OCCASIONAL PUBLICATIONS IN FIELD ARCHEOLOGY
NUMBER 1

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ARCHEOLOGY BRANCH
NORTHEAST REGION
NATIONAL PARK SERVICE
U.S. DEPARTMENT OF THE INTERIOR

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William A. Griswold
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U.S. DEPARTMENT OF THE INTERIOR
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Cover: Photograph of the Statue of Liberty,
Liberty Island, New York.

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Management Summary

In the spring of 1998, the Archeology Branch of the Northeast Cultural Resources Center (NCRC), National Park Service (NPS), completed a comprehensive Archeological Overview and Assessment (AOA) for Liberty Island, administered by the Statue of Liberty/Ellis Island National Monument. Liberty Island is a 12.7-acre island in New York Harbor and is home to one of the symbols of American values, the Statue of Liberty.

An AOA was conducted for the island to provide additional information to site managers concerning the remaining archeological resources. The purpose of an AOA, as defined in *NPS-28, Cultural Resource Management Guidelines* of the National Park Service (1999), is to identify and evaluate potential archeological resources through a thorough investigation of the existing records, documents, and reports. The purpose of the AOA for Liberty Island was to: (1) complement and elaborate on earlier archeological and historical research; (2) identify potentially sensitive archeological sites that could be adversely affected by later construction/maintenance activities; (3) synthesize archeological and documentary data about the site; and (4) identify areas for additional research.

Several archeologically significant and potentially significant areas of the site were identified during the 1998 research. One locus, in particular, the area surrounding a prehistoric shell midden, located adjacent to the plaza, was considered highly sensitive for prehistoric occupation. This shell midden initially had been documented in 1985. During the 1985 restoration of the Statue of Liberty, a utility trench that was excavated in the west lawn, next to a hedge, exposed this prehistoric shell midden. A salvage operation began immediately, though archeologists were given only three days to gather information about the site. Soil samples were collected, and some analysis of the material was attempted. However, due to the limited scope of the salvage project, the results were never formally completed, and only fragmentary data existed to document the site.

The AOA recommended that additional research in this area might yield information concerning Woodland-period shell middens not available elsewhere in the region. This recommendation was adopted, and NPS archeologists undertook intensive excavation and analysis in 1999. The 1999 excavation of the prehistoric shell midden began with three goals in mind. First, the 1985 salvage investigations were to be reviewed and written up, and the analysis initiated in 1985 was to be completed. Second, additional excavations of the prehistoric shell midden would be conducted to gather additional samples for floral, faunal, and pollen analysis. Third, these excavations were to establish and define the lateral extent of the shell midden.

The 1999 project included two major components: fieldwork and specialized analyses. The archeological team completed the fieldwork portion of the project in May 1999, with accompanying specialized analyses finalized by late August 1999. This report summarizes information gathered on the Liberty Island shell midden during both the 1985 and 1999 projects. Recommendations are also made for future management and protection of the site.

Acknowledgments

The author would like to acknowledge a number of people who were instrumental to the success of this project. The key individual for getting the project started was Diana Pardue, Chief of Museum Services. Her enthusiasm, encouragement, and prompt support were always appreciated. I also thank others among the Liberty Island management, including Diane Dayson, Superintendent; Cynthia Young, Deputy Superintendent; Frank Mills, Deputy Superintendent; Richard Wells, Chief of Planning and Professional Services; and Peter O'Dougherty, Chief of the Maintenance Division. Museum staff members who aided our investigations included Robert Checchi, Museum Technician; Judith Giuriceo, Curator of Exhibits and Media; Geraldine Santoro, Curator of Collections; Joan Harris, Museum Specialist; Sydney Onikul, Museum Technician; Eugene Kuziw, Park Ranger; Ruby Hopkins, Personnel Officer; and Kathy Garofalo, Museum Technician. Kathy deserves special recognition for her continual assistance and procurement skills. Brad Hill, owner of Liberty Island Concessions, provided the crew with many free meal coupons, and we wish to thank him for his generosity.

The author also extends a gesture of thanks to the members of the Buildings and Utilities crew on Liberty Island and chief among them Jeff Marrazzo, Buildings and Utilities foreman. They generously shared their shop with us, enabling us to store our field equipment near the site. On rainy days their shop also served as our laboratory space where washing, sorting, and flotation of samples could be done.

Logistically, working on an island can be a trying experience. On Liberty Island, if one needed something, or forgot something on the mainland, one could not simply go and get it. A round-trip boat ride could take as long as two hours. We sincerely thank the captains and staff of *Liberty IV* and the Circle Line boats for transportation each day, and for making those special allowances for unscheduled trips.

Several of the contributors to this report deserve recognition for operating with academic expertise under the constraining government time schedule. I personally thank Tonya Largy, Dr. Lucinda McWeeney, and Dr. David Perry for their contributions to this report. I also thank Dr. Elizabeth Chilton for her help with identifying the prehistoric ceramics. Dr. Gerald Kelso deserves recognition for his work on the pollen of Liberty Island. I also wish to thank Sarah Peabody Turnbaugh who served as technical editor for this monograph. Additionally, I thank Dr. Steven Pendery for his useful comments on this report.

Finally, I thank those individuals who aided me in excavating the site, processing the artifacts, and cataloging the many objects and samples. Included among these are Jesse Ponz, Priscilla Brendler, Natalie Liberace, and Mary Troy.

William A. Griswold

Introduction

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PROJECT OBJECTIVES

A prehistoric shell midden was first discovered on Liberty Island in 1985, during restoration work on the Statue of Liberty, when the excavation of a utility trench bisected the midden. Dick Ping Hsu, then Regional Archeologist, recruited several individuals to aid in the examination and documentation of the site. Only three days were allotted to the initial investigations. Nevertheless, soil, shell, and pollen samples were collected, and preliminary analysis was begun. Budgetary constraints limited the amount of fieldwork that was done during the 1985 investigations. Likewise, money was not available for the flotation or pollen analysis to be written up, or for the site report to be prepared.

Funding was obtained thereafter through the one-year Cultural Resource Preservation Program (CRPP) to complete the analysis and to more thoroughly document the site. The 1999 project had four goals. The first was to complete the analysis of the 1985 research on the fauna and flora obtained from flotation; additional samples were floated in 1999 from the soil samples collected in 1985. The second goal involved limited excavation of additional test pits within the midden. These limited excavations were conducted to recover additional samples needed to complete the fauna, flora, and pollen analyses. Thirdly, the 1999 project was to define the lateral extent of the site, so that it could be protected from any further disturbance. Production of a report summarizing all of the 1985 and 1999 research results was the fourth goal. All of these goals were achieved during 1999.

Background research for this project was conducted in fiscal 1998 with the completion of the Archeological Overview and Assessment (AOA). The purpose of an Archeological Overview and Assessment, as defined in *NPS-28, Cultural Resource Management Guidelines* of the National Park Service (1994), is to identify and evaluate potential archeological resources through a thorough investigation of the existing records, documents, and reports. The four-part purpose of the AOA for Liberty Island was to: (1) complement and elaborate on earlier archeological and historical research; (2) identify potentially sensitive archeological sites that could be adversely affected by later construction/maintenance activities; (3) synthesize archeological and documentary data about the site; and (4) identify areas for additional research.

Previous research at the site was critically evaluated in the AOA, including the work done by Dick Ping Hsu in 1985. Since the time of completion of the AOA, several additional documents critical to the understanding and interpretation of the site have come to light. Included among these important documents are the original profile drawings, a brief, incomplete two-page report on the 1985 excavations, slides of the excavations, and correspondence about the project.

The 1999 archeological excavations on Liberty Island were part of the second phase of a three-year project, designed to provide the staff and visitors with more information about the archeological resources of the island. As noted above, an AOA of Liberty Island was completed in 1998 to document the potential historic and prehistoric resources of the island.

Excavation of the earlier noted prehistoric site was part of the second phase of research. The other component of the second phase involved geophysical testing over approximately 8 of the nearly 13 acres of the island; the modern 20th-century expansion of the island was not included in the geophysical component. Ground Penetrating Radar (GPR), Electromagnetic Induction (EM), and Magnetometry were done over the 8 acres. The products of these investigations are now available in a report, "Geophysical Survey, Statue of Liberty National Monument, Liberty Island, New York," by Hager-Richter Geoscience, Inc., of Salem, New Hampshire. The third phase will ground-truth the geophysical results and attempt to investigate the remaining historic components of the island.

Because of limited time and money, the publication of this volume is not intended to be a final report for the site. This monograph instead is intended to be an interim report, providing preliminary information about the site and the results of the 1985 and 1999 excavations. Additional archeological studies are not planned for the midden, in keeping with the goals of the NPS to preserve and protect archeological sites. However, bags of shells and soil were collected from carefully controlled excavation units so additional analysis potentially could take place. These materials are currently stored in the Statue of Liberty/Ellis Island collections, along with all of the artifacts excavated during the 1999 season. It is hoped that researchers from outside of the NPS may conduct additional analysis on these materials.

While written with a scholarly audience in mind, this monograph is intended not only for the scholar but also for the educated layperson, in keeping with the NPS mission of public education. In the coming years, a general-interest book on the whole Liberty Island project is planned.

RESEARCH METHODS

Project personnel for the 1999 season included Dr. William A. Griswold, Archeological Project Manager NCRC; Mary Troy, Archeological Technician NCRC; Natalie Liberace, Archeological Technician; Jesse Ponz, Archeological Technician; and Priscilla Brendler, Archeological Technician. Geraldine Santoro, Sydney Onikul, Joan Harris, and Kathy Garofalo, all from the Ellis Island/Statue of Liberty Museum Division, also aided us in our investigations, each working at least one day a week with us in the field. Eugene Kuziw, one of the rangers at Liberty, also donated some of his time to help us excavate.

A 10-m grid was established over 8 acres of the island for the archeological and geophysical investigations. Since the current landscape of the island is not aligned to any compass points, the grid was laid out in relation to the central axis of the island and the statue. The point N290 E180, established on top of the electrical outlet in the middle of the second granite band of the circular plaza in between the statue and the flagpole, served as our datum. The southern alignment was on the point of the triangular façade on the pedestal of the statue. All future excavations should continue to use this grid system so excavation units can be precisely located.

When excavations began, the exact location of the shell midden was not known. Following the metric grid established earlier, a few 0.5-x-0.5-m units were excavated along a north–south axis before the northern and southern fringes of the shell midden were located. Several 0.5-x-0.5-m units were then excavated to the west. Distance between the test units varied. Only three of the units, where the shell midden was located in the 0.5-x-0.5-m units, were opened up into larger 1-x-1-m units. Due to inconclusive results, investigations were subsequently undertaken across the diagonal walkway. Three 0.5-x-0.5-m units were excavated in this area along a north–south axis. Only one of these 0.5-x-0.5-m units was opened up into a larger 1-x-1-m unit. The expanded 1-x-1-m unit exposed a portion of the historic-period midden, but no trace of the prehistoric shell midden was observed south of the diagonal walkway.

Numerous deposits were sampled during the 1999 season. The tabulation of artifacts given in Appendix 6, and the table of strata given in Appendix 2, show the range of artifacts recovered and the types of deposits encountered. Several redundant soil and shell samples were also collected from the excavations to enable future archeologists to continue to conduct analyses on the materials without having to go back and excavate the area to obtain samples. Most of the samples have not been washed or brushed so as to aid future analysis of the material.

METHODOLOGICAL DISCUSSION

Some controversy exists over the methodologies used to excavate shell middens of the Northeast (Dincauze 1996; Bourque 1996). Dincauze promotes her position by critiquing the excavation of two shell midden sites, Greenwich Cove (Bernstein 1993) and the Turner Farm site (Bourque 1995). Dincauze contends that additional information could have been gained by a more detailed stratigraphic analysis using Stein's sedimentological method (Stein 1987) and a Harris matrix (Harris 1989) as opposed to the more traditional methods of excavation that Bourque and Bernstein employed. Bourque counters that Stein's analysis is "based upon the false premise that all archaeological deposits are sedimentary" (Bourque 1996:52). Bourque ultimately concludes that "Harris's model is probably workable only for small-scale excavations; Stein's geologically based model inaccurately characterizes shell middens of the Northeast, provides no advantage over conventional methods for their analysis, and may not be an appropriate choice for any shell midden" (Bourque 1996:53).

Stein's methods do appear to have the potential for extracting additional information from the archeological record, especially where microstratigraphy is present. Others have used this approach successfully with useful results (Shaw 1994). However, similar results can be achieved on excavations exhibiting tight stratigraphic controls and detailed recording of the excavations. The excavations that Bourque (1996) and Bernstein (1993) conducted yielded valuable information and, in my opinion, were not as uninformative as Dincauze would have us believe.

A conventional excavation methodology, in which arbitrary levels subdivided natural and cultural strata, was chosen for the 1999 excavations at the Liberty Island shell midden site. This research strategy emphasized the descriptive recording process; the field forms required data on provenience, soil color and type, artifacts recovered, and the excavator's interpretation for each stratum and every level in all units. Much of this information has been compressed and compiled in Appendix 2, and profiles for the excavated units are included elsewhere in this volume. Since only two stratigraphic deposits—an undifferentiated stratum of oyster shell and a dark sand stratum below the shell—were discernable in the 1985 photographs, this excavation method provided adequate stratigraphic control for the limited amount of exposure done in 1999, in which only 2.5 sq. m were exposed. No microstratigraphy was discernable in the shell midden deposits excavated in 1999.

Several of the 1985 samples were floated in the flotation tank in Lowell. However, the recovery rate of the 50 poppy seeds added as a control was low, and the possibility of sample contamination seemed to be high using this system. The equipment used was thus simplified to increase the recovery rate for the 1-liter samples and decrease the possibility of contamination. A new five-gallon plastic bucket, two geological sieves with 1-mm and 2-mm mesh, respectively, and a fine brine shrimp fishnet achieved much more reliable results in a fraction of the time. Largy (Chapter 7) noted a significant increase in the recovery rate using this method. This equipment sorted the material into three classes; a light fraction, a medium fraction (<2.0mm), and a heavy fraction (>2.0 mm). This system was also portable, enabling flotation to be conducted on-site.

Background

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The important prehistoric and historic background of Liberty Island (formerly Bedloe's Island) provides a context for the archeological investigation, as the island's geographic position and paleoenvironment greatly influenced its use and development. In this section, only the briefest summary has been attempted for the prehistoric periods. Due mainly to the nature of prehistoric archeological research, the synopses of the prehistoric periods deal primarily with the Lower Hudson Valley, not specifically with Liberty Island. In certain cases relevant evidence for prehistoric developments is introduced from New York state, New England, and elsewhere in the Northeast. With the advent of European settlement, more specific information is available for Liberty Island. Its rich history is also briefly discussed.

GEOLOGY AND GEOMORPHOLOGY

Liberty Island is a small 12.7-acre island in New York Harbor (Figure 1). As a remnant of glacial activity in the area, it is composed of glacial sand and till. The last glacial advance, during the Wisconsin Glaciation, covered this portion of the harbor with terminal moraines that are visible just to the south on Long Island and Staten Island (Kardas and Larrabee 1976:9). Presently, little topographic relief is evident due to modern construction and landscape alteration. Mid-18th-century maps, however, give some indication as to what the original topography of the island might have been prior to modern alterations. The original natural elevations probably rose no more than 15 to 20 feet above mean sea level.

As an island in New York Harbor, Liberty straddles two different environmental systems. It is near the terminus of the 350-mile-long Hudson River, one of the major waterways into the interior of the country for both the historic and prehistoric periods. The Hudson River starts at a small lake in the Adirondacks and is fed by many different tributaries on its southward journey before it terminates in the Atlantic Ocean. Liberty Island is part of the Lower Hudson Valley environment, herein defined as the region between the Hudson River Highlands gorge southward to the Narrows, an area of roughly 60 miles.

Liberty Island is also a harbor island and, as such, is part of the coastal landscape. Surrounded by relatively shallow waters, Liberty Island and neighboring

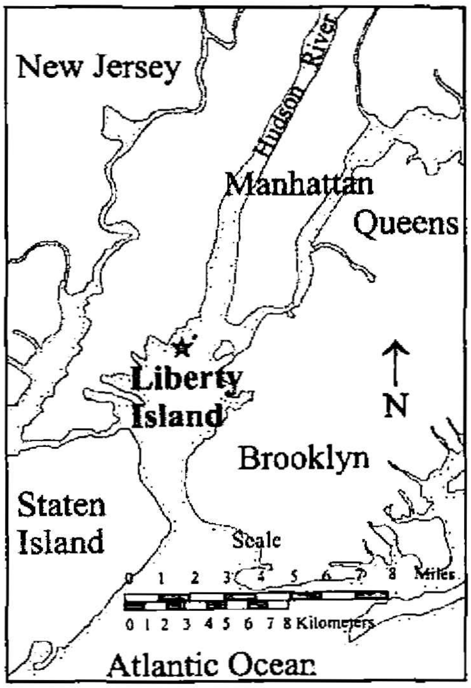

Figure 1 Location of Liberty Island, New York Harbor.

Ellis Island were very early on known as two of the three "Oyster Islands" in "Oyster Bay," indicating some of the shell resources that could be found there. The third island is now submerged but listed on some early Coast and Geodetic Survey charts (Means 1934:3). The mixing of fresh water from the Hudson and salt water from the Atlantic creates an ideal environment (estuary) for many finfish, shellfish, animals, and birds.

Liberty Island was not always an island. During the last glacial advance at the end of the Pleistocene, Liberty Island and much of New York Harbor were covered by ice. The maximum extent of the Wisconsin Glacial Age occurred sometime around 19,000 B.P. with the sea level dropping some 300 to 400 feet in depth (Kardas and Larrabee 1976:10). The continental shelf exposed by the glaciers supported a variety of large fauna and assorted flora. Lands exposed to the migration of people at the end of the Late Pleistocene were probably buried by the rising water levels (Kardas and Larrabee 1976). The rate at which the sea level rose varied through time. However, between 2000 and 600 B.C., when sea level was only 10 feet below modern levels, all of Oyster Bay would have been meadowland edged by marshland (Kardas and Larrabee 1976:11). Even at A.D. 1000, after sea level had risen toward modern levels, Kardas and Larrabee (1976:11–12) argue that Liberty Island would have been much larger than at present and probably would have been connected to Ellis Island. At that time, these two islands would have been low hills enveloped in a large salt marsh. It is only within the last several hundred years that Liberty Island has really become an island, disconnected from the mainland (Kardas and Larrabee 1976).

The entire surface of Liberty Island has been reconfigured several times during its history. As a result all of the indigenous flora and fauna have been eliminated from the island. Therefore, it is difficult to determine historically what once might have been there. However, for most of its habitable period, the lands of the Lower Hudson were covered by stands of hardwood forests (Funk 1976:6–7) that in turn supported:

> white-tailed deer, black bear, elk, beaver, woodchuck, raccoon, otter, bobcat, gray fox, timber wolf, squirrel, chipmunk, fisher, muskrat, turkey, and a host of others. Migratory birds were plentiful in season. The deer, elk, and bear, as the largest animals, produced the most meat per individual and were therefore the mainstays among game in all aboriginal periods except [possibly] that of the Paleo-Indian, who occupied a rather different habitat. Raccoon, turkey, woodchuck, and other small animals were also popular (Funk 1976:7).

Several prehistoric sites have been identified in the vicinity of Liberty Island. The New York state site files include numerous aboriginal sites, most of which were recorded by early 20th-century archeologists like Arthur C. Parker and Alanson B. Skinner. The majority of these sites were located 4 miles or more from Liberty Island. More recently, Lenik (1992) published an article on the prehistoric sites discovered in the New York City area during CRM projects in the 1980s. These include: one on Ellis Island; four on Manhattan Island—A. Heerman's Warehouse, Studt Huys, Barclays Bank, and 60 Wall Street; seven on Staten Island—Sailors' Snug Harbor, Mouquin House, S.I. Industrial Park, Richmondtown, Sharrot Estates, Tottenville, Page Avenue; and two in the Bronx—Riverdale Park and New York Botanical Garden (Lenik 1992). Several shell middens are found near Liberty Island, although most are further away than those previously mentioned, including the important sites of Kaeser (Rothschild and Lavin 1977) and Dogan Point (Claassen 1995b). Numerous others have undoubtedly been destroyed as a result of urban development within the greater New York City area.

In the Northeast, coastal environments like Liberty Island provided a wide variety of exploitable resources, as documented at sites like Greenwich Cove, Rhode Island (Bernstein 1993), and RI1428, also in Rhode Island (Tveskov 1997). Early inhabitants utilized a variety of flora from both inland and estuarine environments. Several genera of shellfish and plentiful finfish, especially anadromous species, could be found within a short distance of the shore. Numerous faunal resources probably included waterfowl, small mammals, reptiles, and deer. Overall, the Liberty Island environment provided richly diverse resources for optimizing the survival of early hunter and gatherer populations.

PREHISTORY

While many visitors journey to Liberty Island annually, most are unacquainted with the prehistory of the island. The richness of the food resources that the ancient Lower Hudson Valley estuary offered undoubtedly attracted early Native Americans to the region, and ultimately to the island. The following section briefly summarizes prehistoric developments in the area.

The Paleo-Indian Period

The term "Paleo-Indian" denotes the era of the earliest human occupation in the New World (Table 1). Both the timing of the migration(s) and the route(s) that the earliest immigrants took are contested issues, especially in light of recent discoveries made in South America (Dillehay 1996; Gruhn 2000). In addition to the Bering Land Bridge, possible other routes include both the Pacific Rim, via Japan and China, and the North Atlantic (Mandryk et al. [2001]; Schurr 2000; Stanford and Bradley 2000; Steele 2000). These ancient newcomers quickly spread out over the Western Hemisphere and utilized a hunting and gathering subsistence strategy to survive. Fluted projectile points known as Clovis, so named because of the flaking technique that left a "flute" on the obverse and reverse sides, are characteristic artifacts from the period. While radiocarbon dates have been obtained for two sites in the Northeast prior to 12,000 B.P. at the Meadowcroft Rockshelter in southwestern Pennsylvania and the Duchess Quarry Cave No. 1 site in New York, both of these sites have problems with their dates (Curran 1999b:5). The earliest firm date for human occupation in the northeastern United States is about 10,900 B.P. and comes from the Bull Brook site in Massachusetts (Curran 1999a:3–4).

Table 1. Prehistoric Periods for the Lower Hudson Valley

Period	Dates
Paleo-Indian	10,000 B.C. – 8000 B.C.
Early Archaic	8000 B.C. – 6000 B.C.
Middle Archaic	6000 B.C. – 4000 B.C.
Late Archaic	4000 B.C.– 1000 B.C.
Early Woodland	1000 B.C. – A.D. 0
Middle Woodland	A.D. 0 – A.D. 1000
Late Woodland	A.D. 1000 – A.D. 1600
Contact Period	Post A.D. 1600–

The environment of the Paleo-Indian period was vastly different than the present-day environment. Recent assessments indicate that by the time people arrived in the area, close to 11,000 B.P., the area had been deglaciated for several thousand years and supported a northern conifer/hardwood forest (McWeeney and Kellogg 2001; cf. Davis 1958, 1969; Edwards and Emory 1977; Newman 1977; Fagan 1978; Snow 1980:114–115; Lavin 1988a:101). The early inhabitants probably hunted a population of large animals like moose, elk, deer, caribou and others. Liberty Island, as well as other islands in New York Harbor, was still attached to the mainland at this time, as sea level was much lower than at present (Kardas and Larrabee 1976). Estimates indicate that along the southern New England/New York shore, sea level rose at the rate of approximately 3 m per 1,000 years between 8000 and 2500 B.P. and at about 1 m per 1,000 years from 2500 B.P. to the present (Oldale 1986:96).

The archeological evidence for the Paleo-Indian period in the southern New York and northern New Jersey area is fragmentary and incomplete. Yet, find sites of Paleo artifacts and fauna indicate that people were in the area of the Lower Hudson Valley (Ritchie 1994:11). Lithics of southern origin found on sites in the north suggest local contacts with southern populations (Curran 1999a:22). The rising ocean levels may, however, have inundated sites. Many of the very early Paleo sites thus may be located offshore below sea level and in drowned river valleys.

In general, not that much is known about the Paleo-Indian period in the Northeast. Most documentation for the presence of Paleo peoples consists of isolated projectile point find sites with a few suspected campsites. The progressive and at times almost systematic destruction of cultural sites in conjunction with rising sea level undoubtedly hampers our ability to recover information about these early peoples.

The Archaic Period

The Archaic period refers to the era when the large mammal hunters of the Paleo-Indian period resorted, instead, to intensive hunting and gathering. Archeologists generally further break down the Archaic period into Early (8000–6000 B.C.), Middle (6000–4000 B.C.), and Late (4000–1000 B.C.) subperiods. As with the Paleo-Indian period, the Early and Middle Archaic are not well-known within the region (Funk 1977). However, current projects are adding additional information about the Early and Middle Archaic periods (Cross 1999).

Paleoenvironmental assessments suggest that the climate continued to fluctuate during Archaic times, although present evidence indicates drier conditions influenced much of the Middle Archaic period (McWeeney and Kellogg 2001). Pollen cores from Peekskill Bay, as reported in the Dogan Point volume, indicate pine forests dominated the region between 10,000 and 8500 B.P. The pine gave way to a pine-oak community between 8500 and 7500 years ago, which in turn yielded to an oak-pine-hemlock community between 7500 and 5000 B.P. (Schuldenrein 1995:59). Lavin (1988a:101) has stated that "the abundant mast foods produced by these species could have supported large populations of deer and wild turkey." Human population levels consequently grew as edible resources became increasingly available and plentiful. Raw site numbers, in conjunction with artifacts, suggest that a more favorable environment in the Northeast supported a much larger population in the Late Archaic. However, as Funk (1996) has recently pointed out, this may be deceiving.

Aquatic resources were exploited heavily, with shell middens constituting an important archeological resource of the period. Ritchie (1994:31) has noted several other items that characterize the Archaic, including an abundance of stone and bone tools, the introduction of cold-hammered copper tools of both imported and native copper (cf. Levine 1999), the absence of shell artifacts and pipes, and the general absence of mortuary offerings in burials. Available evidence suggests that both Paleo-Indian and earlier Archaic economies were mainly based on the hunting and gathering of interior food resources with seasonal base camps located around inland lakes and river falls. Temporary campsites were used to exploit shellfish, which possibly was a more minor subsistence activity than hunting and gathering of interior foodstuffs (Lavin 1988a:104). Gathering involved the exploitation of seasonally available foodstuffs; no agricultural activities were begun until the later Woodland period.

The pattern of inland/riverine base camps continued throughout the predominantly warmer, drier Middle Archaic. The adaptive strategy centered on large lakes, river falls, and wetlands with the indigenous inhabitants exploiting deer, nuts, and wild and aquatic plants with specialized camps for the collection of other resources. This strategy allowed for population growth during the Late Archaic. As a result site size and frequency began to increase. None of the shell middens located in southern Maine, Massachusetts, Connecticut, or southern New York shows unequivocal evidence of use as a base camp (Lavin 1988a:104–105).

While other studies have shown that extensive oyster beds would have been available as a food source for the Paleo-Indian and early Archaic peoples, evidence is lacking for the exploitation of shellfish, to any significant degree, until Middle to Late Archaic times (5000 to 2700 B.C.) (Lavin 1988a:103). Many scholars now doubt that shellfish were collected only during the summer months, as was earlier believed.

More will be said about shell middens in the following chapter.

The artifacts found on Lower Hudson Valley Archaic sites represent the tool kit of the generalized hunter-gatherer-fisher-fowler (Brennan 1991:19) and indicate that hunting and gathering continued to be the dominant subsistence strategy during the Late Archaic. These sites seem to be transient in nature due to the absence of the following: burials, storage pits, signs of heavy stone knapping, structures, and fishing equipment (Brennan 1991:19). While both agriculture and plant domestication were occurring in other parts of the Western Hemisphere, the Northeast did not participate at this time. In summarizing the work of others, Lavin has stated, "This settlement shift has been explained in terms of a northward population movement of riverine-adapted Susquehanna groups from the Middle Atlantic region" (Lavin 1988a:104–105; cf. Turnbaugh 1975). A corresponding shift also occurred in the location of base camps in the Terminal Archaic, or latter Archaic. These base camps moved from the interior lakes and river drainages to the floodplain and first terraces of major river drainages and also appeared along coastal areas (Lavin 1988a:104–105). Clay ceramics followed soapstone vessels, as well, with crushed steatite used as temper in some of the earliest ceramics. These ceramics were probably not an indigenous development in the southeastern New York to northeastern New Jersey area but diffused to it from the Southeast around 1200 B.C. (Funk 1983:332). The soapstone vessels, however, continued to be used for a time along with the earliest ceramic vessels (Sassaman 1999:88).

The Woodland Period

Dramatic changes in technology, subsistence, and settlement patterns mark the start of the Woodland period (1000 B.C.–A.D. 1600). The Liberty Island shell midden dates to this period, and analyses summarized in the following chapters will strongly relate to this discussion. In the Northeast, as elsewhere, the widespread use of ceramics has defined the Woodland period. Changes in vessel types, composition, and decoration are now used to separate and classify the divisions within the Woodland period, which most scholars break down into three subperiods: Early Woodland, 1000 B.C. – 0; Middle Woodland, 0 – A.D. 1000; and Late Woodland, A.D. 1000 – A.D. 1600. The bow and arrow also appeared during this period and became a very effective hunting weapon. Later in the Woodland period, plants, most notably corn but also beans, squash, and sunflower, were domesticated. Cultivation of crops became increasingly important in the subsistence strategy of the indigenous inhabitants, at least for those in the inland areas. Occupants of interior locations became at least semi-settled, if not sedentary, and interregional and intraregional trade flourished.

Life in the Early Woodland period seems to have been much the same as it was during the Late Archaic, with people following a seasonal hunting and gathering subsistence strategy. As mentioned previously, however, one of the distinguishing hallmarks of the Early Woodland period was the widespread use of ceramics. The earliest Northeast pottery type, called Vinette I, appeared on Long Island around 1000 B.C. (Brennan 1991:18). A new ceramic type that was more complex and sophisticated, known as Vinette 2, developed slightly later. Specific changes in style and decoration indicate that several different groups of people, represented collectively as the Point Peninsula tradition, were living within the New York area. The typological varieties in Vinette 2 seem to evolve into the distinctive pottery types of later historical groups (Funk 1983:338).

While transformations from seasonal rounds to sedentary villages, and relying on formerly supplemental crops like maize, seem to have occurred in interior regions of New York, this pattern has not been established for the coast. Very little evidence has been found for domestication of maize on coastal sites. Two kernels dating to the Late Woodland period have been retrieved: one from the Hornblower II site on Martha's Vineyard (Ritchie 1969) and another from the Mago

Point site in southeastern Connecticut (McBride and Dewar 1987; Lavin 1988a:113). A lack of domesticates has also been reported for Narragansett Bay during this period (Bernstein 1992:11). All other maize recovered from coastal sites appears to date to historic times (Lavin 1988a:113). This seems to deviate substantially from the evidence for interior sites, which has led Ceci (1990:23) to speculate that substantially different evolutionary trajectories were taking place on the coast. Neither Vinette-type ceramics nor maize has been recovered from the Liberty Island site, to date. However, analyses of other material remains suggest that the Liberty Island shell midden site is representative of coastal sites of this period.

Two trends are clear from the available evidence. First, subsistence practices on the coast seem to be very different from those being practiced inland (Ceci 1990). The lack of evidence for domestication of agricultural products on the coast contrasts to the abundant evidence for it in the interior. Second, a more diverse diet, probably entailing broad-based collection of flora and fauna, was being practiced on the coast (Bernstein 1993). The inhabitants of the region around New York Harbor could draw upon terrestrial, oceanic, estuarine, and riverine resources at different times of the year. Perhaps this seasonal availability of resources forestalled the intensive focus upon one or more cultigens that was occurring elsewhere. Without a need, the movement to cultivation and the reliance upon a staple crop simply may not have been necessary in this coastal area.

The Contact Period

The Dutch came to the New World looking for a Northwest passage through the continent, hoping to capitalize on the silks, spices, and other exotics that lay to the East. Earlier repeated attempts had failed, but the Dutch utilized Henry Hudson in 1609 to attempt again to find a passage. While his efforts were ultimately unsuccessful, Hudson did manage to give the Netherlands a foothold, known as New Amsterdam, on the North American continent. With the advent of the Contact period, herein defined as the time after Henry Hudson and his ship the *Half Moon* sailed into present-day New York Harbor and up the river that now bears his name, our ability to tell the tale of the past improves.

Many groups of Native Americans inhabited the area through which Hudson traveled, including the Hackensack, Tappan, Esopus, and Warranawankongs along the western side of the river and the Rechgawawank, Wiechquaeskeck, Sinsink, Kichtawank, Nochpeem, and Wappinger along the eastern side of the river. The Canarse lived in what is now Brooklyn and Queens, and the Raritan occupied much of Staten Island (Bolton 1920:239, 285; in Kraft 1991b). The Mahican resided along both sides of the Hudson past the Kingston area north to lakes George and Champlain (Brasser 1978:198; in Kraft 1991b:193). All of these groups spoke a Munsee dialect of the Algonquian Delaware language (Goddard 1978:75–76, 237–238; in Kraft 1991b).

Furs and pelts acquired from the Indians were extraordinarily important commodities for European markets. The most coveted was beaver, but others included otter, bear, mink, raccoon, fox, marten, wild cat, muskrat, and deer (Kraft 1991b:208). Trade in these commodities was so coveted that exclusive trading rights were petitioned for within the Netherlands. In 1614, an exclusive trading agreement was granted to the petitioning merchants "for four voyages or three years" (de Laet 1967[1909]:38, 47). In exchange for these furs and pelts the Europeans traded "iron axes, hoes, knives, fishhooks, strike-a-lights, brass kettles, bangles and bracelets, jews-harps, mirrors, glass beads, stroud cloth, blouses, pants, stockings, needles and thread, tobacco pipes, an occasional gun, powder and lead, rum, beer, and other items" (Kraft 1991b:208).

Even with the extensive exchange being conducted, European trade items are relatively rare on Native American sites in northeastern New Jersey and adjacent parts of New York state (Kraft 1991b:213). This apparent scarcity is in direct contrast to sites in upper

New York state and south-central Pennsylvania where large quantities of historic trade goods have been found on Seneca and Mohawk sites. Edward Lenik conducted an analysis of 12 Contact-period sites in northeastern New Jersey and southeastern New York in an attempt to define the nature of interaction actually occurring between the Indians and the Europeans. Lenik (1989) concluded that contact between the Indians of northeastern New Jersey and southeastern New York and the Europeans was occasional and intermittent, with the Native Americans continuing to maintain their own technologies and lifeways (Lenik 1989).

HISTORY

The island's more recent, historical era may be divided into the Colonial era and the Coastal Defense period. Each is examined further, below.

The Colonial Period — Bedloe's Island, 1609–1794

Governor Nicholls first granted the island known today as Liberty Island to a Captain Needham on December 23, 1667. Needham then sold it to Isaac Bedloo (Levine 1952:11). Isaack Bedloo (a.k.a. Isaac, Isaacq Bedloe, Bedlow), a merchant and shipowner, was the first owner of the island when it was under English control. Although he was a Dutch colonist, Bedloo was probably of French ancestry (Levine 1952:6). Disappointed with his original homeland's lack of support of the colonists, Bedloo changed allegiances to England after the occupation in 1664. Before that time, however, he had aspired to several military and government appointments (Means 1934:4–7).

After Isaack Bedloo's death, the island passed down to his daughter Mary Bedlow Smith. Smith, after acquiring legal interest in the island from her siblings, went through a form of bankruptcy and sold the island to Adolph Philipse and Henry Lane, New York merchants, in 1732.

During Philipse's and Lane's ownership the City commandeered the island as a quarantine station to prevent smallpox from being brought into the colony. On January 22, 1746, Archibald Kennedy, Earl of Cassiles, purchased the island. Kennedy was appointed collector and receiver general of the Port of New York, an office that he held more than 40 years, from 1722 to 1763 (Means 1934:13–16). He is said to have bought the island to use as a summer residence (Stokes 1928, 4:309). Kennedy was responsible for the codification of the early deed transactions.

