they perceived to be a threat to an important resource in much the same way as they had done to protect their croplands from blackbirds and crows, and their livestock from wolves. In fact, Eastham's residents were so avid in their pursuit of the porpoise that the town eventually had to withdraw its offer since it could no longer afford to pay the bounties (Lowe 1968). One fisherman by the name of Elisha Young seems to have been so successful that he turned in some five hundred porpoise tails in a two year period between 1740 and 1742--all of them dutifully recorded by the town clerk (Kittredge 1930: 184).

Thus, although these near-shore resources previously had been utilized by the Indian inhabitants of the outer Cape, they came to be perceived and used in a different way entirely with the arrival of the European colonists. These resources became valued not simply for themselves, but for what they could be exchanged for in the market. From the early colonial period through the late eighteenth century, near-shore locations contained whales valued for their oil, shellfish, such as oysters for export to urban markets and clams for bait, and fish which could be cured and salted for export. All were duly exploited. As a result, whales vanished from the harbors, oysters disappeared from the mudflats, and the supply of fish in near-shore areas declined.

Conclusions

In sum, the manner in which the European colonists interacted with the forests, arable soil, livestock, whales, and near-coastal fisheries, all contributed to the diminution of these resources. Their desire to possess these things and to sell them for a profit in the marketplace resulted in a disasterous situation by around 1800. The strategies which they had employed since the time of the Nauset colony were no longer effective either in allowing them to ensure continued subsistence for their families or to acquire profits from commercial ventures. As a result, they were forced to develop new ways of interacting with the environment. In some situations, this meant finding alternative resources and in others it meant devising new ways of conducting ordinary tasks. Whatever solution was achieved, the outcome was the same. By around the turn of the century or soon thereafter, the very boundaries of

the outer Cape were redefined and the settlers found themselves engaged in a new set of ecological relationships.

CHAPTER 7

The Transformed Landscape

Outer Cape Cod was a an extensively transformed landscape at the beginning of the nineteenth century. Its woodlands had been altered so that for the most part only limited stands of young pitch pine and oak remained. For the most part, the forest had been replaced with cultivated fields and pastures. Where wild animals once roamed, there were scattered herds of cattle and horses, flocks of sheep, and swine. Enclaves of houses, public buildings, and wind-powered mills were joined by an imperfect system of rural highways. Alongside the coast with its vestigal shell mounds from centuries past, there began to appear saltworks, wharfs, and other facilities to accomodate maritime ventures. The environment created by the Euroamerican inhabitants of the outer Cape was undoubtedly distinct from that which their forebearers had encountered in 1644.

There were problems which beset this bucolic landscape. The soils had become drier due to the cutting of the forests and had lost much of their fertility as a result of poor agricultural practices. Wind erosion had become a severe problem. Without standing trees to impede its advance or adequate ground cover to anchor the soil, there was little to prevent sand from sweeping over the landscape. Land that had been cleared and plowed, fences and even roads were apt to be buried under a blanket of sand. Sedimentation processes were accelerated; harbors were altered and some shallow ones were rendered unnavigable; salt marshes were filled in by silt. In Provincetown, for example, the construction of a mill on Mill Creek resulted in such severe silt accumulation that by the early 1800s the creek had run dry (Massachusetts Historical Society 1802:198).

These changes in the outer Cape's landscape and the problems which beset it were due in large part to how the settlers had chosen to use the land. These decisions were shaped by the available technology and by the world in which they found themselves. The former was a relatively simple set of tools such

as axes, plows, saws, hooks, etc., and "know-how" passed down through the generations and enhanced by what they had learned from the Indians and experienced in the New World. The world of which they were a part was one in which relations were governed largely by capitalism. While it was the desire to find new sources of wealth and outlets for European goods that initially motivated the exploratory missions and resulted in the colonization of the New World, subsequent developments in the settlements themselves clearly indicated that profit-motivation was a significant factor in determining how settlers conducted their lives.

To the European settlers, New England was a landscape of great natural wealth (Cronon 1983:168). Even the outer Cape, which may not have been one of the region's lushest areas, attracted those who sought a profit from the land. By making investments of labor that allowed them to transform the natural resources into salable commodities, they soon were able to attain their goals. The fields where they had invested long hours of back-breaking work in turn rewarded them amply by producing a surplus. The harvesting of whales and the processing of its blubber for oil provided them ready entry into the marketplace as did the fish they caught in local waters. The livestock which they selectively bred thrived when let to browse on the natural fodder available in the outer Cape's wetlands and could be sold on the hoof in regional markets or as cured meat for export. These and other successes reinforced the opinions held by many of the outer Cape settlers that this was a land of abundance. Yet, after several generations had passed, there was reason by some to doubt this opinion. The land's productivity had declined, the whales disappeared from the harbors and other similar evidence of enviromental degradation were evident. Perhaps as some had predicted much earlier, the land was only capable of supporting the ambitions of a few (see Chapter 4).

Part of this changed ecosystem were the settlers themselves. In terms of sheer size, their numbers had grown appreciably during the 1700s (Table 7.1). Not only were the older sections included in the Nauset purchase settled, but population had expanded into new parts of the outer Cape (see Chapter 5). The option which New England settlers had exercised so many times in its frontier history -- expansion to new areas -- was no longer possible. On the outer Cape there was little or no new land available from which they could reap profits. Even though Provincetown was sparsely populated in the pre-Revolutionary period, it did not present a viable solution since private ownership of the land was restricted until 1893 when about 955 acres were released by the state for private control (Rockmore 1979). Yet, the land which they now occupied could no longer yield a profit given the existing technology and managment strategies which they had applied to it.

The challenge presented to those who comprised these later generations of settlers was to find ways of dealing with these problems. As early as a hundred years after the founding of

TABLE 7.1

Population Reconstruction for Eastham, Wellfleet, Truro, and Provincetown During the 18th Century

	Eastham*	Wellfleet	Truro	Provincetown
1700	849			
1710	1079			
1720	1240			
1730	825	600		
1740	955	682		
1750	1106	775		
1760	1281	881		
1770	1590	1077	1051	
1780	1897	1193	1217	257
1790	1834	1113	1193	454

* For 1700-1720 the population of Eastham includes Eastham, Wellfleet, Truro, and Orleans; for the remainder of the years the population of Eastham includes Eastham and Orleans

Sources: Rockmore 1979; Hayward 1849; Massachusetts Historical Society 1802; Colonial Census

Nauset, some of the ecological problems which accompanied the colonists' commercial ventures already were apparent and measures were taken to forestall the impending crisis. In some cases, these measures were aimed at preventing further decline of selected resources by restricting their use (see Chapter 6). In general, these measures proved to be ineffective. In other cases, the complete reorganization of the industries centered around these resources was warranted. It was this type of solution involving a reordering of the basic relations which tied people to the land or other resources which would proceed into the nineteenth century.

The Reorganized Maritime Economy

The most significant reorganization involved marine resources. By the middle of the nineteenth century, the outer Cape "untouched, through lack of water-power, by the industrial revolution, neglected by foreign commerce and the railroad, producing but a fraction of its own food..." managed to increase its population and wealth solely through maritime enterprises (Morison 1979:300). Fishing, whaling, and shipping took on new significance in the outer Cape's economy. These activities as conducted in the nineteenth century were different in scale and organization compared to earlier times. As such, participation often prohibited an individual from engaging in any other livelihood. More and more, one became a sailor or fisherman or the like, and not a husbandman first. Accordingly, relationships between the individual and the means of production which had existed on the outer Cape from the time of settlement had changed. Whereas most farmers owned their land and the tools with which to harvest it, those drawing a livelihood from the sea did not own the ships and equipment but were largely in the service of those who did.

For some maritime industries, this reorganization had begun long before the nineteenth century. As early as the middle of the 1700s, the constant activity of hundreds of near-shore whalemen had managed to eliminate whales in the outer Cape's harbors forcing whalemen to focus on the deep seas (see Chapter 6). The vanishing of whales from the near-shore areas did not simply imply a spatial reorganization of the industry. Whaling in the deep seas required sturdy and well-equipped vessels. Between 1771 and 1775, for example, Wellfleet had twenty vessels, for a total of 1600 tons, engaged in the northern whale fishery and an additional ten vessels weighing a total of 1000 tons in southern waters (Starbuck 1878:57). The capital needed for such vessels was beyond the financial means of most outer Cape families. It was only through the efforts of some wealthy individuals that enough money could be raised to support the towns' continued participation in whaling. These individuals in effect were the ones who owned the vessels, although each whaleman who sailed was entitled to a share accordingly to his responsibilities and duties. While in theory, the system appears as "the best

cooperation of capital, capitalizer, and the laborer ever accomplished", it became exploitative as the nineteenth century wore on (Morison 1979:319). Not only were the amount of the proceeds determined by the owner of the whaler at price below that of the market value, but the proportion of the shares given to each seaman also declined. Some owners deducted charges for outfitting and for the use of other expendables during a voyage at much inflated rates and created other expenses which further reduced the take (Morison 1979:319-321). The end result was that most whalemen after having spent periods of time ranging from several months to several years duration had very little to show for their efforts.

The situation in regard to the fisheries was somewhat different. Local waters had supplied the outer Cape's boat fisherman, as they were called, with fresh fish for their consumption and that of other townspeople. This kind of fishing did not require the investment of great amounts of money in crafts, or the sacrifice of large blocks of time so as to inhibit other activities such as farming. More distant waters especially the Grand Banks, and later the Georges Banks situated one hundred miles off of Cape Cod, however, offered more lucrative fishing grounds which lured fishermen. Perhaps as early as the middle of the eighteenth century, some made their way to the Grand Banks of Newfoundland and then headed for the West Indies where they traded their catch for cargoes of rum and molasses. It was this type of venture that required a greater capital outlay than what most outer Cape fishermen could afford individually. Some, however, managed to amass fortunes in such ventures. Elisha Doane of Eastham, for example, invested in several vessels out of Wellfleet outfitted as traders which did such a lucrative business that he became one of the richest men in colonial Massachusetts (Lowe 1968; Morison 1979).

With the loss of some of its principal markets in the West Indies and Europe after the Revolutionary War, the fishing industry was reorganized. Expeditions to the Grand Banks declined as few could support the larger vessels and more expensive outfits needed to fish in these areas. Instead, many fishermen from the outer Cape, like other New Englanders, headed to the Bay of Chaleur and the Labrador Coast where smaller craft were adequate (Kittredge 1930:186). In shifting the bulk of the tonnage to voyages that were shorter in distance when compared to the triangular course navigated by the Grand Banks schooners in the pre-Revolutionary period or the courses charted by deep-sea whaleboats, the character of the fishing industry emerged. It was one, that in comparison to whaling, was much more equitable. It required a relatively small amount of capital; the voyages away from home were shorter enabling one to live at home for at least part of the year; and it was organized on the share system.

On the outer Cape, like most of Cape Cod, vessels were owned in sixteenth-shares, sometimes in part by their crews. The conditions of ownership, however, varied from town to town. In

1802, Eastham had only three fishing vessels and three coasters owned by the town's residents (Massachusetts Historical Society 1802:159). In comparison, Provincetown where the fishing industry played a much more important role had some vessels which were partially owned by the town's inhabitants and by entrepreneurs in Boston. These vessels, however, were outfitted and crewed from Provincetown (Massachusetts Historical Society 1802:200). Each crewman fished "on his own hook", furnishing his own lines, gear, and some of his own food and was entitled to a share of the proceeds from the catch. Essential food such as salted meat, biscuits, and ship chandlery, referred to as the "great general", was furnished by the owners who deducted their cost from the gross proceeds of the expedition before making the division. The owners took between a quarter and three-eighths of the net proceeds for themselves after having deducted the cost of the "great general". The rest was divided among crew members in proportion to the amount that each individual caught (Morison 1979:310).