By 1753 Bedloe's Island had a "Dwelling-House and Light-House" on it and supported a variety of food sources. Beginning around 1756 the island was again used as a quarantine station. Aldermen were later sent from the Corporation of New York to buy Bedlow's Island from Kennedy for not more than 1,000 pounds and to erect upon it a pest house (Means 1934:18; Levine 1952:21). The island was finally sold to the city on February 18, 1758 (Stokes 1928:688), with payments made on June 20, July 20, September 19, and November 13, 1759, for the erection of the pest house (Stokes 1928:703).

The island was leased periodically to various tenants for the next few years when not being occupied as a quarantine station. Shortly thereafter, the British used the island to house Tory refugees during the Revolution. As tension between the American colonists and the British mounted the rebels attacked the island, burned the buildings, and made off with their entrenching tools in April of 1776. Following the Revolution, the Corporation rented the island to various tenants when it was not serving as a quarantine station (Means 1934:22). Between 1793 and 1796 the island was again utilized as a quarantine station, this time by the French. The French are noted to have erected buildings here, but no information was found concerning their type or configuration.

The Coastal Defense Period, 1794–1877

After the Revolution, people fully realized the strategic importance of Bedloe's Island for the defense of New York City Harbor. Situated as it was within New York Harbor, Bedloe's Island provided a clear view of New York City, Governors Island, Ellis Island, and the New Jersey shore. The Corporation of New York opened discussions in 1794 as to whether or not Bedloe's Island should be granted to the State of New York for the purpose of erecting fortifications to defend the city. These negotiations contained a stipulation that when the island was no longer used for fortification it should revert back to the corporation (Levine 1952:30). Slightly later, in 1796, the French, who had earlier been granted use of the island, were asked to leave. For a while the island then served a dual purpose, part as a fort and part as a pest house. The island was finally delivered to the State of New York on November 2, 1796 (Levine 1952:37).

Colonel Jonathan Williams, superintendent of West Point and chief of the U.S. Army Engineers, was appointed in 1805 to survey the defense needs of New York Harbor. Several people realized that the defense system for New York Harbor was inadequate to repel an organized attack. In 1807 President Thomas Jefferson approved the plan to fortify the harbor that Williams, Vice President George Clinton, and Secretary of War Henry Dearborn proposed, and Williams was instructed to carry it out. In 1814, war-governor Daniel Tompkins named these fortifications Fort Wood in memory of Eleazer Wood, "a distinguished hero in the Battle of Fort Erie" (Means 1934:38).

These constructions survived the War of 1812 without being attacked. However, years of neglect had taken their toll on the constructions by 1820, and the fortifications were described in an Army report to be in ruinous condition. Drawings made in 1839 illustrate that the scarp had suffered substantial deterioration, with some breaches in the fortifications evident (Pitkin 1956:5). These same illustrations revealed that the fortifications were earthen at the core, faced with masonry (Pitkin 1956:5).

Beginning in 1844 many changes were made in the fort. The scarp and main gate were repaired; the sallyport was rebuilt; a new magazine, drawbridge, and armaments were added; and the water magazine was greatly expanded (Pitkin 1956:6–8). After 1851, Fort Wood also served as a recruiting depot and ordinance depot. In the following 80 years numerous structures developed all over the island (Pitkin 1956:9).

In 1877 the island was selected as the site for the erection of Auguste Bartholdi's statue of "Liberty Enlightening the World." The Statue of Liberty was a gift from the people of France to the people of the United States in recognition of the centennial of independence and the alliance between France and America during the American Revolution. The monument represented a joint effort by the two nations, with France providing the statue and the United States erecting the pedestal on which it would stand (cf. Figure 2).

A presidential proclamation declared the Statue of Liberty a national monument on October 15, 1924. The War Department, however, continued to administer the remainder of the island. In 1933 the Statue of Liberty National Monument was transferred to the Department of the Interior, National Park Service. Control over the rest of the island was consolidated with that of the statue on September 7, 1937 (Levine 1952:86). It was at this time that the entirety of Liberty Island was first conceptualized as a background for the statue. Norman T. Newton, a National Park Service landscape architect, designed the island's 1937 master plan (Cultural Landscape Inventory 1996:5), which began to be implemented the same year. In subsequent years the island's landscape was transformed, and all of the structures from the Fort Wood period were torn down to implement the landscape design. The buildings present at the northern end of the island are support buildings and residential units dating from the 1940s and 1950s. Several alterations have taken place over the past 64 years of National Park Service ownership, but Newton's overall design concept for the island remains.

While the historic past of the island is much better known, the importance of the prehistoric shell midden must nevertheless be given equal, if not greater, emphasis here, for its ability to enlighten patterns of past human behavior. The prehistory of Liberty Island, as

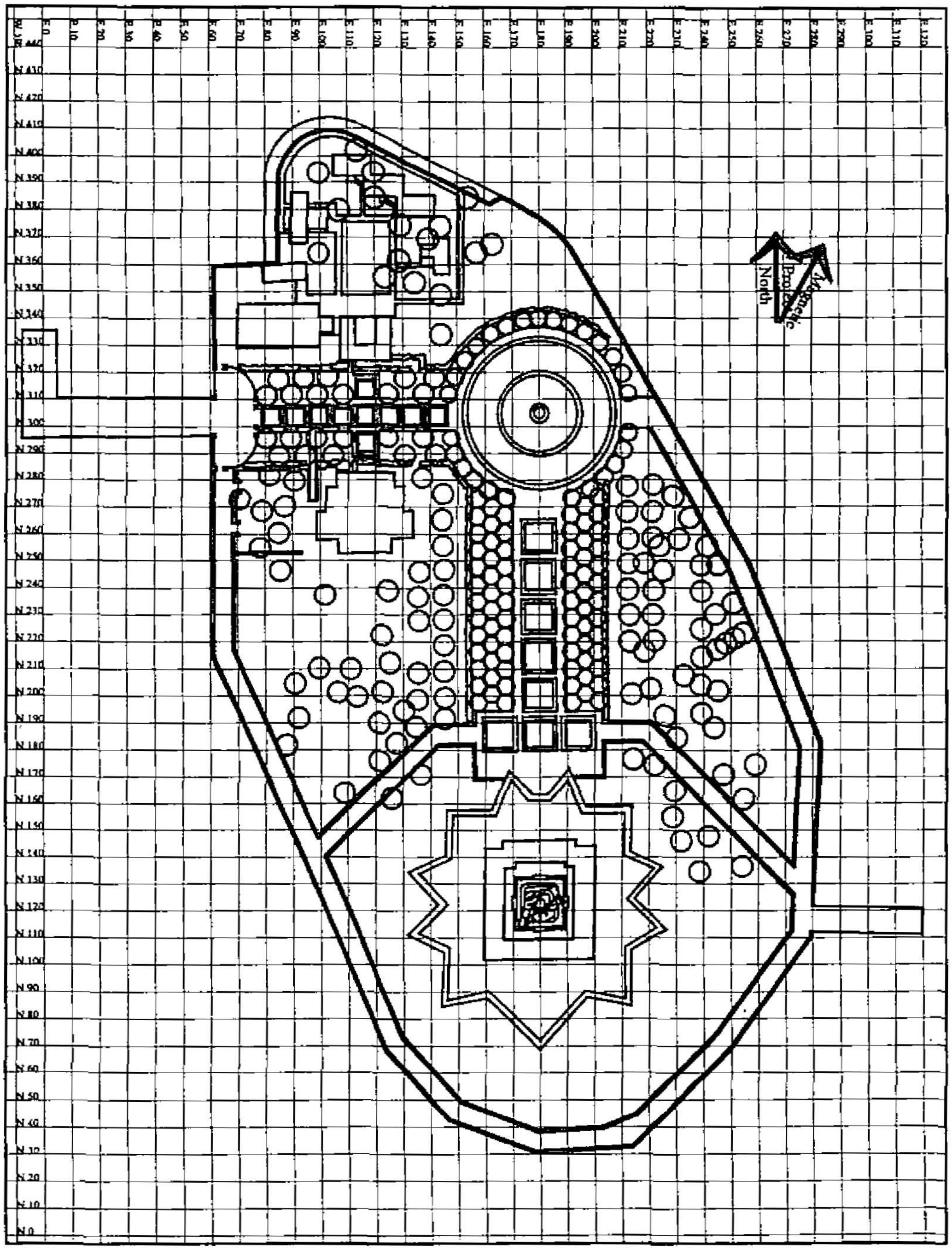

Figure 2 Map of Liberty Island.

exemplified through the excavation of the shell midden, is extraordinarily important for understanding the paleoecology and paleoenvironment of the area. It is also critical for helping to shed light on how the paleoenvironment and paleoecology shaped early human use of and interaction upon local resources. The shell midden gains even greater significance when one considers the damage inflicted upon other prehistoric sites by the extensive urban development of the New York region.

Shell Middens

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Shell middens develop as the final stage of food-procurement activities, the discard of shell and other by-products of the harvesting cycle. As a worldwide phenomenon, numerous examples of shell middens have been documented, most close to marine or riverine environments (cf. Stein 1992). The neutralizing effect of the calcium contained in the shell helps to preserve artifacts and ecofacts contained within the middens. The middens range in time, size, depth, and in shellfish composition, but they all represent the end result of the subsistence cycle. In most cases, other artifacts and ecofacts are deposited on or percolate downward into the midden. Generally, archeologists are left to contemplate the remaining stages in the food-procurement sequence. Analysis of the remains contained in shell middens not only offers insight into the earlier stage of the food-procurement cycle but also can illuminate settlement patterns, mobility cycles, trade and exchange, diet (beyond shellfish), and resource utilization. For these reasons, shell middens represent a valuable source of information to archeologists.

In the 1990s, three critically important works were published on shell midden excavations (Stein 1992; Bernstein 1993; Bourque 1995). Stein explored the remains of a Northwest Coast shell midden, called British Camp, in Washington State. Bourque's research concentrated on excavations at Turner Farm in Maine, and Bernstein's book addressed his efforts at Greenwich Cove in Rhode Island's Narragansett Bay. While utilizing different excavation methodologies, as reviewed above in Chapter 1, all of these studies demonstrate the quantities of data that can be gathered from shell midden excavation. Bernstein's research, because of its proximity to Liberty Island, is considered most relevant to this study.

LOWER HUDSON SHELL MIDDENS

The examination of shell middens in this study will be limited to the Lower Hudson Valley and surrounding areas, occasionally including examples from New England. Most of the Lower Hudson Valley middens are composed primarily of oyster (*Crassostrea virginica*) with lesser amounts of ribbed mussel (*Modiolus plicatulus*), hard-shell clam (*Venus mercenaria*), and bay scallop (*Pectins aequipectins*) (Brennan 1981:43). Mixed in with shell in these deposits are ceramics, lithics, fauna, and flora. Many of these sites, prolific in the early 20th century (Schaper 1989:14), were indiscriminately battered and destroyed throughout the 20th century, as a direct consequence of urban expansion. The analyses of several Lower Hudson Valley middens have provided a wealth of information about the prehistoric inhabitants.

Louis Brennan a long-time investigator of shell middens along the Hudson River, began to challenge previously-held views about shell middens in the 1960s. Much of the subsequent research along the Hudson River has been in reaction to Brennan's earlier conclusions and postulates, which he published in numerous articles (e.g., Brennan 1977, 1981, 1991). Prior to Brennan, researchers believed the shell middens represented a single temporal event (Lavin 1991:69). Brennan, however, argued that the middens represent numerous dumping episodes of smaller shell heaps by family-sized groups through time (Lavin 1991:69). Several shell midden investigations are now addressing the microstratigraphy present in many shell middens (Stein 1992; Shaw 1994). These studies have had some success in unraveling the effects of post-depositional processes, when microstratigraphy is present within the midden.

TEMPORAL DEVELOPMENT

A significant research issue in shell midden studies is their time of development. Salinity sufficient to support oysters from the Narrows to Tarrytown became possible by 11,500 years ago (Claassen 1995a:137). One of the most prominent shell midden sites is Dogan Point, located along the east bank of the Hudson above Tarrytown. The earliest known date for the shell middens in the Lower Hudson Valley comes from Dogan Point. The C-14 dates suggest that the shell accumulated at Dogan Point from 6000 to 4400 and 2500 to 2200 years ago. Projectile point typology extends the dates to 7000 to 2500 years ago and from 1500 to 500 years ago (Claassen 1994:26).

Louis Brennan began investigations at the site in the 1950s and continued work there through the 1960s and into the 1970s (Claassen 1995b:5–11). Since the late 1980s, Cheryl Claassen (1995a, 1995b) has conducted various investigations at the site. The Dogan Point site has been one of the more thoroughly investigated Hudson Valley shell midden sites and has illuminated much about the Archaic period, its primary period of accumulation. Claassen's research at Dogan Point has led her to conclude that the Hudson was saltier between 8000 and 4400 years ago, and probably warmer as well. Additionally, Claassen has suggested that people were hunting while at the site and using the midden from the late fall through the early spring. However, she is careful to point out that "the remains have apparently accumulated during dozens of visits over 5,000 years making it impossible to say that any observations represent patterned behavior" (Claassen and Whyte 1995:78).

Earlier sites representing both the Paleo as well as the Early Archaic likely exist but have not yet been discovered, as they probably were inundated by the rising ocean levels. The majority of sites in this region seem to date to the Archaic period, but this may be a biased representation of sites by excavators attempting to reach the earliest deposition of the midden (Schaper 1989:20). Woodland-period middens are also well represented in the midden site database in the greater New York City area (Schaper 1989).

SEASONALITY

Another frequently addressed topic in shell midden research concerns the season(s) of collection. Most of the studies that have addressed seasonality have done so by assessing growth of the various shellfish. As certain shellfish mature and age, they add growth rings. For certain species of shellfish, the season of death may be determined by reading the recorded growth in the rings of an individual shell. Establishing the season of death for a group of shellfish then allows for interpretations to be made concerning the season of harvest.

Seasonality studies can only be done on groups of shells, never on individual shells (Claassen 1994:30), and have been effectively used on *Mercenaria mercenaria.* Lightfoot and Cerrato conducted an assessment of seasonality on 52 specimens of *Mercenaria mercenaria* from a Woodland-period midden on Shelter Island in eastern Long Island. They concluded that shellfish collection took place in more than one season of the year. Ultimately this project cast doubt on the traditional perspective that hard-shell clam collection was a warm weather activity (Lightfoot and Cerrato 1988:141).

Claassen (1986) summarized sectioning studies from South Atlantic coastal sites that indicated most specimens were collected during cold weather. Results of similar studies on North Atlantic sites demonstrate greater diversity in the seasons when the shellfish were collected. Shells from some middens were deposited in either the summer or winter months, while others indicate that they were deposited during several seasons (Claassen 1986). Lightfoot and Cerrato (1988:142) note that shellfish were most commonly collected on North Atlantic sites during the cold season.

Claassen has not experimented with oyster seasonality, noting that Abraham's (1990) attempt to study oyster seasonality is flawed. Russo's (*1991:186*) review of oyster seasonality studies indicates that no replicable method exists for determining seasonality of oysters (Claassen and Whyte 1995:70). Since most of the shell found in middens along the Lower Hudson Valley is oyster, assessments of seasonality are moot until a method is successfully developed for determining their season of death.

SPECIES DIVERSITY

One of the most amazing characteristics about shell middens is the diversity of species represented within them. Even in those middens that have not undergone flotation analysis, assemblages of diverse resources are evident within their matrices, in each instance, indicating that numerous environments and ecotones were being exploited (Bradley and Spiess 1994:54). Those sites that have had a more detailed analysis done on them also reflect a great diversity of species, both faunal and floral (Bernstein 1993:149; Tveskov 1997). The range of species represented within a midden may be the key to determining the intensity of occupation and the use of domesticates. "In resource-rich areas such as Greenwich Cove, an extremely diverse array of both seasonal and year-round resources is available, making it a particularly attractive settlement location capable of supporting year-round populations," stated Bernstein (1993:149). Bernstein asserts that the richness evident in the surrounding area was the reason that coastal prehistoric populations never adopted domesticates as a staple, and he argues for intensification instead of domestication at Greenwich Cove (Bernstein 1992).

PROXIMITY OF OCCUPATION

The temporal development, season of harvesting, and diversity reflected in floral and faunal remains has led to another highly debated issue: Did people live on the shell midden? Two schools of thought currently exist concerning habitation of the shell midden. The first, and the one shared by most archeologists, is that people did not live on the midden but used shell middens as a dumping ground, creating an unattractive and malodorous place to live. "That campers lived on or within the mass of shell they were accumulating is simply not credible," noted Brennan (1977:137). The jagged edges of shells, including oysters, would also have made habitation of the midden difficult, to say the least (Schaper 1989:17).

Barber, however, expresses the opposite position. He suggests that, after a few months, a mat of grass and weeds would have permitted habitation (Barber 1982:12). Schaper (1989:17) points out that the Wheeler site, on which Barber based his conclusion, consisted of soft-shell clam and not the hard-shell oyster of Lower Hudson Valley sites.

Clearly, while many questions have been addressed by these earlier shell midden studies, more remains to be done. The most promising advances may occur on the microscopic and microstratigraphic front (Stein 1992; Shaw 1994). Chapters 6, 7, and 8 of this monograph indicate the strides made in detailed and microscopic examination of materials contained in soils. Analysis of the soil itself (cf. Volmar 1998), as well as other more technical analysis of soil samples like Perry's parenchymatous tissue analysis (Chapter 8), will undoubtedly elevate our knowledge of the past.

Liberty Island Excavation Results—1985

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Despite the vast amount of earth moved and the number of buildings destroyed on Liberty Island while under NPS control, only three previous archeological excavations have taken place, in the 1960s, 1985, and 1997. Two of these projects bear certain similarities, even though different excavators, working approximately 20 years apart, conducted them. Both can be classified as salvage operations conducted during construction activities. John Cotter's was undertaken while the American Museum of Immigration (AMI) was being built in the 1960s, and Dick Hsu's was conducted in 1985 during the restoration of the Statue of Liberty. While both projects included excavations accomplished during construction, both were under-funded and so collected only a minimum amount of information in a rather hurried fashion. Neither project produced a formal archeological report, although Cotter did write a four-page excavation summary (Griswold 1998: Appendix 3).

During the 1985 restoration work on the Statue of Liberty a long utility trench was excavated along the main axis of the statue in what is known as the west lawn. This utility trench (Figure 3), opened next to a long hedge, bisected a shell midden. Alberto Mauras, an archeology graduate student who had done excavation work on Ellis Island, was alerted to the discovery. Mauras notified John Pousson, who subsequently informed Dick Ping Hsu, Regional Archeologist. Hsu and a crew of three, including Mauras, Tonya Largy, archeologist, and Gordon DeAngelo, avocational archeologist, conducted three days of work on the site.

During data gathering for the AOA, completed in 1998, neither field notes nor a report for the 1985 work were located. Slides taken by Gordon DeAngelo and two inked profile drawings were obtained. Subsequent to the 1998 report, field notes, original profile drawings, and a short report, were located (Appendix 1; Griswold 1999). Much of the following discussion is taken from these documents.

Figure 3 1985 photograph showing the location of the utility trench.

THE SHELL MIDDEN

The strategy for the three-day investigation (13–15 November 1985) included sampling a pre-midden pit feature, collecting artifacts from the feature and the midden, and collecting samples of complete shells and soil from exposed strata within the midden. Hsu concluded that:

> The exact extent of the midden could not be determined; along the axis of the trench (north–south) the midden measured approximately 25 m and east–west at least 5 m. The thickest portion of the midden, approximately 8 m south of the north end (Figures 1, 2), was approximately 0.5 meter thick. At the north and south margins the midden tapered to less than 10 cm thick. Assuming the original configuration of the midden was relatively symmetrical, the western (1/2) portion may still be intact but the eastern (1/3) portion was destroyed when the promenade and walk leading from the landing dock to the Statue were constructed in the 1940s. Over Feature 1, the midden was approximately 15 cm thick (Hsu 1986:2).

THE PRE-MIDDEN PIT FEATURE

Much of the effort from the 1985 excavations was focused on the investigation of a pre-midden pit feature. Hsu comments:

> The feature was truncated by the trench; therefore the exact size, shape and orientation couldn't be determined. Projecting from the remnant portion, the total feature was probably 1 to 1.5 m in diameter at the top and tapered to approximately 0.3 m at the bottom. Fill in the feature was distinctively darker in profile but less so while excavating. Near the bottom of the pit, several ceramic sherds, bird bones, and fish scales were recovered. Four charcoal samples from four separate areas within the feature were recovered. The shell midden extended over the top of the feature (Hsu 1986:3).

Figure 4 illustrates the appearance of the feature during excavation. This was the only feature found during the 1985 excavations. Several soil samples and charcoal samples were collected from the stratified feature (Appendix 1 - Figure 4). Later chapters provide the results from the soil sample (flotation) analysis conducted on this material.

Figure 4 1985 photograph showing Feature 1.

RADIOCARBON DATES

While the actual C-14 report from the lab that conducted the analysis was not available, one of the slides obtained from Tonya Largy illustrated three dates from the analysis. The following is extracted from her slide:

RADIOCARBON AGE DETERMINATION
KRUEGER ENTERPRISES/GEOCHRON LABORATORY

STATUE OF LIBERTY, FEATURE 1

LEVEL I	895 ± 190 C-14 YEARS B.P. (C-13 CORRECTED)
LEVEL II	1035 ± 75 C-14 YEARS B.P. (C-13 CORRECTED)
LEVEL II	1485 ± 225 C-14 YEARS B.P (C-13 CORRECTED)

Hsu indicated that four charcoal samples were collected and described them as being hickory wood. The exact positions of these samples are recorded in the field notes (Appendix 1). However, while four samples were taken, only three underwent analysis, and it is not known which of the samples described in the notes corresponds to the above-mentioned samples.

These radiocarbon dates were calibrated using Calibration 4.1.2 (Stuiver and Reimer 1993). While the dates seem rather disparate in time, the chi-square test performed on these dates indicates that they are statistically the same at the 95 percent level. The weighted average of the dates was calculated at 1057 B.P. ± 68 with one sigma or standard deviation or 1057 B.P. ±136 for two sigmas or two standard deviations. One sigma represents a 68.3 percent probability that the date occurs during this time, and two sigmas represent a 95.4 percent probability. The calibration of this figure produces a date of A.D. 994, rounded to A.D. 990, with the maximum of calibrated age ranges between A.D. 898 and A.D.1023 at 1 sigma. Because the feature was found below the shell midden (Figure 5), one may infer that the midden is stratigraphically later. No charcoal, other than that collected from the feature, was found. Thus, while the midden is later than the feature, how much later remains to be determined.

ARTIFACT DATES

While Hsu (1986) describes "several" ceramic sherds as being recovered in 1985 from Feature 1, the pit feature located below the shell midden, only one was found and cataloged. STLI-29681 was recently identified by Dr. Elizabeth Chilton, of Harvard University, as a cord-marked, crushed quartz–tempered Middle Woodland-period sherd (Figure 6).

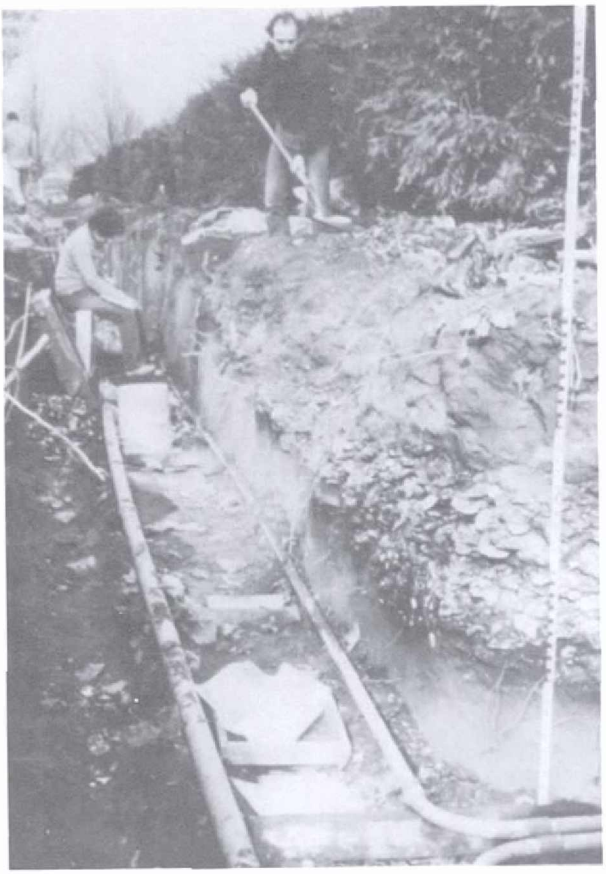

Figure 5 1985 photograph showing the shell midden.

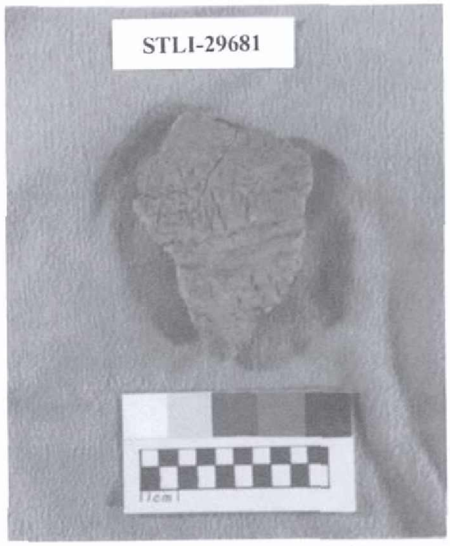

Figure 6 Photograph of a Middle Woodland-period ceramic sherd.

Figure 7 Photograph of a Levanna-type, jasper projectile point.

One additional sherd (STLI-29723) and one projectile point (STLI-29724) were found in the western profile of the midden. Chilton identified the undecorated shell-tempered ceramic as belonging to the Middle Woodland period and the jasper point, made from a flake, as a late Middle Woodland Levanna type (Figure 7).

FLOTATION ANALYSIS

Numerous bags of soil were collected from Feature 1 and from the midden during the 1985 season. Flotation was subsequently done on samples from the feature. Tonya Largy did the preliminary analysis of the flora and fauna obtained from the flotation samples. However, money was not available for a detailed analysis and report in 1985. The completion of Largy's report was funded out of funds made available for the examination of the midden in 1999. The results of the analysis are presented in chapters 6 and 7. Largy's analysis of the 1985 faunal material (Chapter 6) was combined with the field-collected fauna, as well as with the additional flotation samples done during the 1999 season.

POLLEN ANALYSIS

Dr. Gerald Kelso, Archeologist, US Forest Service, conducted the pollen analysis for the 1985 material. Kelso, then with the National Park Service's Eastern Archeological Field Labs, submitted his results to Dick Ping Hsu and Frank McManamon in 1985 (Appendix 1). Kelso originally concluded that the "counts appeared to reflect an oak-hickory forest type within the Oak-Chestnut region" (Kelso 1985). However, Kelso more recently expressed concerns that the pollen represented in the samples may reflect pollen grains that have percolated down from later deposits. Thus, a new sampling strategy was employed during the collection process of the 1999 pollen samples (Chapter 5).

SUMMARY

The 1985 work yielded limited but promising results. However, much remained to be done on the site concerning its demarcation, protection, analysis, and publication. Researchers were optimistic about retrieving more information from the site. But fulfillment of this hope would wait 14 years to be achieved. Additional investigations were conducted in 1999 to complete and expand the earlier work.

Liberty Island Excavation Results—1999

William A. Griswold, Ph.D.

National Park Service, Northeast Cultural Resources Center, Archeology Branch

The 1999 excavation season on Liberty Island succeeded in accomplishing the earlier defined goals. The shell midden was excavated between May 3 and May 26, 1999. The author worked with three hired archeological technicians, a few volunteers, and several museum staff members, generously provided by Diana Pardue, to complete the excavations.

OBJECTIVES

Excavations were conducted in the West Lawn on Liberty Island with the four earlier defined goals of 1) completing the analysis of the 1985 research, 2) exploring additional parts of the midden, 3) defining the site boundaries, and 4) producing a report summarizing the research on the shell midden. All of these goals were accomplished during the 1999 fiscal year. This chapter discusses the results of the May 1999 excavations. Because modern disturbances were encountered in several of the units, the results are broken down into both units where disturbances were encountered and units yielding evidence on the prehistoric shell midden (Appendix 1 - Figure 2).

METHODS

The May 1999 excavations followed natural stratigraphic layers within which 10-cm arbitrary levels were observed. Standardized forms were used to record information including soil type, soil color, artifacts collected, and a grid to document both plan view and profile drawings. The metric system was used for all measurements. All excavation was done by hand, and collected artifacts were bagged and tagged according to their respective provenience. Depths of the various strata and features encountered within the units were measured from a local datum, usually the northeast corner of the unit. These elevations were later shot in with respect to their relative position above or below the site datum at N290 E180. Soil was screened through ¼-in. mesh. After excavation, artifacts were brought back to the NCRC lab in Lowell, Massachusetts, where they were cataloged using the new ANCS+ system (Rediscovery).

A 10-m grid was laid out using an EDM for the geophysical investigations two weeks before the archeological excavations began. This grid was utilized for the archeological excavations (Figure 8). The coordinates referred to within signify the northeast corner of the unit. Two points were used to establish a grid over the entire island. The first point was located on the electrical outlet located in line with the statue and the flagpole on the second granite circle from the flagpole. This point served as N290 E180 and 0 elevation; no benchmark could be identified with an elevation. The 180 degrees, 0 minutes, 0 seconds point corresponds to the apex of the door façade on the pedestal for the statue. This baseline then bisects the statue, Fort Wood, and the flagpole.

Artifacts were collected from all units pertaining to the midden excavations. Once the midden was reached, two 12-x-12-in. bags of soil were collected from every level. One 12-x-12-in. bag of shells was also kept for every level. The shell from the midden was not washed or brushed, and neither was material, other than bone, collected from the prehistoric levels of Feature 9, the prehistoric shell midden; a fungicide was later required to kill mold spores that began to grow on some of the bone. This should allow future research to be done upon these materials as tech-

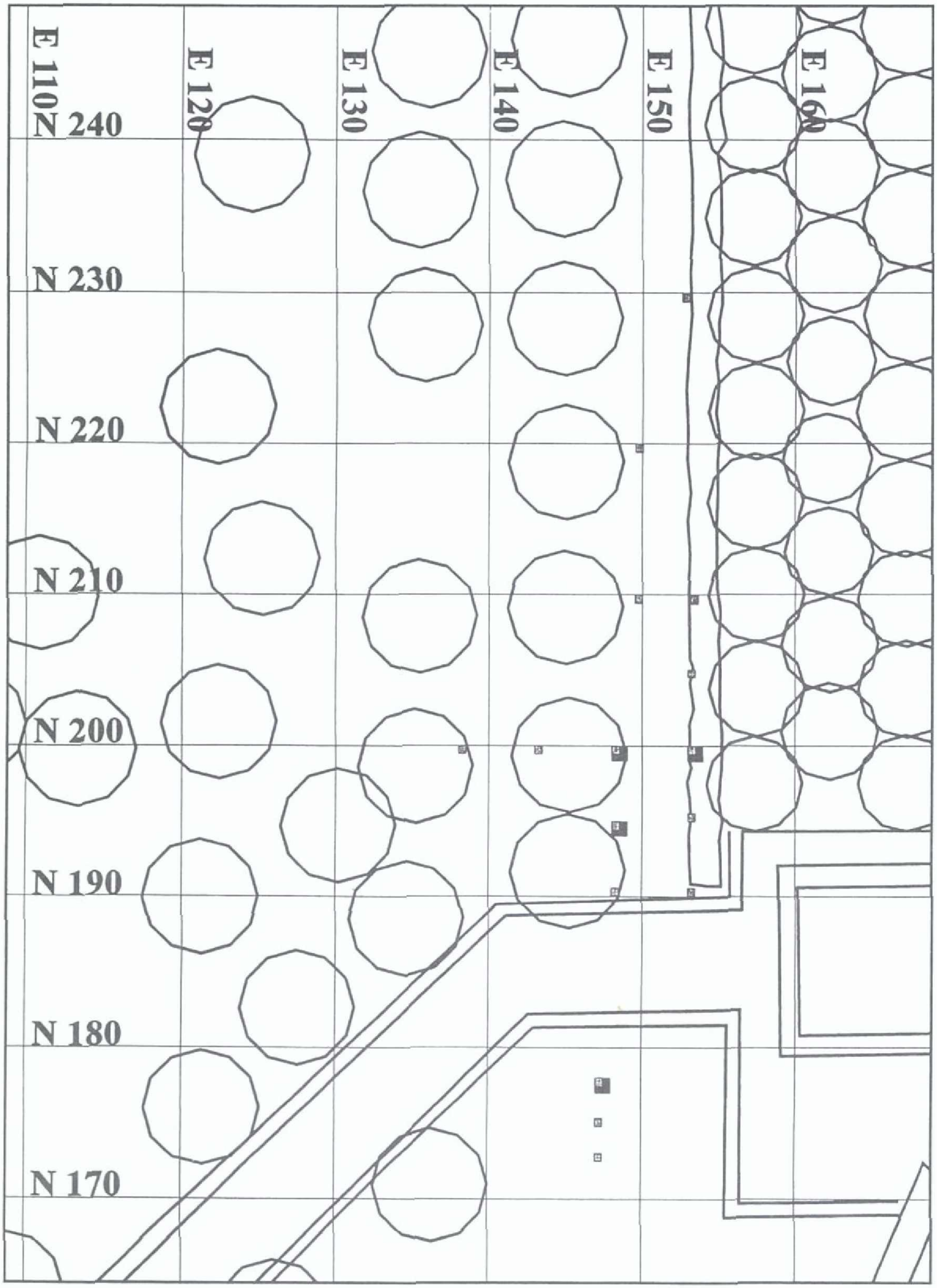

Figure 8 Map showing location of excavated units.

niques improve. Artifacts, shells, and other ecofacts collected from any of the levels of Feature 9 that contained historic-period artifacts were washed.

Pollen samples were collected using two different strategies after consulting with Dr. Gerald Kelso, palynologist. First a columnar sample of soil was taken from the southern profile of N200 E154. Beginning from the bottom and proceeding to the top, a small bag of soil was taken every 5 cm. Kelso had actually recommended that sampling be done every 2 cm, but the midden was so laden with shell that a sample could only be collected every 5 cm. Second, soil was retrieved from the underside of downwardly facing shells, approximately two samples for every level. Thus, approximately 25 samples were retrieved for later study.

Flotation was done on rainy days. A few of the samples of the 1985 material were floated in the flotation tank in Lowell, one specially constructed for the center by an unknown designer. It was soon discovered, however, that a five-gallon bucket, two geological sieves, and a brine shrimp fishnet achieved better results in approximately one-tenth the time as the flotation tank. This method was also portable, meaning that flotation could be done on-site. One quart/one liter of soil was floated for every level, and 50 poppy seeds were added to the soil sample before flotation, to determine a recovery rate for fauna and flora samples.

The excavated units were backfilled with the same material that had been excavated from them. Flagging tape was draped down all four sides and the bottom before most units were backfilled. In areas where either the historic or prehistoric midden were exposed, but not entirely excavated, thick 3-mil plastic was used to line the unit. This was done to avoid contamination and provide potential future excavators a way to pick up quickly where the 1999 excavations had left off.

EXCAVATION RESULTS

Many of the details concerning the individual test pits can be found in Appendix 2, with a tabulation of artifacts available in Appendix 6. The following narrative briefly summarizes the content of the individual test pits.

A. Units without the Prehistoric Shell Midden Deposits

The following test pits contained various historical strata, but did not contain deposits relating to the shell midden. The brief comments contained in the subsequent pages are intended to provide a general summary as to what was found within each of the units (cf. Figure 9).

N173 E147.5

Five different fill strata were uncovered above subsoil in this unit. Identification of plastic in both Strata 1 and 2 indicates that these strata are modern. A relatively thick sand deposit (Stratum 4) was found on top of a deposit consisting almost entirely of slag (Stratum 5). Subsoil was located at an unexpectedly high level.