The system is well-illustrated by the settlement of accounts given for a fishing expedition conducted by the Wellfleet mackerel schooner "Boundbrook" in 1843 (Morison 1979:310). The "whole stock" or proceeds of the expedition amounted to $836.11. From this sum, the owners' deducted the outfitters charges ($83.91) and the cost of the "great general" ($87.65). The owners then took their twenty-five percent share from the remainder which amounted to $166.13. The skipper and two others were given $54.09 apiece; and the remaining $336.14 was allocated to the eleven crew members with the lowest share amounting to $18.78. Their wages even for the times were not substantial as most fishermen rarely made enough to support their families beyond a subsistence level. On the average, however, they did better than those who labored on the whaleboats or in the merchant service.

The reorganization of the fishing industry made it possible for many to seek a living from the sea to a degree that formerly had not been possible. In 1802, for example, Wellfleet had 25 vessels, five of which were whaling vessels, four in the cod and mackerel fishing, another four carried oysters to Boston, Salem, Newburyport, and Portland, and twelve small vessels used in fishing around the Cape (Massachusetts Historical Society 1802:196). By the middle of the century, the size of Wellfleet's fleet had grown to sixty vessels most of which were engagaged principally in mackerel fishing. In Provincetown, where one could take herrings between October and December, bass from May to late November, mackerel in the spring, along with cod and other fish in the harbor and at points offshore, the reorganization brought with it a new life for the town. From the post-Revolutionary War period into the nineteenth century, Provincetown flourished as its large harbor and lucrative fishing grounds began to attract people to its shores, most of whom sought their living from the sea. In 1802, the town had twelve whaleboats, thirty-three engaged in the cod fishery, and four other fishing vessels owned jointly by shareholders in Provincetown and Boston. In 1849, there were 26 vessels in the whale fishery, and fifty in the cod and mackerel

fisheries. By 1865, there were 28 vessels in the whale fishery employing 498 individuals, 105 vessels in the mackerel and cod fisheries employing 1260, and 20 vessels engaged in coastwise or carrying trade providing employment for 130 townsmen. Thus, in Provincetown where farming was a remote possibility, and where cattle had overgrazed the available pasturage, the sea proved viable both for those having the means to make an investment or those willing to work for those who did.

Those who stayed ashore also profited from the growth of the fishing industry. As more cod and mackerel were caught by fishermen, there was an increased demand for salt used in preserving these fish for export. During the 1700s, salt was processed by boiling seawater. The process was costly in that it consumed large amounts of firewood (see Chapter 6), and inefficient as the salt obtained was impure. By the late 1770s, a system was devised that processed salt from seawater with the aid of the sun. It involved the construction of wooden vats into which salt water was poured from buckets and allowed to evaporate. Considerable experimentation with the system involving the addition of covers to eliminate the intrusion of rainwater, the introduction of a pump (first worked by hand later by the wind) to convey water into the vats, and other innovations in construction of the vats resulted in greater efficiency in salt processing by 1800. At this time, it was possible to get an evaporation rate of a third of an inch per day during the dry summer months. Given this kind of efficiency, three hundred feet of salt works were capable of producing a hundred bushels of marine salt, and four hundred and fifty pounds of Glauber salt, in a year (Massachusetts Historical Society 1802:135-138).

Each of the outer Cape towns was involved in salt-making. In Eastham, where developments in the fishing industry did not have a major impact, salt production enabled the town's inhabitants to participate in another way. Once the system was installed, an individual could convert saltwater, a ubiquitous resource available in the bay or in the Town Cove, into a commodity. This all could be accomplished with a relatively low expenditure of labor. By 1802, Eastham had twelve saltworks in operation (Table 7.2); and by 1837, there were fifty-four in operation which yielded approximately 22,370 bushels annually (Lowe 1968:35). Since neither Wellfleet nor Truro invested heavily in salt production at the start of the nineteenth century (Table 7.2), it is likely that they obtained the salt needed for their fisheries from other places on the Cape like Eastham. In the coming decades, this situation may have changed as these towns are listed as having twenty-eight and twenty-five saltworks respectively by the 1840s (Hayward 1849). Provincetown had extensive saltworks in operation by around 1800 (Table 7.2) in an effort to satisfy the needs of its own cod-fishing industry. These works were constructed close to the town's dwelling houses "under the sand hills, which face the south, and reflect on them a strong heat ... " (Massachusetts Historical Society 1802:210). Given that there were no fresh streams running into the harbor to dilute the

TABLE 7.2

Numbers of Saltworks by Town

	Number of Saltworks	Number of Feet
Eastham	12	9,100
Wellfleet	4	180
Truro	1	700
Provincetown	10	11,000

Source: Massachusetts Historical Society 1802:138

water's salinity, the town's saltworks were said to yield more salt per footage than those of any other town on the Cape.

While the outer Cape towns continued to engage in salt-making well into the 1850s, its importance had declined. The number of saltworks had dropped significantly. In 1855, Eastham had 28 saltworks, approximately half the number it had in operation roughly twenty years earlier. Similar reductions in salt production were evident in the other towns, especially in Provincetown where salt-making was all but obliterated by the middle of the nineteenth century. The reasons for these changes in the salt-making industry is the rise of the fresh-fish business in which fish were caught, iced and shipped to urban markets instead of being cured. Of the outer Cape towns, Provincetown was the most eqipped to meet the demands of urban consumers and readily converted to the fresh-fish industry. In the other towns, salt-making remained viable, at least for a while, since catches of cod and mackerel once salted continued to have a profitable domestic market, especially among westward-migrating Yankee families.

In addition to salt-making, other subsidiary industries also were stimulated by the growth of the fishing industry. These included packing-houses, ship's chandlers, warehouses, ship's outfitters, and others. The number of warehouses in which fish were stored rose dramatically by the middle decades of the nineteenth century. By 1850, there were 28 such facilities in Provincetown, one each in Wellfleet and Truro and none in Eastham. Other shore-based facilities such as shipyards, sail lofts, and mast and spar yards also were concentrated in Provincetown. By 1855, there were three shipyards in the town and none in the other outer Cape towns; seven sail lofts compared to two in Wellfleet and Truro respective and three mast and spar yards. Clearly, this concentration of facilities to accommodate the needs of the fishing industry in Provincetown reflects its leadership in the outer Cape's maritime economy during the nineteenth century.

In the case of many subsidiary industries, these enterprises were in the hands of those who also owned or had shares in the fishing industry itself. Many ship's outfitters, for example, who provided not only naval stores, but a wide variety of items ranging from clothing to sweets also owned shares in fishing vessels (Kittredge 1930:195). They extended credit, some even loaned money, and in other ways catered to the needs of those involved in the fishing industry much in the same way as company stores served the factory towns and mining camps. It was a system that had some major drawbacks in that those who effectively paid out wages had a direct role in where and how these wages were spent. The fact that these company stores more often than not played dual roles placed the towns in a very precarious position. In Truro, for example, the Union Wharf Company store in which many of the town's residents owned stock had never bothered to formally incorporate, but operated instead in a paternalistic manner. When it declared bankruptcy shortly before the Civil War, a severe blow

was dealt to the town's economy from which it never recovered (Kittredge 1930:196).

In sum, the reorganization of maritime industries served as a way in which the outer Cape towns confronted problems which in no small part resulted from the environmental crisis created by earlier wasteful practices and over exploitation. These revitalized industries made it possible for fisherman and whalers to continue earning a livelihood from the sea and for those who were farmers to seek their fortunes in an entirely new way. Given the way in which these industries were organized, many individuals no longer owned the means of production needed to supply their own sustenance. The costs involved in acquiring the vessels and outfitting them denied most of the townsmen access to ownership. As a result, many were placed in a situation in which they became wage earners who effectively sold their capacity to work to others (Wolf 1982:267).

For those who did not become fisherman and whalers, but sought to make their living ashore there were new limited roles in maritime commercial activities were possible. The ability to convert sea water into salt allowed those who continued to work the land the opportunity to do so while at the same time engaging in an enterprise that was profitable and required low inputs of capital and labor. Improvements in the salt processing system itself resulted in more efficient production and greater profits beginning around 1800. The towns increasingly attempted to meet the demands of their own fishing fleets for salt, and it is quite probable that in places like Provincetown that saltworks also were set up by entrepreneurs who had financial control or interests in the fishing vessels themselves. Certainly many other ancilliary enterprises were established and operated in this manner. Consequently, in many respects the commercial activities of the outer Cape's fishing towns were rendered similar to New England's mill towns despite the former's lack of water-powered industry.

The Reorganized Agricultural Economy

The reorganization of maritime industries was, however, only one way in which the inhabitants of the outer Cape towns responded to conditions which were influenced largely by the decisions that they had made about the environment from the start. The manner in which they farmed the land, from the crops they planted to the techniques they employed in managing their plots, resulted in a progressive decline in agricultural productivity throughout the eighteenth century. Having exhausted their agricultural acreage, and having no land left to exploit, they gradually began to alter the ways in which they had interacted with the land. This reorganization was focused primarily on the introduction of new "scientific" farming practices and increased emphasis on the cultivation of fruit and vegetables.

On the outer Cape, as elsewhere in New England, publications relating directly to agriculture began to make their way into the farmer's home during the nineteenth century (Russell 1982:130). Agricultural societies were formed which encouraged the sharing of information put forth in the journals and gained through personal experimentation. Long before the middle of the century, the old system of planting the same crops for successive years until their yields did not repay the labors of the husbandman was all but abandoned. In fact, the colonial practice of farming large tracts of land had become unpopular. Farmers began to cultivate smaller areas more intensively much in the same manner as their European counterparts. Where previously the relations of production were premised upon environmental abundance so that a higher value was attached to labor than to the land (Cronon 1983:169), this situation now was reversed.

Few planted more land than they could fertilize (Palfrey 1846). Greater attention was paid to collecting of material that could be used in fertilizing the soil and in making compost. The European practice of using animal manure as a fertilizer received renewed interest as farmers began to yard their animals at night in order to collect their manure. In fact, the Knowles farm in Eastham was said to have something that no good farmer should be without -- a cellar under the barn, open on one side to the barnyard, where the animals could be housed at night (Palfrey 1846). In colonial times, the use of this important fertilizer was lost due to the practice of allowing livestock to wander freely over much of the landscape (Cronon 1983:150).

In addition to fertilizing, land reclamation strategies began to gain favor. This is a sure indication that the relationship between land and labor had shifted as many of the areas reclaimed were those considered at first to be totally unsuitable, or at least unnecessary, to cultivate. Yet, swamps, bogs, and other wetlands when covered with sand formed rich plots ideal for gardening. By the middle decades of the nineteenth century, Thoreau remarked that Eastham's gardens were "little patches...redeemed from the edges of marshes and swamps"(1961:45). Other outer Cape towns did likewise, even Provincetown, where these small plots were the only cultivated land (Thoreau 1961:230).

Although the "forests caused the soils as much as the soils caused the forests" (Cronon 1983:115), the colonists in their haste to settle in and realize a profit from the land and its riches had failed to heed this premise. Consequently, the soils were deprived of the long term benefits of trees. During the 1800s, the outer Cape farmers began to take measures to remedy this situation by replanting trees. The following testimony by a Barnstable County farmer attests to this:

> I offer, for the consideration of the committee on the above subject, two acres of pitch-pine trees. These

> trees are over one year and not more than three years old; standing not less than five hundred trees to the acre, and were all raised from seed planted by myself. I have several acres more of larger growth than that required by the rules of the society, which I had planted at an earlier day. The land on which these trees are planted, was worth at the time nothing for tillage, and very little for pasturage. Its value could not exceed two dollars per acre. The expense of planting is all comprehended in mere labor; and, except the value of land, the present plantation is wholly the result of labor. I gather the seed of the pine from trees in October, extracting it from the cones at leisure moments during the winter, and plant in April (Walker 1853: 550-551, emphasis added)

Not only did the planting of trees allow the farmer to improve the quality of the soil on which they were grown, but the trees created barriers which protected the fields from wind damage and blowing sand. In the long run, they would provide the farmer once again with a source of firewood and timber which could be sold at a profit.

In addition, farmers began to be more selective about the crops that they planted and when they planted them vis-a-vis other crops in the agricultural system. Less acreage was planted with corn than had been formerly (Palfrey 1846) as farmers began to realize the effects that long-term corn monocropping had on the soil. While it had been the mainstay of the outer Cape's grain crops, and continued to be important, it now required rich, well-manured, and cultivated lands to yield an abundant harvest. Under these conditions, it was possible to obtain yields of 40 bushels per acre, although on the average the yeild per acre was considerably less. The 1855 Massachusetts Census, for example, indicates that 401 acres planted with Indian corn in the town of Eastham yielded a harvest of 6015 bushels, or approximately 15 bushels per acre. In Truro, where 175 acres were seeded, the yield was 25 bushels, or 14.7 bushels per acre. In Wellfleet, the yield per acre for Indian corn was considerably lower than in Eastham and Truro; from the 131 acres planted, 1572 bushels were harvested averaging 12 bushels per acre. Yet, for each of the towns, the total number of bushels of Indian corn harvested exceeded the amount that had been obtained in many decades. By 1860, Eastham had produced enough corn to satisfy its not only own needs but also to export 3000 bushels (Freeman 1958).

Rye, and to a lesser degree oats and barley continued to be planted, although more and more farmers began to adhere to the practice of alternating these crops in successive years, along with fertilizing, in order to ensure the continued productivity of the soil that they now fought so hard to regain. In the outer Cape towns where cereal grains were raised, rye continued to be an important crop, perhaps second only to corn. In Eastham, in fact, almost equal acreage was devoted to the raising of these two

grains by the middle of the nineteenth century. Rye, however, yielded fewer bushels per acre than corn, averaging between five and eight bushels per acre. This figure is considerably lower than what was said to have been obtained formerly from the outer Cape's best agricultural acreage, but about the same as the yield for the more marginal soils (see Chapter 6).

Wheat-raising was virtually eliminated from the outer Cape towns as well as in other New England towns during the nineteenth century. The soil conditions that were required in order to obtain a successful harvest were beyond that which could be achieved even with reasonable investments of effort. The 1841 tax valuations indicate that no wheat was grown on the outer Cape; although during the 1850s, Eastham experimented with planting a very minor portion of its acreage with wheat. Of the 813 acres planted with cereal crops in 1855, two acres or .002% were planted with wheat. Thus, while wheat had never an important crop on the outer Cape even during colonial times, its significance declined even further during the nineteenth century. As farmers began to manage their land more effectively, only those crops which could produce returns which could meet the farmers' efforts continued to be sown. Wheat was not among them.

Although fruits and vegetables had been grown on the outer Cape from early colonial times, these crops took on added significance during the nineteenth century as the local farmers attempted to improve the disasterous situation which existed in rural employments. The way in which they had begun to use the land, with less acreage broken for cultivation at any one time than previously, was ideally suited to growing fruits and vegetables since the number of bushels of produce yielded per acre was greater. Of the forty acres that each of the towns planted with potatoes in the mid-1850's, the yields in each exceeded 2000 bushels. Eastham's potato crop at 6000 bushels was the most successful; Wellfleet and Truro harvested 3000 and 2000 bushels respectively. Moreover, fruits and vegetables did well on the outer Cape's sandy soils. Unlike grain crops which now required the use of fertilizers to improve yields, turnips, potatoes, beets, and other vegetables, all could be grown in plots of sandy soil without the aid of fertilizers as Thoreau noticed both in Eastham and Truro (Thoreau 1961: 45, 192). For some root crops and other vegetables, seaweed was used to enrich the soil, although this practice fell into disfavor since many claimed that it resulted in a mildew condition which destroyed the crops.

All of the outer Cape towns, except Provincetown, were engaged in raising some vegetable crops during the nineteenth century. This produce, particularly root crops like potatoes, became staples which were consumed by the producing households, stored in small, circular brick cellars for later use, or sold locally. Some vegetable production was almost entirely directed toward sale. Asparagus, in addition to turnips and onions, for example, became profitable crops that did well in towns like Eastham (Lowe 1968:30). Among the outer Cape towns, however, it

was Truro that seems to have experimented the most in growing vegetables for commerce. The town's venture into market gardening would have found a ready outlet among its own fishermen and those in Provincetown, as well as among those living in urban centers. By 1865, it was the only town on the outer Cape to have a sizable plot of its agricultural acreage-- 24 acres-- invested in market gardening.

Orchard trees, such as apples and pears, also were grown on the outer Cape during the nineteenth century. Accordingly, acreage comprising "tilled orchards" was included in the estimates of "tilled" land made by Massachusetts tax assessors for the towns beginning at that time. Despite infestations with worms and insects, and their puny size these fruit trees seem to have faired reasonably well. By about the middle of the century, Eastham had about 1804 apple trees cultivated for their fruit, Wellfleet 2425, and Truro 1200. Although tradition suggests that pear trees planted on the outer Cape did so well that one of those planted in Eastham about 1640 by Governor Thomas Prence of Plymouth was said to yield fifteen bushels of fruit 200 years later (Russell 1982: 47), these were not as numerous as apple trees.

By the middle decades of the century, not only did the outer Cape towns people maintain apple and pear orchards, but all had converted some portion of their swampland into cultivated cranberry bogs. Cranberry production, which began on the Cape a few decades earlier as a result of experiments involving the transplanting of wild cranberry vines into bogland dusted with sand, became a very important enterprise during the nineteenth century. It was so important to the local economy that many of the towns adopted local ordinances for protecting wild cranberry vines (Russell 1982: 218). By 1865, the outer Cape towns had attained levels of production whereby Eastham had 21 5/8 acres of cultivated bogland yielding 189 bushels of cranberries, Wellfleet had 22 acres producing 55 bushels, and Truro had 12 acres of bogland yielding 140 bushels. In Provincetown where no other form of agricultural development of any scale had been possible, cranberry production exceeded the level of production noted for all of the other outer Cape towns combined. Within the town, 110 acres of bogland were cultivated from which a harvest of 400 bushels of cranberries was obtained by the middle of the 1860s. By the later decades of the century, it even served as an alternative form of livelihood for those who formerly had engaged in maritime trades or in related subsidiary production such as salt-making. Even the young were recruited to aid in cranberry production; the school term frequently was delayed until after harvest time in order to have the labor of children to help in picking cranberries (Lowe 1968: 30).

Given the agricultural strategies which the outer Cape residents devised to meet the problems besetting their land, it is likely that large portions of acreage which formerly had been cultivated now were not. Following what was common practice among the colonists, many abandoned fields on the outer Cape were turned

over to pasture (Cronon 1983). Less-labor intensive forms of agricultural production, like livestock raising and timbering did not retain the same importance on the outer Cape during the nineteenth century as they had in colonial times. In the early decades of the nineteenth century, however, sheep-raising appears to have become an important enterprise Truro, and to some degree in Wellfleet. The wool sheared from sheep raised in Truro, in fact, was described as being of such high quality that "if a single county of Penobscot, Maine, would produce as much wool in proportion to its territory and quality of its soil, as the town of Truro... the quantity would be sufficient to clothe all the inhabitants on the globe" (Hayward 1849: 288). By 1850 though, sheep were not listed among the town's assets according to its valuation for that year and the era of sheep-raising had passed.

In general, the situation in regard to stock raising by this time was such that swine had become quite insignificant; and oxen, which had served as important heavy draft animals in the early days of settlement, were no longer needed to perform this service to the extent that they formerly were. Horses may have taken on many of the tasks once assigned to oxen as their numbers increased in all of the towns (Table 7.3). Conceivably, the improvements made to the outer Cape's road system during the nineteenth century (Hershey 1962) made horses a more popular form of transportation. Cattle-raising, which declined in Truro as a result of overgrazing, gained some importance in Wellfleet (Table 7.3). In Eastham, the density of cows remained relatively stable from the late eighteenth century. Thus, if there is any pattern in regard to pastoral activities on the outer Cape during the nineteenth century, it may be the inhabitants desire to return cattle and horse herds to levels that had not been seen since early in the seventeenth century. Both of these animals could be maintained with relatively low inputs of labor relative to other agricltural tasks conducted during the nineteenth century.

In sum, new agricultural practices enabled the outer Cape's farmers to revitalize farming during the nineteenth century. These developments made it possible for many to continue seeking a livelihood from the land. They accomplished this formidable task by using the land in ways that were very different from what had been done before. The practice of cultivating extensive areas of land was abandoned in favor of utilizing smaller plots more intensively. Land reclamation strategies allowed many to create arable plots for gardens where none had existed previously. Thus, by making capital improvements in the land it was possible for many, if not to totally solve the outer Cape's agricultural problems, at least to improve the situation. Moreover, the crops which received greater emphasis, such as vegetables and fruits, found ready local markets; some, like cranberries, even became a profitable export industry. Yet, these more labor intensive strategies of outer Cape husbandmen were balanced with those that required less input such as stock raising, and even cutting salt hay. Therefore, unlike many other parts of New England, agricultural responses did not follow one clear-cut pattern.

TABLE 7.3

Number of Animals and Their Density per Acre by

Based on 1850 Tax Valuations

	Eastham		Wellfleet		Truro		Provincetown	
Horses	7.4	(118)	4.9	(104)	4.1	(90)	3.1	(32)
Oxen	0.8	(12)	0.9	(19)	1.3	(28)	0.0	(0)
Cows	12.4	(197)	8.7	(184)	10.0	(220)	5.1	(52)
Steers/ Heifers	10.8	(171)	1.5	(32)	2.0	(44)	0.0	(0)
Sheep	0.1	(2)	0.2	(4)	0.0	(0)	0.1	(1)
Swine	8.3	(132)	0.8	(16)	0.1	(3)	6.3	(65)

Actual numbers of animals are shown in parentheses.

Conclusions

Unlike other towns in many parts of New England, the outer Cape towns managed to find solutions to the problems which beset them at the end of the eighteenth century. Without sources of water-power that could be harnessed for industrialization, without large expanses of soil that in the traditional sense would be considered appropriate for agriculture, reaching viable solutions would appear to most analysts to be a remote possibility. Nevertheless, the inhabitants of the outer Cape made considerable gains despite these limitation. Moreover, they managed to do this without demographic disruptions involving major depopulation and the relocation. Most of the outer Cape town's, in fact, either gained population or remained relatively stable until about the middle of the nineteenth century (Table 7.4).

How was this possible? The level of prosperity that the outer Cape towns achieved during the nineteenth century was achieved in a number of ways. First, there was increased reliance on non-agricultural resources and on regional cooperation, both of which were evident in the development of the fishing industry. Whether capital was raised locally by pooling the resources of local townsmen, or brought in by outsiders, this industry brought in cash and stimulated that growth of secondary industries. Aided by developments occurring on a broader scale, such as the reduction of Boston's fishing fleet in the late 183Ø's, the outer Cape's fishing ports took on added significance not only in the lives of the local inhabitants but in the region as well.

Second, rural employments, the outer Cape's inhabitants also forged responses that in the short term enabled them to continue to farm the land successfully despite the poor conditions that earlier agricultural practices had created. Given the ratios of labor and land in the nineteenth century, it was clear that even these measures would not enable them to attain the commercial gains they had once reaped from the land. In the short term, however, new management techniques ranging from increased labor input to small parcels of land to less labor intensive techniques enabled them to meet some of their own subsistence needs, and to gain some profits from the sale of their harvests. Yet for those who remained on the land, involvement in the boom created by the maritime industries also was possible, at least indirectly, by the production of a commodity essential to this industry through the conversion of seawater into salt and by developing a network of support services and subsidiary industries.