N175.5 E147.5

This unit contained eight strata and one feature. Strata 1 and 2 were clearly modern deposits. Strata 3-7 were various indeterminate deposits, with a small piece of plastic being found in Stratum 7. The historic midden, excavated elsewhere on the site, was discovered below Stratum 7. It was too deep to excavate without opening the unit up into a 1-x-1-m unit. However, time did not permit us to do that. Beginning at Stratum 4, a trench feature (Feature 16) had cut down through all of the various strata. The bottom of the trench was never reached, so no determination could be made as to what utility had been installed in it. Excavation was discontinued approximately 1 m below the test pit datum.

N178 E147.5 and N178 E148

Excavation of the 0.5-x-0.5-m unit revealed a stratigraphic sequence almost identical to the one revealed

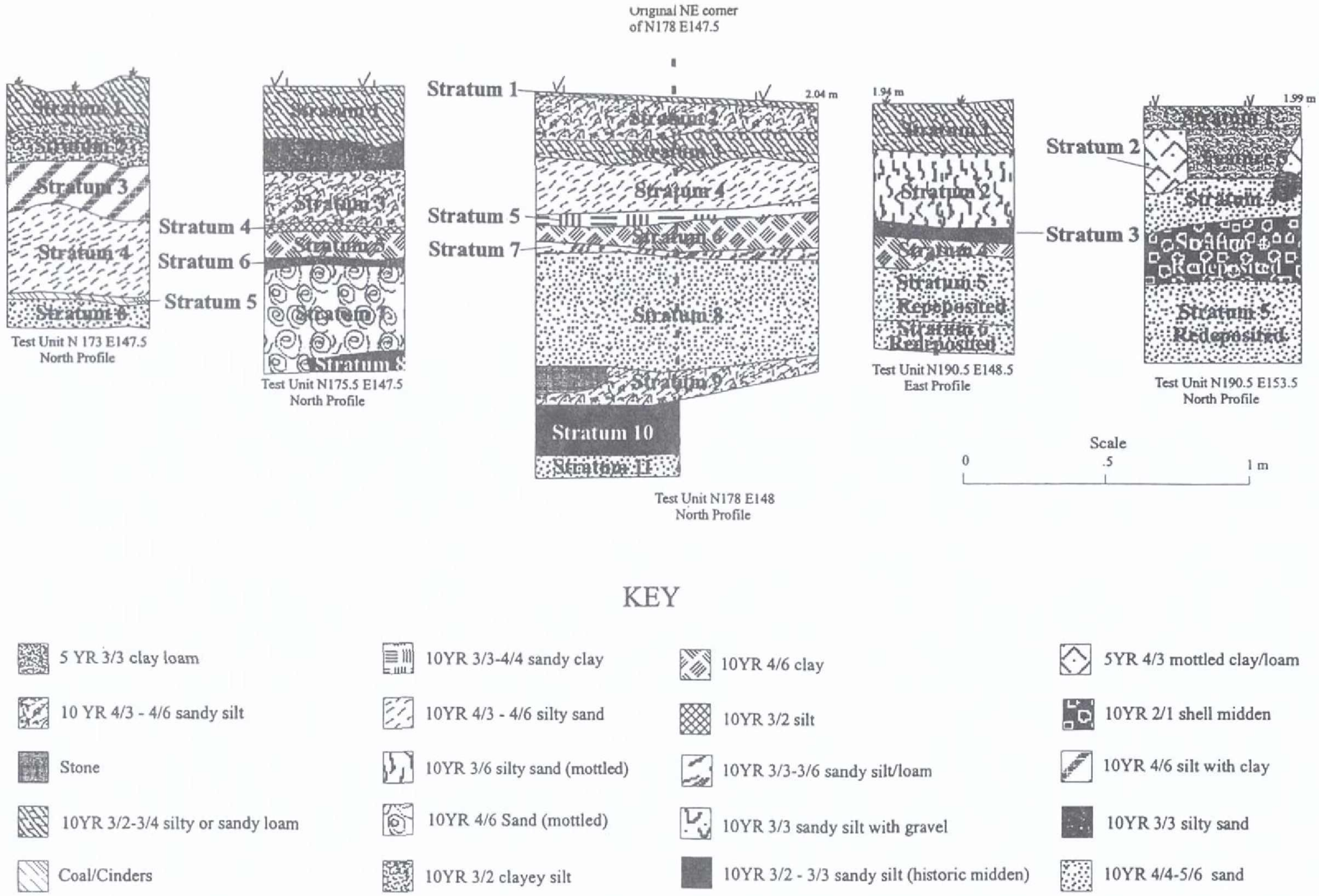

Figure 9 Test unit profiles.

through the excavation of N175.5 E147.5. A core sample taken at the bottom of Stratum 7 revealed a dark organic deposit below, and so the unit was opened up into a 1-x-1-m unit. Due to time constraints, after Stratum 9 was excavated across the entire unit, excavation resumed in the 0.5-x-0.5-m unit. The historic midden deposit was encountered in Stratum 10, but was only 4 cm thick. Subsoil, Stratum 11, was encountered below the historic midden deposit, at approximately 1.1 m below the test pit datum (Figure 10).

N190.5 E153.5

Excavation of this 0.5-x-0.5-m unit indicated that it had been previously disturbed. Hallmarks of disturbance, like modern plastics, were revealed in both hand excavation and in the soil cores taken at the bottom of the excavated unit.

N195.5 E153.5

This unit, located just to the north of the diagonal sidewalk, was thoroughly disturbed. While the slides taken by Gordon DeAngelo seem to indicate that this unit was not impacted at the time the slide was taken, it was probably disturbed during the same construction episode, during the 1985 renovations of the statue. A terra cotta tile was found at approximately 0.86 m below the local datum.

N200 E138.5

Excavation of this deep unit showed no evidence of either the historic or the prehistoric midden located in adjacent units. Strata 1 and 2 contained modern material culture with Strata 2 and 3 exhibiting a very compact soil matrix. Stratum 5 was described as containing only cinders and slag. Stratum 6, a possible feature, was found only in the eastern quarter of the test pit. Subsoil was located directly below Strata 5 and 6 at approximately 0.75 m below the local datum.

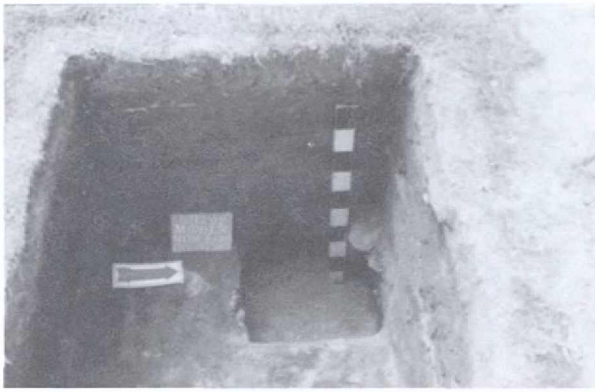

Figure 10 Photograph of historic midden, N178 E148.

N200 E143.5

Stratum 1 contained modern cultural material. Strata 2-5 were unremarkable fill layers, with Stratum 6 possibly corresponding to the early historic levels of N200 E149. Stratum 7 appeared to be a partially windblown deposit that overlaid Stratum 8, a silty sandy deposit containing early historic materials. The prehistoric midden was absent in this unit, and subsoil lay below Stratum 8.

N205 E153.5

Two modern strata were distinguished in the top half of the unit. These strata had been deposited on top of subsoil. While artifacts were found in the top 10 cm of the subsoil, additional excavation and coring produced no other artifacts.

N210 E150

Dark yellowish brown sandy loam was also found in this unit down to 60 cm below the northeast corner datum. A soil core was taken at 60 cm, which indicated that the same material continued for at least another 50 cm. In all likelihood, this is also fill within a trench, although no edges were discovered.

N210 E153.5

This unit contained various modern deposits and features including Feature 3, a small pit, and Feature 4, a black PVC pipe. Subsoil was encountered below the modern deposits and features.

N220 E150

This unit was also filled with a dark yellow brown sandy loam down to approximately 1.0 m; excavation was discontinued 60 cm below the northeast datum. It is believed that this loam was feature fill, probably from a deep trench, although no edges were discernable. This fill had been cut in 1985 by Feature 1, a shallow trench containing an irrigation pipe.

N230 E153

A dark yellow brown sandy loam characterized the fill taken out of this unit down to 60 cm. A core sample was taken at this point, and it indicated that the fill continued. A large cement pedestal or base was apparent in the eastern section. This cement block began approximately 20 cm below the ground surface. Its base had still not been located when excavation was discontinued at 60 cm. Styrofoam was found on top of this feature indicating that it was of recent derivation. A group of seven wires for the irrigation system was found running E-W across the middle of the unit.

B. Units Containing the Prehistoric Midden Deposits

The following units contained the shell midden deposits. The comments contained herein provide a brief summary concerning what was found and how the unit was excavated.

N190.5 E148.5

Core samples taken after the 0.5-x-0.5-m unit had been excavated to approximately 0.8 m in depth revealed the top of the prehistoric shell midden. This unit was excavated in an attempt to define the western extent of the midden. When the presence of the midden was confirmed, this information was considered sufficient, and the unit was not opened up further into a 1-x-1-m unit.

Excavation of the top 0.8 m of material revealed six strata. Stratum 1 contained modern cultural material. Strata 2 and 3 were various silty-sand layers deposited on top of Stratum 4, a dark yellowish brown clay layer. The red sandstone building fragments identified in Strata 5 and 6 indicate that this is an earlier deposit. Ceramics found in the same strata in other units, notably those described in this section of the report, indicate that these building fragments can be associated with late 18th- to early 19th-century deposits. Two soil cores removed at the bottom of the excavated unit revealed that the prehistoric shell midden was buried approximately 1.4 m below the local datum.

N195 E148.5 and N195 E149

This unit was originally opened as a 0.5-x-0.5-m test pit. Five distinct strata were observed in the test pit. Soil cores taken at the bottom of the excavated unit revealed that the top of the prehistoric shell midden lay approximately 30 cm below the bottom of the unit. Subsequently the unit was expanded into a 1-x-1-m unit. The strata identified in the 0.5-x-0.5-m unit were identical to those identified in the 1-x-1-m unit. Because the 1-x-1-m unit went deeper than the 0.5-x-0.5-m unit, additional strata were discovered and recorded.

Stratum 1, a dark brown loam, contained modern artifacts. Beginning in Stratum 3 earlier ceramics and material culture began to be found. Late 18th- to early 19th-century ceramics were excavated within these strata. No late 18th- to early 19th-century historic features were discovered, however, and the strata seemed to be unremarkable except for the fact that these early historic materials were found within them. Time constraints forced a reduction in the size of the excavated area after Stratum 6 was reached. A relatively large number of early historic artifacts were found in Strata 6 through 9 before the prehistoric shell midden was uncovered at approximately 1.2 m below the local datum. This historic midden deposit contained relatively large quantities of shell and bone in various organic matrices.

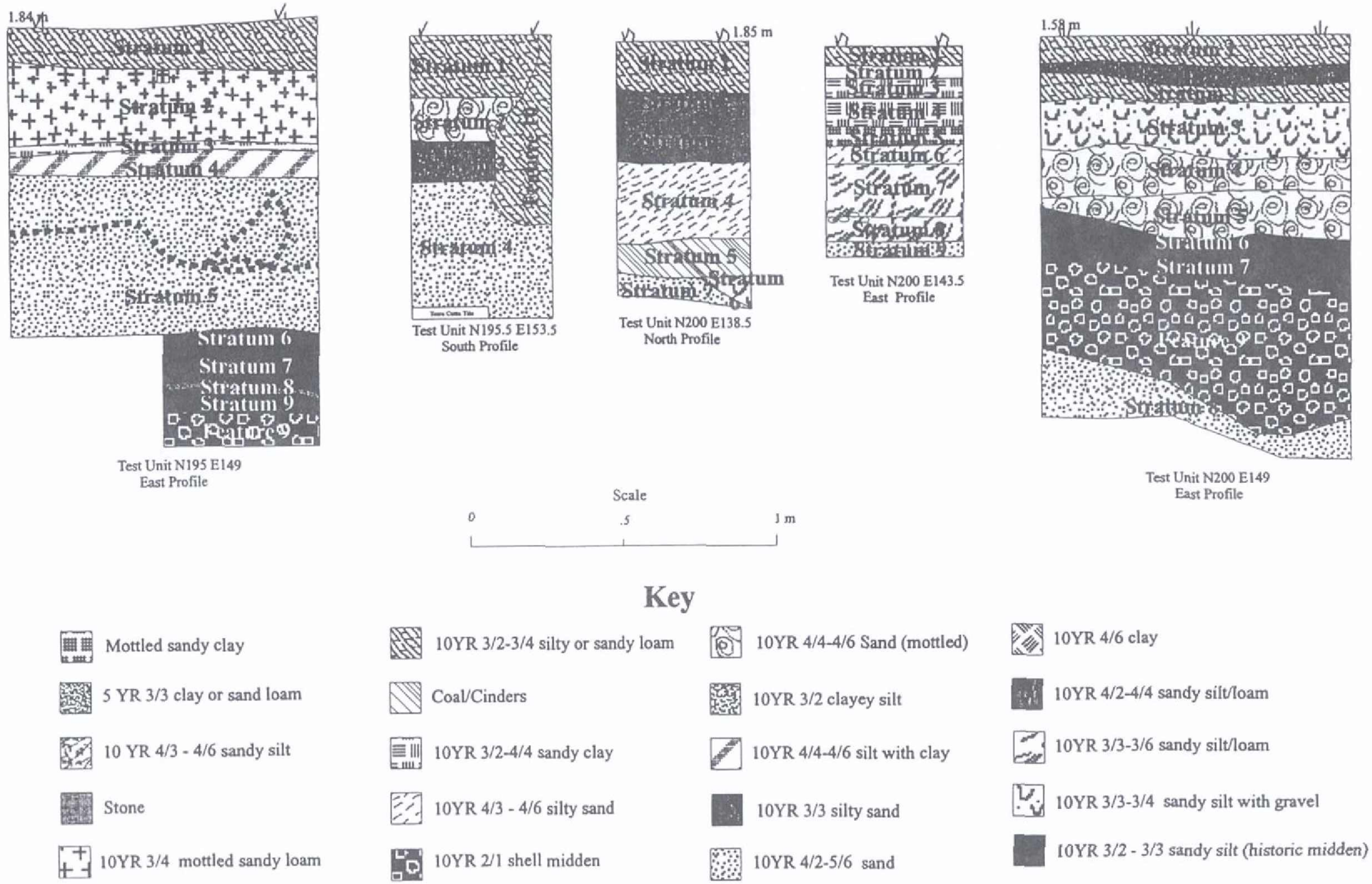

Figure 11 Test unit profiles.

The prehistoric midden, Feature 9, was only partially excavated. One arbitrary level was extracted to confirm the presence of the midden. Following its confirmation, the unit was lined with plastic and backfilled in anticipation of resuming the excavation of it at a later time (Figure 11; Figure 12).

N200 E 153.5 and N200 E154

The prehistoric shell midden was first discovered at approximately 0.5 m deep in unit N200 E153.5, a 0.5-x-0.5-m test unit. Four historic strata were identified on top of the prehistoric shell midden (Feature 9). Strata 1, 2, and 3 appear to be modern, possibly contaminated by the insertion of a recent irrigation pipe. No installation trench could be discerned for the installation of the PVC pipe. Modern installation methods for these types of pipes can cut the ground and install the pipe without digging a trench; they, therefore, leave no visible trace of their installation.

Stratum 4 contained earlier material, namely, late 18^{th}- to early 19^{th}-century material, along with a significant quantity of red sandstone. This sandstone was observed elsewhere in other units and was also accompanied by earlier artifacts.

Feature 9 was exposed at approximately 50 cm below datum (Figure 13). For logistical ease Feature 9 was used to designate the shell midden in all of the excavated units. The unit was expanded into a 1-x-1-m unit when the shell midden was exposed. The northeast corner of the unit then became N200 E154, but the original datum was maintained. Excavation of the remaining quadrants of the new 1-x-1-m unit revealed the same stratigraphy as observed in the 0.5-x-0.5-m unit. Six separate 10-cm levels were excavated in Feature 9, with the western half of the unit entirely excavated before the eastern half was begun.

The western half on the midden was composed primarily of oyster shell with less soil present. Gastropods and occasionally a piece of prehistoric pottery were found within a few of the levels. Columnar soil samples were taken from the southern profile before the eastern half of the midden was excavated. Excavation of the eastern half of the unit revealed much of the same material. Subsoil was observed at approximately 80 cm below datum in the east and quickly sloped to just over 1 m in the west. It was difficult to tell if this was a natural slope of the landscape or whether the subsoil had intentionally been modified. While the material in the western half of the unit had all been taken out as Feature 9, the soil contained significantly less shell in the eastern half after the subsoil had been encountered along the eastern profile. This material was then excavated as Feature 15. Feature 15, a deposit discovered directly below Feature 9 and above subsoil, contained significantly less shell and was slightly lighter in color than Feature 9 (Figure 14).

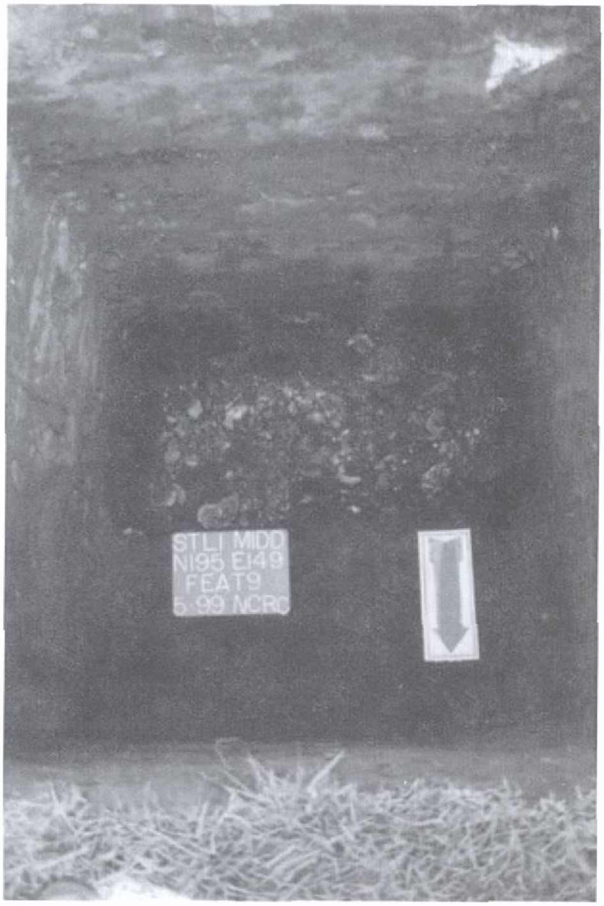

Figure 12 Photograph of Feature 9, N195 E149.

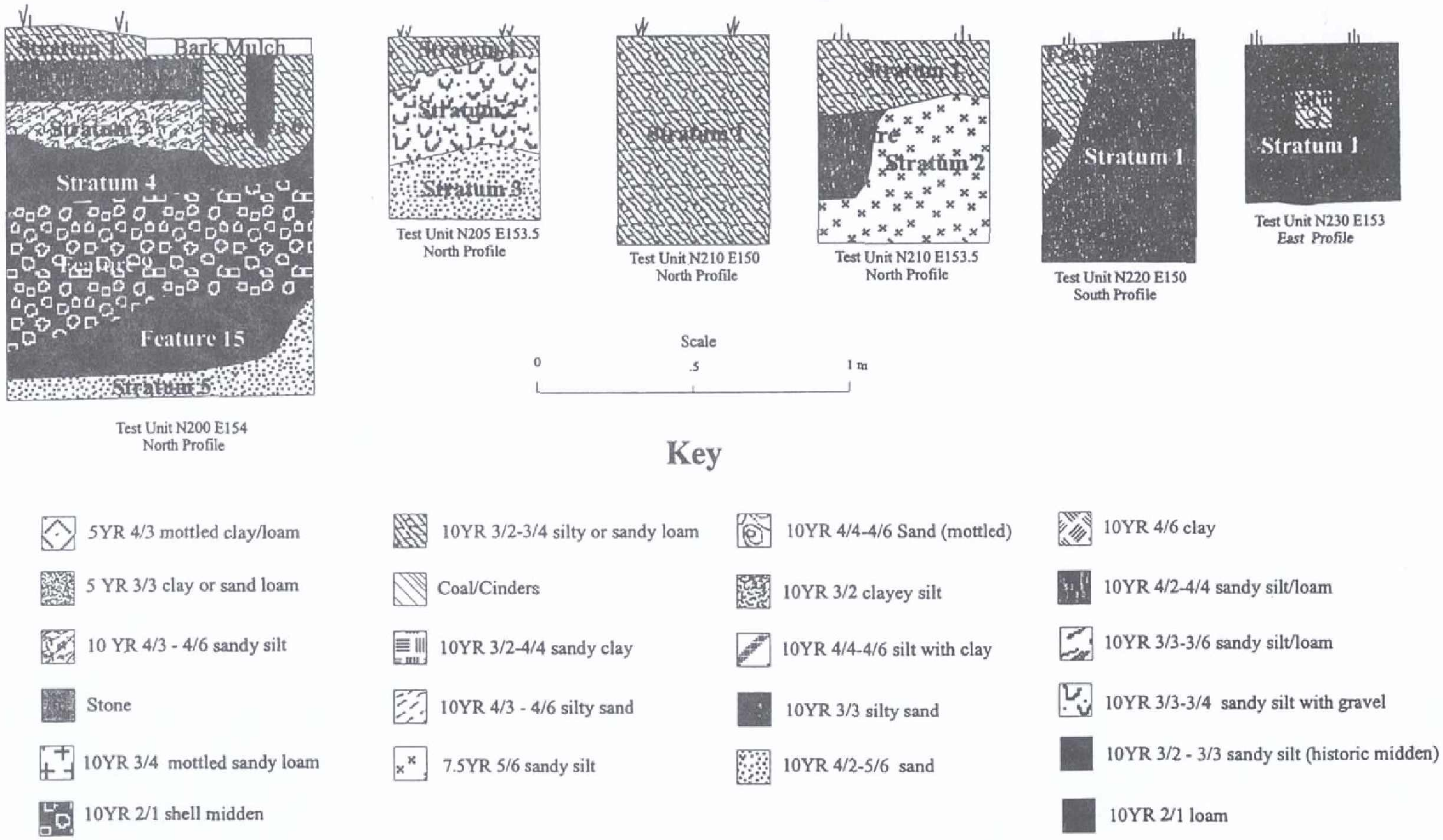

Figure 13 Test unit profiles.

N200 E148.5 and N200 E149

This unit began as a 0.5-x-0.5-m pit (N200 E148.5) but was later expanded into a 1-x-1-m unit (N200 E149). The seven strata observed in the initial test pit correlated well with those of the larger 1-x-1-m unit. The first stratum was clearly of modern derivation as plastic was found in it. Strata 2 and 3 are believed to be either fill or landscaping deposits. A much older artifact assemblage, dating to the late 18th- to early 19th-century, was found in Strata 4-7, including a concentration of red sandstone pieces identified as Feature 8. The red sandstone seems to be a characteristic of the earlier deposits.

The number of bones, whole and fragmentary, along with a quantity of ceramics indicates that this was likely a historic midden deposit. Soil samples were collected from Strata 6 and 7. These strata had been deposited directly on top of Feature 9, the prehistoric shell midden (Figure 15). After the shell midden was located the unit was opened up into a 1-x-1-m unit.

Feature 9 contained only three levels and was therefore thinner than that encountered in N200 E154. The same material was found in Feature 9 in this unit that had been found in Feature 9 of N200 E154. The first level contained historic-period materials mixed in with the matrix. Prehistoric pottery was found in Level 2, but not in Level 3. While some loam was mixed in, the vast majority of the matrix consisted of oyster shells.

Stratum 8 marked the interface between Feature 9 and the subsoil. It was removed in two levels, which revealed several features within the subsoil. The first, Feature 11, appeared to be a large but shallow pit feature containing sand with silt. Feature 12 seemed to be a possible post mold within Feature 11. Features 13 and 14 were small post mold shaped features in the northwest corner of the unit. Feature 13 bottomed out in a round pocket rather than in a point, and Feature 14 tended to meander, suggesting that it is a rodent hole rather than a post mold.

ARTIFACT DATES

The shell midden contained few clues as to its date. No lithic tools were recovered, and no charcoal samples large enough to do a C-14 analysis were retrieved or observed during the excavation. However, a few ceramic fragments were excavated. Dr. Elizabeth Chilton identified the ceramics as belonging to the Middle, Late, and very Late Woodland/possibly Contact periods. The ceramic fragments dating to the Middle and Late Woodland periods (Figure 16) were recovered from Feature 9, Level 2, in N200 E154 (STLI-30630 and STLI-30631). The very Late Woodland-/Contact-period ceramics (Figure 17) came out of Feature 9, Level 2, in N200 E149 (STLI-30500). These findings suggest that the shell midden is a multicomponent site, beginning in the Middle Woodland period and continuing through the Contact period.

Figure 14 Photograph of Feature 9, N200 E154.

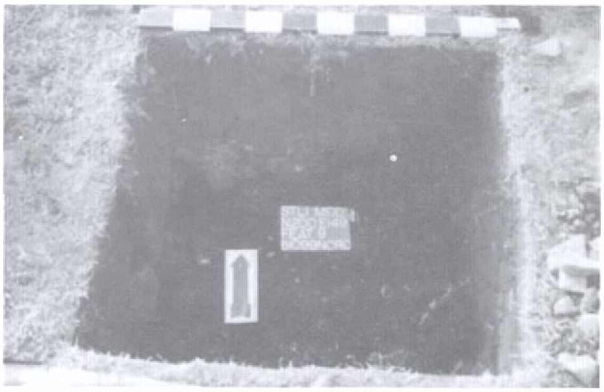

Figure 15 Photograph of Feature 9, N200 E149.

FLOTATION ANALYSIS

A total of 14 samples underwent flotation analysis during the 1999 season. These samples were processed on site using the five-gallon bucket, two geological sieves, and brine shrimp net described earlier. Fifty poppy seeds were added to each sample before processing. The samples first went to Dr. Lucinda McWeeney for plant and seed analysis. Then, these samples were delivered to Tonya Largy for faunal analysis. The results of these investigations are reported in the following chapters.

POLLEN ANALYSIS

As mentioned in the previous chapter, Gerald Kelso expressed some doubts as to the accuracy of the 1985 pollen analysis. As a result, additional pollen samples were collected during the 1999 excavations. Two sampling methods were used to recover the soil needed for the pollen analysis. The first involved obtaining a vertical columnar sample of pollen from the shell midden. This involved collecting a small 4-x-4-in. bag of soil from every 5 cm in a column, beginning at the bottom of the midden and proceeding to the top. This control sample was used to assess the pollen percolation rates. The second method collected soil from within downward-facing shells, with the assumption that pollen recovered from these samples should be unaffected by pollen percolation. Three samples were sent off for analysis. The results of the analysis proved disappointing, as processing of these three samples did not produce enough pollen to count. It was later determined, after additional independent input from Kelso, that acetolysis should not have been added to the 1999 samples. Kelso indicated that pollen in temperate zone profiles is already degraded to some extent, and acetolysis destroys most of the surviving pollen (Gerald Kelso 2000, personal communication). We are not reporting the results of of the 1999 analysis in this volume. The remaining pollen samples, collected in 1999 in a manner consistent with Kelso's guidelines to assess pollen percolation rates, have the potential to provide additional information on the local

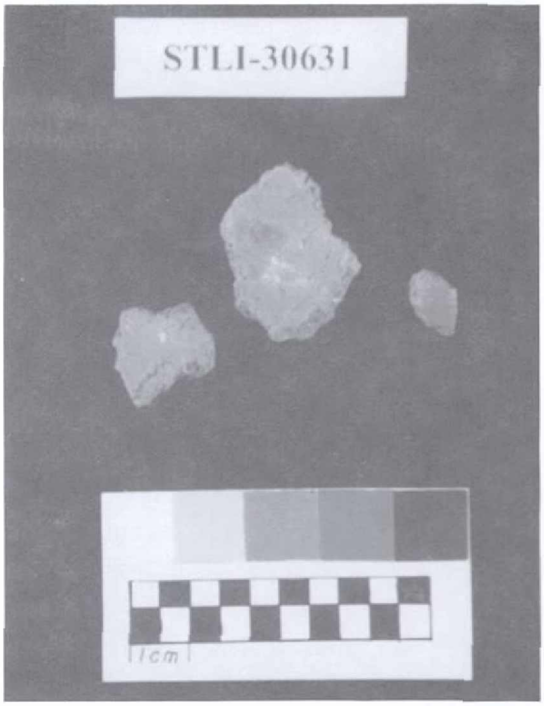

Figure 16 Photograph of Middle Woodland-period ceramic sherds.

Figure 17 Photograph of very Late Woodland/ Contact-period ceramic sherds.

paleoenvironment. They have been cataloged and are now stored with the artifacts in the collections division of the park. There, they await involvement from interested researchers. Since results of both the 1985 and the 1999 pollen analyses are inconclusive, neither of these reports is included in this volume. It is hoped that more conclusive analyses will be realized at a later time.

SUMMARY

The 1999 excavations and subsequent analyses essentially fulfilled the stated objectives of the 1985 project. In addition, the 1999 research delimited the site, assessed its overall condition, and gathered additional samples for analysis from stratigraphically controlled excavations. The basic, core elements needed to define, demarcate, and protect the site have been accomplished. The analysis, however, need not end here. Numerous soil and shell samples were collected and documented and are being curated for future research. It is our hope that other researchers will analyze these samples to further enhance our understanding of the site and local paleoecology.

Archeofaunal Analysis—Liberty Island Excavations

Tonya Baroody Largy, M. A.

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This chapter discusses the prehistoric archeofauna from Liberty Island, New York, for both the 1985 and the 1999 seasons. This inquiry includes the results from analyses of 34 flotation samples done on soil recovered from the 1985 field season and of 12 flotation samples taken during the 1999 excavations: macrofaunal remains recovered in the field are also included. Faunal analyses are important generally as they may illuminate the paleoecology of a site, subsistence patterns, and season(s) of occupation or exploitation (Chaplin 1971; Davis 1987) as well as post-depositional processes (Lyman 1994). Archeoflora recovered from the 1985 flotation samples are discussed in the following chapter.

Thirty-four samples excavated in 1985 from five loci in the archeological trench were analyzed. Dick Ping Hsu keyed all of the samples to 0, a local datum. According to the inked figures, 0 was established 16 m north of the cement foundation for the knee wall of the diagonal sidewalk, on the west side of the utility trench (Appendix 1). Twenty-eight samples were collected from Feature 1, the East Wall of the trench, and six from the West Wall. Samples from Feature 1 were taken as follows: six samples from Level 1, 17 from Level 2, and five from Level 3. The six samples from the West Wall were taken from two loci. One sample was collected from the "Dark Level Above Shell," 9.6 m south of 0. The remaining five samples were collected 5.0 m south of 0: two from the "Dark Soil Below Midden," and the remaining three from the "West Wall Shell Layer."

Twelve flotation samples from the 1999 field season, in addition to field-collected bone, were also submitted for faunal analysis, thus augmenting the examination of samples collected in 1985. In 1999, soil samples were collected from all exposed levels of Feature 9, the prehistoric shell midden, as well as from other prehistoric features encountered during the excavations. These samples were taken from various levels of three units: N195 E149, N200 E154, and N200 E149.

INTERPRETATION OF SHELL MIDDEN FAUNA

The body of literature on shell midden research is too large to summarize here, though Chapter 3 provides a brief review. However, research reports on lower Hudson River valley sites (e.g., Salwen 1975; Parris 1987; Lavin 1988a; Lightfoot and Cerrato 1988; Funk 1991; Claassen 1995b) expand the regional picture of this area. These publications address molluscan biology and ecology as well as human exploitation of this resource. The authors seek to determine seasonality and paleoecology and consider social implications from the molluscan remains. Others (e.g., Amorosi 1991; Claassen and Whyte 1995) derive similar data from vertebrate remains preserved within the shell matrix of these sites.

The high pH encountered in shell middens provides favorable conditions for preservation of vertebrate remains in the normally acidic soils of northeastern North America. Coastal shell middens, such as the Liberty Island example, are most common, but inland shell middens do exist. Though few in number, inland shell middens provide comparable biological data (Downs 1995; Largy 1995; Rhodin 1995).

Barber (1982:11–12) discusses two different theories of prehistoric midden development and use (Byers and Johnson 1940; Brennan 1977). Byers and Johnson (1940:92–93) postulated an uneven development of middens, perhaps allowing people to live on the surface of the refuse itself as evidenced by hearths and pits. Brennan (1977) believed that people would not live on such a "smelly" place.

Recognition of strata within shell deposits is important in interpreting artifacts, features, and vertebrate remains. Claassen's (1995a:11) reexamination of Brennan's work at Dogan Point illustrates the variability in excavator skill in recognizing stratigraphy within a midden. Even though bones are deposited within a stratum, bioturbation by burrowing rodents, earthworms–as observed during the 1985 salvage excavation at Liberty Island–and other invertebrates may contribute to intrusion into other levels.

Preservation of the originally deposited assemblage of bone in a shell midden is incomplete. Carnivores such as domestic dogs and scavengers such as crows and herring gulls have ample opportunity to carry off freshly discarded food or other animal remains. A decade of personal observation of an open-air "midden" created with Largy kitchen scraps, including bone, demonstrates how quickly crows can remove the remains of a meal. Smaller, lightweight bones from birds like chicken are carried off immediately, certainly by the next morning. The heavier steak or chop bones either may be left or carried to nearby locations, presumably by squirrels whose gnaw marks have been later observed. Therefore, a faunal assemblage provides only a sample of species that a site's inhabitants exploited. Meadow (1980) has fully discussed the many factors that ultimately determine "the nature of a faunal sample and its eventual published representation."

ANALYTICAL METHODS

Samples floated in 1985 consisted of a heavy fraction and a light fraction. Samples floated in 1999 included heavy, medium, and light fractions. All flotation samples were examined under magnification ranging from 10X to 250X using a binocular stereomicroscope. Materials were manipulated with "feather-light" forceps to reduce accidental breakage. Most faunal specimens were removed and packaged in hard plastic microtubes, and their identifications were recorded on acid-free labels.

The 1985 sample bags were identified with a bag number including the designation "A" or "B" to indicate the fraction. "A" represented heavy fractions and "B" light fractions. As an example, sample bag 1-A contained specimens recovered from the heavy fraction of sample 1. The 1999 samples were labeled only with provenience information. Field-collected bone from the 1999 season was received with NPS catalog numbers that were used along with sequential numbers to differentiate individual bones within the cataloged lot.

Molluscs comprising the 1999 heavy fraction samples were sorted by removing extraneous material and weighing the entire amount of crushed and broken shell. A sample of identifiable valves was collected, counted, and weighed as a voucher for the designated taxa. All gastropods, or univalves, were removed from the light fractions and counted but not weighed.

Analysis was carried out using the comparative collections of the Zooarchaeology Laboratory, Peabody Museum, Harvard University, Cambridge, Massachusetts, and the collections of the ornithology, herpetology, molluscan, and ichthyology departments of the Museum of Comparative Zoology, Harvard University.

RESULTS

Vertebrate fauna include mammal, bird, fish, salamander, and turtle. Mammal, bird, and larger fish bones were field collected while salamander, turtle, and numerous smaller fish, mammal, and bird bones were recovered through flotation. Most of the larger fragments can be identified as to genus and/or species, but most fragments from the flotation samples were extremely small in size and proved to be unidentifiable.

Data presented in Appendix 4, Tables 1 through 5, reflect identifications of field-collected fauna from both the 1985 and 1999 excavations and the results of flotation analysis from the 1999 field season. The contents of the 1985 and 1999 flotation samples were analytically homogenous. Therefore, while flotation analysis from the 1985 excavations is discussed in general, the following in-depth discussion is heavily based on the 1999 samples.