TABLE 7.4

Population for Eastham, Wellfleet, Truro and Provincetown During the 19th Century

	Eastham	Wellfleet	Truro	Provincetown
1800	659	1207	1152	812
1810	751	1402	1209	936
1820	766	1472	1241	1252
1830	970	2046	1547	1710
1840	940	2306	1916	2101
1850	841	2372	2002	2672
1860	779	2322	1583	3206
1870	683	2093	1234	3935
1880	692	1875	1017	4346
1890	602	1291	919	4642

CHAPTER 8

Summary and Conclusions

This study of the outer Cape has examined the interrelationships that have existed among people, resources, and economic organization during a period of time that began with the initial settlement by Euroamericans at Nauset and ended at the close of the nineteenth century. In exploring the development of this easternmost frontier of colonial settlement in southern New England, the aim has been to view it as both an ecological and economic transformation. It was ecological in that the settlement of the region by Euroamericans ultimately affected the circumstances of aboriginal groups, animal populations, and plant communities that previously had existed there. It was economic in that in the process of altering this landscape the Euroamericans regarded the land and its resources as salable commodities. In taking these commodities and in exchanging them, the colonists acquired new markets and trading partners, and became participants in the global capitalist economy.

In this process, the land itself became so altered that many of the resources that once provided a source of wealth for the colonists were no longer abundant. Moreover, the depletion of many of these resources led to further environmental degradation. The loss of the forests, for example, not only reduced the available wood supply, but deteriorated soil conditions as well. Without the protection of the trees, wind erosion advanced on precious farmland. Evidence of soil exhaustion, over-grazing and even the depletion of near-shore marine resources were apparent in the settled towns and in the Province lands before 1800.

These transformations, promoted a reorganization of the local economy. Under this reorganization, both the maritime and agricultural sectors of the local economy were restructured. The depletion of near-coastal resources, in large part due to the colonists' own practices, as well as natural environmental shifts that are at this time poorly understood, dramatically altered the way in which people earned their living from the sea. It changed

the nature of relations that previously existed between fishermen and the means of production. It raised the level of production, and increased flows of commodities between the outer Cape and other places. As a result, it encouraged the development of towns where sufficient facilities and personnel could be maintained to support and coordinate these flows.

This reorganization of the maritime economy was not achieved solely by local efforts. Much of it was accomplished through the investment of outside capital. The involvement of these investors in local economy of the outer Cape promoted greater integration with the urban-industrial centers of New England which sought to control the flow of maritime resources. In the region itself, the channeling of these resources to the consuming centers encouraged greater entrepreneurship among local inhabitants who either worked for, or were in partnership with these investors. This system of surplus extraction along with joint ventures that were financed locally characterized maritime industries on the outer Cape for at least the first half of the nineteenth century.

After the middle of the nineteenth century, only places that could meet the growing demands of the urban consumers and could efficiently support an economy of scale survived. On the outer Cape, it was only Provincetown that continued to prosper. In so doing, it clearly rose to a position of economic dominance among the outer Cape towns, and displaced Eastham that for so long had maintained local hegemony as the founding settlement. In spite of the reorganization of the agricultural sector of the economy which enabled the town to increase its yields almost to levels that had been attained much earlier in its history, it offered no match to the level of activity taking place in maritime industries at Provincetown. The agricultural economy could not be expanded further.

Thus, the outer Cape that in the eyes of many observers in the past was nothing more than a barren wasteland had achieved considerable expansion of its rural economy from the middle of the seventeenth through nineteenth century. This was accomplished without the aid of water-powered industry or large-scale urbanization usually associated with the shift to capitalism but in the area of rural employments involving farming and the harvesting of the sea. Through the interaction of demographic, cultural, and ecological factors the land itself became a scarce commodity, that consequently limited the options for expanding the agricultural sector of the local economy. By changing land use strategies, by relying on non-agricultural resources, and by increasing regional cooperation, however, significant expansion of the rural economy was achieved. This expansion significantly altered the relationships between land, labor, and capital. Whereas resources were eyed as salable, now the human labor needed to work the land and reap its yields was too. Like the system of land use which preceeded it, this cycle resulted in altered circumstances -- ones still be evident on the outer Cape today.

What had been a "coastal wilderness" in the eyes of some was perceived by other as a place from which they could reap their fortunes. For those who did, at various times during the outer Cape's history, the place, at least for a time, became "the Paradise of all those parts".

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PART III

HISTORIC LAND USE AND SETTLEMENT ON OUTER CAPE COD: AN EXPLORATORY ANALYSIS OF ARCHEOLOGICAL DATA

EDITOR'S NOTE

The report presented in Part III is a synthesis of a paper given by McManamon and Childs at the 1980 Annual Meeting of the Society for Historical Archaeology and a manuscript prepared in 1981 by Childs describing a quantitative analysis that she performed on the historic artifact assemblage data. The data used here are limited to those available from the 1979 field season. No further analysis has been conducted on the historic period site artifact assemblages or associated data.

HISTORIC LAND USE AND SETTLEMENT ON OUTER CAPE COD: AN EXPLORATORY ANALYSIS OF ARCHEOLOGICAL DATA

Francis P. McManamon and S. Terry Childs

During the 1979 field season, the Cape Cod National Seashore Archeological Survey fieldwork identified and did initial site examination on many historic period archeological sites. These activities provided data on the general sizes, structures, and contents of the sites. These data were used in the analysis described here to explore whether useful and interesting interpretations could be derived from a statistical study of historic period artifact assemblages and their locational characteristics.

This part reports the analysis of field survey data from the 1979 season. Regarding the historical archeological record, the 1979 field survey and analysis had three goals:

(1) to estimate the frequency and locations of historic period resources,

(2) to describe and interpret the temporal and functional variation among resources, and

(3) to interpret the archeological record as represented by the resources in terms of both the specific history of the outer Cape towns and general historical developments.

The data and interpretations presented here could be refined and improved by further analysis of field survey data from 1980 and 1982, documentary research, and additional site examination at selected sites. While they may inspire hypotheses about the Seashore's historic period archeology, these interpretations are not final statements.

An increasing number of historical archeological studies have examined the diversity and spatial pattern of groups of sites rather than individual sites (Goodyear 1977; House 1977; Klein 1973; Langhorne 1976; Paynter 1982; Swedlund 1975; Thorbahn and Mrozowski 1979)). This analysis continues the developing pattern by focusing on the archeological record of a region rather than single site or small number of related sites. The full range of historic period remains from plowzone scatters of trash on upward were identified and described during the study and most are considered in this analysis.

The survey investigation area originally was divided into two strata based on the locations of known, predominately prehistoric, sites (see McManamon 1984). The stratification scheme then, had more significance for the prehistoric record than the historic record considered here. Stratum I included all land except wetlands, sand dunes, and beach deposits non-swamp and non-beach land within 200 m of fresh water or tidal flats, while Stratum II included all other land within the Seashore. Stratum I was further subdivided into three strata which included: Stratum IA, the Nauset area in Eastham and the High Head area in North Truro which are both areas of documented Native American occupation; Stratum IB, areas around ponds and along rivers; Stratum IC, areas of freshwater wetlands and hollows (Figure 1).

The investigation area also is contained within the political boundaries of four towns: Eastham, Wellfleet, Truro, and Provincetown. No historic sites were found in Provincetown during 1979 so the town will not be considered here. The analysis below indicates that these historical political divisions have as significance to the historic archeological record as the environmentally-based above.

The abundance of historic sites discovered during the 1979 season provided an excellent opportunity to examine archeologically the historic settlement pattern of the outer Cape Cod region. Initial documentary research identified many historic period settlements in the region (Rockmore 1979), yet a number of factors supported the need for associated archeological work. For instance, it is likely that processes of research and history caused distortions in the documentary records (House 1978). Sites may have been missed in the document search or some kinds of historic period activities might have been overlooked, or deliberately concealed, hindering their initial recording. If this were so patterns of human land use would be delineated inadequately by reliance on documentary research alone. Wood (1978), for example, has proposed that economic and social events occurring in New England villages during the early 19th century seriously distorted the documentary basis of our conception of how earlier agricultural villages and towns initially were patterned.

History of the Outer Cape

The history of the outer Cape is conveniently and logically described through the individual histories of the towns of Eastham, Wellfleet, and Truro (see Rubertone'sreport in this volume for a more detailed survey of the town histories). Provincetown is not considered here because no archeological resources were discovered in the small portion of the investigation area within the town. Although they share political boundaries, the towns seem to have developed independently. Their individual histories contain similar periods of population growth and decline, settlement pattern change, and economic change. Each town, however, is associated with some

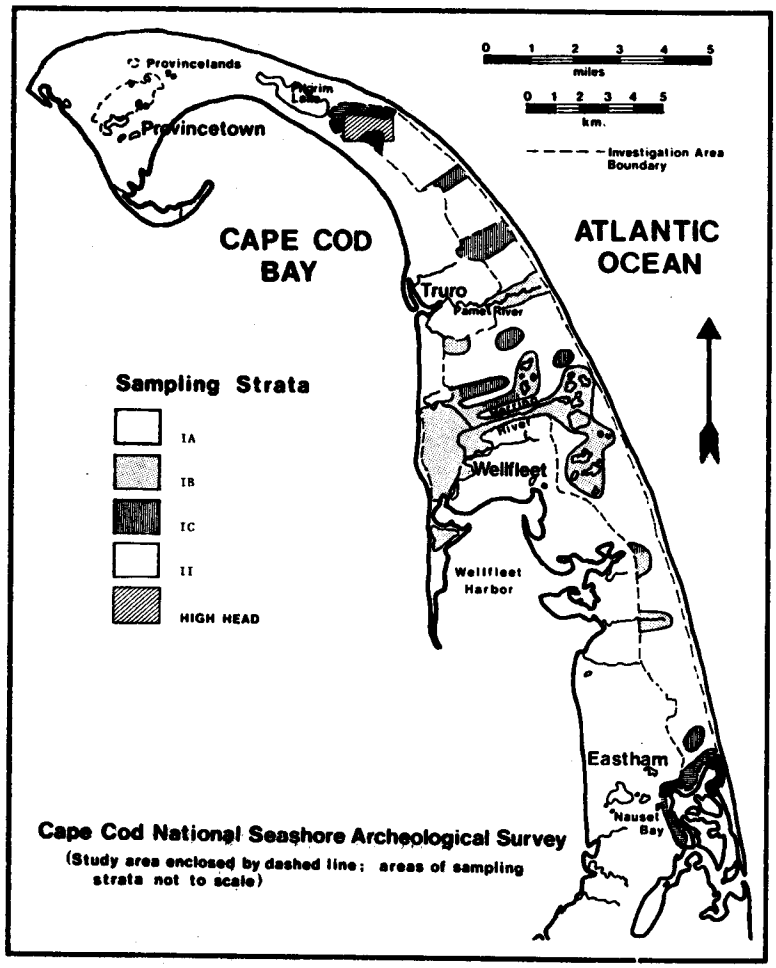

FIGURE 1. Archeological Survey Investigation Area with Sampling Strata Illustrated, Areas not to Scale.

TABLE 1

Comparison of Analyzed Historic and Prehistoric Site Frequencies Per Stratum

	Number of Sample Units			Acreage		Number Analyzed Sites			
						Prehistoric		Historic	
Stratum	Sampled	Available	% Sample	n	%	n	%	n	%
IA	38	125	30.4	614	4.2	42	86	20	43
IB	46	678	6.6	3322	22.8	3	6	18	38
IC	8	295	2.7	1444	9.9	2	4	4	8
II	23	1868	1.2	9152	62.9	2	4	5	11
						49		47	

characteristic or pattern different from the others.

Eastham was settled in 1644 by families from the original Plymouth Colony. Eastham, especially the Nauset area was visited regularly by colonists following the 1620 settlement at Plymouth (e.g., Mourt 1963). It was the first permanent Euroamerican settlement on the outer Cape, extending originally as far north as Herring Brook in present-day Wellfleet (Pratt 1844:13). Eastham's inhabitants seem not to have followed the typical 17th-century pattern of settlement with an aggregation of dwelling houses surrounded by the fields of individual farmers (Dickie 1968:312-15, Map 3). A 1717 map, albeit schematic, shows no concentration of structures. More convincing is recent detailed research showing that during the second half of the 17th century farmers actively traded and sold land tracts to consolidate their holdings (Dickie 1968). A similar pattern of increasingly dispersed settlement occurred in other New England towns during this period (e.g., Lockridge 1970:94-5).

Eastham seems to have had primarily an agricultural economy. Narrative texts, maps, and census records support this interpretation and document consistent land use from settlement into the 20th century (Rockmore 1979:6; also see Rubertone, this volume). Fishing enterprises which were substantial and numerous in the other towns seem to have been unimportant in Eastham. Eastham's population remained relatively small compared to Wellfleet's and Truro's (see Table 7.4, p. 112, this volume).

Wellfleet, originally the northern section of Eastham, was sparsely occupied soon after the initial settlement until the early 18th century (Dickie 1968: 330-335). It separated from the political control of the original town in 1722 (Pratt 1844:124). Of the three towns, Wellfleet's inhabitants seem to have been most involved in exploiting marine resources (Dickie 1968:335-339). A whale fishery is credited as the original business of the town (Whitman 1794). Later, oyster harvesting, fishing, and shipping were common activities. Compared to Truro with nine vessels, Wellfleet at the end of the 18th century had 25 engaged in fishing and shipping along the Northeastern coast (Whitman 1802:196). An observer noted in 1802 that:

> ...many people of this town spend more than half of their lives at sea and on shipboard... Navigation engrosses the town's whole attention, otherwise excellent gardens might be made in swamps (Whitman 1802:196).

Although families evidently engaged in some agriculture (Dickie 1968; Yentsch 1977), Wellfleet in the late 18th century imported most of the grain its inhabitants required (Whitman 1794:118). The overall importance of agricultural activities might be hidden by the 19th-century observers' and historians' romance with seafaring. Recent research (Bragdon 1977; Rockmore 1979; Yentsch 1977) suggests that many inhabitants pursued both activities, at

least until the early 19th century.

Like Eastham, Wellfleet appears to have had no single village center. There apparently were, however, clusters of houses rather than isolated individual or pairs of structures. Between 1690 and 1730 settlements appeared on Great Island, Billingsgate Island, Bound Brook Island, and around Duck Creek Harbor; not until the 1830s did the latter become the town center (Figure 2). During the first half of the 19th century another group of at least eight structures developed along Fresh Brook in southern Wellfleet.

Truro, the most recently settled town of the three, was incorporated in 1709. Like Wellfleet, Truro's inhabitants engaged in maritime activities as well as agriculture. However, Truro's farmers were able to raise both vegetables and grain and the town apparently did not have to import them.

Like Wellfleet, 18th-century Truro had no single concentrated settlement. Several "villages" were located within the town (Figure 2).

All three towns experienced a similar process of population growth, economic change, and population decrease. Settlement pattern changes in response to the demographic and economic variation seem to have been continual until at least the late 19th century. Differences seem to exist in the magnitude of the changes and specific developments in each town. We can use the archeological survey data to examine the general pattern and confirm and quantify the specific differences in population, settlement pattern change, and activities among the towns.

The parts of each town within the investigation area have a significant bearing on our ability to test and improve upon the documentary record. None of the modern town centers are covered by the investigation area (Figure 2), all of these are outside the boundary of the National Seashore, although several of the 18th- and 19th-century settlement clusters are included. We do not expect, therefore, that the sites within the investigation area will represent the variety of historic period activities associated with each town proportionally. We expect that agricultural activities and farm life are over-represented because of the preponderance of upland in our sample frame. Furthermore, a small coastal portion of coast of Wellfleet Harbor is the only part of the investigation area directly associated with a potential location of maritime-related activities.

The investigation area does contain remains from the entire historic period. We expect the temporal distribution of sites to be more proportionally representative.

The notion that early New England agricultural villages were settled in the image of their English predecessors with houses and the meeting house forming a village core surrounded by farm land and communal property (McManis 1975; Morris 1951; Scofield 1938)

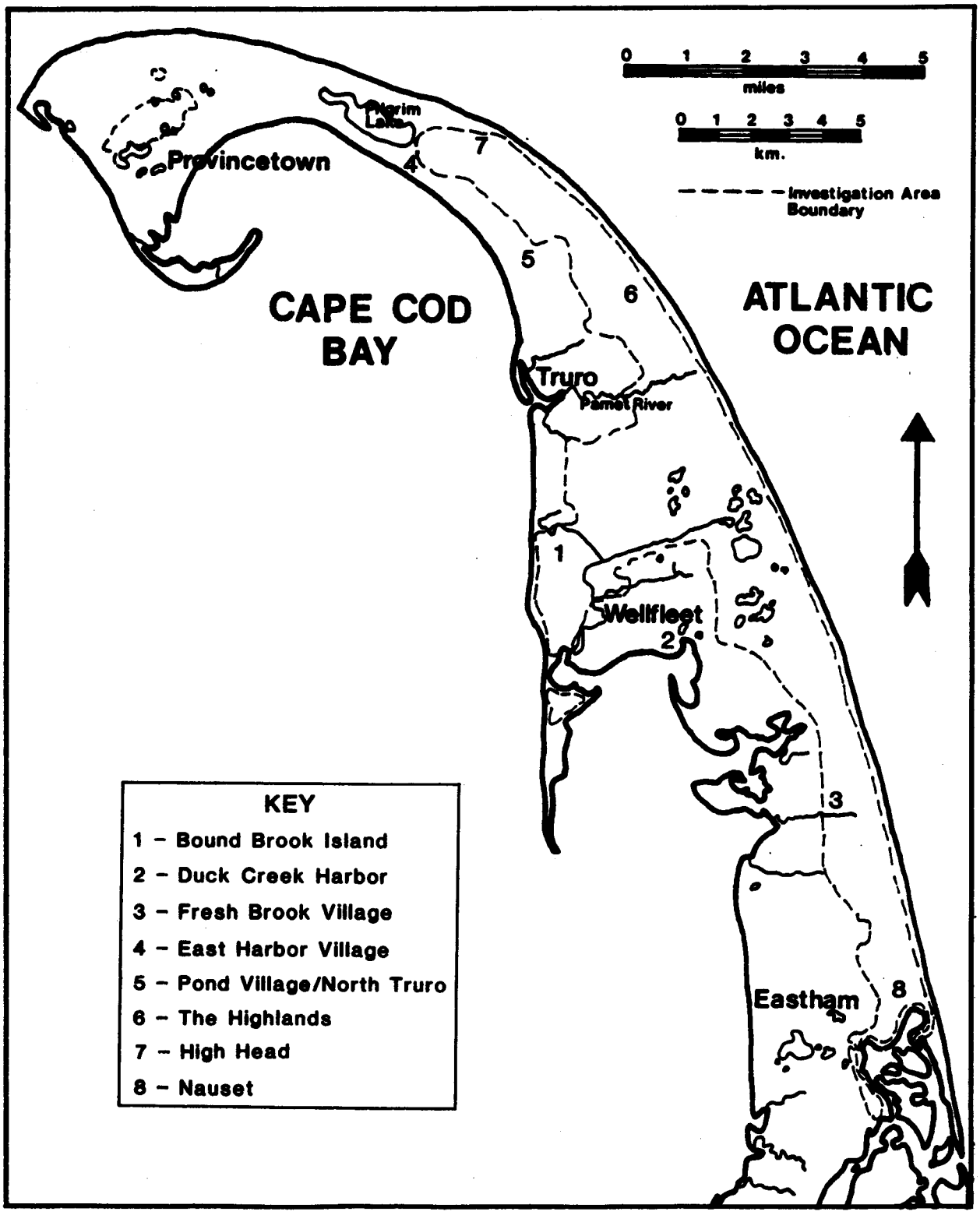

FIGURE 2. Locations of Historic Period Settlements Mentioned in Text.

has been questioned recently (Wood 1978, 1980). Wood replaces this construct with one of much more dispersed homesteads each with enough land so that desires for private holdings yielding economic security and social prestige could be fullfilled. These farms were situated within the political and economic boundaries of a village where psychological unification focused on the meetinghouse replaced spatial closeness. Wood's conception of the early village is a network of economic and social ties, not a physical settlement pattern.

Early Euroamerican settlement pattern and land use were influenced by practices of several culture groups. If criteria used to judge the agricultural potential of the land were adopted from Native American practices, some overlap might be expected in settlement and/or activity areas by both groups. If social and economic practices of English farmers were maintained by the Euroamericans within the constraints of their new environment and changing needs, then the English influence should be visible in the early settlement pattern.

It is expected that flat, fertile land near fresh water and within a close distance to natural resources provided by the sea such as shellfish and salt would have been utilized by both Native American and Euroamerican groups. This overlap might especially include the Nauset area.

It is expected that open areas previously utilized by Native Americans might have been sought for farm and grazing lands depending on their overall fertility.

If Wood's (1978) model of early Euroamerican settlement pattern is correct within the environmental context of the outer Cape, it is expected that the desire for individual, enclosed tracts of land would result in dispersed homestead over the landscape.

The earliest economic focus of outer Cape settlement was predominately agricultural. Prior to the development and use of the area by Euroamericans, its resource potential was explored (see Rubertone's report in this volume for more details). Such early observations and decisions in conjunction with social and economic factors influenced both the settlement configurations of the individual towns as well as the frequency and diversity of functional site types over time.

Early assessment of the Wellfleet area determined its agricultural potential to be minimal while its maritime possibilities great (Dickie 1968). It is expected that Wellfleet's land use pattern will reflect a minimum of agricultural focus versus a greater orientation toward the sea, both in types of sites recovered and their pattern of occurrence.

In the areas of greater agricultural potential, such as Eastham's Nauset area and the Highlands of Truro, it is expected that despite economic and social factors altering the town's foci over

time, the dispersed farms maintained an essential service and structure to the towns that did not change significantly over time.

Archeological Data Analysis

In order to achieve the goals of the initial analysis, the variation among the sites discovered during the survey had to be described and interpreted. Our interest in comparing the archeological data with the interpretation based upon documentary analysis required that the sites be dated, at least roughly, and functional differences among them identified.

The functional diversity of historic site types are expected to be visible in the artifact record (Bragdon 1977). Several artifact/site type associations were sought based on previous research in eastern Massachusetts historic archeology (Bragdon 1977; Brown 1973; Deetz 1973; Yentsch 1977). These include: a high proportion of redware suggestive of 17th and 18th century dairy farming, a high proportion of pearl and creamware suggesting 19th century house sites,and low frequencies of ceramics and high frequencies of building materials suggesting non-domestic activities.

A temporal examination of historic sites resources necessitates the assumption that the relative frequencies of recovered ceramic paste types provides a general framework for the chronological arrangement of sites (South 1977). For this analysis several simple rules were used in our attempt to associate artifact assemblages and sites to general historic periods. A relatively high frequency of redware and low frequency or absence of other ceramic types suggested an early period of occupation in the 18th century. Creamware was popular around 1750-1820, while pearlware indicated occupation at approximately 1800-1850. Whiteware was taken to indicate the most recent period of occupation. In all cases, interpretations were mediated by considering the other artifact types in the site's assemblage as well as associations with standing structures, roads, foundations and documentary data.

Precise dating of each site was impossible due to the general level of documentary information available and limited size of many of the artifact assemblages. The variation in the relative frequencies of different ceramic paste types among the assemblages did suggest, however, that a general framework for arranging the sites chronologically using this variation was possible.

Artifacts were catalogued in the laboratory; site context regarding topographical and existing cultural features was investigated visually and through various reports and historic records. Some of the larger sites were further examined by plotting frequency per test pit contours of the ceramics and particular construction materials on the site maps to discover any unusual artifact concentrations which might suggest more than one

historic activity in an area previously designated a single site or the consolidation of two or more sites into one larger site.

Historic and Prehistoric Site Frequencies

Each historic resource initially was categorized by the density of artifacts, relationship with prehistoric resources and artifact distribution. This exercise permitted a constructive evaluation of the range and frequency of historic resources both with and without associated cultural features over the outer Cape, their utility for further analysis, and environmental and cultural insights derived from comparing their mean frequencies and standard error per sample unit across the survey data.

An examination of site frequency and site type variation among the sampling strata was used to compare the land use patterns of prehistoric Native American groups and Euroamericans.