Molluscs

Mollusca (3.0 kg) retrieved from the 1999 excavation flotation samples, taken from N200 E149 and N200 E154, were the most numerous biological remains. All are listed in Appendix 4, Table 3. This type of fauna is difficult to quantify unless taken from column samples. "Voucher" specimens were selected, counted, and weighed, both for the largest as well as smaller representative valve fragments; these are the figures listed in Appendix 4, Table 3. Eastern oyster *(Crassostrea virginica)* predominates (N = 91; 702.2 g), followed by soft-shell clam *(Mya arenaria)* with a much lower weight of 57.5 g (N = 45). Very small fragments of ribbed mussel *(Geukensia demissa)* were present in every sample but easily could have been overlooked. Minuscule (<1 cm) individuals identified as slipper shell (*Crepidula* sp.) were present, as well. These definitely have no economic utility and probably came onto the site while attached to larger individuals of other species (Adam Baldinger 1999, personal communication). The eastern oyster dominates shell midden sites along the eastern seaboard, including Hudson River sites (Claassen and Whyte 1995:67). Claassen's work at Dogan Point identified oyster, soft-shell clam, and ribbed mussel, but ribbed mussel occurred in a greater percentage of column proveniences.

During the 1985 excavation, several large oyster shells were collected and are listed in Appendix 4, Table 3, as numbers 42 through 45. The largest is 11 cm high by 8 cm wide and weighs 149 g. Its elongated shape indicates that it grew in the river channel with fast moving water (David Backus 1985, personal communication).

Salinity levels affect river ecology and mollusc habitat selection. Parris (1987) cites a salinity study by Maurer and Watling (1973) of rivers in Delaware where oysters were shown to "inhabit regions of maximum salinity for each river . . . approximately 29.0 percent." Claassen and Whyte (1995:67–70) provide a more complete discussion.

Gastropods, or univalves, are numerous at Liberty Island, occurring in 1985 flotation samples from Feature 1 as well as from 1999 excavation. Appendix 4, Table 4, lists only those from 1999. A total of 762 individuals were counted but not weighed since weight has no significance in such small specimens. Total counts vary between the units, with Unit N200 E149 yielding a total of 291 individuals and N200 E154 a total of 471. Identification of gastropods is best left to specialists since they are difficult to identify. David Backus, Curatorial Assistant in the Mollusc Department of the Museum of Comparative Zoology in 1985, volunteered to identify gastropods from the 1985 excavations. From the loci in the West Wall, the taxa Backus identified are *Anguispira* sp., *Vallonia* sp., *Odostomia* sp., *and Helicodiscus* sp. The taxa from Feature 1 are *Stenotrema* sp., *Melampus bidentatus, Vallonia* sp., *Anachis* sp., *Odostomia* sp., *Vallonia pulchella, Helicodiscus parallelus*, and *Helicodiscus songleyomni.* Interface gastropods recovered from Feature 1, Level 2, include: *Striatura* sp., *Strobilops* sp., *Gastrocopta contracta and Pupoides albilabris.* These are species not identified in other levels of the feature. All taxa are land and brackish water marine snails that might be found in a *Spartina* marsh (David Backus 1985, personal communication).

Mammal

Appendix 4, Table 1, lists bone collected in 1985 along the exposed walls of the utility line trench. Only one (2.2 g) bone was taken from the "middle of shell layer," the prehistoric stratum. This bone was identified as a shaft fragment of a medium/large mammal.

Cataloged bone from the 1999 excavation is listed in Appendix 4, Table 6. Two fragments without catalog numbers were found in flotation samples. Twenty-one mammal bones were recovered in all. Identified taxa include *Bos* (cow/ox, N = 1), *Odocoileus* (deer, N = 1), cf. *Odocoileus* (deer, N = 1), Canidae (dog family, N = 1), and Microtinae (microtine rodent, N = 3). Large mammal (N = 1), medium/large mammal fragments (N = 8), medium-size mammal (N = 1), small mammal (N = 1), and mammal (N = 1). Two fragments from the flotation samples are classified as mammal (N = 1) and "resembles" mammal (N = 1). All mammal bone came from Level 1 except for one fragment of deer (Level 5) and five indeterminate fragments from "wall clean-up." Preservation of mammal bone, including one domesticated species (Bos), in Level 1 of the shell midden, likely is due to more recent deposition and incorporation into the shell layer as a result of bioturbation or pedoturbation.

Bird

Appendix 4, Table 2, lists 21 bird bones from 1985 (N = 16) and 1999 (N = 5) combined. Five taxa are represented: a proximal humerus of *Colinus virginianus* (bobwhite quail); a right coracoid, right humerus, and left ulna of *Aythya valisineria* (canvasback duck); one left tibiotarsus and one left femur of an immature pelican *(Pelecanus* sp.); and three duck bones from two bay ducks (Anatinae) and one surface-feeding duck *(Anas* sp.). The remaining fragments either are broken or too small to identify, or the elements represented are not distinctive between species. All but five specimens were recovered in 1985 from Feature 1, which is probably a refuse pit.

The two pelican bones have attributes of an immature individual, suggesting a nestling/fledgling not yet mature enough to fly. In turn, one might infer this species was breeding locally, possibly on Liberty Island. The brown pelican typically breeds in coastal colonies as far north as South Carolina (Forbush 1925) beginning in May and extending into August. When speaking of white pelicans (*Pelecanus erythrorhynchos*), Edward Howe Forbush (1925:165) states, without further reference, that "in former days when Pelicans were abundant in North America, . . . the early settlers reported flocks of white pelicans on the Hudson River."

Temperatures may affect bird distributions, and many diverse ecological relationships are involved in the interplay between birds and climate (Welty 1979:428–429). Gene Montgomery of the Smithsonian Tropical Research Institute in Panama demonstrated that reproductive success of the brown pelican today depends on climatic conditions (Miller 1983:62–63). Bird ranges and "successfully occupied" nesting sites change with shifts in climate (Lamb 1977:184–186, 234–235). These pelican nestling/fledging bones excavated at the Liberty Island site, well north of the present breeding range of the brown pelican, raise the interesting possibility of a warmer climate at the time of deposition.

As the bones are those of a pelican, their presence in the assemblage from the Liberty Island site suggests a warmer climate. In fact, the Medieval Warm period (Lamb 1965) occurred in Europe around the approximate date of occupation of Liberty Island, again, assuming the validity of the calibrated radiocarbon dates for the Liberty Island site. Fine-resolution proxy data that would document such a warm period in New England at this time are sparse. The pelican identification from Liberty Island may serve as proxy data for climate, bearing in mind stated assumptions.

Fish

A total of 74 fish bones were recovered. Fifteen were from Feature 1 (1985), while 56 were from Feature 9 (1999). Two fish bone fragments came from Feature 15 (1999) flotation samples. No fish bone was recovered from Feature 12 (1999). Most were fragmentary and unidentifiable, but three taxa were identified among the more complete specimens. Seven head bones, including a right and left angular-articular, were identified as oyster toadfish *(Opsanus tau)* and probably represent one individual that was approximately 18 cm (7 in.) long. Two bones of white perch (cf. *Morone americana),* and one possibly of an individual from the cod family (cf. *Gadidae)* also were identified. Several elements are identifiable but not yet known. The remaining bone has been identified simply as Osteichthyes (bony fishes). The majority (N = 53, 72%) of the fish bone was recovered by flotation although none was large enough to identify. Flotation serves to eliminate recovery bias by showing that small fish were utilized, assuming their remains represent subsistence. The presence of small fish in the midden suggests this resource was a smaller dietary component that supplemented shellfish, bird, and mammal, and perhaps even served as bait.

The oyster toadfish lives in close association with oysters, using empty shells as spawning places (Gudger 1910:1084). Studies show this species comes close into shore to spawn in shallow water in early summer. As the water temperature drops, the oyster toadfish moves back out into deeper water (Schwartz 1975). Even though this small fish is fearsome looking with a spiny head, it is fairly meaty for its small size. Whyte identified one toadfish bone at Dogan Point (Claassen and Whyte 1995:77).

Amphibia

Salamander vertebrae identified as *Plethodon* sp. were recovered by flotation. These are likely naturally intrusive into the midden, but subsistence cannot be ruled out. While many species of salamanders require fresh water for their lifecycle, some, such as *Plethodon cinereus cinereus* (red-backed salamander), are completely adapted to terrestrial life (Bishop 1943:232).

Reptiles

Turtles are represented by two carapace/plastron fragments recovered by flotation of samples from the 1999 units from Feature 9, Level 5 (N = 1) and Feature 15, Level 1 (N = 1). These are very small fragments and bear no diagnostic landmarks. However, these are the first turtle remains to be recovered.

CONCLUSIONS

Various archeologists over the last two decades have published many studies of coastal New York and the Lower Hudson Valley. More precise recovery and analytical techniques for faunal data are contributing to more refined inferences pertaining to subsistence and seasonality data of plants and of bone. As an example, shell sectioning has potential for refining interpretations of seasonality. While oyster apparently is not a good candidate for sectioning (Claassen 1995b), Lightfoot and Cerrato (1988:147) found that soft-shell clam sectioning studies of coastal New York sites indicate more seasonal variability than had been considered earlier. Similarly, more thorough recovery methods at sites such as Dogan Point have improved the retrieval of species, such as fish. Whyte (Claassen and Whyte 1995:76) cites Brennan (1981:45) who noted "the almost complete absence of fish bone . . ." from Dogan Point.

Liberty Island vertebrate taxa are not as numerous as those recovered at Dogan Point. This difference may be an artifact of excavation, which was limited to salvage and survey in keeping with National Park Service policy of resource preservation.

Assuming prehistoric occupants of Liberty Island deposited the bird and fish bones in Feature 1 during subsistence activities, then it seems the feature may have been used as a trash pit during more than one season. The presence of a very young bird suggests deposition during the spring season. Mid- to late summer is the season when toadfishes are more readily available. Bay ducks come in close to shore beginning in the fall and remain during the winter. There is no question that these remains were deposited deliberately into the intact feature. While Lightfoot and Cerrato (1988) have suggested early winter shellfish collecting along the New York coast, the Liberty Island assemblage suggests multi-seasonal use, as found at some other sites in the region (Lightfoot and Cerrato

1988; Schaper 1993; Bradley and Speiss 1994). The range of species in such a limited faunal assemblage suggests Liberty Island was a desirable location from which to exploit shellfish and other shallow-bay resources on a year-round basis.

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Liberty Island Botanical Analyses—1985

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National Park Service laboratory staff carried out flotation in 1985–1986. Twenty-five samples were submitted for analysis at the request of Dick Ping Hsu. Fiscal resources were unavailable to complete the analysis at that time. Nine additional flotation samples from the soils collected in 1985 were processed in 1999 to complement the earlier analysis. This report, finished in 1999, completed the analysis on the material collected during the 1985 excavations.

INTERPRETATION OF ARCHEOLOGICAL PLANT REMAINS

The interpretation of archeological plant remains recovered by flotation is a complex issue necessarily requiring careful deliberation, especially in the case of wild plant foods. Preagricultural peoples relied heavily on this resource for their subsistence. Carbonized seeds from fruits and berries and carbonized nutshell are the most common plant remains preserved in the archeological record. These materials have usually been preserved by accidentally falling into the hearth during food preparation or by deliberately being discarded and charred in the food processing cycle. However, these same items can also be carbonized by blowing into a fire or by being caught in a generalized "burn" over an area, resulting from either cultural activities or a natural event.

The literature reflects the difficulty in interpreting uncharred seeds recovered in flotation. According to Minnis (1981:147), "Many ethnobotanists use this basic rule: unless there is a specific reason to believe otherwise, only charred remains will be considered prehistoric." While a few uncharred seeds were found in the flotation samples for Liberty Island, this chapter will deal exclusively with carbonized plant remains.

METHODOLOGY

Flotation samples consisted of a heavy fraction and a light fraction. The heavy fraction essentially is the material that sinks to the bottom during the flotation process, while the light fraction is that which rises to the top, either to be skimmed off or poured off into fine sieves. Proportions vary from site to site and locus to locus. All recovered materials were examined under magnification ranging from 10X to 250X using a binocular stereomicroscope. These remains were manipulated with "feather-light" forceps to reduce accidental breakage. Both charred and uncharred seeds, charred nutshell and wood, and other unidentified charred plant fragments were removed and packaged in gelatin capsules and hard plastic containers. Provenience was recorded on acid-free labels. Sample bags were identified with a bag number including the designation "A" or "B" to indicate the fraction. "A" represented heavy fractions and "B" light fractions. As an example, sample bag 1-A contained specimens recovered from the heavy fraction of sample 1.

Wagner (1982) suggested a poppy seed test as a way to test efficiency of flotation systems in recovering seeds. These seeds frequently are added to soil samples as controls prior to flotation to test recovery rates (Pearsall 1989). Poppy seeds recovered from both fractions, when averaged, indicate the rate of recovery for seeds within the samples. Poppy is not native to eastern North America and is easily distinguished by the analyst. Charred poppy seeds are recommended because they more closely approximate charred archeological specimens in size. In New England, uncharred poppy seeds are routinely used in Cultural Resource Management, or CRM, projects.

Fifty uncharred poppy seeds were added as controls to each of 23 Liberty Island samples (500 ml) before flotation in 1985. The rate of recovery for the 1985 flotation samples was 23 percent, a relatively poor rate.

The second stage of flotation carried out in 1999 on nine additional samples used a different flotation method, and the samples were larger (1,000 ml). Fifty poppy seeds were added to five of these samples. Recovery rates ranged between 38 percent and 80 percent with an average of 54.4 percent, an improved percentage of recovery.

RESULTS

Thirty-four samples from five proveniences in the trench were analyzed. Twenty-eight samples were collected from the East Wall of the trench and six from the West Wall. All samples from the East Wall are from Feature 1, as follows: six samples from Level 1, 17 samples from Level 2, and five samples from Level 3. The six West Wall samples are taken from two loci: one from the "Dark Level Above Shell" 9.6 m south of 0, two from the "Dark Soil Below Midden" 5.0 m south of 0, and the remaining three from "West Wall Shell Layer." These were also collected at 5.0 m south of 0 datum.

Wood

Wood data presented here are based on analysis of the initial 25 samples. Examination of wood from the additional nine samples showed the same taxa in roughly the same proportions, with the exception of two fragments of oak *(Quercus* sp.) identified in Level 3. The oak fragments are discussed further Table 2.

Wood fragments were present in most samples from Feature 1. A total of 121 of the larger fragments were selected for examination. Identified arboreal taxa included hickory *(Carya* sp.) and Coniferales (conifer wood). Other dicot (deciduous) species that could not be identified were labeled as angiosperm wood (Table 2). The presence of hickory might be expected, since the larger fragments submitted for radiocarbon dating were also identified as hickory. Much of the dicot, or angiosperm, wood may also be hickory, but these fragments were smaller or not as well preserved. Numerous fragments in this category were ring-porous and so may represent other species. Oak identified in Feature 1, Level 3, during the second-stage analysis supports this interpretation. In the following chapter, McWeeney and Perry also report oak in samples from the 1999 excavations.

Table 2. Wood Taxa from Feature 1

Location	Hickory (N)	Coniferales (N)	Dicot (N)	Total (N)
Level 1	18	0	19	37
Level 2	24	1	14	39
Level 3	0	6	39	45
Total (N)	42	7	72	121

Only wood from Feature 1 has been quantified for this report. Bioturbation in shell middens is widely recognized, and wood data from general shell midden contexts do not specifically contribute to the analysis. In general, however, both dicot and conifer woods were found in the West Wall samples, but no dicot fragments were large enough to identify as hickory.

Wood fragments from Ellis Island were removed from flotation samples but were not immediately identified (French 1989). French's search for analyzed flotation assemblages in the area in the late 1980s indicated that "few sites along the coast have had flotation done" (French 1989:3). Those that had included flotation had reported limited plant taxa.

Nutshell

Numerous small (1.5–3.0 mm) fragments of nutshell were found in samples from the West Wall. The nutshell included in this class has been distinguished by morphology, texture, and density. Fragments may be recognized as nutshell only by texture and density but exhibit insufficient morphology to identify the taxon. Numerous fragments listed in Table 3 as hickory *(Carya* sp.*)* are of this type and show recent breakage, probably during flotation. They are associated with larger recognizable fragments of hickory and therefore are placed in this taxon.

Table 3. Charred Nutshell from 1985 Excavations

Location	Hickory (N)	Nutshell (N)	Total (N)
East Wall Feature 1			
Level 1	0	0	0
Level 2	9	1	10
Level 3	0	4	4
Subtotal (n)	9	5	14
West Wall			
Dark Level Above Shell	0	0	0
Shell Layer	145	52	197
Dark Soil Below Midden	91	93	184
Subtotal (n)	236	145	381

Nutshell data are summarized in Table 3. A marked contrast occurs between nutshell counts from Feature 1 and the West Wall samples. A total of 14 fragments were excavated from all three levels of Feature 1, while 381 fragments came from the West Wall. The majority is concentrated in "Shell Layer" samples with a lesser amount from the "Dark Soil Below Midden." With the caveat that shell middens are subject to bioturbation, this concentration suggests nuts may have been gathered contemporaneously with the shellfish, and, a late summer/fall season of occupation may be inferred. Hickory nutshell has been identified in 1999 excavation samples from Feature 9, the shell midden, implying that its presence in the midden is ubiquitous (McWeeney and Perry, Chapter 8).

Seeds

No charred seeds were recovered.

CONCLUSIONS

Plant remains recovered from a total of 34 flotation samples from the 1985 excavation consist primarily of wood and nutshell. While uncharred seeds-not included in this report-were identified, no charred seeds were recovered. Nutshell, identified as hickory *(Carya* sp.*)*, is most numerous in the shell layer above the feature. Feature 1 recoveries are limited to nine small fragments identified as hickory. It is possible that agents of bioturbation may have brought down the few fragments found in the feature. Large earthworms were active in and below the shell midden during salvage work and were personally observed.

Wood taxa are hickory *(Carya* sp.), oak *(Quercus* sp.), and coniferales (conifer). The presence of both hickory wood and nutshell suggests that the trees were growing on or very near the site. Thus, the paleoenvironment on Liberty Island ca. A.D. 1000 may not have been a bleak, sandy beach. Instead, it may have been a pleasant location with plant cover desirable for camping near the estuary in order better to exploit shellfish and other shallow-bay resources.

Liberty Island Botanical Analyses—1999

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Fourteen packages of botanical samples were recovered by flotation during the 1999 archeological excavations on Liberty Island, New York Harbor, New York City. These were analyzed for identifiable fragments of charred wood, as well as seed/fruit remains. Any such fragments might yield insights into paleoecology and prehistoric lifeways of the early occupants of Liberty Island. The botanical packages contained both floral and faunal materials. For this project the floral specimens were sorted from the samples prior to sending the remainder to Tonya Largy for faunal analyses. For the most part, these samples were not rich in charred plant remains. Yet they did provide sufficient data from most samples to determine the dominant wood taxa burned at the site.

Charred seed specimens were rare. Special analysis of five fragments of parenchymatous, or possible "root and tuber," plant tissues was included from one of the botanical samples. This chapter discusses the results of the botanical analysis according to these three main classes of botanical evidence.

METHODS

Several methods are employed to analyze diverse botanical assemblages. This consideration of methods outlines the processes used to conduct the analysis of wood, charcoal, of seeds and nuts, and of parenchymatous tissues recovered from the 1999 Liberty Island excavations.

Wood Charcoal

The identification of charred wood assemblages from archeological sites requires the use of low- and high-power reflected light microscopy. A binocular, zoom Zeiss microscope and a compound scope with magnification up to 400X were used to make the identifications. Fragments of charred wood, usually those greater than 3 mm in largest dimension are sectioned in three anatomical planes, the cross-section, tangential section, and radial section. The examination of the visible anatomical structures in conjunction with standard anatomical texts and photomicrographs (e.g., Schweingruber 1978, 1990; Panshin and de Zeeuve 1980; Hoadley 1990; cf. Pearsall 1989) and modern reference material allows the identification of some fragments as to genus and sometimes as to species. The nomenclature used in this analysis follows Fernald (1970).

Two major approaches may be used to sample archeological wood for identification. The first examines the largest fragments from a sample in order to focus on fragments with both the greatest number of anatomical features and, most likely, the best state of preservation. Unfortunately, as some researchers have discussed (Smart and Hoffman 1986), this technique is dependent on the assumption that all species of woody plants fracture into pieces of similar size when charred. The fallacy of this assumption (cf. Casparie et al. 1977) is unfortunate, for it requires a somewhat different approach to sampling.

In order to identify a representative sample of all genera represented in the archeological wood charcoal sample, it is necessary to include the full range of fragment sizes–down to the lower limit of identifiability. Zalucha (1982) and Minnis (1987) more fully discuss identifiable sizes (cf. Thiébault 1988). Sample selection is best accomplished through standard techniques of botanical sample division–either with specialized equipment such as a riffle box, or through more simple techniques such as pouring a sample over a grid and selecting a pre-established fraction or percentage of the material to identify (Pearsall 1989:120). In the current analysis, samples were divided into eighths, or in the case of particularly small samples, quarters, all fragments in which were identified to the greatest possible resolution. In rare cases, not all fragments were identifiable. Indeterminate fragments were not considered a large component of the assemblage and therefore will not be discussed further.

Seeds and Nuts

Seeds and nut remains can be recovered from archeological sediments by processing through flotation. Pearsall (1989) describes flotation techniques. A sample of 50 poppy seeds was added to several samples to test the rate of recovery from the Liberty Island midden sediments. Shell middens often have a poor rate of recovery due to the shell matrix. The shell abrasion on charcoal and seeds may be responsible for breakage and deteriorating fragment size that can be lost in the processing.

A Zeiss binocular microscope with both a range of 8–50X magnification and a fiber optic external, reflected light source was used in the seed identification process. Measurements are crucial in refining the identifications when using photomicrographs (Martin and Barkley 1961; Montgomery 1977; Schoch et al. 1988). Comparisons of the fossil seeds to a modern reference collection of known specimens are even more critical. Further details on seed identification can be found in Pearsall (1989).

Parenchymatous Tissues

The identification of soft plant tissues encompasses essentially all plant parts with the exception of wood from trees, and seeds or fruits. That is, for the purposes of this research, vegetative tissues include the leaves, stems, twigs, roots, and storage organs of plants; in other words, the bulk of the plant biomass, and that part which is rarely identified in archeobotanical reports.

The process of sample sorting for vegetative materials may be viewed in two ways. The first, and most accurate, means of describing the process is the selection of all fragments that are not either charred wood or seeds/fruits. As Hather (1988, 1991, 1993) has described, vegetative storage organs–a subset of the vegetative tissues considered here–are formed primarily of parenchyma cells and vascular tissue. As the parenchyma cells are friable, and iso-diametric, charred fragments of these tissues are often rounded and amorphous in appearance. However, remains of more durable tissues, such as the "woody" tissues of secondarily thickened twigs or roots, do not exactly fall into this category but are often a significant source of data. For this reason, a second approach is to isolate more fragments for analysis than would be the case if the only goal were the identification of "root and tuber" tissues.

The size of fragments selected can vary greatly. Sometimes only a very small fragment is needed. While no definitive statement can be made about the minimum size of vegetal tissue needed for identification, some practical constraints do exist. Fragments less than 2mm in greatest dimension are difficult to section and therefore are unlikely to provide the necessary anatomical criteria. For this reason, fragments larger than this measure were selected for analysis.

Once promising fragments had been isolated from the parent sample, they were then mounted on a standard metal stub for analysis under the scanning electron microscope (SEM). In order to examine the greatest number of anatomical features, fragments were fractured using a scalpel along a transverse anatomical plane. One of the resulting fragments was then mounted onto a SEM stub for viewing. In order to process as many fragments as possible, several fragments were placed on a single stub–though these were always taken from the same archeological context.

Once under the SEM, fragments of charred plant material were examined for distinctive anatomical characteristics, including the orientation and differentiation of different types of plant tissues, the relative state of preservation, and distinctive features of the vascular or other tissues. Photographs were taken of each fragment and were stored digitally as "tiff" image files, which can be stored and retrieved at will using a personal computer.

The final stage in identification occurs later when these photographs are compared to one another, to published comparative work on vegetative tissues from archeological sites (e.g., Hather 1993), and to the standard literature on plant anatomy (e.g., Hayward 1938; Metcalfe 1960, 1987; Esau 1966; Metcalfe and Chalk 1979, 1983; Fahn 1990).

RESULTS

The use of flotation to recover plant remains allows researchers to make interpretations that would otherwise be unavailable from the archeological record. Although small quantities of preserved botanical remains were recovered from the shell midden on Liberty Island, the analyses established the prehistoric use of oak, hickory, and elm trees. Based upon what is known about the prehistoric Oak/Hickory Forest (Braun 1950) environment, we can suggest the biodiversity present during the period of prehistoric occupation.

Part 1: Charcoal

The small number of charred wood fragments from the Liberty Island site allows the combination of the two approaches to wood identification. Selecting the largest wood fragments often included the entire sample of identifiable specimens. For this reason, the analysis of these data should be useful for both an understanding of the range of tree taxa utilized and their relative significance as well.

Table 4 lists the wood taxa identified from each archeological sample. The numbers given in each column represent fragment counts and are therefore only a general indication of relative significance.

The charred wood evidence clearly indicates that

Table 4. Charred Wood Identified from the 1999 Liberty Island Flotation Samples *(numbers refer to fragment counts)*

Unit	Feature/Level	*Quercus*	*Juniperus*	*Ulmus*	*Clematis*	Indet. Wood	Indet. Conifer
N200 E149	9/1	11			1		
N200 E149	9/2	9	2	2			
N200 E149	9/3			10			1
N200 E149	11	1				30< 1mm	
N200 E149	12-1/2	1				11	1
N200 E154	9/2	3					
N200 E154	9/3	9				4	4
N200 E154	9/4	3	1			4	2
N200 E154	9/6	3				1	
N200 E154	9/5	3				2	1
N200 E154	15/1	4				2	
N200 E154	15/2	8					
N195 E149	9/1	3					3

Analysts: David Perry and Lucinda McWeeney oak (*Quercus* sp.) is the dominant taxon at this site. Remains of elm (*Ulmus* sp.) and juniper (*Juniperus* sp.) are infrequently present and are not found in every sample. A single fragment represents clematis (cf. *Clematis virginiana*), and its presence deserves special attention since this identification is unique to this site.

Several species of oak may have contributed to the charcoal recovered from Liberty Island. White oak (*Quercus alba*), swamp white oak (*Q. bicolor*), dwarf chestnut oak, chestnut oak (*Q. prinus*), and post oak (*Q. stellata*) are a few in the white oak subgenus. Some in the red oak subgenus include scarlet oak (*Q. coccinea*), southern red oak (*Q. falcata*), red oak (*Q. rubra*), and black oak (*Q. velutina*). Oak wood is well recognized for providing a steady, hot fire. The acorn production from trees suggested by the presence of the oak charcoal would certainly have provided a food resource for the people and the animals they hunted such as white tailed deer and wild turkey.

One or more of four hickory species grow in the range of Liberty Island (Little 1971) and may have provided the charred nutshells found on Liberty Island. The site is in the growth range for bitternut hickory (*Carya cordiformis*), pignut hickory (*C. glabra*), mockernut hickory (*C. tomentosa*), and shagbark hickory (*C. ovata*). However, according to Burns and Honkala (1990:226), mockernut and pignut hickory grow on dry ridges and hillsides in the northern portion of its range, an environment not typical of Liberty Island. Shagbark hickory, one of the hardiest hickories that produces flavorful eating nuts, grows on south-facing upland slopes (Burns and Honkala 1990:219) and may potentially have occupied space on the hillsides described by Kardas and Larrabee (1976:11) in their report on the geomorphological reconstruction for Ellis Island. Bitternut hickory, and its name reflects its palatability, grows well in moist soils such as along stream banks and in low wetlands and swamps (Burns and Honkala 1990:190).

Two species of elm may have grown on Liberty Island: American elm (*Ulmus americana*) and slippery elm (*U. rubra*). American elm grows well on flats and bottomlands and well-drained soils (Burns and Honkala 1990:801), suggesting its potential for a local presence. Slippery elm also grows on moist soils, especially along low slopes, stream banks, and river terraces (Burns and Honkala 1990:812). Both elms can be found in association with several species of oak, the four hickories mentioned above, maples, and ash trees, along with black cherry (*Prunus serotina*), black walnut (*Juglans nigra*), and hackberry (*Celtis occidentalis*). Understory plants include raspberry shrubs (*Rubus* sp.), dogwoods (*Cornus* sp.), hazel shrubs (*Corylus* sp.), grape (*Vitis* sp.) vines, and witch hazel (*Hamamelis virginiana*) to name but a few (Burns and Honkala 1990).

The native species of clematis, Virgin's bower (*Clematis virginiana*), grows on low ground, in thickets and borders of woods according to Fernald (1970:664). While appropriate for the wooded land on Liberty Island, it is clearly an unusual discovery in a northern archeological assemblage. Moerman (1998:168–169) describes its use as an analgesic, mixed with milkweed (*Asclepias* sp.) to be used for backache. In addition, an infusion made from the root could be used for stomach trouble or applied on venereal sores. Clematis also held hallucinogenic capabilities when prepared as a decoction from the stems. In the west, pulverized clematis charcoal was dusted onto burns (Moerman 1998:168–169). The charred clematis found in the Liberty Island excavations possibly may be from modern landscaping activities. The rare presence of a *Juniperus* species may also relate to historic landscaping.

Part 2: Seed/Fruit Remains

Few remains of seeds or fruits were found in the samples from Liberty Island. Included in this category are charred archeological materials as well as the uncharred seeds and the sample poppy (*Papaver* sp.) seeds that were added to the samples to estimate flotation recovery rates. These data are presented in Table 3. Nutshell is the most common class of seed/fruit

Table 5. Seed/Fruit Taxa Identified from the 1999 Liberty Island Flotation

Unit	Feature/ Level	Indet. Nutshell	*Carya* Shell	*Eupatorium*	*Amaranthus*	Monocot Stem	Indet. Seeds	*Papaver*
N200 E149	12-1/2		5					
N200 E149	9/3		14		1			5
N200 E154	9/6							
N200 E154	9/4							
N200 E154	9/2							
N200 E154	9/3	2		1				2
N200 E154	15/2							6
N200 E154	15/1	3					1	2
N200 E149	9/2		2			1		1
N200 E154	9/5		2					1
N200 E149	9/1		4				1	
N195 E149	9/1							
N200 E149	11	1	7					

Analysts: David Perry and Lucinda McWeeney

evidence recovered from this site. While nutshell is not uncommon at hunter-gatherer sites, it also tends to preserve better after charring than do many other floral parts. The low recovery of modern poppy seeds suggests a low recovery rate through the flotation technique. This may be due to the significant amount of shell included in the recovered light and heavy fractions, which may have destroyed or obscured the poppy seeds. The remaining seed material, including the uncharred taxa identified to the level of genus, will be discussed in more detail below. The charred, fragmented remains are difficult to identify or interpret.

The three genera of seeds identified to date include single, uncharred specimens of *Eupatorium*, *Amaranthus*, and Leguminosae. Modern mychorrhizal sclerotia, spherical black forms that are sometimes confused with seeds (McWeeney 1989), were not recorded for this analysis. The seeds will be discussed in terms of their economic potential, though the low numbers preclude any interpretation that requires numerical significance. They most likely represent intrusive, modern weed specimens.

Eupatorium sp. (Boneset, Joe pye weed)

Moerman (1998:228–229) notes the use of the several species of *Eupatorium* available in Eastern North America as medicine. In most cases, these involved ingesting various portions of the plant in order to combat fever or other ailments. Few food uses are indicated in the Native American compendium.

Amaranthus sp. (Amaranth, Pigweed)

Some Native American groups used the seeds of amaranth as dietary staples (Moerman 1998:64–66), while a wider range of cultures used it as a dietary supplement. Food uses do predominate in the ethnobotanical literature, though other purposes to which this plant can be applied exist, including the production of dyes, as medicine, and as paint. Considering its uncharred nature, the single fragment found at Liberty Island is difficult to interpret in terms of any of these uses, in particular, except its weedy presence.

Leguminosae (Legume seed, possibly clover)

Legume plants are known for their nitrogen fixing ability in soil.

Carya sp. (Hickory)

Except for the charred hickory (*Carya* sp.) nutshell, the seed/fruit remains from the Liberty Island midden site do not indicate the intensive collection of any single botanical resource as a dietary staple. Charred nutshell remains are the most numerous prehistoric floral evidence from this site. However, the dense cellular structure of this class of remains suggests a taphonomic rather than an economic explanation for this pattern. According to Bernstein (1992:9), the total amount of floral remains recovered from an archeological site may reflect the preservation factors and not the value of those foods in the native diet. Some have suggested that hickory nutshell was a source of fuel, yet the charred presence may be indicative of their disposal by burning (Lopinot 1984). Based on Waugh's (1973) data, among the Iroquois, hickory nuts were either used to make a beverage or eaten raw. Also, the nutmeat may have been cooked for mush or boiled for oil and used to season other food.

Part 3: Identification of Parenchymatous Tissue Remains

Five fragments of probable parenchymatous tissues were isolated from one of the botanical samples taken at the Liberty Island shell midden (Figure 18). Parenchymatous tissue was seen in many of the samples, but only these five were examined under SEM. The results, given in Table 6, demonstrate the utility of this type of analysis.

Table 6. Parenchymatous Tissues Identified from the Liberty Island Shell Midden

Unit	Feature/ Level	Micrographs	Identification
N200 E149	9/3	F1-11-1	*Nymphaea*
N200 E149	9/3	F1-11-2	*Butomus*
N200 E149	9/3	F1-11-3	*Butomus*
N200 E149	9/3	F1-11-4	*Butomus*
N200 E149	9/3	F1-11-5	Indeterminate

Analyst: David Perry

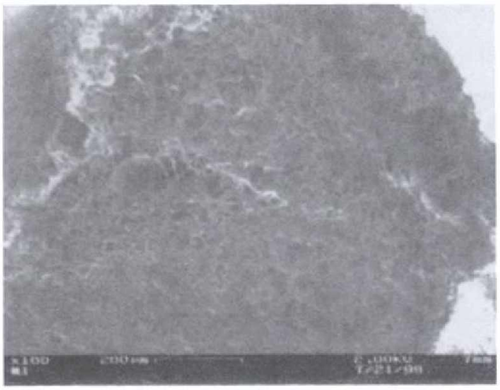
In the case of the fragment of water lily (*Nymphaea* sp.), the identification was based upon the orientation of two distinct types of vegetative tissues–the aerenchyma, in which parenchyma cells are surrounded by intercellular air spaces, and more conventional parenchyma. The presence of the remains of idioblastic cells supports this identification (Hather 1993:18–19). Water lily could have been used in a number of ways during prehistoric times. Water-lily roots might have been roasted and eaten like potatoes, while the young buds also could have been eaten. The leaves often have been used as a cold remedy, while the roots have been made into a poultice for various skin ailments (Moerman 1998:359–360). In Europe, water lilies have been used to make a fermented drink. The rhizomes can be useful as well, though they apparently require considerable cooking before they are edible (Couplan 1998:46–47). Crellin and Philpott (1989) note that the drying effect of poultices made from water-lily roots is probably the most significant medicinal quality of this plant.

Remains of flowering rush (*Butomus* sp.) have only a single known ethnobotanical use according to Moerman (1998:130). The Iroquois used a decoction of the plant to combat worms in livestock–a use that must have postdated contact but could have been derived from earlier medicinal uses of this taxon. The preservation of these fragments was identified through the anatomical descriptions of Ogden (1974). The preservation was quite different from that which Hather (1993) observed–possibly because these are likely to be stem fragments rather than root fragments. A total of three fragments of this taxon were examined.

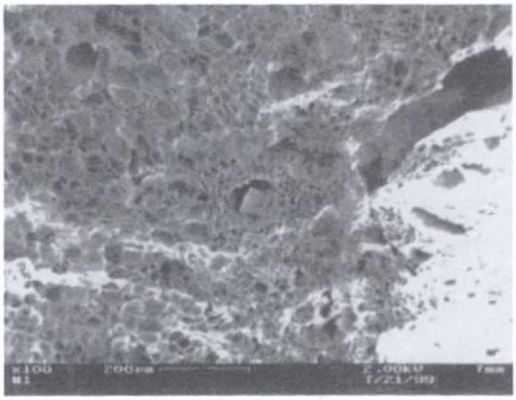
The fifth fragment examined under SEM was mostly degraded and bore no distinctive anatomical features. Further work might change this assessment in the future, but until this fragment can be associated with better-preserved material, it is likely to remain unidentifiable.