An initial idea of the differences in site frequency between historic and prehistoric sites in each stratum can be obtained from Table 1 (see page 129). A number of observations can be made, the most striking of which is the more even distribution of historic sites over the investigation area. This suggests that the Euroamericans exploited more parts of the outer Cape environment with greater intensity than did prehistoric peoples. It also suggests that Euroamericans were more dispersed in permanent locations over the landscape than prehistoric groups. Population size differences, the invisibility of some cultural activities in the archeological record, and the destruction of prehistoric resources by some Euroamerican land use practices, however, must be considered before such statements are made definitively.

It is also evident that Stratum IA was utilized actively by both prehistoric and historic peoples. This suggests that the resources in this area provided basic needs to both groups. Eighteen percent (8/44) of the relatively large (i.e., number of artifacts is greater than 15) historic and prehistoric resources discovered in Stratum IA during the first phase of the archeological survey contained at least two components with evidence of historic and prehistoric use. Fifty percent (30/60) of all (i.e., no minimum assemblage size) historic and prehistoric resources in Stratum IA showed prehistoric and historic period overlap.

Stratum IB including areas around freshwater ponds and along rivers or streams was exploited six times more intensely by historic peoples than prehistoric groups; the Euroamericans seem to have used it to the same extent as they used Stratum IA. This observation leads to several questions for consideration:

1) Is there diachronic evidence of changing historic land use pattern in Stratum IB?

2) Are there functional differences in historic site types between Strata IA and IB?

3) Is the frequency of historic sites in this stratum a function of water resource variations between the three towns such that Wellfleet offers many ponds for use while Eastham has few ponds but has good bay resources?

Although Strata IC and II were not extensively exploited by either prehistoric or historic peoples, it is evident that the latter group did leave behind evidence of their uses of these areas twice as frequently as the prehistoric peoples. This observation requires further testing since the percentage of sample units surveyed in each stratum is significantly smaller than for Stratum IA and somewhat smaller than for Stratum IB.

A comparison of the mean frequencies per sample unit of various kinds of historic and prehistoric sites, as determined by artifact frequency, artifact spread, and cultural associations, also is interesting (Table 2). The latter two comparative categories of historic and prehistoric sites are not mutually exclusive of the other site types but provide data of cultural significance. Also, the last pair (prehistoric with ceramics and historic with cellar hole), though not exactly comparable, both are cultural associations that suggest relatively long term, domestic settlement. These data provide some additional information with which to compare Native versus Euroamerican land use on the outer Cape.

In general, the frequencies of historic and prehistoric site types associated with middens or cellar holes correspond with the frequency of all kinds of historic and prehistoric sites within a particular stratum. High frequencies of sites with middens or cellar holes occur in strata with high frequencies of sites overall. This is especially true of the prehistoric sites, although there are some exceptions in the historic data. Historic sites associated with cellar holes are more prevalent in Strata IB and II where a lower overall frequency of sites exists than in Strata IA and IC where the highest mean frequencies of historic sites exist. Several tentative explanations can be offered for this paradox: (1) other cultural features are associated with the sites in IA and IC, such as standing horses or roads; (2) cultural features existed but could not be observed due to vegetation in the area around the sites, especially in the hollows of Stratum IC; or (3) the low frequency of historic midden and cellar holes in Stratum IA may result from historic land use patterns involving dispersed settlements and large tracts of land for agriculture.

To summarize the comparisons between historic and prehistoric site frequencies within the four strata, three methodological and interpretive points are apparent. First, it is evident that in the relatively small area of the outer Cape some multiple occupation sites are found, although the amount of overlap between

TABLE 2

Comparison of Historic and Prehistoric Resource Types -
Mean Frequencies and S- Per Sample Unit
x

Stratum	Very Small Prehistoric (n=1-6)	Very Small Historic (n=1-7)	Isolated PH in H	Isolated H in PH	Analyzed PH sites	Analyzed H sites	PH with Midden	H with Midden	PH with Ceramics	H with Cellar Hole
IA	.16±.06	.18±.08	.20±.08	.47±.12	1.11±.21	.58±.12	.32±.12	.11±.05	.24±.08	.03±.03
IB	r	.09±.04	.24±.07	.02±.02	.04±.03	.39±.10	r	.02±.02	r	.15±.07
IC	.12±.12	.38±.26	r	.13±.13	.25±.50	.50±.27	r	r	r	r
II	r	.05±.05	r	r	r	.24±.19	r	.05±.05	r	.10±.10

NOTES

PH = Prehistoric
H = Historic
n = number of artifacts
r = rare

significantly large historic and prehistoric sites (18%) is not large. The fifty percent overlap between all of the historic and prehistoric sites, however, suggests that scatters of historic and prehistoric materials become intermixed in areas of extensive historic farming, particularly on relatively flat and fertile land. It is critical, however, to learn the effects of historic plowing on prehistoric sites and to test some of these areas in order to differentiate prehistoric short-term activity areas.

Second, the areas within Stratum IA should be examined more closely for common criteria of settlement and land use among prehistoric and historic peoples, e.g., fresh and salt water resources, good agricultural land, natural salt works, natural fields for livestock grazing, forests, etc. The 1620 assessment of the outer Cape by the Pilgrims noted the land use patterns of the local Indian groups (McManis 1975; Mourt 1963). Although the Pilgrims decided not to settle on the Cape at that time, the possibility that similar criteria were important to settlers from Plymouth twenty years later must not be overlooked. The evolution of land needs and criteria for land selection by Euroamericans after initial settlement would make an important corollary study.

Finally, it is evident from the initial data set that the Euroamericans exploited a wider area of land more intensely than did the prehistoric Native Americans. The fact that Euroamerican occupation was so widespread supports the interpretation of dispersed settlement. An examination of microenvironmental variation within the modern political limits of each town will be presented below as a potentially more useful focus for historic settlement pattern than simply hydrographic and topographic criteria.

Historic Site Characteristics by Sample Stratum

Although some interpretative statements were possible using the entire initial data set discussed in the previous section, the designation of sites for further comprehensive statistical analysis was an important product. Eliminated from further analysis were the very small assemblages with historic artifact densities of 1-6 items and the low-density assemblages of historic artifacts in a predominately prehistoric assemblage. The final number of site assemblages for further analysis was forty-seven. A basic characteristic of these sites is a minimum of fifteen artifacts for reliable statistical analysis.

Frequency counts of twenty-four variables per site were subjected to further analysis. Two major catagories of variables were examined: (1) ceramic paste types including the ones discussed above as temporal indicators as well as stoneware, porcelain, and kaolin; (2) vessel shapes which include indeterminate, storage containers, large thick-bodied kitchen wares, and tablewares such as plates, saucers, cups, bowls, teapots, etc.

Several statistical analyses were conducted on the artifact counts per site using MIT's Consistent System statistical package within the Multics system. The analyses conducted include frequency percentages of artifact and site types by stratum and town. A cluster analysis on artifact count percentages per site also was done to explore this multivariate technique as a means of identifying groups of similar sites the outer Cape. The cluster analysis results are presented in a later section.

There are several qualitative biases which must be considered when using any of these quantitative methods. First, there is a strong emphasis on historic ceramics. The ceramic counts used in the analyses are a compilation of more finely categorized types and, therefore, lose some of their chronological significance in their generality. Since all the ceramic variables are the products of such lumping, they are compatible for analysis. The more fine-tuned classifications of individual sherds will be useful for future studies especially those concerned with socio-economic problems. Recent warnings on the elusiveness of pottery types such as creamware and pearlware as chronological indicators (Miller 1980) are acknowledged, yet the use of other cultural material and historical documents in this study provides important collaborating material.

A second qualitative bias concerns the relationship between the survey area and the whole outer Cape region within which it is located. The advantage of a regional focus in archeology is the flexibility with which the variety of activities and interactions of peoples can be examined over space (House 1978). The artificial boundaries of the survey area prevent an examination of the complete settlement pattern in the outer Cape. The centers of the three towns are all outside the survey boundaries and are located along harbors on the bay side. It is expected, therefore, that: (1) the sites in the survey area do not proportionally represent the full variety and frequency of historic period activities associated with each town, and (2) farm life and agricultural activities are over-represented while maritime-related activities are under-represented overall. This apparent problem is lessened when the stated goal to examine the settlement pattern of dispersed farmsteads within agriculturally-oriented towns and the effect of new economic and social conditions upon the area over time is considered.

Third, the relatively small assemblage sizes of some sites significantly limit functional interpretation. Adequate identification of specific activities or types of activities cannot be made with these data, although associated features, such as cellar holes and roads, as well as documents help to counter this problem.

Finally, a major quantitative bias in the study sample is the variation in artifact assemblage sizes per site ranging from 15 to 1152 items. This discrepancy between sites can cause severe weighting toward the large ones. Wherever possible, especially in

the cluster analysis, percentages of artifact counts were used to reduce sample size bias. Several variables included in this study occur infrequently at the sites and, therefore, probably do not carry much weight in the analyses. These include: stoneware, porcelain, kaolin, tool, ornament, and hardware.

A rough idea of occupation dates and the functional diversity of sites can be delineated within each stratum by examiing the relative frequency of ceramic artifacts as a group (Table 3) and the non-ceramics as another group (Table 4). A number of observations can be made with the percentage data.

Interpretations of the ceramic data are interesting, but tentative. The greatest frequency of redware, representing early occupation, is in Stratum IC, the inland wetlands, and valley hollows. This finding is particularly significant given the scarcity of sites found in this stratum during the first stage of the survey. There are also functional imlications for the high percentage of redware. It has been shown that dairy farming utilizes a high proportion of redware vessels and was a major economic activity in 17th and early 18th century Massachusetts (Deetz 1973). It is possible that dairy farming was popular in the hollows and wetland areas since the topography might not have lent itself to agriculture as easily as grazing and dairying.

Stratum II also has a relatively high frequency of redware suggesting early occupation and/or an emphasis on dairy farming. It is significant that these two areas contain evidence of some of the earliest settlement and land use since they are both areas of forest, undulating hills, and open grasslands. The variety of resources offered in these areas, the protection from storms offered by the topography and the abundance of potential land may have been criteria used in its initial settlement. The lower frequencies of redware in Strata IA and IB suggest later occupation of these areas or might imply a differentiation of contemporaneous socio-economic groups such that people living in Strata IA, for instance, were better off as a whole than people living in the hollows and, therefore, had different goods. Alternatively, the difference in ceramics might reflect different activities.

Stratum II has an interesting bimodality of high frequency redware and moderately high frequency whiteware. This suggests that fluctuations occurred in land use patterns within the stratum over time. It is possible that several factors may have operated to make this distribution: (1) a change in settlement pattern occurred in the 19th century that caused people to cluster in the town centers away from the dispersed farmsteads and then when population increased, these areas were reinhabited; (2) the location of most of these sites near a road may have introduced the more recent artifact types.

There is a consistently low frequency of creamware in all of the strata which can be explained in several ways. First, it is often

TABLE 3

Comparison of Ceramic Type Frequencies by Stratum

Stratum (Sites)	Redware		Creamware		Pearlware		Whiteware		Stoneware		Porcelain		Kaolin	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
IA (20)	300	35	105	12	284	35	128	15	14	2	5	1	16	2
IB (18)	542	30	254	14	565	32	388	22	11	1	5	<1	20	1
IC (4)	337	74	59	13	19	4	24	5	9	2	0	0	10	2
II (5)	203	49	51	13	38	9	102	25	5	1	1	<1	11	3

TABLE 4

Comparison of Non-Ceramic Type Frequencies by Stratum

Stratum (Sites)	Brick		Sheetmetal		Nail		Tool		Glass		Window Glass		Vessel Glass		Hardware		Charcoal/ Slag		Plaster/ Mortar	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
IA (20)	665	43	9	1	195	13	3	<1	12	1	106	7	99	6	2	<1	417	27	37	2
IB (18)	1096	47	74	3	220	9	3	<1	76	3	200	9	152	6	16	1	302	13	208	7
IC (4)	160	72	2	1	18	8	0	0	3	1	23	11	7	3	0	0	7	3	3	1
II (5)	454	61	19	3	59	8	1	<1	4	1	32	4	24	3	0	0	151	20	2	<1

difficult to distinguish creamware from pearlware except among sherds where pigment has concentrated in the glaze or when particular stylistic attributes are associated. Therefore, some bias may have been introduced during cataloging which distorted the frequencies to some degree. Second, creamware may not have been widely available on the outer Cape, and therefore not used. This is testable if store inventories are found and examined for the towns. Finally, the low, but consistent, frequencies not only could indicate the presence of Euroamericans throughout much of the outer Cape in the late 18th and early 19th century, but the slow adoption of these items.