Summary of the Parenchymatous Material

The identified vegetative tissues from the Liberty Island shell midden are comparable to the seed evidence in quantity and quality. Further analysis of this

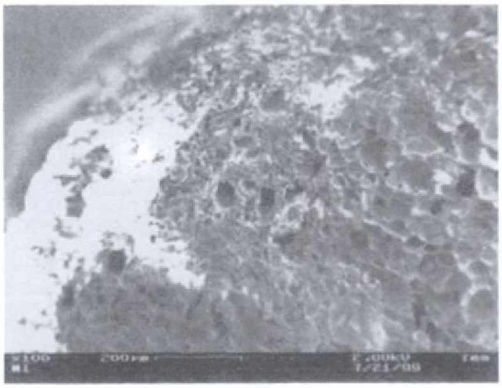


F1-11-1

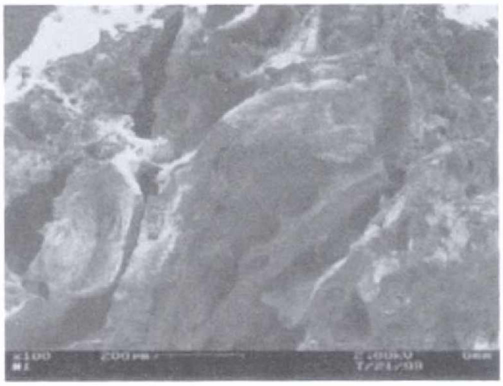


F1-11-2

F1-11-3



F1-11-4



F1-11-5

Figure 18 Photographs of five parenchymatous tissue samples.

type of evidence may well add a significant dimension to interpretations of the archeological record–as has proven the case in other archeological contexts. While water lilies and flowering rushes may not constitute dietary staples, they do attest to the diverse gathering practices of the inhabitants of this site. Additional research may allow a more explicit, detailed understanding of the ecological implications of these practices (cf. Perry 1999a, 1999b).

DISCUSSION

This section interprets data from Liberty Island in relation to area archeological sites where botanical identifications have been made.

The assemblage of botanical evidence outlined above demonstrates a limited correlation with regional evidence for Late Woodland coastal occupations. None of the plant remains is indicative of horticultural production. The charred wood evidence for oak and the hickory nutshell is consistent with extant environmental data, suggesting that Liberty Island falls within the Oak/Hickory, formerly called the Oak/Chestnut, Forest region initially described by Braun (1950). The Oak/Hickory woodland would have contained elm (*Ulmus* sp.) and possibly clematis (*Clematis* sp.) as an understory component.

With over a century of excavations at coastal archeology sites in the southern New England and New York area, numerous shell midden sites have been identified. However, analyses of their botanical remains have been few and far between (Wissler 1909; Ritchie 1969; Brennan 1977; Claassen 1995b; Ceci [1986]). Charcoal was noted in several early excavation reports, and once radiocarbon dating techniques became available this charcoal was often dated. Ceci ([1986]) was one of the first researchers to scour museums for earlier excavated charcoal from coastal sites, have it identified, and then have it dated. Largy's (1987, see also this volume) identification of the 1985 Liberty Island botanical assemblage is an early example of identification of flotation remains. Her botanical analyses indicate that hickory wood and nutshell were the major contributors, along with minor oak representation. The 1999 botanicals discussed in the current analysis included oak charcoal but did not contain hickory charcoal, although hickory nutshells were identified.

A survey of charred plants identified by McWeeney for CRM work from Terminal Archaic through Late Woodland sites in Connecticut, southern New York, and New Jersey indicates that oak and hickory wood and nutshells predominate in the botanical assemblages (Appendix 5). A limited presence of other taxa such as maple (*Acer* sp.), hophornbeam/hornbeam (*Ostrya/Carpinus* sp.), dogwood (*Cornus* sp.), ash (*Fraxinus* sp.), black walnut (*Juglans nigra*), butternut (*Juglans cinerea*), hackberry (*Celtis occidentalis*), and elm (*Ulmus* sp.) plus some coniferous wood could be identified for several of the sites. However, for the coastal New York area sites studied by Ceci ([1986]) hickory wood was the dominant taxon followed by oak and chestnut. Roberts (1991:138) recounts the presence of hickory nutshell from the Wicker's Creek shell midden site in Dobbs Ferry, New York. However, as discussed further here, the actual charcoal analysis by McWeeney shows much more diversity. At Wicker's Creek hickory nutshell plus chestnut and ash wood charcoal were present during the Early Woodland period. For the Middle Woodland period oak and hornbeam, an understory tree, were being burned. Undated features contained cherry (*Prunus* sp.), maple, and conifer remains.

French's (1989) identification of walnut from Ellis Island-whether it is butternut or black walnut was not indicated-compares with McWeeney's indeterminate identification of walnut family (Juglandaceae) charcoal from the Old Lyme shell heap in Connecticut (Lavin 1991). The taphonomic processes in a shell midden where calcium carbonate leaches through the sediments may result in the poor preservation of some charcoal. Alternatively, the burning process itself may have caused the severe checking or cracking of the charred remains, making identification difficult.

The weighted average for the radiocarbon dates derived from the 1985 excavation indicate the Liberty Island shell midden was used around 1060 B.P. (A.D. 990). Historical literature suggests this occurred at the beginning of the "Little Climatic Warming Period" (ca. A.D. 900–1300) when drought conditions impacted many regional environments and cultures around the world (Lamb 1981; Dahl-Jensen et al. 1998; Malcome Hunt 2000, personal communication). Based on the charcoal from several nearby sites, trees such as black walnut and sourwood (*Oxydendrum arboreum*) either extended their northern ranges into the coastal New York and Connecticut region or were transported there by humans (ca. A.D. 1000–1250). Evidence for sourwood charcoal has been found at several sites. These include: Sturgeon Pond, New Jersey (1986 Identification for Michael Stewart, Senior Archaeologist, Lewis Berger Associates, Inc., New Jersey); Sebonic, Long Island (Ceci [1986]); and one possible specimen from the Manakaway site in Greenwich, Connecticut (1994 Identification for the Anthropology Division, Bruce Museum, Greenwich, Connecticut). Today, the normal range for sourwood extends to southwestern Pennsylvania. Until recently, the range for black walnut trees stopped in the vicinity of Liberty Island. However, the charcoal appears in Connecticut coastal archeological sites and north up the Connecticut River to the Morgan site in Rocky Hill, Connecticut (Lavin 1988b). Using an Accelerator Mass Spectrometer (AMS), the Morgan site black walnut has been dated to 1060 A.D., or 885 ± 45 C-14 years B.P. ([Lab #AA-10917] McWeeney 1994:23).

It has been suggested that coastal shell middens in this area and adjacent southern New England may have been year-round occupations in which all annual activities occurred within a few kilometers of the middens themselves (Griswold 1998). Site seasonality studies have been performed using oyster shell hinges to determine season of harvest, however not every scientist trusts this method of determination (Claassen 1995b). Bernstein (1992) and Brennan (1977) both suggest seasonal occupation of shell midden sites. The dominant inclusion of charred hickory nutshell in the Liberty Island botanical assemblage suggests the potential for a late summer or fall utilization of the Liberty Island site.

The identification of aquatic plant remains correlates with an interpretation of native visits to collect plants from a variety of estuarine, riverine, and terrestrial ecozones within close proximity to the site. The parenchymatous tissue identifications provide a significant contribution to the archeological database with documentation for a wetland component to plant gathering at Liberty Island. Kardas and Larrabee (1976) have discussed proposals on sea level changes in the vicinity of Liberty Island and alteration of the landscape. No mention was made of a pond on Liberty Island that could have been a source of the identified plants. However, a prehistoric freshwater wetland may be obscured by modern-day sea level. Peteet (1980) reconstructed vegetation for nearby Hackensack Meadows, in New Jersey, where a forested environment 2,600 years ago contained hickory, oak, elm, maple (*Acer* sp.), ash (*Fraxinus* sp.), and sweetgum (*Liquidambar* sp.). Freshwater marsh plants existed at least until 800 years ago (Peteet 1980). The discovery of water lily and flowering rush from Liberty Island suggests a contemporary freshwater source was close to or on the island. The collection of these plants by prehistoric people may represent a seasonal collecting activity corresponding with their use of the hickory nuts.

Perry (1999a) has identified charred aquatic and terrestrial plant remains, based on the parenchyma tissue, from prehistoric assemblages on the Mashantucket Pequot reservation in Ledyard, Connecticut, and in southeastern Connecticut. Prior to Perry's parenchyma studies numerous genera such as cattail (*Typha* sp.), bulrush (*Scirpus* sp.), arrowhead (*Saggitaria* sp.), water plantain (*Alisma plantago-aquatica*), and water lily (*Nymphaea* sp.) rarely gained recognition in archeological assemblages unless seeds were present. A few of these taxa have been identified for sites in Rhode Island (Bernstein 1992) and Maryland (LeeDecker and Holt 1991).

CONCLUSIONS

First and foremost, the National Park Service is to be congratulated for implementing the flotation and analysis of charred plant remains from the Liberty Island archeological site. To understand more fully the nature of plant gathering at this site, it would be useful, and necessary, to examine a wider range of archeological contexts in addition to the shell midden. The possibility afforded by new analytical techniques such as the analysis of parenchymatous tissues (Perry and McBride 1999) may contribute to and extend knowledge of prehistoric plant use and seasonality. In turn, the identified botanical remains provide data on the potential prehistoric landscape of Liberty Island.

Interpretations and Recommendations

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Given the amount of construction activity that has taken place on Liberty Island, it is difficult for many to believe that an archeological resource as valuable and fragile as a shell midden could still exist. Yet, other prehistoric sites have been found in equally unlikely contexts (Lenik 1992). The prehistoric shell midden was most likely preserved due to the original topography of Liberty Island. According to the 1772 map of Bedloe's Island (Griswold 1998:Fig. 3.3), the site is located in a somewhat depressed area of the island, which may have helped to shelter and protect it. The shell midden not only has survived to the present day but also has yielded considerable data concerning Native American life, especially as it unfolded through the past two millennia.

SHELL MIDDEN CHRONOLOGY

Radiocarbon dates were taken in 1985 from the pre-midden Feature 1. These suggest a weighted-average, calibrated date of A.D. 994 with a maximum/minimum of calibrated age ranges between A.D 898 and 1023 at one sigma (Stuiver and Reimer 1993). This correlates to the terminus of the Middle Woodland period or beginning of the Late Woodland period. Radiocarbon dates have not been determined for the shell from the site. The radiocarbon date for Feature 1, and the contemporaneous and subsequent accumulation of the shell midden on Liberty Island during the Middle and Late Woodland and Contact periods corresponds to a time when peoples were heavily utilizing coastal resources throughout the Northeast coastal region (Bernstein 1993, 1999; Bradley and Speiss 1994). These studies, as well as the data from the Liberty Island site, indicate that widely diverse food resources were available to the Native American population. Plant domestication seems to have been a more important subsistence strategy at sites further inland than at those on the coast, largely due to this diversity of coastal resources (Ceci 1990; Bernstein 1993, 1999). As previous chapters have shown, this variety of resources is well attested to on Liberty Island.

The ceramic fragments found within the shell midden during the 1999 season clearly indicate that the shell midden was formed as a result of shellfish exploitation during several prehistoric periods, beginning in the Middle Woodland, continuing through the Late Woodland, and possibly extending into the Contact period. Since the shells of the midden were deposited over Feature 1, it is currently assumed that the C-14 dates obtained from the feature represent the earliest prehistoric dates for this portion of the site. However, given the tendency of new migrants to move to fresh areas of the site (Rothschild and Lavin 1977), earlier midden deposits may have existed that conceivably have been destroyed during subsequent construction activities at the site. This possibility, however, does not preclude the potential for finding other, older features on the island. The historic midden levels deposited above the prehistoric strata indicate that colonists used the area for the same purposes as the prehistoric inhabitants, namely as a dump.

SHELL MIDDEN STRATIGRAPHY

Excavation of shell middens potentially can reveal a complex stratigraphy, even microstratigraphy, of the depositional processes. As others have pointed out, the development of these shell middens was not an overnight process (Rothschild and Lavin 1977). In general, each food-procurement episode often involved a small group of individuals, of from 10 to 20 persons, and generated between five and 12 bushels of shell refuse (Brennan 1981:44). Throughout prehistory, discard of shell refuse may have occurred in different places at a given site, as has been demonstrated at the Kaeser site (Rothschild and Lavin 1977). Pedoturbation and bioturbation, as well as natural taphonomic events, have served to move deposited refuse around. As Largy has noted in prior chapters, the formation processes involved in shell midden development are complex; they only hint at what was originally there.

The excavations conducted in 1999 concentrated on identifying various strata within the midden. While the shell midden feature, itself, could easily be discerned from both earlier and later deposits, no stratigraphy could be distinguished within the shell layer of the midden, at least in the few larger 1-x-1-m units that were excavated. Excavation by arbitrary levels within the midden provided some useful information, but several factors undoubtedly are responsible for the observed homogeneity. The most obvious concerns the use of the site. Oysters and other shell and finfish were harvested numerous times during the last 1,500 years. The by-products of the food procurement activities led to a fairly uniform debris pile.

Another perhaps not-so-obvious reason for the homogeneity apparent in the layer of shell and soil concerns the agents of bioturbation discussed by Largy. The activities of many of these agents, including worms, insects, and rodents, cannot always be detected, even under the best of conditions. In addition to these agents identified by Largy, the 1999 excavations also documented numerous fibrous roots growing among the shell debris, especially along the hedge line. Pedoturbation may also have operated at this site, moving shell around and further obscuring microstratigraphy. All of these agents, coupled with the gradual deterioration of the shell, act on a site to increase the homogeneity of certain deposits. And, they work against an excavator who is trying to differentiate minor differences in stratigraphy. As exemplified by research at Willowbend (Shaw 1994), this seeming homogeneity does not, however, preclude the existence of stratigraphy within the shell midden at Liberty Island. It just means that microstratigraphy could not be detected in the shell midden in the 1-x-1-m units that were opened in 1999.

FAUNA, FLORA, POLLEN, AND LITHICS

While oyster remains account for the largest percentage of identified molluscs in the site, Largy's analysis indicates that numerous other shellfish, finfish, mammal, bird, reptiles, and amphibia are represented within the shell midden. These include soft-shell clam, ribbed mussel, slipper shell, a host of identified univalves, deer, dog, rodents, several unidentifiable large, medium, and small mammals, bobwhite quail, canvasback duck, bay duck, other duck, an immature pelican, oyster toadfish, white perch, cod-family fish, salamander, and turtle. Some identified taxa, such as cow, are either intrusive into the earlier deposits or represent a Contact-period deposition as the cow fauna were from Level 1, the top level, of the shell midden.

Largy has cogently argued that the discovery of a fledgling/nestling pelican bone may indicate a climatic warming. The bones of the pelican were found in 1985 in Feature 1, and the charcoal in the feature has been radiocarbon dated to the end of the Middle Woodland/beginning of the Late Woodland. These birds do not normally nest this far north, suggesting that the temperature at that time would have been warmer than at present. Corroboration comes from the work of McWeeney and Perry who have additionally noted that around A.D. 1000 the "Little Climatic Warming Period" (Lamb 1981; Dahl-Jensen et al. 1998) was occurring, thus permitting specific arboreal species to extend their northern range into the coastal New York and Connecticut regions.

Several species of flora are also represented in the midden. Wood fragments identified by Largy from Feature 1 include conifers, hickory, and perhaps other deciduous trees. Analysis of the wood recovered from the flotation samples conducted on the midden material by McWeeney and Perry indicated that oak dominated the taxa, followed by elm and juniper. A single fragment of clematis was also identified, but its occurrence in Level 1 of the shell midden is suspect, especially considering the cow bone and uncharred seeds that had found their way into the prehistoric deposits. Charred seed/fruit present in the midden identified by McWeeney included only one species, hickory. Likewise, Largy identified large quantities of hickory nuts in the midden deposits collected in 1985. Other uncharred seed/fruit was identified, but these examples probably represent intrusive species of plants, introduced through post-depositional processes.

Perry (McWeeney and Perry, Chapter 8), using a new analytical technique, identified two additional species of plants in the midden through parenchymatous tissue analysis. The discovery of water-lilies and flowering rushes through this technique not only expands the information about prehistoric plant usage at Liberty Island but also should pique the analytical interests of many archeologists. It illustrates a new technique for investigating paleoflora, and it expands the plant list utilized by Native Americans. The presence of water-lilies and flowering rushes, both freshwater plants, raises some interesting questions, especially since the earliest maps of the island show no freshwater source. The most reasonable conclusion is that these plants were brought to the island when the shellfish were collected, indicating that these early people were likely making multiple stops for the procurement of various resources during their hunting and gathering forays. An alternate suggestion is that the plants were growing in a nearby freshwater pond now inundated by saltwater.

It must again be pointed out that the formation processes on shell middens are complex. While it cannot unequivocally be stated that all of the flora and fauna species identified in the analysis of the midden come from human exploitation of those species, the analysis suggests a diverse diet that utilized numerous estuarine, riverine, and terrestrial resources. This interpretation is in concert with findings in other shell midden studies (Bernstein 1993:149; Bradley and Spiess 1994:54).

The acetolysis methodology employed during pollen separation probably confounded the results of the pollen analysis for Liberty Island. This methodology, however, is quite commonly used among palynologists (cf. Pousson 1986). The 1999 pollen analysis at Liberty Island was unable either to clarify Kelso's earlier work or to isolate pollen particular to the time periods represented within the shell midden. Perhaps the next attempt at pollen analysis or techniques derived from future research, such as phytolith and diatom analyses, will allow researchers to glean additional information from the remaining collected samples.

The discovery of a jasper Levanna projectile point during the 1985 excavations indicates that the Native Americans were utilizing local (area available and not island available) resources for their lithic tools; the only raw materials available on the site are those materials that wash up onshore. While a small number of flakes were recovered during the 1999 season, lithic production or reduction seems to have been a relatively minor component on the site. Lack of lithic processing on shell midden sites seems to be in accordance with the lack of lithic debitage found at other, comparable shell midden sites (Brennan 1981:44).

SEASONALITY

The available archeological data indicate that Liberty Island was used during several of the prehistoric periods, and also that the island was utilized at various times during the year. The faunal remains, identified by Largy, are ideally exploited at several seasons during the year. Her conclusion that Feature 1 may have been used as a trash pit during more than one season is a valid one, given the range of fauna recovered from the feature. It should be pointed out, however, that any type of open pit would not have stayed open for longer than a year or two. The recovery of a substantial number of charred hickory nutshell remains from the midden indicates that Native Americans were likely exploiting several resources in the late summer/fall season. This conclusion is supported by the recovery of the aquatic species of water-lily and flowering rush parenchymatous tissues by Perry.

The lack of features connected with long-term occupation of the island seems to indicate that Native Americans were not living here, but were, instead, intensively exploiting the resources available during the year, as at other shell middens (Salwen 1968; Rothschild and Lavin 1977; Lightfoot et al. 1985; Lavin 1991). Another possibility may be that the features connected with the long-term occupation of the site have been inundated by rising sea levels. The evidence gathered from excavation and analysis supports the contention that shell middens were not intended as living surfaces (Brennan 1977:137; Schaper 1989:17). Rather, available data indicate that the shell midden was more the end result of food procurement activities. This current research supports Kardas and Larrabee's summation that Oyster Bay would have been flat meadowland with some tidal marsh at the edge between 2,600 and 4,000 years ago. Their position is still valid given updated estimates of sea-level rise (Kardas and Larrabee 1976:11; Oldale 1986; Coch and Weiss 1989). Islands like Liberty would have risen from 10 to 30 feet above the flat (Kardas and Larrabee 1976:11). The land upon which the Liberty Island shell midden formed must have provided an ideal location from which to exploit a rich, diverse ecosystem of varied estuarine, riverine, and terrestrial resources.

RECOMMENDATIONS

The previous analysis has substantiated the considerable importance of the archeological site on Liberty Island. This shell midden is one of the few prehistoric sites remaining in the greater New York City area. The information available within the shell midden should serve to enlighten scholars, as well as the interested public, about life during the Middle Woodland, Late Woodland, and Contact periods, as well as taphonomic processes at work in a shell midden. As such, the site has great importance as a research and an interpretive tool.

The new use of parenchymatous tissue analysis allows us to glean additional information from the limited examination of the site. Archeological techniques and analyses will continue to improve in the future, and archeologists will be able to garner more and more information about past life on the island. It is, therefore, imperative that this portion of the site be protected against future ground-disturbing impacts. The previously excavated utility corridor should be the only exception permitted; with archeological monitoring, it may continue to be utilized for utility upgrades. Figure 19 delimits the area to be protected against any future impacts.

Since the island was occupied during multiple periods, other shell middens, or fragments thereof, may be found on Liberty Island. The NPS is the government agency charged with the stewardship of these fragile and important archeological resources, and it is imperative that all ground-disturbing activities on the island go through the Section 106 process. With systematic diligence to the compliance process, this site will be protected and other equally significant shell middens, with some luck, will be found on the island.

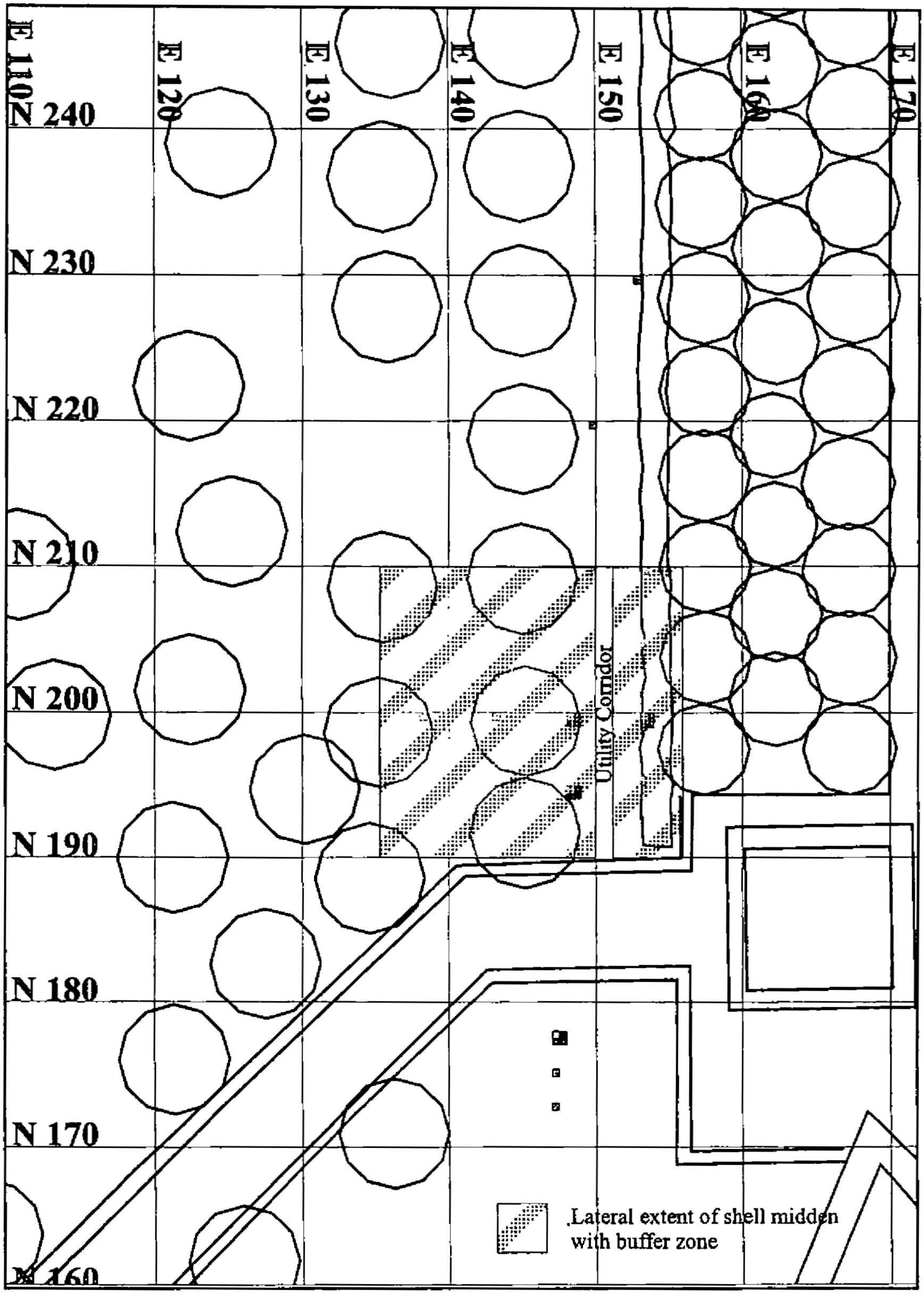

Figure 19 Plan of prehistoric shell midden. Aside from the previously excavated utility corridor, this area should be avoided for all subsequent ground disturbing activites.

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Progress Summary, Shell Midden, Liberty Island, N.Y.

Dick Ping Hsu
April 28, 1986

BACKGROUND

The prehistoric shell midden was discovered in the wall of a trench excavated for the installation of new electrical conduits and a fuel oil line for the Statue of Liberty. Adalberto Mauras, a New York University archeology graduate student employed part time by the Denver Service Center to monitor construction activities on the Ellis Island restoration project, made the first professional evaluation of the significance of the resource. He informed John Pousson who in turn informed the author of the discovery. After prehistoric artifacts had been recovered from the excavated dirt, and a second trench was to be excavated, the decision was made to conduct a salvage excavation project where the second trench was to be dug.

Tonya Largy of the National Park Service, Gordon DeAngelo, volunteer avocational [sic] archeologist 'par excellence,' and Mauras assisted on the project. The utility trench was about one meter wide and approximately two meters deep where it intruded through the shell midden. Fortunately, the information about a second utility trench was erroneous, so we shifted our efforts from mitigation of new disturbances to detailed recordation and data recovery of the exposed portion of the midden.

Mauras had already made a profile drawing of the east wall of the trench; a profile drawing of the west wall was made.

Data recovery consisted of the excavating of a premidden feature, collecting samples of complete shells and soils from all recognized strata, and collecting artifacts (including faunal specimens) exposed in either trench wall. The soil samples and artifacts were shipped to the Eastern Archeological Field Laboratory in Boston for processing and analysis.

Description of Site

The feature was truncated by the trench; therefore the exact size, shape and orientation couldn't be determined. Projecting from the remnant portion, the total feature was probably 1 to 1.5 meters in diameter at the top and tapered to approximately 0.3 meter at the bottom. Fill in the feature was distinctively darker in profile but less so while excavating. Near the bottom of the pit, several ceramic sherds, bird bones, and fish scales were recovered. Four charcoal samples from four separate areas within the feature were recovered. The shell midden extended over the top of the feature.

The exact extent of the midden could not be determined; along the axis of the trench (north–south) the midden measured approximately 25 meters and east–west at least 5 meters. The thickest portion of the midden, approximately eight meters south of the north end (Fig[s. 1, 2]), was approximately 0.5 meter thick. At the north and south margins the midden tapered to less than 10 centimeters thick. Assuming the original configuration of the midden was relatively symmetrical, the western (1/2) portion may still be intact but the eastern (1/3) portion was destroyed when the promenade and walk leading from the landing dock to the Statue were constructed in the 1940s. Over Feature 1, the midden was approximately 15 centimeters thick.

There were at least two major recognizable intrusions into the midden; both appear to be the result of the military occupation of the island (Fig[s. 1, 2]). The fill in the intrusion contained 19th- and 20th-century construction materials.

Specimens for Analysis

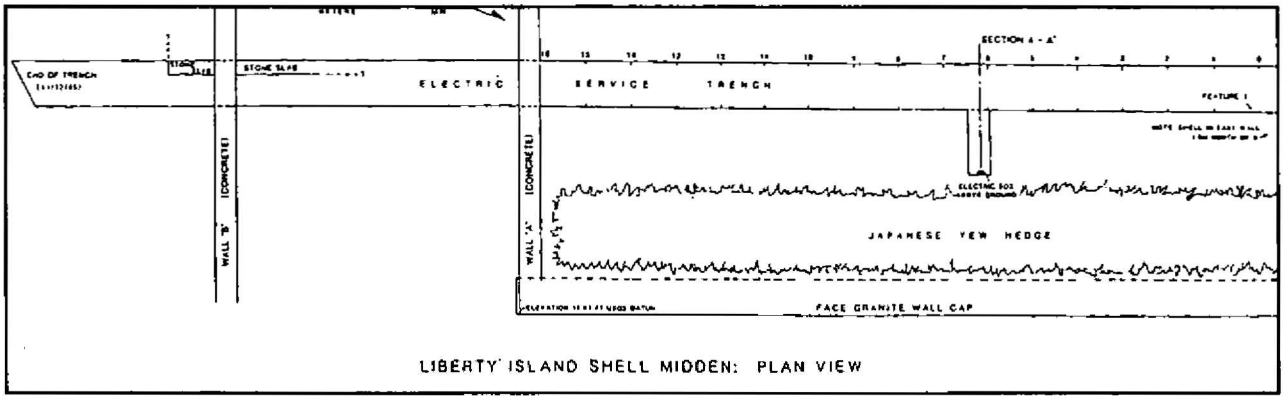
The soil samples were sufficiently large to conduct a variety of analytical tests to attempt to reconstruct the environment of the site at the time of occupation. A portion of each sample was put through water flotation to recover micro specimens. Snail shells and some seed fragments have been recognized in the separation process. Materials recovered from the floation [sic] process and the faunal specimens have been delivered to Tonya Largy; she is awaiting permission to proceed with the identification and analysis of the material. Samples will be sent for soil chemistry tests.

A portion of each sample has been processed for pollen extraction. The preliminary findings from one sample indicated poor preservation condition; however hickory pollen has been recognized. Visual examination of the charcoal samples for C-14 dating indicated the wood was also hickory.

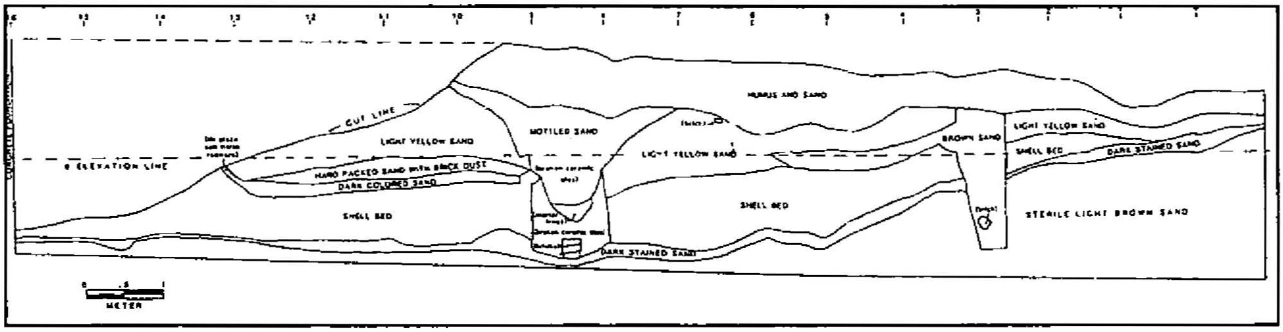
The charcoal samples have been identified as hickory; a thin section of one specimen will be photographed through a SEM at M.I.T.

To date, there has been little progress in determining if environmental and seasonality data can be derived reliably from oyster shells. One of the major stumbling blocks will be the lack of controlled samples for comparative data. The native oyster beds around Ellis and Liberty Islands have been dredged away for the present ship channels.

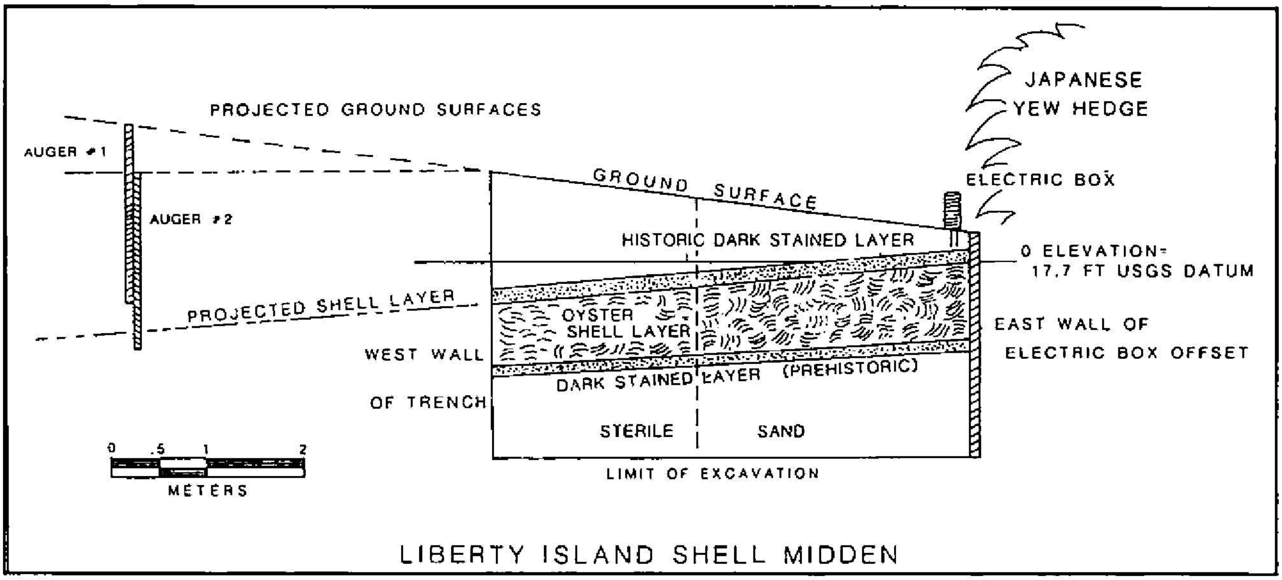
Most of the large faunal specimens were recovered in levels above the shells; historical period ceramics were found in all the levels above the shell layer. The animal bones were probably the refuse of the military; it was not unusual for each installation to have several head of livestock. A bovine would be slaughtered once a week for fresh meat. (Reprint of Hsu 1986)



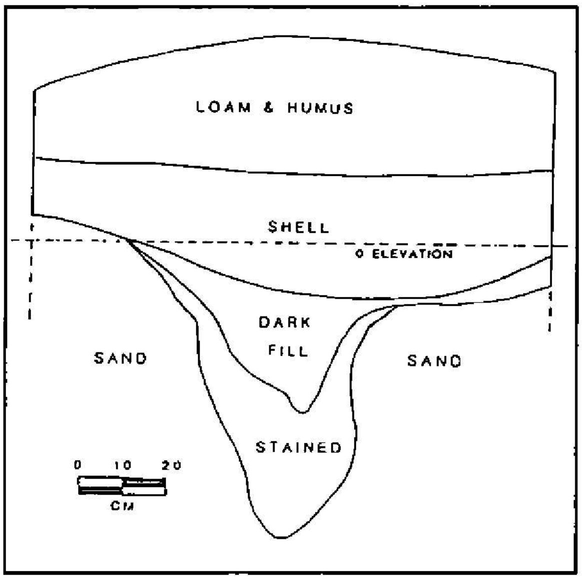
Appendix 1 - Figure 1 Liberty Island Shell Midden: plan view.



Appendix 1 - Figure 2 West wall profile.



Appendix 1 - Figure 3 North wall profile - Section A-A.



Appendix 1 - Figure 4 Profile of Feature 1.