The frequency of pearlware is considerably greater in Strata IA and IB than in Strata IC and II which implies more intense utilization of these areas in the mid-19th century than at other times. The very low percentages of pearlware in Strata IC and II suggest a de-emphasis on land use in these areas at this period as discussed above or may represent slower adoption of new material culture and the cultural mindset behind such a purchase. It is quite possible that dispersed farmers were much slower in adopting new material culture than in the town centers. This would be a very fruitful hypothesis to test in the future. Bias introduced in the laboratory however must not be discounted as a possible contributor to these percentages.

Overall, the ceramic data from Strata IA and IB show a relatively consistent occupation of the areas while the data from Strata IC and II suggest more intermittent use during the earlier phases of Euroamerican settlement. Since the ceramic categories consisted of "lumped" ceramic types, more refined dating should be possible. As well, the very small amounts of stoneware, porcelain, and kaolin or pipe fragments within each strata are not useful in this analysis, yet studies of individual sites may be aided by such dating techniques as bore width of pipe stems (Harrington 1954; Binford 1962).

An examination of Table 4 for insights about site type diversity is not very helpful. Brick is the principal construction material that remained at the sites although its high frequency in Strata IC and II suggests that its use might have been most frequent in earlier times. This pattern of frequencies might be distorted, however, by an overabundance of brick at just one site. Future analyses might continue by looking for production marks on the bricks or some petrographic analysis to determie manufacturing location and dates.

In summation, the frequency analysis of the ceramic and non-ceramic artifacts within each stratum was useful for delineating the extent of functional diversity and temporal fluctuations in Euroamerican land use within different natural environments of the outer Cape. Ecological considerations seem to have played a role in the selection of areas for settlement and associated activities. Variation in the natural environment within the three towns had a significant impact upon town

settlement patterns (see Rubertone, this volume, for more details on this).

Historic Site Characteristics by Town

A very general evaluation of some basic temporal and functional distinctions among sites in different towns is also possible. Table 5 reveals the frequency percentages of major ceramic paste types by town and provides support for some of the historical differences noted above. Eastham has a clear preponderance of redware which suggests early occupation and the likelihood of an emphasis upon dairy farming. The relatively uniform frequency spread of redware, cream/pearlware, and whiteware in Wellfleet underscores the continuity in its occupation with particular emphasis upon recent occupation. Overall, Truro exhibits similar continuity in settlement as Wellfleet, yet when the town is broken down into two sections, the northern area, including the Highlands and High Head, and the southern area near the Pamet River, the percentages differ. North Truro has a high proportion of redware suggesting early occupation and, perhaps, an emphasis upon farming. It is known that the East Harbor area was used for grazing throughout the 18th century (Rockmore 1979), while the Highlands area was noted for its agricultural productivity. The southern part of Truro is associated with a high proportion of pearlware suggesting its importance in the mid-18th century.

Cluster Analysis of the Historic Site Data

More specific distinctions of the temporal and functional variability of historic sites in general and as associated with towns were sought by a multivariate statistical analysis. Relative frequencies of artifact types from each site were used to develop a matrix of Euclidian distance measures between each pair of sites. A cluster analysis of this matrix was performed using the "agclus" program, one of the applications available in the Consistent System programs at the Information Processing Center, Massachusetts Institute of Technology. A complete link method of clustering was chosen in order to maximize the simlarity of members of individul clusters and the differences among clusters.

Two analyses were conducted with different groups of artifact types. An initial cluster analysis was performed using only the relative frequencies of ceramic paste types at sites. The marked differences in paste types suggest six clusters containing from 2 to 13 sites (Table 6). In general, we interpreted redware as representing the early historic period, creamware and pearlware as representing the late 18th- and early 19th-century period, and whiteware as reresenting the subsequent period. These simple interpretations were tempered by other contents in a site's assemblage and the site's associations with roads, standing structures, etc., as will be described below.

TABLE 5

Comparison of Ceramic Type Frequencies by Town

Town	Redware		Creamware		Pearlware		Whiteware		Other*		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Eastham (15)	598	49	145	12	277	23	145	12	46	4	1211	100
Wellfleet (13)	447	32	164	12	302	22	438	32	29	2	1380	100
Truro Total (19)	337	37	161	17	327	36	59	6	37	4	921	100
South Truro (6)	197	31	101	16	290	45	51	8	1	<1	640	100
North Truro (13)	140	50	60	21	37	13	8	3	36	13	281	100

* Includes stoneware, porcelain, kaolin

TABLE 6

Percentages of Ceramic Paste Types for Each Cluster in First cluster Analysis

Cluster	Redware		Creamware		Pearlware		Whiteware		Other	
	%	n	%	n	%	n	%	n	%	n
(10) A	76	519	11	72	4	28	4	26	5	34*
(2) B	9	5	74	42	9	5	0	0	8	5
(9) C	36	476	19	251	33	431	11	149	1	21
(7) D	12	42	4	14	66	223	14	48	3	12
(13) E	32	342	8	96	20	215	37	395	3	29
(3) F	3	1	3	1	11	4	67	23	15	5

( ) = Number of sites in cluster

Other includes stoneware, porcelain, and kaolin

* 10 pieces of stoneware and 24 pieces of kaolin

The relatively small size of assemblages from a number of sites more drastically limited functional interpretation. No specific activities or types of activities were identified with the data at hand. Additional assemblage analysis, site-specific documentary research, and analysis of additional archeological data from fieldwork in 1980 and 1982 quite likely could provide some of this information. Despite the lack of details at this point the groups of sites display general patterns of contents and associations that distinguish them.

The clear variation in ceramic paste types was reduced when other variables were added to the analysis in an attempt to gainsome insights about the combination of temporal and functional site differences. Again cluster analysis was the technique used. The approach was the same as that used for the ceramic paste type analysis. Specifically, relative frequencies of the ceramic paste and construction material types from each site were used to develop a matrix of Euclidian distance measures between each pair of sites. Again, cluster analysis of this matrix was performed using the "agclus" program a complete link method of clustering also was used. Seven clusters were identified in the resulting dendrogram (Table 7).

Five tentative historic site types were derived from these cluster analysis results in conjunction with documentary evidence and observed associations of foundations, standing structures, wells, roads, or substantial archeological features:

I. Early Period Scatter

The nine sites of Cluster A are included in this site type. The very strong emphasis upon construction bricks along with disproportionately high percentage of redware and low percentage of creamware, pearlware, and whiteware suggests structures and activities dating from a relatively early period of time. The presence of pipe fragments and stoneware without any porcelain, as well as the lack of sheet metal at these sites, supports this interpretation. Five of the sites are located in areas known to have been occupied in the mid-to-late-18th century, particularly the High Head region of Truro. Two sites are associated with early-19th century occupation. The majority of the sites are associated with roads, particularly old King's Highway, an early historic road. A potential alternative interpretation of this site type is that it represents specialized activities from a wide range of time periods that required coarse redware vessels but not more refined ceramic types.

II. Early Period Structure

The 17 sites of Cluster B and the single site in Cluster C

TABLE 7

Percentages of General Ceramic Types and Frequencies of Construction Material Types for Each Cluster

Cluster	Redware		Creamware		Pearl-Ware		White-Ware		Other Ceramic*		Total Ceramics
	%	n	%	n	%	n	%	n	%	n	
(9) A	74	79	2	2	5	5	6	6	14	15	107
(17) B	36	334	25	231	23	214	13	124	4	37	940
(1) C	77	333	13	54	3	11	4	19	3	14	431
(8) D	36	562	10	163	27	422	25	400	2	25	1572
(1) E	31	16	6	3	23	12	40	21	0	0	52
(5) F	13	39	4	11	66	204	14	44	3	9	307
(6) G	13	9	9	6	26	18	40	28	13	9	70

Cluster	Brick		Nail		Window Glass		Plaster/ Mortar		Other Metal		Total Other Construction Materials
	%	n	%	n	%	n	%	n	%	n	
(9) A	90	422	3	14	3	17	<1	2	3	12	487
(17) B	74	1192	10	163	10	160	4	69	1	26	1610
(1) C	69	51	14	10	16	12	1	1	0	0	74
(8) D	59	475	20	160	14	111	2	15	5	38	799
(1) E	34	82	1	3	4	9	49	122	13	31	247
(5) F	55	118	24	52	13	27	2	5	6	14	216
(6) G	19	36	48	90	13	25	19	36	<1	1	188

( ) = Number of sites in cluster

* Includes stoneware, porcelain, and kaolin

are grouped within this site type. The high frequency of brick, and the association of 8 cellar holes and two standing structures with their sites suggest the association with permanent structures. Four sites are located in late-18th century occupation areas and four other sites stand in early-19th century occupation areas.

III. Long Term Occupation Structure

Nine members of Clusters D and E make up this site type. The ceramics show a clear continuity of types--redware through whiteware. Many of the sites are associated with cultural features such as middens, wells, barns/outbuildings, and standing houses suggesting long-term use. At least five of the sites are located inareas of 1830-1880 occupation. Others are the Fresh Brook area where settlement might have begin somewhat earlier.

IV. Mid-19th Century Occupation

This site type includes the five members of Cluster F. The predominance of pearlware at these sites suggests early-to-mid-19th century occupation. This is further supported by the presence of a dated dwelling of ca. 1830 at one site and a possible foundation in an area occupied around 1830-80. Four of the five sites are paired within individual sample units, with another site beloging to either Type II or III above.

V. Recent Scatter

The four members of Cluster G consist of a scatter of relatively modern artifacts and standing structures. Although two of the sites have evidence of 1830-80 occupation, the disturbance of adjacent lawns could have destroyed previous indications of land use.

Using the distribution of these general site types among the survey's sample units, estimates of the frequency of each in different towns were calculated (Table 8). The estimates provide basic iformation about the distribution and frequency of historic period resources within the Seashore. They, therefore, satisfy one of the goals of the analysis; however, considerable additional survey effort is needed in order to increase the precision of the estimates.

The estimates also are useful for comparing the settlement patterns of the outer Cape towns. Such comparisons reflect upon the historical demographic and economic processes that affected each town and the entire outer Cape.

It is immediately clear from the estimates that, aside from one case, no single town, stratum, or stratum within a town has a monopoly on all or particular site types. The exception is the

TABLE 8

Average Frequency of Occurrence of Site Types per Sample Unit

Eastham

Stratum	I	II	III	IV	V
Nauset (31)	.097 ± .054	.161 ± .067	.065 ± .045	.065 ± .045	.129 ± .061
IB (0) *	-	-	-	-	-
IC (2)	rare	.500 ± .707	rare	rare	rare
II (7)	rare	rare	rare	rare	rare

Wellfleet

IB (36)	.028 ± .028	.139 ± .071	.111 ± .066	.056 ± .039	rare
IC (1)	rare	rare	rare	rare	rare
II (6)	rare	rare	.167 ± .167	rare	rare

Truro

High Head (8)	.375 ± .183	.250 ± .163	rare	rare	rare
IB (9)	rare	.222 ± .147	.222 ± .147	.111 ± .111	.111 ± .111
IC (5)	.400 ± .245	.200 ± .200	rare	rare	rare
II (8)	.125 ± .125	.375 ± .375	rare	rare	rare

( ) = Number of sample units sampled, sample unit contains 2 hectanes or 4.9 acres.