1999 Excavation Notes Summary.

Unit	Stratum	Color	Composition	Comments
N173 E147.5	1	10YR 3/3	Silty loam	Modern deposit
	2	10YR 3/2	Clayey silt	Modern deposit
	3	10YR 4/6	Clayey silt	
	4	10YR 4/6	Silty sand	
	5	10YR 3/2	Coal/Cinders	
	6	10YR 4/4	Sand	Subsoil
N175.5 E147.5	1	10YR 3/3	Silty loam	Modern deposit
	2	10YR 3/3	Silty sand	
	3	10YR 4/6	Sandy silt	
	4	10YR 3/2	Silt	
	Feature 16	10YR 4/4	Sand	
	5	10YR 4/6	Clay	
	6	10YR 3/3	Silty sand	
	7	10YR 4/6 with 3/2 mottles	Sand	
	8	10YR 3/2	Silt	
N178 E147.5	1	10YR 3/ 4	Silty loam	
	2	10YR 4/3	Sandy silt	Modern deposit
	3	10YR 3/3	Sandy loam	
	4	10YR 4/3	Silty sand	
	5	10YR4/2	Sandy clay	
	6	10YR 4/6	Clay	
	7	10YR 4/6	Sandy silt	
N178 E148	1	(10YR 3/2)	Silty loam	
	2	10YR 4/3	Sandy silt	gravel
	3	10YR 3/3	Sandy loam	
	4	10YR 4/4	Silty sand	
	5	10YR 3/3	Sandy clay	
	6	10YR 4/6	Clay	
	7	10YR 3/6	Sandy silt	
	8	10YR 4/6	Sand	
	9	10YR 4/3	Sandy silt	
	10	10YR 3/3	Sandy silt	1 x 1 reduced to 0.5 x 0.5 m unit of original N178 E147.5
	11	10YR 4/6	Sand	Subsoil
N190.5 E148.5	1	10YR 3/ 4	Silty loam	
	2	10YR 3/6 mottled	Silty sand	gravel
	3	10YR 3/3	Silty sand	
	4	10YR 4/6	Clay	
	5	10YR 4/6	Sand	
	6	10YR 4/6	Sand	Combine with above stratum?

Unit	Stratum	Color	Composition	Comments
N190.5 E153.5	1	5YR 3/3	Clayey loam	
	Feature 5	5YR 3/3	Clayey loam	Modern trench
	2	Mottled 5YR 4/3-3/3	Clayey loam	
	3	10YR 5/6	Sand	Modern
	4	10YR 3/3	Sand, loam, and shell	Redeposited portion of shell midden
	5	10YR 4/4	Sand	Coring revealed plastic at 1.0 mbgs
N195 E148.5	1	10YR 3/3 and 4/3	Sandy loam	
	2	10YR 3/ 4 with 10YR 6/8 and 3/1	Mottled sandy loam	
	3	10YR 3/2	Sandy clay	
	4	10YR 3/ 4	Silty clay	
	5	10YR 4/ 4	Sand	
N195 E149	1	10YR 3/3 and 4/3	Sandy loam	1 x 1 expansion of N195 E148.5
	2	10YR 3/ 4 with 1 0YR 4/4 and 3/2	Mottled sandy loam	
	3	10YR 3/2	Sandy clay	
	4	10YR 4/4	Silty clay	
	5	10YR 4/4	Sand	
	6	10YR 3/3	Organic silt	Excavation conducted in south half of unit
	7	10YR 2/2	Organic silt with sand	18th century ceramics; bone concentration in SE corner
	7A	10YR 4/6	Silty sand	Thin lens in SW corner of unit
	8	10YR 4/2	Sandy silt	18th century ceramics
	9	10YR 3/2	Sandy silt	18th century artifacts
	Feature 9	10YR 2/2	Shell with silty sand	Prehistoric midden
N195.5 E153.5	1	10YR 3/2	Sandy loam	
	2	10YR 4/4 with 2/2 and 5/3	Sand	Fill
	Feat. 10	10YR 3/2	Sandy loam	
	3	10YR 4/2	Sandy, silty loam	
	4	10YR 4/4	Sand	Terra-cotta tile at bottom of unit
N200 E138.5	1	10YR 3/ 4	Silty loam	
	2	10YR 3/3	Silty sand	
	3	10YR 3/3 mottled with 4/4	Silty sand	
	4	10YR 4/4	Silty sand	

Unit	Stratum	Color	Composition	Comments
N200 E138.5	5		Coal/Cinders	
	6	10YR 3/ 4	Silty sand and gravel	Only seen in the east ¼ of unit
	7	10YR 4/6	Sand	Subsoil
N200E143.5	1	10YR 3/3	Sandy loam	
	2	2.5YR 3/6 mottled with 10YR 3/3		
	3	10YR 3/2	Sandy clay	
	4	10YR 3/2 mottled with 10YR 5/6	Sandy clay	
	5	10YR 5/6 m ottled with 3/2	Sandy clay	
	6	10YR 4/6 mottled with 3/3	Silty sand	
	7	10YR ¾	Sandy silt	Wind blown deposit?
	8	10YR 3/3	Sandy silt	
	9	10YR 4/6 mottled	Sand	Subsoil
N200 E148.5	1	10YR 3/2	Silty loam	Topsoil
	2	10YR 4/4	Sand	
	3	10YR 3/3 mottled with 4/4	Silty sand	gravel
	4	10YR 4/4-3/4	Sand	
	5	10YR 3/3	Sand	
	Feature 8	10YR 4/6 and 3/3	Silty sand	Red sandstone
	6	10YR 3/1-3/2	Silty sand	Red sandstone
	7	10YR 2/1	Silty sand	
N200 E149	1	10YR 3/2	Silty loam	Expansion to a 1 x 1 unit
	2	10YR 4/4-4/6	Sand	
	3	10YR 3/3-3/4	Silty sand	gravel
	4	10YR 3/4-4/4	Sand	
	5	10YR 3/6-4/6	Sand	
	6	10YR 3/3 mottled with ¾	Silty sand	18th century
	Feature 8	10YR 3/2-3/3	Silty sand	18th century?
	7	10YR 2/1-2/2	Silty sand	
	Feature 9	10YR 2/1	Silty sand and loam	Prehistoric midden
	8	10YR 4/6	Silt with some loam	Interface between shell midden and subsoil
	Feature 11	10YR 3/2	Sand with silt	Dark circular feature with possible post molds in it
	Feature 12	10YR 3/1	Silt	Post mold?
	Features 13 and 14	10YR ¾ mottled with 3/3	Silty sand	Feature 14 probably a rodent burrow
N200 E 153.5	1	10YR 3/3	Silty loam	Unit later expanded to a 1 x 1 meter unit
	2	10YR 4/4	Sandy silt	

Unit	Stratum	Color	Composition	Comments
N200 E 153.5	3	10YR 5/4	Sandy silt	
	4	10YR 4/6 with 4/1	Sandy silt	
N200 E 154	1	10YR 3/3	Silty loam	1 x 1 expansion from N200 E153.5
	Feature 6	10YR 3/3	Silty loam	Trench for irrigation system
	2	10YR 4/4	Sandy silt	
	3	10YR 4/4	Sandy silt	
	4	10YR 4/4 with 3/2	Sandy silt	
	Feature 9	10YR 2/1	Silt with shell	
	Feature 15	10YR 2/1	Loam	Substantially less shell; either a slope or a pit
	5	10YR 3/ 4	Silty loam	Subsoil
N205 E153.5	1	10YR 4/4	Silty loam	
	2	10YR 3/2 mottled	Sandy silt with gravel	Irrigation pipe seen in western side of unit
	3	10YR 4/4	Sand	MC found in top level; remainder including core was sterile
N210 E150	1	10YR 4/4	Sandy loam	Probably trench fill, but no edges were found.
N210 E153.5	1	10YR 3/3	Sandy loam	
	Feature 3	10YR 4/4 Mottled	Loam	Pit containing rebar
	2	7.5 YR 5/6	Sandy silt	Sterile
	Feature 4			Irrigation pipe
N220 E150	1	10YR 3/4-3/6	Sandy loam	Probably trench fill, but no edges were found
	Feature 1	10YR 3/3-4	Sandy loam	Irrigation pipe and trench; cut into Stra. 1.
N230 E153	1	10YR 4/3	Sandy loam	Probably trench fill, but no edges were found
	Feature 2	10YR 3/3	Silty sandy loam	Trench containing irrigation system wires.

C-14 Calibration Information.

UNIVERSITY OF WASHINGTON
QUATERNARY ISOTOPE LAB
RADIOCARBON CALIBRATION PROGRAM REV 4.1.2
(Stuiver and Reimer, 1993:215-230)

Calibration file(s): intcal98.14c
Listing file: c14fil.lst
Export file: c14res.csv

Geo 1
Sample 1

Radiocarbon Age B.P.	895 ± 190	Reference
Calibrated age(s)	cal A.D. 1161 cal B.P. 789	(Stuiver et al. 1998a)

cal A.D./B.C.(cal B.P.) age ranges obtained from intercepts (Method A):

one Sigma**	cal A.D.	980-1289 (970-661)
two Sigma**	cal A.D.	694-698 (1256-1252)
		717-748 (1233-1202)
		766-1419 (1184-531)

Summary of above:
maximum of cal age ranges (cal ages) minimum of cal age ranges:

1 sigma	cal A.D.	980 (1161) 1289
	cal B.P.	970 (789) 661
2 sigma	cal A.D.	694 (1161) 1419
	cal B.P.	1256 (789) 531

cal A.D./B.C. & cal B.P. age ranges (cal ages as above)
from probability distribution (Method B):

% area enclosed		cal A.D. (cal B.P.) age ranges	relative area under probability distribution
68.3 (1 sigma	cal A.D.	974-1293 (976-657)	1.000
95.4 (2 sigma)	cal A.D.	730-735 (1220-1215)	.004
		772-1411 (1178-539)	.996

Geo 2
Sample 2

Radiocarbon Age B.P. 1035 ± 75 Reference

Calibrated age(s) cal A.D. 1002, 1012, 1016 (Stuiver et al. 1998a)
cal B.P. 948, 938, 934

cal A.D./B.C. (cal B.P.) age ranges obtained from intercepts (Method A):

one Sigma**	cal A.D.	902–917 (1048–1033)
		961–1034 (989–916)
two Sigma**	cal A.D.	784–787 (1166–1163)
		879–1163 (1071–787)
		1175–1176 (775–774)

Summary of above:
maximum of cal age ranges (cal ages) minimum of cal age ranges:

1 sigma	cal A.D.	902 (1002, 1012, 1016) 1034
	cal B.P.	1048 (948, 938, 934) 916
2 sigma	cal A.D.	784 (1002, 1012, 1016) 1176
	cal B.P.	1166 (948, 938, 934) 774

cal A.D./B.C. & cal B.P.age ranges (cal ages as above)
from probability distribution (Method B):

% area enclosed	cal A.D. (cal B.P.) age ranges		relative area under probability distribution
68.3 (1 sigma)	cal A.D.	896–926 (1054–1024)	.166
		940–1042 (1010–908)	.700
		1098–1114 (852–836)	.087
		1144–1151 (806–799)	.047
95.4 (2 sigma)	cal A.D.	788–791 (1162–1159)	.007
		820–844 (1130–1106)	.015
		860–1187 (1090–763)	.979

Geo 3
Sample 3

Radiocarbon Age B.P. 1485 ± 225 Reference

Calibrated age(s) cal A.D. 599 (Stuiver et al. 1998a)
cal B.P. 1351

cal A.D./B.C. (cal B.P.) age ranges obtained from intercepts (Method A):

one Sigma**	cal A.D.	265–267 (1685–1683)
		341–724 (1609–1226)
		740–771 (1210–1179)
two Sigma**	cal A.D.	72–1002 (1878–948)
		1011–1016 (939–934)

Summary of above:
maximum of cal age ranges (cal ages) minimum of cal age ranges:

1 sigma	cal A.D.	265 (599) 771
	cal B.P.	1685 (1351) 1179
2 sigma	cal A.D.	72 (599) 1016
	cal B.P.	1878 (1351) 934

cal A.D./B.C. & cal B.P. age ranges (cal ages as above)
from probability distribution (Method B):

% area enclosed	cal A.D. (cal B.P.) age ranges		relative area under probability distribution
68.3 (1 sigma)	cal A.D.	262–277 (1688–1673)	.031
		325–326 (1625–1624)	.015
		336–776 (1614–1174)	.954
95.4 (2 sigma)	cal A.D.	82–991 (1868–959)	1.000

average
average

Radiocarbon Age B.P. 1057 ± 68 Reference

Calibrated age(s) cal A.D. 994 (Stuiver et al. 1998a)
cal B.P. 956

cal A.D./B.C. (cal B.P.) age ranges obtained from intercepts (Method A):

one Sigma**	cal A.D.	898–921 (1052–1029)
		944–1023 (1006–927)
two Sigma**	cal A.D.	783–789 (1167–1161)
		828–840 (1122–1110)
		863–1059 (1087–891)
		1086–1123 (864–827)
		1138–1156 (812–794)

Summary of above:
maximum of cal age ranges (cal ages) minimum of cal age ranges:

1 sigma	cal A.D.	898 (994) 1023
	cal B.P.	1052 (956) 927
2 sigma	cal A.D.	783 (994) 1156
	cal B.P.	1167 (956) 794

cal A.D./B.C. & cal B.P. age ranges (cal ages as above)
from probability distribution (Method B):

% area enclosed	cal A.D. (cal B.P.) age ranges		relative area under probability distribution
68.3 (1 sigma)	cal A.D.	895–932 (1055–1018)	.228
		934–1027 (1016–923)	.772

95.4 (2 sigma)	cal A.D.	783–788 (1167–1162)	.010
		812–849 (1138–1101)	.037
		855–1067 (1095–883)	.852
		1080–1130 (870–820)	.068
		1134–1157 (816–793)	.034

References for datasets used:
Stuiver, M., Reimer, P. J., Bard, E., Beck, J. W., Burr, G. S., Hughen, K. A., Kromer, B., McCormac, F. G., v.d. Plicht, J., and Spurk, M. (1998) *Radiocarbon* 40:1041–1083.

Comments:
* This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2)
where ^2 = quantity squared.
[ ] = calibrated with an uncertain region or a linear extension to the calibration curve
0* represents a "negative" age B.P.
1955* denotes influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr.

APPENDIX 4

Faunal Identification Tables.

TABLE 1. MAMMAL TAXA FROM EAST & WEST TRENCH WALLS, LIBERTY ISLAND, NEW YORK

East wall	West wall	Cat#	#Spec	Wt.	Element	Taxon	Comments
11.3m. -Black Stain above		001	1	3.2 g	lumbar vertebra	*Ovis/Capra*	fused; split?
11.3m.-Black Stain above		002	1	0.6 g	rib	*Ovis/Capra*	small fragment
	West wall hist. level	003	1	438.3 g	tibia	*Bos* (ox)	almost complete
10.2m.-Black Stain above		004	1	0.5 g	rib shaft	*Ovis/Capra*	*small fragment*
13.3m.-Top of Black Stain		005	1	3.3 g	vertebra	Medium-size	abnormal growth -artic. surface margin
13.3m.-Top Black Stain		006	1	1.3 g	Fragment	Medium-size	
5.3m.-Middle of shell layer		007	1	2.2 g	shaft fragment	Med/Lg	splinter only
4.5m-Base of fill-top of dark		008	1	47.5 g	R distal humerus	*Bos*	sawn; rodent gnawing; split off shaft?
4.5m.-Base of fill-Top of dk.		009	1	59.3 g	cervical vertebra	*Bos*	Large animal; unfused; split
10.9m.-Black Stain above		010	1	19.1 g	proximal rib	*Bos*	large animal
10.9m.-Black Stain above		011	1	63.1 g	L proximal ulna	*Bos*	large animal; unfused
10.9m. Black Stain above		012	1	2.3 g	R proximal radius	*Ovis*	split off?
10.9m.-Black Stain above		013	1	1.3 g	scapula fragment	Medium-size	
	West wall hist. level	014	1	4.1 g	sacrum	*Sus*	unfused; split?; small/young animal
	West wall hist. level	015	1	1.2 g	sacrum	*Sus*	R side; unfused; split?
	West wall hist. level	016	1	0.7 g	fragment	Med/Lg	
	West wall hist. level	017	2	0.3 g	fragment	Medium-size	
	13.3m.-Bone base on dk	018	1	0.7 g	lumbar vertebra	Medium-size	small frament; fused
	12.85m.-In shell layer	019	1	1.2 g	lumbar vertebra	Medium-size	small fragment; unfused

TABLE 2. AVIFAUNA FROM LIBERTY ISLAND, NEW YORK

Unit	Level	Feature	Cat#	#Spec	Wt.	Element	Taxon	Comments
	3	1	020	1	0.1 g	R Proximal	*Colinus*	Northern bobwhite quail
	2	1	025	1	1.0 g	L ulna	Anatinae	almost complete; mature
	2	1	026	1	0.8 g	R proximal humerus	*Aytha vallsineria*	Canvasback duck
	2	1	027	1	1.1 g	R coracoid	*Anas* sp.	smaller than mallard
	2	1	028	1	1.7 g	L tibiotarsus shaft	cf. *Pelicanus* sp.	fledgling/nestling
	2	1	029	1	1.2 g	L femur	*Pelicanus* ? sp.	immature bird
	2	1	030	1	0.3 g	R carpometacarpus	Anatinae	Duck
	2	1	031	1	0.3 g	tibiotarsus shaft	Aves	immature bird
	2	1	032	1	0.3 g	tarsometatarsus	Pelecaniformes	Order includes pelicans;
	2	1	033	1	0.2 g	L femur	Aves	small fragment; immature
	2	1	034	1	0.05 g	Phalange	Aves	whole bone; immature bird
	2	1	035	1	0.05 g	proximal radius	Aves	immature bird; resembles
	2	1	036	1	0.05 g	radius shaft	Aves	immature bird
	2	1	037	1	0.05 g	shaft fragment	Aves	immature bird
	2	1	038	1	0.05 g	shaft fragment	Aves	duck-size bird
	2	1	039	1	0.05 g	fragment	Aves?	
N200 E154	1	9	30628	1	0.1 g	Distal	Aves	Medium size
N200 E154	4	9	31280	2	0.05 g	shaft fragments	Aves	Large bird
N200 E149	1	9	31300-1-	1	0.15 g	shaft fragment	Aves	
N200 E149	45-60	9	31302-2	1	0.05 g	shaft fragment	Aves/Mammalia	WII clean-up N & E

TABLE 3. BIVALVES FROM LIBERTY ISLAND, NEW YORK

Unit	Level	Feature	Cat#	#Spec	Wt.	Taxon	Comments
Trench backfill		Shell midden	044	1	149.0 g	*Crassostrea*	L=11.8cm W=8.0cm
Trench backfill		Shell midden	042	1	184.0 g	*Crassostrea*	L=21cm W=7.5cm
Trench backfill		Shell midden	043	1	133.0 g	*Crassostrea*	L=16.7cm W=7.5cm
Trench backfill		Shell midden	045	1	55.0 g	*Crassostrea*	L=8.5cm W=6.2cm
N200 E149	1	9	31300-3	1	0.15 g	Mollusca	probably *Crassostrea*
N195 E149	1	9			300+ g	Bivalvia	
N195 E149	1	9		13	56.7 g	*Crassostrea*	flotation
N195 E149	1	9		2	1.32 g	*Mya arenaria*	flotation
n195 E149	1	9		3	0.03 g	*Geukensia*	flotation
N195 E149	1	9		1	0.26 g	Bivalvia	flotation
N200 E149	1	9			300+ g	Bivalvia	flotation
N200 E149	1	9		16	21.1 g	*Mya arenaria*	
N200 E149	1	9		10	76.8 g	*Crassotrea*	flotation
N200 E149	1	9			242 g	Bivalvia	
N200 E149	2	9		7	44.7 g	*Crassotrea*	
N200 E149	2	9		2	6.7 g	*Mya arenaria*	
N200 E149	3	9			65.9 g	Bivalvia	
N200 E149	3	9		9	34.7 g	Crassostrea	
N200 E149	3	9		1	0.31 g	Mya arenaria	
N200 E149	3	9		3	0.20 g	*Geukensia*	
N200 E154	2	9			300+ g	Bivalvia	
N200 E154	2	9		5	28.6 g	*Crassostrea*	
N200 E154	2	9		4	3.5 g	*Mya arenaria*	
N200 E154	2	9		1	0.01 g	*Geukensia*	
N200 E154	3	9		10	41.64 g	*Crassostrea*	

TABLE 3. BIVALVES FROM LIBERTY ISLAND, NEW YORK

Unit	Level	Feature	Cat#	#Spec	Wt.	Taxon	Comments
N200 E154	3	9		1	0.02 g	*Geukensia*	
N200 E154	3	9		1	0.31	Unidentified	
N200 E154	4	9			264.7 g	Bivalvia	
N200 E154	4	9		10	43.1 g	*Crassostrea*	
N200 E154	4	9		1	0.4 g	*Mya arenaria*	
N200 E154	5	9			229.5 g	Bivalvia	
N200 E154	5	9		8	8.6 g	*Mya arenaria*	
N200 E154	5	9		13	53.9 g	*Crassostrea*	valves smaller this level
N200 E154	5	9		9	4.8 g	Unidentified	
N200 E154	5	9			123.8 g	Bivalvia	
N200 E154	6	9		9	37.1 g	*Crassostrea*	
N200 E154	6	9		5	7.9 g	*Mya arenaria*	
N200 E154	6	9		1	3.1 g	cf. *Mercenaria*	Quahog clam
N200 E149		12			3.65 g	Bivalvia	
N200 E149		9		1	3.3 g	*Crassostrea*	
N200 E149		9		1	0.6 g	Bivalvia	
N200 E149		9		1	0.02 g	*Geukensia*	
N200 E154	1	15			43.4 g	Bivalvia	
N200 E154	1	15		3	17.1 g	*Crassostrea*	
N200 E154	1	15		5	7.3 g	*Mya arenaria*	
N200 E154	2	15			13.2 g	Bivalvia	
N200 E154	2	15		1	0.6 g	*Crassostrea*	
N200 E154	2	15		1	0.4 g	Mya arenaria	

TABLE 4. GASTROPODS FROM LIBERTY ISLAND, NEW YORK

Unit	Level	Feature	Cat#	#Spec	Taxon	Comments
		1	046	3	Gastropoda	1/8" screen
N194 E149	1	9		54	Gastropoda	
N200 E149	1	9		79	Gastropoda	
N200 E149	2	9		98	Gastropoda	
N200 E149	3	9		57	Gastropoda	
N200 E154	2	9		2	*Crepidula* sp.	<1cm size
N200 E154	2	9		59	Gastropoda	
N200 E154	3	9		170	Gastropoda	
N200 E154	4	9		120	Gastropoda	
N200 E154	4	9		2	*Crepidula* sp.	<1cm size
N200 E154	5	9		13	Gastropoda	more fragile & opaque this level
N200 E154	6	9		48	Gastropoda	
N200 E149		9		37	Gastropoda	
N200 E154	1	15		20	Gastropoda	
N200 E154	2	15		2	Gastropoda	

TABLE 5. FISH TAXA FROM 1985 & 1999 EXCAVATIONS, LIBERTY ISLAND, NEW YORK

Unit	Level	Feature	Cat#	#Spec	Wt.	Element	Taxon	Comments
N200 E149	3	9		1	0.05 g	vertebra	Osteichthyes	
N200 E149	3	9		3	0.01 g	unidentified	Osteichthyes	miscellaneous
N200 E149	3	9		2	<0.01g	pharyngobranchial	Osteichthyes	2-3mm size range
N200 E149	3	9		13	0.1 g	unidentified frags.	Osteichthyes	misc.
N200 E149	3	9		1	<0.01 g	fish scale	Osteichthyes	
N200 E154	2	9		1	0.01 g	fish scale	Ostheichthyes	
N200 E154	2	9		1	0.01 g	spine	Osteichthyes	
N200 E154	2	9		3	0.01 g	unidentified	Osteichthyes	
N200 E154	3	9		1	<0.01 g	spine	Osteichthyes	partially charred?
N200 E154	3	9		2	0.02 g	fragments	Osteichthyes	
N200 E154	4	9		1	<0.01 g	fish scale	Osteichthyes	
N200 E154	4	9		1	0.06 g	Unidentified	Osteichthyes	identifiable
N200 E154	4	9		6	0.12 g	fragments	Osteichthyes	misc. fragments
N200 E154	6	9		2	0.01 g	fragments	Osteichthyes	
N200 E154	1	15		2	0.01	fragment	Osteichthyes	

TABLE 5. FISH TAXA FROM 1985 & 1999 EXCAVATIONS, LIBERTY ISLAND, NEW YORK

Unit	Level	Feature	Cat#	#Spec	Wt.	Element	Taxon	Comments
	3	1	021 a	1	0.05 g	opercle	cf. *Morone americana*	white perch
	3	1	021 b	3	0.05 g	lateral facial bones	unidentified (*Morone*?	likely same fish
	3	1	021	1	0.05 g	preopercle	cf. *Morone americana*	
	3	1	022 a	1	0.2 g	L Angular-articular	*Opsanus tau*	Oyster toadfish
	3	1	022 b	1	0.2 g	R Angular-articular	*Opsanus tau*	
	3	1	023 a	1	0.05 g	maxilla	Osteichthyes	unidentified species
	3	1	023 b	1	0.02 g	Opercular	*Opsanus tau*	
	3	1	023 c	1	0.02 g	trunk vertebra	Unidentified	
	3	1	023 d	1	0.1 g	L cleithrum	*Opsanus tau*	
	3	1	023 e	1	0.1 g	vertebra	Unidentified	
	3	1	023 f	1	0.1 g	R quadrate	*Opsanus tau*	
	3	1	024	1	0.5 g	R dentary	*Opsanus tau*	
	3	1	040	1	0.03 g	vertebra	Osteichthyes	Gadidae? (cod)-Clupeidae?
	3	1	041	1	0.02 g	fragment	Osteichthyes	
N200 E154	3	9	31279-1	1	0.40 g	dorsal ray	cf. *Morone saxitilis*	Striped bass
N200 E149	1	9	31299-1	1	0.05 g	L angular	cf. Gadidae	Large fish; cod family?
N200 E149	45-60		31301-1	1	0.05 g	vertebra	Osteichthyes	Wall clean-up N & E
N195 E149	1	9		2	<0.01 g	spine	Osteichthyes	flotation
N195 E149	1	9		1	<0.01 g	scale fragment	Osteichthyes	flotation
N195 E149	1	9		5	0.03 g	unidentified	Osteichthyes	flotation; misc bone
N200 E149	1	9		1	0.03	vertebra	Osteichthyes	
N200 E149	1	9		3	0.02 g	fragments	Osteichthyes	
N200 E149	1	9		1	<0.01 g	fish scale	Osteichthyes	
N200 E149	2	9		1	0.01 g	fish scale	Osteichthyes	
N200 E149	2	9		1	0.01 g	bone	Osteichthyes	

TABLE 6, MAMMAL TAXA FROM THE 1999 EXCAVATION, LIBERTY ISLAND, NEW YORK

Unit	Level	Bag#	Cat#	#Spec	Wt.	Element	Taxon	Comments
N200 E154	1		31277-2	1	69.1 g	carpal	*Bos* sp.	complete bone
N200 E154	1		31277-1	1	17.0 g	R astragalus	*cf. Odocoileus virginianus*	complete bone
N200 E154	1		31278-1	1	55.1 g	shaft fragment	Large mammal	
N200 E154	1		31278-2	1	8.0 g	Distal tibia?	Med/Lg	small fragment
N200 E154	1		31278-3	1	5.0 g	fragment	Med/Lg	cancellous bone
N200 E154	5		31381	1	1.2 g	R proximal metatarsal	*Odocoileus*	small shaft fragment
N200 E149	1		31299-2	1	0.2 g	L mandible?	Small mammal ?	
N200 E149	1		31299-3	1	0.1 g	L mandible	Microtinae	*Synaptomys*? (S. bog lemming?)
N200 E149	1		31299-4	1	0.05 g	L femur	Microtinae	
N200 E149	1		31299-5	1	0.03 g	L pelvis	Microtinae	
N200 E149	1		31300-2	1	0.25 g	fragment	Med/Lg	
N200 E149	45-60		31302-1	1	0.1 g	fragment	Mammalia	Wall clean-up N & E
N200 E149	45-60		31302-3	3	13.0 g	fragments	Med/Large	Wall clean-up N & E
N200 E149	45-60		31302-4	1	0.13 g	ilium (pelvis)	Medium size	Wall clean-up; young? animal
N195 E149	1		31342-1	1	0.5 g	rib shaft	Canidae	dog family
N195 E149	1		31342-2	1	0.9 g	fragment	Med/Lg	
N195 E149	1		31342-3	1	0.5 g	fragment	Med/Lg	flotation
N200 E154	3			1	0.1 g	fragment	cf. Mammalia	resembles mammal
N200 E154	1			1	0.18	fragment	Mammalia	

Regional Compilation of Plant Remains.

CHARRED PLANT REMAINS FROM ARCHAEOLOGICAL SITES DATING BETWEEN 4,000 BP AND CONTACT
A REGIONAL PERSPECTIVE **Massachusetts**

Prepared by Lucinda McWeeney, PH. D., Archaeobotanist, September 1999

SITES	DATE	*Acer*	*Betula*	*Carpin/Ostr*	*Carya*	*Carya shell*	*Castanea*	*Cheno/Am*	*Cornus*	*Corylus*	*Fagus*	*Fraxinus*
Millbury III												
Sample 1	3830+/-110											
Sample 2	?											
Sample 3	?											
Sample 4	3610+/-90											
Sample 5	3250+/-80											
Sample 6	?											
Sample 7	?											
Polpis Rd.,Nantucket	?	2										
Lucy Vincent, MV	Lt. Wdlnd											
Nauset Lagoon, Cape Co	2200BP				1							

CHARRED PLANT REMAINS FROM ARCHAEOLOGICAL SITES DATING BETWEEN 4,000 BP AND CONTACT

A REGIONAL PERSPECTIVE **Massachusetts**

Prepared by Lucinda McWeeney, PH. D., Archaeobotanist, September 1999

Juglandaceae	*J. nigra*	*Juglans nut*	*Magnolia*	*Pinaceae*	*P. strobus*	*Platanus*	*Quercus*	*Q. nutshell*	*Rubus*	*Salix*	*Sassafras*	*Ulmus*	Vitis
							5						
				1	2		8						
							5						
							5						
							5						
							8						
							5						
							28						
			1				3						

CHARRED PLANT REMAINS FROM ARCHAEOLOGICAL SITES DATING BETWEEN 4,000 BP AND CONTACT
A REGIONAL PERSPECTIVE **New York**

Prepared by Lucinda McWeeney, PH. D., Archaeobotanist, September 1999

SITES	DATE*AD	*Acer*	*Alnus*	*Betula*	*Carpin/Ost*	*Carya*	*C. nut*	*Castanea*	*Celtis*	*Cheno/Am*	*Conife*	*Cornus*	*Corylus*	*Diospyros*	*Fagus*
Tottenville	630-1040														
	1335-1480					1									
Bowmans Brook	930-1235					1		1	1						
Pelham Bay Knolls	1205-1325					1									
	1420-1650					1									
Port Washington	765-175 BC					1									
	1220-1410							1							
	1400-1525					1		1							
Sebonac, L.I.	1280-1415					1									

*From Ceci, ms., ID by McWeeney
Radiocarbon dates are based on a 5,568 half life

SITES	DATE*AD	*Acer*	*Alnus*	*Betula*	*Carpin/Ost*	*Carya*	*C. nut*	*Castanea*	*Celtis*	*Cheno/Am*	*Conife*	*Cornus*	*Corylus*	*Diospyros*	*Fagus*
Ellis Island						pollen	2								
French, ms. 1989															
Liberty Island						c/p	6	pollen			2				
Largy, ms. 1985															
104.41.50.55, Staten I	nd	4				1	327				22				1
several features															
Somers			16		cf.2	16	20	9			1	2			
Wickes Creek															

c=charcoal, p=pollen

CHARRED PLANT REMAINS FROM ARCHAEOLOGICAL SITES DATING BETWEEN 4,000 BP AND CONTACT
A REGIONAL PERSPECTIVE New York
Prepared by Lucinda McWeeney, PH. D., Archaeobotanist, September 1999 p.2

Fraxinus	Juglandace	J. nigra	J. nut	Nyssa	Oxydendro	Pinaceae	P. strobus	Platanus	Prunus	Quercus	Q. nuts	Rubus	Salix	Sassafras	Tilia	Ulmus
	1															
										2						1
										2						
									1							
					1				1	1					1	

Fraxinus	Juglandace	J. nigra	J. nut	Nyssa	Oxydendro	Pinaceae	P. strobus	Platanus	Prunus	Quercus	Q. nuts	Rubus	Salix	Sassafras	Tilia	Ulmus
	5															
										pollen						
										c=68	2					
5				8					1	69						1

CHARRED PLANT REMAINS FROM ARCHAEOLOGICAL SITES DATING BETWEEN 4,000 BP AND CONTACT
A REGIONAL PERSPECTIVE **New Jersey** p.1
Prepared by Lucinda McWeeney, PH. D., Archaeobotanist, September 1999

SITES	DATE*	*Acalypha*	*Acer*	*Alnus*	*Betula*	*Carpin/Os*	*Carya*	*C. nut*	*Castanea*	*Cheno/Am*	*Cornus*	*Corylus*	*Diospyro*	*Fagus*	*Fraxinus*
Sediment Core															
Hackensack Tidal Marsh	2610+/-130		p	m/p			p								p
Peteet 1980	RL-1033														
Archaeological Sites															
Pine Breeze Island	nd	NC 3	2				2						1		
Delaware Water Gap	nd		1				5								3
Sturgeon Pond															
S219.5	1390AD														
S214.5W74.5*	1750 BC						1								
S214.5W82-92	nd					2									4
S217W72	nd						1								1
S232W74.5	nd													1	1
S237 W42	nd														

* Feature in S214.5W74.5 was dated

*Uncalibrated radiocarbon dates yrs. BP
m=plant macrofossils
p=pollen
NC=not charred

CHARRED PLANT REMAINS FROM ARCHAEOLOGICAL SITES DATING BETWEEN 4,000 BP AND CONTACT
A REGIONAL PERSPECTIVE **New Jersey**
Prepared by Lucinda McWeeney, PH. D., Archaeobotanist, September 1999

Juglandace	*J. nigra*	*J. nut*	*Liquadamb*	*Oxydendro*	*Pinus*	*P. strobus*	*Platanu*	*Prunus*	*Quercus*	*Q. nutshell*	*Rubus*	*Salix*	*Sassafras*	*Tsuga*	*Ulmus*	Vitis
			p		p				p						p	
3									1							
				1												
1									1							
				1				1								

CHARRED PLANT REMAINS FROM ARCHAEOLOGICAL SITES DATING BETWEEN 4,000 BP AND CONTACT p.1

A REGIONAL PERSPECTIVE Connecticut

Prepared by Lucinda McWeeney, PH. D., Archaeobotanist, September 1999

SITES	DATE	*Acer*	*Betula*	*Carpin/Ostr*	*Carya*	*C. nut*	*Castanea*	*Cheno**	*Cornus*	*Corylus*	*Fagus*	*Fraxinus*	*Juglandaceae*
CT													
Morgan, Rocky Hill	Lt Wdlnd												
	1170 AD	1		2									1
	nd	2		2									
	1200 AD	1			2								17**
	1360 AD				6	2		17					1
Fea. 10		1			5	27						2	3
*Are the Chenopodium/Amaranth. really charred?													
**Includes *J. nigra AMS=1065AD*													
Rye Hill, Woodbury	?				2					11			
Antonelli, Bethany	?										1		
Grannis Is., New Haven	?				1								
Manakaway, Greenwich	1300 AD		2		3		cf. 2		5				
Indian Field, Greenwich	Lt. Wdlnd	1	4	1	34	602							1
Cobb Island, Greenwich	1090 AD				24	2							
included maize Comstock Brook, Wilton	?						6				1		
Hoosegow, Newtown	Mid-Lt Wdlnd						1						

CHARRED PLANT REMAINS FROM ARCHAEOLOGICAL SITES DATING BETWEEN 4,000 BP AND CONTACT p.2
A REGIONAL PERSPECTIVE **Connecticut**
Prepared by Lucinda McWeeney, PH. D., Archaeobotanist, September 1999