I = Early Period Scatter

II = Early Structure

III = Long Term Occupation Structure

IV = Mid-19th Century Scatter

V = Recent Scatter

* The small amount of IB in Eastham was not within the sample chosen.

number of Early Period Scatter and Early Structure site types that have unusually high frequencies in Truro's High Head section. This is somewhat of a surprise because this area was not identified by the documentary research as one of early period concentrated settlement. The area was adjacent to Old King's Highway, an early pan-Cape route, however, and this might have attracted farmers to locate their residences and barns along it. The agricultural productivity of the land from the Highlands to High Head may have been a further impetus.

A dispersed settlement pattern is indicated by the distribution of sites in Truro (Figure 3). Three of the eight sample units contained a single site and one has two sites. This contrasts with the distribution of the same site types in Stratum II. There all four sites were discovered in one of the eight sample units. The sample unit fell into the Highlands section of Truro, a small settlement concentration identified by the documentary research. Although only one cellar hole was discovered in this sample unit, the high concentrations of artifacts from the three other site locations indicate substantial activity in the immediate vicinity.

Because the site types have a temporal association, the overall site occurrence frequencies in Truro might yield an interesting insight into settlement and demographic change. It is clear from the site data that in most of the archeological investigation area within the town a significant decrease in population occurred with time. The population movement that occurred in 19th century Truro was stimulated by economic and environmental processes. It is possible that the more protected areas of Stratum IB around the inland ponds and rivers where settlement seems to have been steadier provided a more stable environment for continual land use.

Within Eastham the only portion of the investigation area substantially occupied during the historic period were Fort Hill and the Salt Pond area (Figure 4). The relatively constant estimates of Nauset sites from all periods is consistent with implications from the documentary research that Eastham's settlement pattern was relatively constant.

The spatial distribution of sites around Nauset Marsh also supports the inference of dispersed settlement in the town throughout the historic period. The quality of land for agriculture in Eastham might have been one of the variables causing a dispersed settlement, along with land consolidation and ownership continuity.

In Wellfleet site distribution suggests the opposite spatial pattern. Approximately fifty percent of the 13 sites discovered are located in two relatively concentrated, albeit small, 18th and 19th century settlement loci--Bound Brook Island and Fresh Brook--both identified by the documentary research. The other sites are more dispersed and are located around inland ponds and rivers and within hollows. Some interesting observatios can be

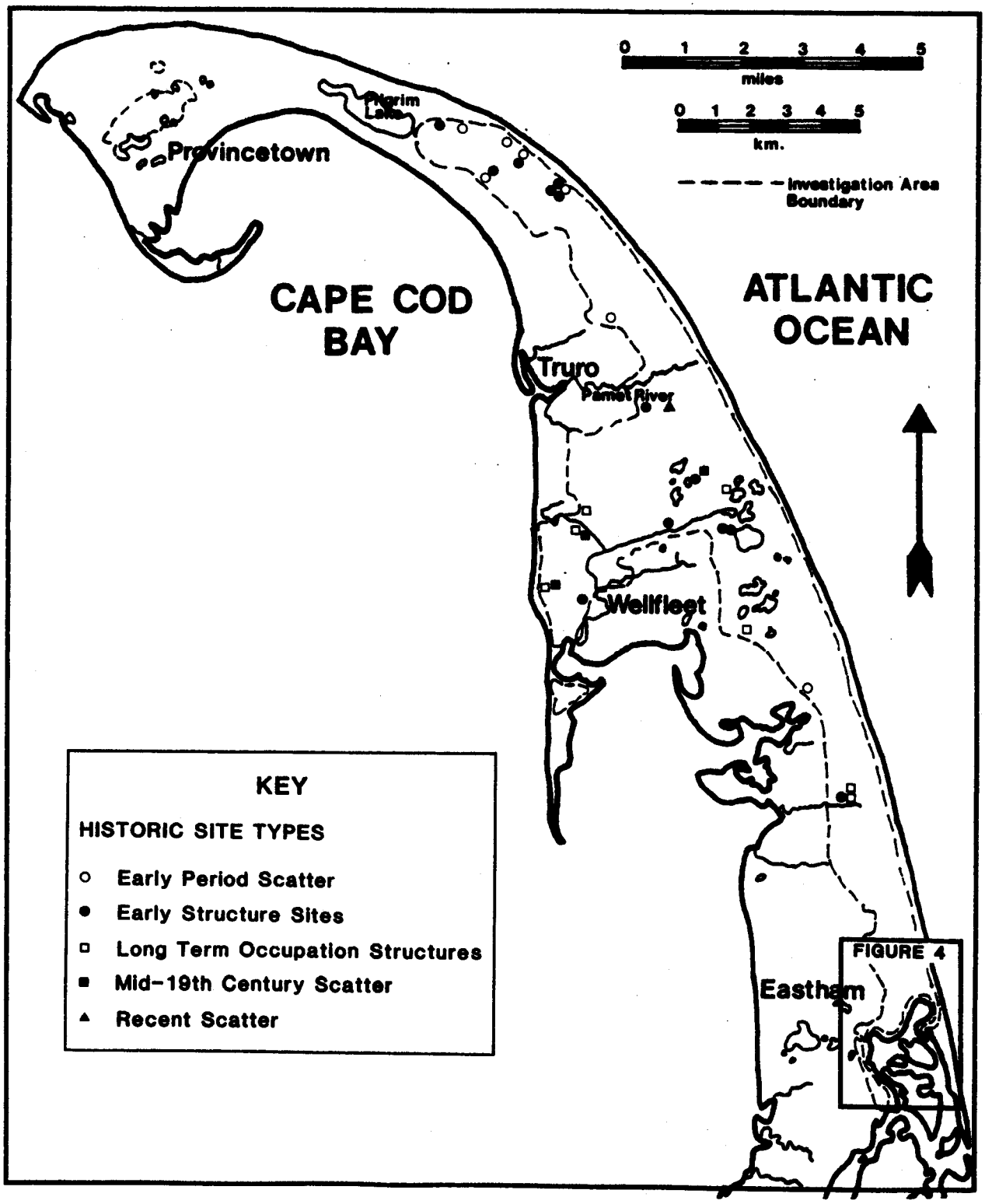

FIGURE 3. Geographical Distribution of Historic Period Site Types.

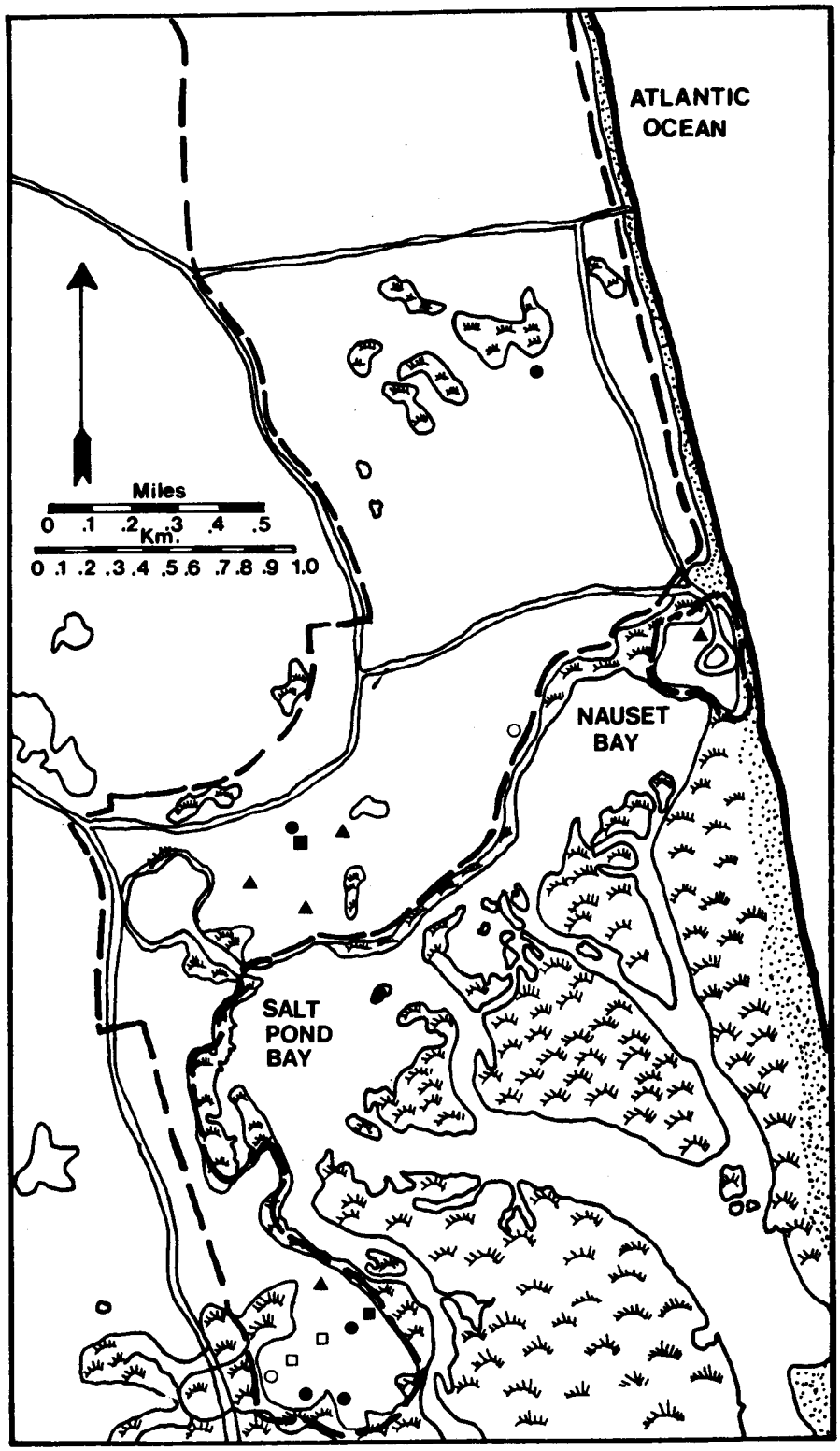

FIGURE 4. Geographical Distribution of Historic Period Site Types around Nauset Marsh (Key on Figure 3).

made concerning the spatial and temporal distributions of sites in Wellfleet.

It is known from the documents that both small settlement disbanded in the late 19th or early 20th century (Rockmore 1979) and have remained largely uninhabited ever since. Economic trends as well as the location of the Cape Cod railway system through both areas may have contributed to their demise. Settlement on Bound Brook Island existed near the periphery of the island suggesting a maritime orientation. Changes in localized economic pursuits as well as environmental degradation may have stimulated population movement from there.

In contrast to those more concentrated areas of occupation, the dispersed settlements around the ponds and rivers and in the hollows have been occupied over a longer period of time. Although specific homesteads may not have survived, the strong tendency to occupy those well protected areas has continued. More recently, new factors, such as summer recreational use have influenced settlement by many of the current occupants of these areas. Settlement continues there in obvious contrast to Bound Brook Island and Fresh Brook.

Conclusions

Sweeping interpretations, or reinterpretations, of the history, historic period archeology, or general laws of human behavior will not be forthcoming from the analysis just reported. The data are too preliminary and underanalyzed at this point; to say otherwise would be misleading. The framework for analysis, both documentary and archeological, however, seems solidly and properly anchored. Documentary analysis of specific identified sites aided by further artifact analysis could result in detailed reconstruction of associated activities and social phenomena. For example, a salt works within the vicinity of an early 19th century farm at Fort Hill has been identified in the documents and tentatively through archeological surface observations. Investigation into the social and economic background of this salt works and its relation to the farmstead is possible. Once more of this increasingly specific research is accomplished, further insights into the processes affecting the settlement, economic, and demographic changes within the outer Cape Cod towns will be suggested.

The explicit sample strategy and estimation procedure will permit these specific interpretations to be generalized quantitatively, and with relatively high objectivity, for an entire town and the investigation area in general. The known bias of the investigation area boundaries can be accounted for and used to enhance rather than denigrate interpretations from the archeological data.

We believe this analysis contributes to the increasing regional focus in historic period studies by presenting useful methods for

sampling and quantitative analysis. In addition, substantive informatio has been derived for resource management. Finally, general statements about the pattern of historic period site frequency and distribution have both supported and refined interpretations based upon the documentary record.

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