J. nigra	*J. nut*	*Oxydendron*	*Pinaceae*	*P. rigida*	*Platanus*	*Quercus*	*Q. nutshell*	*Rubus*	*Salix*	*Sassafras*	*Ulmus*	*Vitis*
					4						6	
					2						1	
					9	4				1	25	
1	3				7			3			13	
	43		1			3	4				84	
						9						
						4						
						12						
		cf. 1		1		13						
	10					28						
						14	1					1
						6			3			
1						3						

1999 Catalog of Artifacts.

PROVEN	PREHCNT	PREHWT	HISTCNT	HISTWT	UNKCNT	UNKWT	CERAMIC	REDWARE	TINENAMEL	CBUFFBODY	CREAMWARE
N173 E147.5, STRA 1 TOTALS	0	0.00	23	101.50	0	0.00	0	0	0	0	0
N173 E147.5, STRA 2 TOTALS	0	0.00	10	45.90	0	0.00	0	0	0	0	0
N173 E147.5, STRA 3 TOTALS	0	0.00	10	8.90	0	0.00	2	0	0	0	0
N173 E147.5, STRA 4 TOTALS	0	0.00	9	24.90	0	0.00	0	0	0	0	0
N173 E147.5, STRA 5 TOTALS	0	0.00	9	399.50	0	0.00	0	0	0	0	0
N173 E147.5 TOTALS	0	0.00	61	580.70	0	0.00	2	0	0	0	0
N175.5 E147.5, FEAT 16 TOTALS	0	0.00	46	271.40	0	0.00	2	0	0	0	0
N175.5 E147.5, STRA 1 TOTALS	0	0.00	14	70.20	0	0.00	0	0	0	0	0
N175.5 E147.5, STRA 2 TOTALS	0	0.00	17	92.62	0	0.00	1	0	0	1	0
N175.5 E147.5, STRA 3 TOTALS	0	0.00	41	94.80	0	0.00	0	0	0	0	0
N175.5 E147.5, STRA 4 TOTALS	0	0.00	6	16.10	0	0.00	0	0	0	0	0
N175.5 E147.5, STRA 5 TOTALS	0	0.00	6	10.30	0	0.00	0	0	0	0	0
N175.5 E147.5, STRA 6 TOTALS	0	0.00	4	2.20	0	0.00	0	0	0	0	0
N175.5 E147.5, STRA 7 TOTALS	0	0.00	13	43.50	0	0.00	1	0	0	0	0
N175.5 E147.5, STRA 8 TOTALS	0	0.00	4	44.50	0	0.00	0	0	0	0	0
N175.5 E147.5 TOTALS	0	0.00	151	645.62	0	0.00	4	0	0	1	0
N178 E147.5, STRA 10 TOTALS	0	0.00	11	280.40	0	0.00	2	0	0	0	1
N178 E147.5, STRA 2 TOTALS	0	0.00	24	165.50	0	0.00	0	0	0	0	0
N178 E147.5, STRA 4 TOTALS	0	0.00	25	196.50	0	0.00	0	0	0	0	0
N178 E147.5, STRA 5 TOTALS	0	0.00	51	474.30	0	0.00	1	0	0	0	0
N178 E147.5, STRA 6 TOTALS	0	0.00	41	95.30	0	0.00	1	0	0	0	0
N178 E147.5, STRA 7 TOTALS	0	0.00	17	88.70	0	0.00	4	2	0	0	1
N178 E147.5 TOTALS	0	0.00	169	1300.70	0	0.00	8	2	0	0	2
N178 E148, STRA 10 TOTALS	0	0.00	6	2.20	0	0.00	0	0	0	0	0
N178 E148, STRA 2 TOTALS	0	0.00	12	53.90	0	0.00	0	0	0	0	0
N178 E148, STRA 3 TOTALS	0	0.00	74	464.60	0	0.00	0	0	0	0	0
N178 E148, STRA 4 TOTALS	0	0.00	46	329.10	0	0.00	1	0	0	0	0
N178 E148, STRA 5 TOTALS	0	0.00	17	32.30	0	0.00	3	0	0	0	0
N178 E148, STRA 6 TOTALS	0	0.00	40	433.34	0	0.00	4	0	0	0	0
N178 E148, STRA 7 TOTALS	0	0.00	43	157.10	0	0.00	1	0	0	0	0
N178 E148, STRA 8 TOTALS	1	0.50	22	40.70	0	0.00	2	0	0	0	1
N178 E148, STRA 9 TOTALS	0	0.00	22	119.30	0	0.00	1	0	0	0	0
N178 E148 TOTALS	1	0.50	282	1632.54	0	0.00	12	0	0	0	1

PROVEN	PEARLWARE	WHITEWARE	OTHEARTH	PORCELCNT	WSGSTONE	DBSTONE	OTHSTONE	TPIPES	BOTTLEGL	DRVESGL	INDVESGL
N173 E147.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N173 E147.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N173 E147.5, STRA 3 TOTALS	0	2	0	0	0	0	0	0	0	0	0
N173 E147.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	1	0	0
N173 E147.5, STRA 5 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N173 E147.5 TOTALS	0	2	0	0	0	0	0	0	1	0	0
N175.5 E147.5, FEAT 16 TOTALS	0	2	0	0	0	0	0	1	0	0	0
N175.5 E147.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N175.5 E147.5, STRA 2 TOTALS	0	0	0	0	0	0	0	1	2	0	0
N175.5 E147.5, STRA 3 TOTALS	0	0	0	0	0	0	0	2	0	0	0
N175.5 E147.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	1
N175.5 E147.5, STRA 5 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N175.5 E147.5, STRA 6 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N175.5 E147.5, STRA 7 TOTALS	1	0	0	0	0	0	0	0	0	0	0
N175.5 E147.5, STRA 8 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N175.5 E147.5 TOTALS	1	2	0	0	0	0	0	4	2	0	1
N178 E147.5, STRA 10 TOTALS	0	0	0	0	0	0	1	0	0	0	0
N178 E147.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N178 E147.5, STRA 4 TOTALS	0	0	0	0	0	0	0	1	0	0	0
N178 E147.5, STRA 5 TOTALS	1	0	0	0	0	0	0	0	1	0	0
N178 E147.5, STRA 6 TOTALS	0	0	1	0	0	0	0	0	0	0	0
N178 E147.5, STRA 7 TOTALS	1	0	0	0	0	0	0	0	0	0	0
N178 E147.5 TOTALS	2	0	1	0	0	0	1	1	1	0	0
N178 E148, STRA 10 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N178 E148, STRA 2 TOTALS	0	0	0	0	0	0	0	0	1	0	1
N178 E148, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	0	2
N178 E148, STRA 4 TOTALS	0	1	0	0	0	0	0	0	2	0	0
N178 E148, STRA 5 TOTALS	0	2	0	0	0	0	1	0	1	0	0
N178 E148, STRA 6 TOTALS	1	2	1	0	0	0	0	1	6	0	0
N178 E148, STRA 7 TOTALS	1	0	0	0	0	0	0	0	0	0	0
N178 E148, STRA 8 TOTALS	0	0	0	0	0	0	1	0	0	0	0
N178 E148, STRA 9 TOTALS	0	0	0	0	0	0	1	0	1	0	0
N178 E148 TOTALS	2	5	1	0	0	0	3	1	11	0	3

PROVEN	BOTCLOS	APPAREL	PERSCNT	WINGLASSCT	WRTNAILCT	CUTNAILCT	WIRNAILCT	INDNAILCT	OFASTDCNT	STRUCTCT	STRUCTWT
N173 E147.5, STRA 1 TOTALS	0	0	0	1	0	0	0	0	0	10	85.20
N173 E147.5, STRA 2 TOTALS	0	0	0	0	0	0	0	1	0	3	26.40
N173 E147.5, STRA 3 TOTALS	0	0	0	2	0	0	0	0	0	0	0.00
N173 E147.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N173 E147.5, STRA 5 TOTALS	0	0	0	0	0	0	0	0	0	2	334.40
N173 E147.5 TOTALS	0	0	0	3	0	0	0	1	0	15	446.00
N175.5 E147.5, FEAT 16 TOTALS	0	0	0	1	0	0	1	0	0	4	188.20
N175.5 E147.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	6	45.20
N175.5 E147.5, STRA 2 TOTALS	0	0	0	1	0	1	0	0	0	2	46.32
N175.5 E147.5, STRA 3 TOTALS	0	0	0	1	0	1	1	0	0	4	37.20
N175.5 E147.5, STRA 4 TOTALS	0	0	0	0	0	0	0	1	0	0	0.00
N175.5 E147.5, STRA 5 TOTALS	0	0	0	0	0	0	0	0	0	3	6.10
N175.5 E147.5, STRA 6 TOTALS	0	0	0	0	0	0	0	0	0	1	0.30
N175.5 E147.5, STRA 7 TOTALS	0	0	0	0	0	0	0	0	0	3	40.20
N175.5 E147.5, STRA 8 TOTALS	0	1	0	0	0	0	0	0	0	0	0.00
N175.5 E147.5 TOTALS	0	1	0	3	0	2	2	1	0	23	363.52
N178 E147.5, STRA 10 TOTALS	0	0	0	1	1	2	0	0	1	4	84.40
N178 E147.5, STRA 2 TOTALS	0	0	1	0	0	0	0	1	0	11	112.50
N178 E147.5, STRA 4 TOTALS	0	0	0	1	0	0	0	0	0	7	61.50
N178 E147.5, STRA 5 TOTALS	0	0	0	0	0	1	1	6	0	20	371.30
N178 E147.5, STRA 6 TOTALS	0	0	0	0	0	1	2	2	0	15	28.70
N178 E147.5, STRA 7 TOTALS	0	0	0	0	0	0	1	1	0	5	70.90
N178 E147.5 TOTALS	0	0	1	2	1	4	4	10	1	62	729.30
N178 E148, STRA 10 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N178 E148, STRA 2 TOTALS	0	0	1	0	0	0	0	0	0	3	35.40
N178 E148, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	47	394.80
N178 E148, STRA 4 TOTALS	0	0	0	3	0	0	1	0	0	27	131.20
N178 E148, STRA 5 TOTALS	0	0	0	1	0	0	0	5	0	0	0.00
N178 E148, STRA 6 TOTALS	0	0	0	0	0	1	0	4	0	10	274.00
N178 E148, STRA 7 TOTALS	0	0	0	2	0	0	0	5	0	23	92.50
N178 E148, STRA 8 TOTALS	0	0	0	0	0	0	1	0	0	5	6.50
N178 E148, STRA 9 TOTALS	0	0	0	1	0	0	0	0	0	7	3.80
N178 E148 TOTALS	0	0	1	7	0	1	2	14	0	122	938.20

PROVEN	HARDWCNT	FIREFUELCT	FIREFUELWT	SHELLCT	SHELLWT	BONECT	BONEWT	VEGETALCT	VEGETALWT	SAMPLECT	SAMPLEWT
N173 E147.5, STRA 1 TOTALS	0	7	11.40	5	4.10	0	0.00	0	0.00	0	0.00
N173 E147.5, STRA 2 TOTALS	0	3	12.80	2	2.40	0	0.00	0	0.00	0	0.00
N173 E147.5, STRA 3 TOTALS	0	2	1.60	0	0.00	1	0.10	0	0.00	0	0.00
N173 E147.5, STRA 4 TOTALS	0	8	16.20	0	0.00	0	0.00	0	0.00	0	0.00
N173 E147.5, STRA 5 TOTALS	0	7	65.10	0	0.00	0	0.00	0	0.00	0	0.00
N173 E147.5 TOTALS	0	27	107.10	7	6.50	1	0.10	0	0.00	0	0.00
N175.5 E147.5, FEAT 16 TOTALS	0	5	33.30	31	32.70	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 1 TOTALS	0	4	20.70	3	3.40	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 2 TOTALS	0	2	18.60	7	11.40	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 3 TOTALS	0	8	18.20	24	24.30	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 4 TOTALS	0	1	1.40	3	1.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 5 TOTALS	0	2	2.30	1	1.90	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 6 TOTALS	0	1	1.30	2	0.60	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 7 TOTALS	0	0	0.00	8	3.10	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 8 TOTALS	0	0	0.00	3	39.80	0	0.00	0	0.00	0	0.00
N175.5 E147.5 TOTALS	0	23	95.80	82	118.20	0	0.00	0	0.00	0	0.00
N178 E147.5, STRA 10 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	123.20
N178 E147.5, STRA 2 TOTALS	1	9	25.70	0	0.00	0	0.00	0	0.00	1	13.10
N178 E147.5, STRA 4 TOTALS	0	15	122.70	1	1.00	0	0.00	0	0.00	0	7.60
N178 E147.5, STRA 5 TOTALS	0	21	58.40	0	0.00	0	0.00	0	0.00	0	12.50
N178 E147.5, STRA 6 TOTALS	0	19	34.50	1	4.00	0	0.00	0	0.00	0	0.00
N178 E147.5, STRA 7 TOTALS	0	3	3.00	1	2.00	0	0.00	0	0.00	0	0.00
N178 E147.5 TOTALS	1	67	244.30	3	7.00	0	0.00	0	0.00	1	156.40
N178 E148, STRA 10 TOTALS	0	0	0.00	0	0.00	6	2.20	0	0.00	0	0.00
N178 E148, STRA 2 TOTALS	0	6	9.70	0	0.00	0	0.00	0	0.00	0	7.10
N178 E148, STRA 3 TOTALS	0	25	54.60	0	0.00	0	0.00	0	0.00	0	11.60
N178 E148, STRA 4 TOTALS	0	12	123.30	0	0.00	0	0.00	0	0.00	0	60.90
N178 E148, STRA 5 TOTALS	0	6	5.80	1	3.80	0	0.00	0	0.00	0	0.00
N178 E148, STRA 6 TOTALS	0	7	23.80	0	0.00	6	5.00	0	0.00	1	77.40
N178 E148, STRA 7 TOTALS	0	12	30.80	0	0.00	0	0.00	0	0.00	0	24.60
N178 E148, STRA 8 TOTALS	0	2	17.00	12	11.60	0	0.00	0	0.00	0	0.00
N178 E148, STRA 9 TOTALS	0	1	2.60	0	0.00	9	8.30	0	0.00	0	96.50
N178 E148 TOTALS	0	71	267.60	13	15.40	21	15.50	0	0.00	1	278.10

PROVEN	MISCHISTCT	CHPSTNCT	CHPSTNWT	CORECT	COREWT	SHATTERCT	SHATTERWT	FLAKECT	FLAKEWT	FIRECRKCT	FIRECRKWT
NN173 E147.5, STRA 1 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N173 E147.5, STRA 2 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N173 E147.5, STRA 3 TOTALS	3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N173 E147.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N173 E147.5, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N173 E147.5 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, FEAT 16 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 1 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 7 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5, STRA 8 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N175.5 E147.5 TOTALS	3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E147.5, STRA 10 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E147.5, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E147.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E147.5, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E147.5, STRA 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E147.5, STRA 7 TOTALS	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E147.5 TOTALS	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148, STRA 10 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148, STRA 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148, STRA 7 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148, STRA 8 TOTALS	0	1	0.50	0	0.00	0	0.00	1	0.50	0	0.00
N178 E148, STRA 9 TOTALS	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N178 E148 TOTALS	2	1	0.50	0	0.00	0	0.00	1	0.50	0	0.00

PROVEN	GROUNDS TCT	GROUNDS TWT	STONECNT	STONEWT	PRCERAMCT	PRCERAMWT	PRSHELLWT	ALLOTHCT	ALLOTHWT	TOTARTCNT	TOTARTWT
N173 E147.5, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	23	101.50
N173 E147.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	10	45.90
N173 E147.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	10	8.90
N173 E147.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	9	24.90
N173 E147.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	9	399.50
N173 E147.5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	61	580.70
N175.5 E147.5, FEAT 16 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	46	271.40
N175.5 E147.5, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	14	70.20
N175.5 E147.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	17	92.62
N175.5 E147.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	41	94.80
N175.5 E147.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	6	16.10
N175.5 E147.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	6	10.30
N175.5 E147.5, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	4	2.20
N175.5 E147.5, STRA 7 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	13	43.50
N175.5 E147.5, STRA 8 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	4	44.50
N175.5 E147.5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	151	645.62
N178 E147.5, STRA 10 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	11	280.40
N178 E147.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	24	165.50
N178 E147.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	25	196.50
N178 E147.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	51	474.30
N178 E147.5, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	41	95.30
N178 E147.5, STRA 7 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	17	88.70
N178 E147.5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	169	1300.70
N178 E148, STRA 10 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	6	2.20
N178 E148, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	12	53.90
N178 E148, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	74	464.60
N178 E148, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	46	329.10
N178 E148, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	17	32.30
N178 E148, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	40	433.34
N178 E148, STRA 7 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	43	157.10
N178 E148, STRA 8 TOTALS	0	0.00	1	0.50	0	0.00	0.00	0	0.00	23	41.20
N178 E148, STRA 9 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	22	119.30
N178 E148 TOTALS	0	0.00	1	0.50	0	0.00	0.00	0	0.00	283	1633.04

PROVEN	PREHCNT	PREHWT	HISTCNT	HISTWT	UNKCNT	UNKWT	CERAMIC	REDWARE	TINENAMEL	CBUFFBODY	CREAMWARE
N190.5 E148.5, STRA 1 TOTALS	2	4.00	42	293.10	0	0.00	1	0	0	0	0
N190.5 E148.5, STRA 2 TOTALS	1	0.90	89	255.80	0	0.00	3	0	0	0	1
N190.5 E148.5, STRA 3 TOTALS	0	0.00	8	8.40	0	0.00	1	0	0	0	0
N190.5 E148.5, STRA 4 TOTALS	0	0.00	23	44.90	0	0.00	0	0	0	0	0
N190.5 E148.5, STRA 5 TOTALS	0	0.00	63	471.70	0	0.00	2	1	0	0	0
N190.5 E148.5, STRA 6 TOTALS	0	0.00	5	64.00	0	0.00	0	0	0	0	0
N190.5 E148.5 TOTALS	3	4.90	230	1137.90	0	0.00	7	1	0	0	1
N190.5 E153.5, FEAT 5 TOTALS	0	0.00	13	812.70	0	0.00	0	0	0	0	0
N190.5 E153.5, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0	0	0	0	0
N190.5 E153.5, STRA 2 TOTALS	1	4.50	60	2680.50	0	0.00	0	0	0	0	0
N190.5 E153.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0	0	0	0	0
N190.5 E153.5, STRA 4 TOTALS	0	0.00	9	487.90	0	0.00	0	0	0	0	0
N190.5 E153.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0	0	0	0	0
N190.5 E153.5 TOTALS	1	4.50	129	6998.50	0	0.00	0	0	0	0	0
N195 E148.5, STRA 1 TOTALS	0	0.00	9	24.50	0	0.00	1	0	0	0	0
N195 E148.5, STRA 2 TOTALS	0	0.00	24	53.20	0	0.00	0	0	0	0	0
N195 E148.5, STRA 3 TOTALS	0	0.00	21	73.70	0	0.00	0	0	0	0	0
N195 E148.5, STRA 4 TOTALS	0	0.00	27	397.60	0	0.00	3	0	0	0	1
N195 E148.5, STRA 5 TOTALS	0	0.00	52	909.10	0	0.00	0	0	0	0	0
N195 E148.5 TOTALS	0	0.00	133	1458.10	0	0.00	4	0	0	0	1
N195 E149, FEAT 9 TOTALS	0	0.00	45	7619.70	86	358.31	0	0	0	0	0
N195 E149, STR 7 TOTALS	0	0.00	0	0.00	0	0.00	0	0	0	0	0
N195 E149, STRA 1 TOTALS	0	0.00	50	1726.60	0	0.00	1	0	0	0	0
N195 E149, STRA 2 TOTALS	0	0.00	31	284.00	0	0.00	0	0	0	0	0
N195 E149, STRA 3 TOTALS	0	0.00	13	71.00	0	0.00	2	1	0	0	0
N195 E149, STRA 4 TOTALS	0	0.00	25	126.10	0	0.00	6	2	0	0	0
N195 E149, STRA 5 TOTALS	0	0.00	93	2857.50	0	0.00	30	0	0	0	15
N195 E149, STRA 7 TOTALS	0	0.00	180	5518.40	0	0.00	18	8	0	0	8
N195 E149, STRA 7A TOTALS	0	0.00	3	5581.60	0	0.00	1	0	0	0	1
N195 E149, STRA 8 TOTALS	0	0.00	11	88.50	0	0.00	2	0	0	0	2
N195 E149, STRA 9 TOTALS	0	0.00	66	302.40	0	0.00	0	0	0	0	0
N195 E149 TOTALS	0	0.00	586	24528.70	86	358.31	99	46	0	0	28

PROVEN	PEARLWARE	WHITEWARE	OTHEARTH	PORCELCNT	WSGSTONE	DBSTONE	OTHSTONE	TPIPES	BOTTLEGL	DRVESGL	INDVESGL
N190.5 E148.5, STRA 1 TOTALS	0	1	0	0	0	0	0	0	0	0	0
N190.5 E148.5, STRA 2 TOTALS	1	1	0	0	0	0	0	1	1	0	0
N190.5 E148.5, STRA 3 TOTALS	1	0	0	0	0	0	0	0	0	0	2
N190.5 E148.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	3
N190.5 E148.5, STRA 5 TOTALS	0	0	1	0	0	0	0	0	1	0	0
N190.5 E148.5, STRA 6 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N190.5 E148.5 TOTALS	2	2	1	0	0	0	0	1	2	0	5
N190.5 E153.5, FEAT 5 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N190.5 E153.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N190.5 E153.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	1	0	1
N190.5 E153.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N190.5 E153.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N190.5 E153.5, STRA 5 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N190.5 E153.5 TOTALS	0	0	0	0	0	0	0	0	1	0	1
N195 E148.5, STRA 1 TOTALS	1	0	0	0	0	0	0	0	0	0	0
N195 E148.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	0	4
N195 E148.5, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N195 E148.5, STRA 4 TOTALS	0	2	0	0	0	0	0	0	0	0	0
N195 E148.5, STRA 5 TOTALS	0	0	0	0	0	0	0	1	1	0	0
N195 E148.5 TOTALS	1	2	0	0	0	0	0	1	1	0	4
N195 E149, FEAT 9 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N195 E149, STR 7 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N195 E149, STRA 1 TOTALS	0	1	0	0	0	0	0	0	5	0	1
N195 E149, STRA 2 TOTALS	0	0	0	0	0	0	0	0	2	0	0
N195 E149, STRA 3 TOTALS	0	1	0	0	0	0	0	0	0	0	0
N195 E149, STRA 4 TOTALS	0	4	0	0	0	0	0	0	1	0	0
N195 E149, STRA 5 TOTALS	10	4	0	0	0	0	1	1	1	0	0
N195 E149, STRA 7 TOTALS	1	0	0	0	0	0	1	1	13	0	0
N195 E149, STRA 7A TOTALS	0	0	0	0	0	0	0	0	0	0	0
N195 E149, STRA 8 TOTALS	0	0	0	0	0	0	0	0	2	0	0
N195 E149, STRA 9 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N195 E149 TOTALS	11	10	0	0	0	0	4	3	25	0	6

PROVEN	BOTCLOS	APPAREL	PERSCNT	WINGLASSCT	WRTNAILCT	CUTNAILCT	WIRNAILCT	INDNAILCT	OFASTDCNT	STRUCTCT	STRUCTWT
N190.5 E148.5, STRA 1 TOTALS	0	0	0	5	0	0	2	3	0	17	183.20
N190.5 E148.5, STRA 2 TOTALS	0	0	0	1	0	0	1	3	0	43	103.30
N190.5 E148.5, STRA 3 TOTALS	0	0	0	1	0	0	0	0	0	3	3.70
N190.5 E148.5, STRA 4 TOTALS	0	0	0	0	0	0	0	1	0	3	6.20
N190.5 E148.5, STRA 5 TOTALS	0	0	0	0	0	1	1	1	0	33	250.90
N190.5 E148.5, STRA 6 TOTALS	0	0	0	0	0	0	0	0	0	3	32.20
N190.5 E148.5 TOTALS	0	0	0	7	0	1	4	8	0	102	579.50
N190.5 E153.5, FEAT 5 TOTALS	0	0	0	0	0	0	0	0	0	4	181.00
N190.5 E153.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N190.5 E153.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	34	2424.80
N190.5 E153.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N190.5 E153.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	6	291.50
N190.5 E153.5, STRA 5 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N190.5 E153.5 TOTALS	0	0	0	0	0	0	1	2	0	81	5260.90
N195 E148.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	3	17.90
N195 E148.5, STRA 2 TOTALS	0	0	0	2	0	0	0	3	0	5	15.40
N195 E148.5, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	2	62.80
N195 E148.5, STRA 4 TOTALS	0	0	0	1	0	0	1	0	0	19	337.30
N195 E148.5, STRA 5 TOTALS	0	0	0	0	0	1	0	1	0	28	695.90
N195 E148.5 TOTALS	0	0	0	3	0	1	1	4	0	57	1129.30
N195 E149, FEAT 9 TOTALS	0	0	0	0	0	0	0	2	0	2	2.20
N195 E149, STR 7 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N195 E149, STRA 1 TOTALS	0	0	1	0	0	0	2	0	0	22	1561.60
N195 E149, STRA 2 TOTALS	0	0	0	2	0	1	0	9	0	4	116.10
N195 E149, STRA 3 TOTALS	0	0	0	2	0	0	0	2	0	3	10.90
N195 E149, STRA 4 TOTALS	0	0	0	3	0	0	0	0	0	10	72.50
N195 E149, STRA 5 TOTALS	0	0	0	1	0	5	0	6	0	25	2306.10
N195 E149, STRA 7 TOTALS	0	3	0	0	0	0	0	13	0	23	457.20
N195 E149, STRA 7A TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N195 E149, STRA 8 TOTALS	0	0	0	0	0	0	0	0	0	7	2.80
N195 E149, STRA 9 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N195 E149 TOTALS	0	3	1	8	0	6	2	32	0	105	4539.40

PROVEN	HARDWCNT	FIREFUELCT	FIREFUELWT	SHELLCT	SHELLWT	BONECT	BONEWT	VEGETALCT	VEGETALWT	SAMPLECT	SAMPLEWT
N190.5 E148.5, STRA 1 TOTALS	0	11	24.70	0	0.00	1	0.10	0	0.00	0	55.20
N190.5 E148.5, STRA 2 TOTALS	1	24	35.00	7	7.90	1	3.40	0	0.00	0	3.70
N190.5 E148.5, STRA 3 TOTALS	0	1	2.10	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E148.5, STRA 4 TOTALS	0	13	27.80	3	5.00	0	0.00	0	0.00	0	0.00
N190.5 E148.5, STRA 5 TOTALS	1	14	48.20	3	1.10	2	0.90	0	0.00	0	73.20
N190.5 E148.5, STRA 6 TOTALS	0	2	4.00	0	0.00	0	0.00	0	0.00	0	27.80
N190.5 E148.5 TOTALS	2	65	141.80	13	14.00	4	4.40	0	0.00	0	159.90
N190.5 E153.5, FEAT 5 TOTALS	0	8	50.80	0	0.00	0	0.00	0	0.00	0	7.10
N190.5 E153.5, STRA 1 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E153.5, STRA 2 TOTALS	1	23	117.70	0	0.00	0	0.00	0	0.00	0	129.70
N190.5 E153.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E153.5, STRA 4 TOTALS	0	3	120.00	0	0.00	0	0.00	0	0.00	0	76.40
N190.5 E153.5, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E153.5 TOTALS	2	37	403.80	0	0.00	1	10.10	0	0.00	0	539.60
N195 E148.5, STRA 1 TOTALS	0	5	5.90	0	0.00	0	0.00	0	0.00	0	0.00
N195 E148.5, STRA 2 TOTALS	0	6	9.40	3	2.40	0	0.00	0	0.00	0	18.30
N195 E148.5, STRA 3 TOTALS	0	3	2.00	16	8.90	0	0.00	0	0.00	0	0.00
N195 E148.5, STRA 4 TOTALS	0	1	0.50	0	0.00	2	6.30	0	0.00	0	10.50
N195 E148.5, STRA 5 TOTALS	0	10	92.70	0	0.00	8	8.70	0	0.00	0	79.70
N195 E148.5 TOTALS	0	25	110.50	19	11.30	10	15.00	0	0.00	0	108.50
N195 E149, FEAT 9 TOTALS	0	0	0.00	0	0.00	41	5.80	0	0.00	0	7604.30
N195 E149, STR 7 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 1 TOTALS	0	14	34.30	0	0.00	3	1.60	0	0.00	0	107.00
N195 E149, STRA 2 TOTALS	1	11	36.10	0	0.00	1	10.00	0	0.00	0	64.20
N195 E149, STRA 3 TOTALS	0	3	3.40	0	0.00	1	0.40	0	0.00	0	40.80
N195 E149, STRA 4 TOTALS	0	3	23.70	0	0.00	0	0.00	0	0.00	0	11.20
N195 E149, STRA 5 TOTALS	0	4	3.90	0	0.00	19	30.10	0	0.00	0	254.20
N195 E149, STRA 7 TOTALS	0	1	5.60	4	53.50	104	441.20	0	0.00	0	4366.20
N195 E149, STRA 7A TOTALS	0	0	0.00	1	1.30	1	0.10	0	0.00	0	5580.00
N195 E149, STRA 8 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	84.00
N195 E149, STRA 9 TOTALS	0	0	0.00	0	0.00	66	302.40	0	0.00	0	0.00
N195 E149 TOTALS	1	36	107.00	5	54.80	245	808.50	0	0.00	0	18282.20

PROVEN	MISCHISTCT	CHPSTNCT	CHPSTNWT	CORECT	COREWT	SHATTERCT	SHATTERWT	FLAKECT	FLAKEWT	FIRECRKCT	FIRECRKWT
N190.5 E148.5, STRA 1 TOTALS	2	2	4.00	0	0.00	0	0.00	2	4.00	0	0.00
N190.5 E148.5, STRA 2 TOTALS	3	1	0.90	0	0.00	0	0.00	1	0.90	0	0.00
N190.5 E148.5, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E148.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E148.5, STRA 5 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E148.5, STRA 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E148.5 TOTALS	9	3	4.90	0	0.00	0	0.00	3	4.90	0	0.00
N190.5 E153.5, FEAT 5 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E153.5, STRA 1 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E153.5, STRA 2 TOTALS	0	1	4.50	0	0.00	0	0.00	1	4.50	0	0.00
N190.5 E153.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E153.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E153.5, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N190.5 E153.5 TOTALS	3	1	4.50	0	0.00	0	0.00	1	4.50	0	0.00
N195 E148.5, STRA 1 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E148.5, STRA 2 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E148.5, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E148.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E148.5, STRA 5 TOTALS	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E148.5 TOTALS	3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, FEAT 9 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N 195 E149, STR 7 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 1 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 4 TOTALS	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 5 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 7 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 7A TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 8 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149, STRA 9 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195 E149 TOTALS	9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

PROVEN	GROUNDS TCT	GROUNDS TWT	STONECNT	STONEWT	PRCERAMCT	PRCERAMWT	PRSHELLWT	ALLOTHCT	ALLOTHWT	TOTARTCNT	TOTARTWT
N190.5 E148.5, STRA 1 TOTALS	0	0.00	2	4.00	0	0.00	0.00	0	0.00	44	297.10
N190.5 E148.5, STRA 2 TOTALS	0	0.00	1	0.90	0	0.00	0.00	0	0.00	90	256.70
N190.5 E148.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	8	8.40
N190.5 E148.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	23	44.90
N190.5 E148.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	63	471.70
N190.5 E148.5, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	5	64.00
N190.5 E148.5 TOTALS	0	0.00	3	4.90	0	0.00	0.00	0	0.00	233	1142.80
N190.5 E153.5, FEAT 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	13	812.70
N190.5 E153.5, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	0	0.00
N190.5 E153.5, STRA 2 TOTALS	0	0.00	1	4.50	0	0.00	0.00	0	0.00	61	2685.00
N190.5 E153.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	0	0.00
N190.5 E153.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	9	487.90
N190.5 E153.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	0	0.00
N190.5 E153.5 TOTALS	0	0.00	1	4.50	0	0.00	0.00	0	0.00	130	7003.00
N195 E148.5, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	9	24.50
N195 E148.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	24	53.20
N195 E148.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	21	73.70
N195 E148.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	27	397.60
N195 E148.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	52	909.10
N195 E148.5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	133	1458.10
N195 E149, FEAT 9 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	131	7978.01
N195 E149, STR 7 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	0	0.00
N195 E149, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	50	1726.60
N195 E149, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	31	284.00
N195 E149, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	13	71.00
N195 E149, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	25	126.10
N195 E149, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	93	2857.50
N195 E149, STRA 7 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	180	5518.40
N195 E149, STRA 7A TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	3	5581.60
N195 E149, STRA 8 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	11	88.50
N195 E149, STRA 9 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	66	302.40
N195 E149 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	672	24887.01

PROVEN	PREHCNT	PREHWT	HISTCNT	HISTWT	UNKCNT	UNKWT	CERAMIC	REDWARE	TINENAMEL	CBUFFBODY	CREAMWARE
N195.5 E153.5, FEAT 10 TOTALS	1	0.70	28	2222.70	0	0.00	1	0	0	0	1
N195.5 E153.5, STRA 1 TOTALS	0	0.00	34	560.60	0	0.00	2	0	0	0	0
N195.5 E153.5, STRA 2 TOTALS	0	0.00	8	75.00	0	0.00	1	0	0	0	1
N195.5 E153.5, STRA 3 TOTALS	0	0.00	4	123.70	0	0.00	0	0	0	0	0
N195.5 E153.5, STRA 4 TOTALS	0	0.00	38	1275.90	0	0.00	0	0	0	0	0
N195.5 E153.5, STRA 7 TOTALS	0	0.00	66	2876.40	0	0.00	20	3	0	0	11
N195.5 E153.5 TOTALS	1	0.70	178	7134.30	0	0.00	24	3	0	0	13
N200 E138.5, STRA 1 TOTALS	2	9.20	61	1491.40	0	0.00	1	0	0	0	0
N200 E138.5, STRA 2 TOTALS	1	1.30	32	164.70	0	0.00	0	0	0	0	0
N200 E138.5, STRA 3 TOTALS	0	0.00	68	451.70	0	0.00	1	0	0	0	1
N200 E138.5, STRA 4 TOTALS	0	0.00	23	338.40	0	0.00	0	0	0	0	0
N200 E138.5, STRA 5 TOTALS	0	0.00	15	357.80	0	0.00	1	0	0	0	1
N200 E138.5, STRA 6 TOTALS	0	0.00	11	29.80	0	0.00	0	0	0	0	0
N200 E138.5 TOTALS	3	10.50	210	2833.80	0	0.00	3	0	0	0	2
N200 E143.5, STRA 1 TOTALS	0	0.00	21	93.00	0	0.00	0	0	0	0	0
N200 E143.5, STRA 2 TOTALS	0	0.00	10	23.70	0	0.00	0	0	0	0	0
N200 E143.5, STRA 3 TOTALS	0	0.00	27	32.90	0	0.00	2	0	0	0	2
N200 E143.5, STRA 4 TOTALS	0	0.00	9	10.10	0	0.00	0	0	0	0	0
N200 E143.5, STRA 5 TOTALS	0	0.00	28	58.80	0	0.00	3	1	0	0	2
N200 E143.5, STRA 6 TOTALS	0	0.00	46	371.00	0	0.00	5	0	0	0	2
N200 E143.5, STRA 8 TOTALS	1	0.90	138	2420.40	0	0.00	17	0	0	0	8
N200 E143.5 TOTALS	1	0.90	279	3009.90	0	0.00	27	1	0	0	14
N200 E148.5, FEAT 8 TOTALS	0	0.00	15	436.30	0	0.00	3	0	0	0	0
N200 E148.5, STRA 1 TOTALS	1	2.10	23	152.90	0	0.00	0	0	0	0	0
N200 E148.5, STRA 2 TOTALS	0	0.00	0	106.90	0	0.00	0	0	0	0	0
N200 E148.5, STRA 3 TOTALS	0	0.00	43	167.90	0	0.00	2	0	0	0	0
N200 E148.5, STRA 4 TOTALS	0	0.00	51	621.20	0	0.00	4	0	0	0	1
N200 E148.5, STRA 5 TOTALS	0	0.00	86	640.10	0	0.00	4	0	0	0	1
N200 E148.5, STRA 6 TOTALS	0	0.00	46	7473.70	0	0.00	5	1	0	0	0
N200 E148.5, STRA 7 TOTALS	0	0.00	102	745.90	0	0.00	1	1	0	0	0
N200 E148.5 TOTALS	1	2.10	366	10344.90	0	0.00	19	2	0	0	2

PROVEN	PEARLWARE	WHITEWARE	OTHEARTH	PORCELCNT	WSGSTONE	DBSTONE	OTHSTONE	TPIPES	BOTTLEGL	DRVESGL	INDVESGL
N195.5 E153.5, FEAT 10 TOTALS	0	0	0	0	0	0	0	0	1	0	1
N195.5 E153.5, STRA 1 TOTALS	0	2	0	0	0	0	0	0	3	0	0
N195.5 E153.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N195.5 E153.5, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N195.5 E153.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N195.5 E153.5, STRA 7 TOTALS	1	0	0	3	0	0	2	2	3	0	2
N195.5 E153.5 TOTALS	1	2	0	3	0	0	2	2	7	0	3
N200 E138.5, STRA 1 TOTALS	0	0	0	0	0	0	1	0	1	0	0
N200 E138.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	2	0	0
N200 E138.5, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	0	4
N200 E138.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E138.5, STRA 5 TOTALS	0	0	0	0	0	0	0	0	1	0	0
N200 E138.5, STRA 6 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E138.5 TOTALS	0	0	0	0	0	0	1	0	4	0	4
N200 E143.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	2	0	0
N200 E143.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E143.5, STRA 3 TOTALS	0	0	0	0	0	0	0	0	4	0	0
N200 E143.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	3	0	1
N200 E143.5, STRA 5 TOTALS	0	0	0	0	0	0	0	0	2	0	0
N200 E143.5, STRA 6 TOTALS	2	0	0	0	0	0	1	3	1	0	0
N200 E143.5, STRA 8 TOTALS	6	0	0	0	0	0	3	0	9	0	7
N200 E143.5 TOTALS	8	0	0	0	0	0	4	3	21	0	8
N200 E148.5, FEAT 8 TOTALS	3	0	0	0	0	0	0	1	1	0	0
N200 E148.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	9	0	0
N200 E148.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E148.5, STRA 3 TOTALS	0	2	0	0	0	0	0	0	5	0	0
N200 E148.5, STRA 4 TOTALS	3	0	0	0	0	0	0	0	3	0	0
N200 E148.5, STRA 5 TOTALS	3	0	0	0	0	0	0	1	1	0	1
N200 E148.5, STRA 6 TOTALS	3	0	0	0	0	0	1	0	4	0	1
N200 E148.5, STRA 7 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E148.5 TOTALS	12	2	0	0	0	0	1	2	23	0	2

PROVEN	BOTCLOS	APPAREL	PERSCNT	WINGLASSCT	WRTNAILCT	CUTNAILCT	WIRNAILCT	INDNAILCT	OFASTDCNT	STRUCTCT	STRUCTWT
N195.5 E153.5, FEAT 10 TOTALS	0	0	0	2	0	1	0	5	0	8	1984.30
N195.5 E153.5, STRA 1 TOTALS	0	0	0	6	0	0	1	1	0	14	320.70
N195.5 E153.5, STRA 2 TOTALS	0	0	0	3	0	0	0	0	1	1	1.60
N195.5 E153.5, STRA 3 TOTALS	0	0	0	1	0	0	0	3	0	0	0.00
N195.5 E153.5, STRA 4 TOTALS	0	0	0	1	0	1	3	0	0	7	88.20
N195.5 E153.5, STRA 7 TOTALS	0	0	0	2	0	0	0	8	0	22	2481.70
N195.5 E153.5 TOTALS	0	0	0	15	0	2	4	17	1	52	4876.50
N200 E138.5, STRA 1 TOTALS	0	0	0	1	0	1	1	0	0	23	1352.20
N200 E138.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	2	11.20
N200 E138.5, STRA 3 TOTALS	0	0	0	2	0	0	0	1	0	21	289.00
N200 E138.5, STRA 4 TOTALS	0	0	0	0	0	0	0	3	0	5	241.10
N200 E138.5, STRA 5 TOTALS	0	0	0	0	0	1	0	0	0	2	266.30
N200 E138.5, STRA 6 TOTALS	0	0	0	0	0	0	0	3	0	5	14.80
N200 E138.5 TOTALS	0	0	0	3	0	2	1	7	0	58	2174.60
N200 E143.5, STRA 1 TOTALS	0	0	1	0	0	0	1	0	0	11	71.20
N200 E143.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	8	21.80
N200 E143.5, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	11	11.60
N200 E143.5, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	1	1.70
N200 E143.5, STRA 5 TOTALS	0	0	0	0	0	1	1	0	0	10	15.40
N200 E143.5, STRA 6 TOTALS	0	0	0	2	0	1	0	5	0	5	9.10
N200 E143.5, STRA 8 TOTALS	0	0	0	2	0	1	0	11	0	66	1541.90
N200 E143.5 TOTALS	0	0	1	4	0	3	2	16	0	112	1672.70
N200 E148.5, FEAT 8 TOTALS	0	0	0	0	0	1	0	1	0	6	3.00
N200 E148.5, STRA 1 TOTALS	0	0	1	0	0	0	0	0	0	9	29.70
N200 E148.5, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N200 E148.5, STRA 3 TOTALS	0	0	0	1	0	0	0	0	1	9	13.80
N200 E148.5, STRA 4 TOTALS	0	0	0	0	0	0	0	1	0	23	511.80
N200 E148.5, STRA 5 TOTALS	0	0	0	0	0	0	0	6	0	31	293.00
N200 E148.5, STRA 6 TOTALS	0	0	0	1	0	0	0	0	0	12	29.60
N200 E148.5, STRA 7 TOTALS	0	0	0	0	0	0	0	0	0	64	269.70
N200 E148.5 TOTALS	0	0	1	2	0	1	0	8	1	154	1150.60

PROVEN	HARDWCNT	FIREFUELCT	FIREFUELWT	SHELLCT	SHELLWT	BONECT	BONEWT	VEGETALCT	VEGETALWT	SAMPLECT	SAMPLEWT
N195.5 E153.5, FEAT 10 TOTALS	0	8	31.00	0	0.00	1	0.80	0	0.00	0	163.50
N195.5 E153.5, STRA 1 TOTALS	0	6	153.80	0	0.00	0	0.00	0	0.00	0	32.50
N195.5 E153.5, STRA 2 TOTALS	0	1	2.10	1	46.50	0	0.00	0	0.00	0	18.30
N195.5 E153.5, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	96.00
N195.5 E153.5, STRA 4 TOTALS	1	21	124.70	2	20.50	1	0.60	0	0.00	0	949.70
N195.5 E153.5, STRA 7 TOTALS	0	0	0.00	0	0.00	7	102.30	0	0.00	0	160.20
N195.5 E153.5 TOTALS	1	36	311.60	3	67.00	9	103.70	0	0.00	0	1420.20
N200 E138.5, STRA 1 TOTALS	0	7	94.10	23	18.50	0	0.00	1	2.00	0	0.00
N200 E138.5, STRA 2 TOTALS	0	11	138.70	8	9.00	0	0.00	0	0.00	0	0.00
N200 E138.5, STRA 3 TOTALS	0	10	67.30	27	87.10	1	0.70	0	0.00	0	0.00
N200 E138.5, STRA 4 TOTALS	1	6	19.10	8	66.60	0	0.00	0	0.00	0	0.00
N200 E138.5, STRA 5 TOTALS	0	9	79.90	1	2.40	0	0.00	0	0.00	0	0.00
N200 E138.5, STRA 6 TOTALS	0	0	0.00	1	0.40	2	1.20	0	0.00	0	0.00
N200 E138.5 TOTALS	1	43	399.10	68	184.00	3	1.90	1	2.00	0	0.00
N200 E143.5, STRA 1 TOTALS	0	3	3.60	3	2.60	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 2 TOTALS	0	0	0.00	2	1.90	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 3 TOTALS	0	9	6.60	1	0.50	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 4 TOTALS	0	4	3.20	0	0.00	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 5 TOTALS	1	4	7.20	6	3.50	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 6 TOTALS	0	10	25.00	0	0.00	10	22.10	0	0.00	0	188.30
N200 E143.5, STRA 8 TOTALS	0	0	0.00	0	0.00	25	104.90	0	0.00	0	588.90
N200 E143.5 TOTALS	1	30	45.60	12	8.50	35	127.00	0	0.00	0	777.20
N200 E148.5, FEAT 8 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	2	420.20
N200 E148.5, STRA 1 TOTALS	0	2	2.60	0	0.00	0	0.00	0	0.00	1	109.40
N200 E148.5, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	106.90
N200 E148.5, STRA 3 TOTALS	0	20	131.40	4	0.60	0	0.00	0	0.00	0	0.00
N200 E148.5, STRA 4 TOTALS	0	16	35.80	0	0.00	4	1.60	0	0.00	0	53.90
N200 E148.5, STRA 5 TOTALS	0	6	0.90	0	0.00	35	81.80	0	0.00	0	193.20
N200 E148.5, STRA 6 TOTALS	0	0	0.00	0	0.00	22	54.60	0	0.00	1	7374.80
N200 E148.5, STRA 7 TOTALS	0	5	33.80	0	0.00	29	22.50	0	0.00	0	334.20
N200 E148.5 TOTALS	0	49	204.50	4	0.60	90	160.50	0	0.00	4	8592.60

PROVEN	MISCHISTCT	CHPSTNCT	CHPSTNWT	CORECT	COREWT	SHATTERCT	SHATTERWT	FLAKECT	FLAKEWT	FIRECRKCT	FIRECRKWT
N195.5 E153.5, FEAT 10 TOTALS	0	1	0.70	0	0.00	0	0.00	1	0.70	0	0.00
N195.5 E153.5, STRA 1 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195.5 E153.5, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195.5 E153.5, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195.5 E153.5, STRA 4 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195.5 E153.5, STRA 7 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N195.5 E153.5 TOTALS	2	1	0.70	0	0.00	0	0.00	1	0.70	0	0.00
N200 E138.5, STRA 1 TOTALS	2	2	9.20	0	0.00	0	0.00	2	9.20	0	0.00
N200 E138.5, STRA 2 TOTALS	9	1	1.30	0	0.00	0	0.00	1	1.30	0	0.00
N200 E138.5, STRA 3 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E138.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E138.5, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E138.5, STRA 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E138.5 TOTALS	12	3	10.50	0	0.00	0	0.00	3	10.50	0	0.00
N200 E143.5, STRA 1 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 6 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E143.5, STRA 8 TOTALS	0	1	0.90	0	0.00	0	0.00	1	0.90	0	0.00
N200 E143.5 TOTALS	4	1	0.90	0	0.00	0	0.00	1	0.90	0	0.00
N200 E148.5, FEAT 8 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E148.5, STRA 1 TOTALS	1	1	2.10	0	0.00	0	0.00	1	2.10	0	0.00
N200 E148.5, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E148.5, STRA 3 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E148.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E148.5, STRA 5 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E148.5, STRA 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E148.5, STRA 7 TOTALS	3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E148.5 TOTALS	6	1	2.10	0	0.00	0	0.00	1	2.10	0	0.00

PROVEN	GROUNDS TCT	GROUNDS TWT	STONECNT	STONEWT	PRCERAMCT	PRCERAMWT	PRSHELLWT	ALLOTHCT	ALLOTHWT	TOTARTCNT	TOTARTWT
N195.5 E153.5, FEAT 10 TOTALS	0	0.00	1	0.70	0	0.00	0.00	0	0.00	29	2223.40
N195.5 E153.5, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	34	560.60
N195.5 E153.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	8	75.00
N195.5 E153.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	4	123.70
N195.5 E153.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	38	1275.90
N195.5 E153.5, STRA 7 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	66	2876.40
N195.5 E153.5 TOTALS	0	0.00	1	0.70	0	0.00	0.00	0	0.00	179	7135.00
N200 E138.5, STRA 1 TOTALS	0	0.00	2	9.20	0	0.00	0.00	0	0.00	63	1500.60
N200 E138.5, STRA 2 TOTALS	0	0.00	1	1.30	0	0.00	0.00	0	0.00	33	166.00
N200 E138.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	68	451.70
N200 E138.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	23	338.40
N200 E138.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	15	357.80
N200 E138.5, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	11	29.80
N200 E138.5 TOTALS	0	0.00	3	10.50	0	0.00	0.00	0	0.00	213	2844.30
N200 E143.5, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	21	93.00
N200 E143.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	10	23.70
N200 E143.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	27	32.90
N200 E143.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	9	10.10
N200 E143.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	28	58.80
N200 E143.5, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	46	371.00
N200 E143.5, STRA 8 TOTALS	0	0.00	1	0.90	0	0.00	0.00	0	0.00	139	2421.30
N200 E143.5 TOTALS	0	0.00	1	0.90	0	0.00	0.00	0	0.00	280	3010.80
N200 E148.5, FEAT 8 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	15	436.30
N200 E148.5, STRA 1 TOTALS	0	0.00	1	2.10	0	0.00	0.00	0	0.00	24	155.00
N200 E148.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	0	106.90
N200 E148.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	43	167.90
N200 E148.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	51	621.20
N200 E148.5, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	86	640.10
N200 E148.5, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	46	7473.70
N200 E148.5, STRA 7 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	102	745.90
N200 E148.5 TOTALS	0	0.00	1	2.10	0	0.00	0.00	0	0.00	367	10347.00

PROVEN	PREHCNT	PREHWT	HISTCNT	HISTWT	UNKCNT	UNKWT	CERAMIC	REDWARE	TINENAMEL	CBUFFBODY	CREAMWARE
N200 E149, FEAT 11 TOTALS	0	0.00	0	7350.00	18	2.02	0	0	0	0	0
N200 E149, FEAT 12 TOTALS	0	0.00	0	0.00	40	7.77	0	0	0	0	0
N200 E149, FEAT 13 TOTALS	0	0.00	1	188.70	0	0.00	0	0	0	0	0
N200 E149, FEAT 14 TOTALS	0	0.00	1	194.70	0	0.00	0	0	0	0	0
N200 E149, FEAT 8 TOTALS	0	0.00	64	732.10	0	0.00	30	0	0	0	4
N200 E149, FEAT 9, L 1	1	311.70	11	9936.43	118	98.03	0	0	0	0	0
N200 E149, FEAT 9, L 2	8	3209.05	4	7748.40	111	293.40	0	0	0	0	0
N200 E149, FEAT 9, L 3	0	216.20	4	2223.00	95	102.29	0	0	0	0	0
N200 E149, FEAT 9 TOTALS	9	3736.95	19	19907.83	324	493.72	0	0	0	0	0
N200 E149, STRA 1 TOTALS	0	0.00	98	1981.54	0	0.00	9	2	0	0	2
N200 E149, STRA 2 TOTALS	0	0.00	3	168.80	0	0.00	0	0	0	0	0
N200 E149, STRA 3 TOTALS	0	0.00	83	192.60	0	0.00	10	0	0	0	0
N200 E149, STRA 4 TOTALS	0	0.00	51	750.40	0	0.00	3	0	0	0	1
N200 E149, STRA 5 TOTALS	0	0.00	65	890.70	0	0.00	22	1	0	0	12
N200 E149, STRA 6 TOTALS	0	0.00	182	1747.10	0	0.00	95	7	0	0	27
N200 E149, STRA 7 TOTALS	0	0.00	239	6262.60	0	0.00	59	7	0	1	13
N200 E149, STRA 8 TOTALS	0	0.00	17	11.00	0	0.00	0	0	0	0	0
N200 E149 TOTALS	9	3736.95	825	40398.17	382	503.51	228	17	0	1	59
N200 E153.5, STRA 1 TOTALS	0	0.00	27	522.70	0	0.00	0	0	0	0	0
N200 E153.5, STRA 2 TOTALS	0	0.00	61	2834.10	0	0.00	3	0	0	1	1
N200 E153.5, STRA 4 TOTALS	0	0.00	42	766.40	0	0.00	12	0	0	0	9
N200 E153.5, STRA 6 TOTALS	0	0.00	1	0.10	0	0.00	0	0	0	0	0
N200 E153.5 TOTALS	0	0.00	131	4123.30	0	0.00	15	0	0	1	10
N200 E154, FEAT 15, L 1	0	0.00	0	6741.00	26	67.80	0	0	0	0	0
N200 E154, FEAT 15, L 2	0	0.00	0	4281.30	4	4.20	0	0	0	0	0
N200 E154, FEAT 15 TOTALS	0	0.00	0	11022.30	30	72.00	0	0	0	0	0
N200 E154, FEAT 6 TOTALS	0	0.00	123	713.50	0	0.00	6	2	0	0	1
N200 E154, FEAT 9, L 1	0	0.00	52	1612.40	0	0.00	11	0	0	0	8
N200 E154, FEAT 9, L 2	4	1097.77	1	7824.90	77	330.15	0	0	0	0	0
N200 E154, FEAT 9, L 3	2	3717.76	4	8515.55	202	312.97	1	0	0	0	1
N200 E154, FEAT 9, L 4	6	2086.90	2	14220.50	142	308.41	0	0	0	0	0
N200 E154, FEAT 9, L 5	0	2060.00	2	17.40	139	299.95	0	0	0	0	0
N200 E154, FEAT 9, L 6	0	1120.00	1	8061.60	85	168.81	0	0	0	0	0
N200 E154, FEAT 9 TOTALS	12	10082.43	62	40252.35	645	1420.29	12	0	0	0	9

PROVEN	PEARLWARE	WHITEWARE	OTHEARTH	PORCELCNT	WSGSTONE	DBSTONE	OTHSTONE	TPIPES	BOTTLEGL	DRVESGL	INDVESGL
N200 E149, FEAT 11 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E149, FEAT 12 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E149, FEAT 13 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E149, FEAT 14 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E149, FEAT 8 TOTALS	26	0	0	0	0	0	0	2	2	0	1
N200 E149, FEAT 9, L 1	0	0	0	0	0	0	0	0	0	0	0
N200 E149, FEAT 9, L 2	0	0	0	0	0	0	0	0	0	0	0
N200 E149, FEAT 9, L 3	0	0	0	0	0	0	0	0	0	0	0
N200 E149, FEAT 9 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E149, STRA 1 TOTALS	4	1	0	0	0	0	0	0	4	0	1
N200 E149, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E149, STRA 3 TOTALS	0	8	0	1	0	0	1	0	8	1	1
N200 E149, STRA 4 TOTALS	0	1	0	0	0	0	1	0	2	0	0
N200 E149, STRA 5 TOTALS	7	0	2	0	0	0	0	0	0	0	2
N200 E149, STRA 6 TOTALS	59	0	1	0	0	0	1	3	10	2	2
N200 E149, STRA 7 TOTALS	37	0	0	0	0	0	1	3	7	0	0
N200 E149, STRA 8 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E149 TOTALS	133	10	3	1	0	0	4	8	33	3	7
N200 E153.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	1	0	0
N200 E153.5, STRA 2 TOTALS	1	0	0	0	0	0	0	0	1	0	0
N200 E153.5, STRA 4 TOTALS	3	0	0	0	0	0	0	0	0	0	10
N200 E153.5, STRA 6 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E153.5 TOTALS	4	0	0	0	0	0	0	0	2	0	10
N200 E154, FEAT 15, L 1	0	0	0	0	0	0	0	0	0	0	0
N200 E154, FEAT 15, L 2	0	0	0	0	0	0	0	0	0	0	0
N200 E154, FEAT 15 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E154, FEAT 6 TOTALS	2	0	0	1	0	0	0	0	3	0	0
N200 E154, FEAT 9, L 1	0	0	0	0	0	0	3	2	0	0	1
N200 E154, FEAT 9, L 2	0	0	0	0	0	0	0	0	0	0	0
N200 E154, FEAT 9, L 3	0	0	0	0	0	0	0	0	0	0	0
N200 E154, FEAT 9, L 4	0	0	0	0	0	0	0	0	0	0	0
N200 E154, FEAT 9, L 5	0	0	0	0	0	0	0	0	0	0	0
N200 E154, FEAT 9, L 6	0	0	0	0	0	0	0	0	0	0	0
N200 E154, FEAT 9 TOTALS	0	0	0	0	0	0	3	2	0	0	1

PROVEN	BOTCLOS	APPAREL	PERSCNT	WINGLASSCT	WRTNAILCT	CUTNAILCT	WIRNAILCT	INDNAILCT	OFASTDCNT	STRUCTCT	STRUCTWT
N200 E149, FEAT 11 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N200 E149, FEAT 12 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N200 E149, FEAT 13 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N200 E149, FEAT 14 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N200 E149, FEAT 8 TOTALS	0	0	3	0	0	0	0	7	0	17	65.60
N200 E149, FEAT 9, L 1	0	0	0	0	0	0	0	1	0	0	0.00
N200 E149, FEAT 9, L 2	0	0	0	0	0	0	0	0	0	0	0.00
N200 E149, FEAT 9, L 3	0	0	0	0	0	0	0	0	0	0	0.00
N200 E149, FEAT 9 TOTALS	0	0	0	0	0	0	0	1	0	0	0.00
N200 E149, STRA 1 TOTALS	0	0	1	1	0	0	0	0	0	54	1161.70
N200 E149, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	2	23.00
N200 E149, STRA 3 TOTALS	0	0	1	9	0	0	0	4	0	12	20.80
N200 E149, STRA 4 TOTALS	0	0	0	0	0	5	1	11	0	18	555.60
N200 E149, STRA 5 TOTALS	0	0	0	0	0	2	0	5	0	15	537.80
N200 E149, STRA 6 TOTALS	0	0	0	1	0	0	0	19	0	15	311.30
N200 E149, STRA 7 TOTALS	0	0	0	0	0	2	0	8	0	25	3989.90
N200 E149, STRA 8 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N200 E149 TOTALS	0	0	5	11	0	9	1	55	0	160	6685.30
N200 E153.5, STRA 1 TOTALS	0	0	0	1	0	0	0	1	0	11	482.10
N200 E153.5, STRA 2 TOTALS	0	0	0	1	0	0	1	0	0	39	2743.40
N200 E153.5, STRA 4 TOTALS	0	0	0	0	0	0	0	2	0	18	601.40
N200 E153.5, STRA 6 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N200 E153.5 TOTALS	0	0	0	2	0	0	1	3	0	68	3826.90
N200 E154, FEAT 15, L 1	0	0	0	0	0	0	0	0	0	0	0.00
N200 E154, FEAT 15, L 2	0	0	0	0	0	0	0	0	0	0	0.00
N200 E154, FEAT 15 TOTALS	0	0	0	0	0	0	0	0	0	0	0.00
N200 E154, FEAT 6 TOTALS	0	0	0	5	0	3	1	2	0	52	334.10
N200 E154, FEAT 9, L 1	0	0	0	0	0	0	0	1	0	31	470.70
N200 E154, FEAT 9, L 2	0	0	0	0	0	0	0	0	0	0	0.00
N200 E154, FEAT 9, L 3	0	0	0	0	0	0	0	1	0	0	0.00
N200 E154, FEAT 9, L 4	0	0	0	0	0	0	0	0	0	0	0.00
N200 E154, FEAT 9, L 5	0	0	0	0	0	0	0	0	0	0	0.00
N200 E154, FEAT 9, L 6	0	0	0	0	0	0	0	0	0	0	0.00
N200 E154, FEAT 9 TOTALS	0	0	0	0	0	0	0	2	0	31	470.70

PROVEN	HARDWCNT	FIREFUELCT	FIREFUELWT	SHELLCT	SHELLWT	BONECT	BONEWT	VEGETALCT	VEGETALWT	SAMPLECT	SAMPLEWT
N200 E149, FEAT 11 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	7350.00
N200 E149, FEAT 12 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, FEAT 13 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	1	188.70
N200 E149, FEAT 14 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	1	194.70
N200 E149, FEAT 8 TOTALS	0	0	0.00	0	0.00	1	1.10	0	0.00	0	558.90
N200 E149, FEAT 9, L 1	0	0	0.00	0	0.00	8	1.33	0	0.00	2	9930.00
N200 E149, FEAT 9, L 2	0	0	2.60	0	0.00	3	0.20	0	0.00	1	7745.60
N200 E149, FEAT 9, L 3	0	0	0.00	0	0.00	4	3.00	0	0.00	0	2220.00
N200 E149, FEAT 9 TOTALS	0	0	2.60	0	0.00	15	4.53	0	0.00	3	19895.60
N200 E149, STRA 1 TOTALS	2	14	235.90	0	0.00	2	8.80	1	2.60	0	519.50
N200 E149, STRA 2 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	136.50
N200 E149, STRA 3 TOTALS	1	26	73.70	0	0.00	1	0.10	0	0.00	8	41.80
N200 E149, STRA 4 TOTALS	0	2	6.00	0	0.00	9	79.40	0	0.00	0	46.00
N200 E149, STRA 5 TOTALS	0	0	0.00	0	0.00	19	18.80	0	0.00	0	275.20
N200 E149, STRA 6 TOTALS	0	1	1.30	0	0.00	34	162.10	0	0.00	0	849.50
N200 E149, STRA 7 TOTALS	0	9	362.20	0	0.00	122	453.00	0	0.00	0	1219.80
N200 E149, STRA 8 TOTALS	0	0	0.00	2	2.80	15	8.20	0	0.00	0	0.00
N200 E149 TOTALS	4	52	681.70	2	2.80	218	736.03	1	2.60	13	31276.70
N200 E153.5, STRA 1 TOTALS	0	13	19.20	0	0.00	0	0.00	0	0.00	0	17.20
N200 E153.5, STRA 2 TOTALS	0	10	43.20	0	0.00	0	0.00	0	0.00	0	20.60
N200 E153.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	112.30
N200 E153.5, STRA 6 TOTALS	0	0	0.00	0	0.00	1	0.10	0	0.00	0	0.00
N200 E153.5 TOTALS	0	23	62.40	0	0.00	1	0.10	0	0.00	0	150.10
N200 E154, FEAT 15, L 1	0	0	0.00	0	0.00	0	0.00	0	0.00	0	6741.00
N200 E154, FEAT 15, L 2	0	0	0.00	0	0.00	0	0.00	0	0.00	0	4281.30
N200 E154, FEAT 15 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	11022.30
N200 E154, FEAT 6 TOTALS	2	49	226.80	0	0.00	0	0.00	0	0.00	0	95.80
N200 E154, FEAT 9, L 1	0	0	0.00	0	0.00	6	92.20	0	0.00	0	941.30
N200 E154, FEAT 9, L 2	0	0	0.00	0	0.00	0	0.00	0	0.00	0	7820.00
N200 E154, FEAT 9, L 3	0	0	0.00	0	0.00	2	0.55	0	0.00	0	8510.00
N200 E154, FEAT 9, L 4	0	0	0.00	0	0.00	1	3.40	0	0.00	1	14217.10
N200 E154, FEAT 9, L 5	0	2	0.00	0	0.00	0	0.00	0	0.00	0	17.40
N200 E154, FEAT 9, L 6	0	0	0.00	0	0.00	0	0.00	0	0.00	1	8061.60
N200 E154, FEAT 9 TOTALS	0	2	0.00	0	0.00	9	96.15	0	0.00	2	39567.40

PROVEN	MISCHISTCT	CHPSTNCT	CHPSTNWT	CORECT	COREWT	SHATTERCT	SHATTERWT	FLAKECT	FLAKEWT	FIRECRKCT	FIRECRKWT
N200 E149, FEAT 11 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, FEAT 12 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, FEAT 13 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, FEAT 14 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, FEAT 8 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, FEAT 9, L 1	0	1	311.70	1	311.70	0	0.00	0	0.00	0	0.00
N200 E149, FEAT 9, L 2	0	1	11.00	0	0.00	0	0.00	1	11.00	0	0.00
N200 E149, FEAT 9, L 3	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, FEAT 9 TOTALS	0	2	322.70	1	311.70	0	0.00	1	11.00	0	0.00
N200 E149, STRA 1 TOTALS	9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, STRA 3 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, STRA 5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, STRA 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, STRA 7 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149, STRA 8 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E149 TOTALS	15	2	322.70	1	311.70	0	0.00	1	11.00	0	0.00
N200 E153.5, STRA 1 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E153.5, STRA 2 TOTALS	6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E153.5, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E153.5, STRA 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E153.5 TOTALS	6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 15, L 1	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 15, L 2	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 15 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 6 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 9, L 1	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 9, L 2	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 9, L 3	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 9, L 4	0	0	0.00	0	0.00	0	0.00	0	0.00	6	346.90
N200 E154, FEAT 9, L 5	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 9, L 6	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, FEAT 9 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	6	346.90

PROVEN	GROUNDS TCT	GROUNDS TWT	STONECNT	STONEWT	PRCERAMCT	PRCERAMWT	PRSHELLWT	ALLOTHCT	ALLOTHWT	TOTARTCNT	TOTARTWT
N200 E149, FEAT 11 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	18	7352.02
N200 E149, FEAT 12 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	40	7.77
N200 E149, FEAT 13 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	1	188.70
N200 E149, FEAT 14 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	1	194.70
N200 E149, FEAT 8 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	64	732.10
N200 E149, FEAT 9, L 1	0	0.00	1	311.70	0	0.00	0.00	0	0.00	130	10346.16
N200 E149, FEAT 9, L 2	1	308.40	2	319.40	1	0.35	1560.00	5	1329.30	123	11250.85
N200 E149, FEAT 9, L 3	0	0.00	0	0.00	0	0.00	216.20	0	0.00	99	2541.49
N200 E149, FEAT 9 TOTALS	1	308.40	3	631.10	1	0.35	1776.20	5	1329.30	352	24138.50
N200 E149, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	98	1981.54
N200 E149, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	3	168.80
N200 E149, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	83	192.60
N200 E149, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	51	750.40
N200 E149, STRA 5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	65	890.70
N200 E149, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	182	1747.10
N200 E149, STRA 7 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	239	6262.60
N200 E149, STRA 8 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	17	11.00
N200 E149 TOTALS	1	308.40	3	631.10	1	0.35	1776.20	5	1329.30	1216	44638.63
N200 E153.5, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	27	522.70
N200 E153.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	61	2834.10
N200 E153.5, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	42	766.40
N200 E153.5, STRA 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	1	0.10
N200 E153.5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	131	4123.30
N200 E154, FEAT 15, L 1	0	0.00	0	0.00	0	0.00	0.00	0	0.00	26	6808.80
N200 E154, FEAT 15, L 2	0	0.00	0	0.00	0	0.00	0.00	0	0.00	4	4285.50
N200 E154, FEAT 15 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	30	11094.30
N200 E154, FEAT 6 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	123	713.50
N200 E154, FEAT 9, L 1	0	0.00	0	0.00	0	0.00	0.00	0	0.00	52	1612.40
N200 E154, FEAT 9, L 2	0	0.00	0	0.00	4	7.77	1090.00	0	0.00	82	9252.82
N200 E154, FEAT 9, L 3	0	0.00	0	0.00	2	3715.05	2.11	0	0.60	208	12546.28
N200 E154, FEAT 9, L 4	0	0.00	6	346.90	0	0.00	1740.00	0	0.00	150	16615.81
N200 E154, FEAT 9, L 5	0	0.00	0	0.00	0	0.00	2060.00	0	0.00	141	2377.35
N200 E154, FEAT 9, L 6	0	0.00	0	0.00	0	0.00	1120.00	0	0.00	86	9350.41
N200 E154, FEAT 9 TOTALS	0	0.00	6	346.90	6	3722.82	6012.11	0	0.60	719	51755.07

PROVEN	PREHCNT	PREHWT	HISTCNT	HISTWT	UNKCNT	UNKWT	CERAMIC	REDWARE	TINENAMEL	CBUFFBODY	CREAMWARE
N200 E154, STRA 1 TOTALS	0	0.00	41	497.21	0	0.00	0	0	0	0	0
N200 E154, STRA 2 TOTALS	0	0.00	81	602.30	0	0.00	5	0	0	0	2
N200 E154, STRA 3 TOTALS	0	0.00	12	131.00	0	0.00	8	0	0	0	5
N200 E154, STRA 4 TOTALS	0	0.00	12	95.70	0	0.00	7	0	0	0	7
N200 E154 TOTALS	12	10082.43	331	53314.36	675	1492.29	38	2	0	0	24
N205 E153.5, STRA 1 TOTALS	1	4.20	69	86.00	0	0.00	0	0	0	0	0
N205 E153.5, STRA 2 TOTALS	0	0.00	176	3124.30	0	0.00	3	0	0	0	1
N205 E153.5, STRA 3 TOTALS	0	0.00	17	82.10	0	0.00	0	0	0	0	0
N205 E153.5 TOTALS	1	4.20	262	3292.40	0	0.00	3	0	0	0	1
N210 E150, STRA 1 TOTALS	0	0.00	47	228.00	0	0.00	2	0	0	0	0
N210 E150, STRA 2 TOTALS	0	0.00	37	41.70	0	0.00	0	0	0	0	0
N210 E150 TOTALS	0	0.00	84	269.70	0	0.00	2	0	0	0	0
N210 E153.5, FEAT 3 TOTALS	0	0.00	27	160.33	0	0.00	1	0	0	0	0
N210 E153.5, STRA 1A TOTALS	0	0.00	55	146.80	0	0.00	2	0	0	0	0
N210 E153.5 TOTALS	0	0.00	82	307.13	0	0.00	3	0	0	0	0
N220 E150, FEAT 1 TOTALS	0	0.00	16	171.00	0	0.00	0	0	0	0	0
N220 E150, STRA 1 TOTALS	0	0.00	117	438.90	0	0.00	0	0	0	0	0
N220 E150 TOTALS	0	0.00	133	609.90	0	0.00	0	0	0	0	0
N230 E153, FEAT 2	0	0.00	4	40.70	0	0.00	0	0	0	0	0
N230 E153, STRA 1 TOTALS	0	0.00	123	577.30	0	0.00	1	0	0	0	0
N230 E153 TOTALS	0	0.00	127	618.00	0	0.00	1	0	0	0	0

PROVEN	PEARLWARE	WHITEWARE	OTHEARTH	PORCELCNT	WSGSTONE	DBSTONE	OTHSTONE	TPIPES	BOTTLEGL	DRVESGL	INDVESGL
N200 E154, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N200 E154, STRA 2 TOTALS	1	2	0	0	0	0	0	0	0	0	0
N200 E154, STRA 3 TOTALS	3	0	0	0	0	0	0	0	0	0	0
N200 E154, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	0	1
N200 E154 TOTALS	6	2	0	1	0	0	3	2	3	0	2
N205 E153.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N205 E153.5, STRA 2 TOTALS	2	0	0	0	0	0	0	0	1	0	2
N205 E153.5, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	0	0
N205 E153.5 TOTALS	2	0	0	0	0	0	0	0	1	0	2
N210 E150, STRA 1 TOTALS	1	1	0	0	0	0	0	0	1	0	1
N210 E150, STRA 2 TOTALS	0	0	0	0	0	0	0	0	2	0	0
N210 E150 TOTALS	1	1	0	0	0	0	0	0	3	0	1
N210 E153.5, FEAT 3 TOTALS	0	1	0	0	0	0	0	0	0	0	0
N210 E153.5, STRA 1A TOTALS	0	2	0	0	0	0	0	0	3	0	0
N210 E153.5 TOTALS	0	3	0	0	0	0	0	0	3	0	0
N220 E150, FEAT 1 TOTALS	0	0	0	0	0	0	0	0	1	0	0
N220 E150, STRA 1 TOTALS	0	0	0	0	0	0	0	0	1	0	3
N220 E150 TOTALS	0	0	0	0	0	0	0	0	2	0	3
N230 E153, FEAT 2	0	0	0	0	0	0	0	0	0	0	0
N230 E153, STRA 1 TOTALS	0	1	0	0	0	0	0	0	3	0	1
N230 E153 TOTALS	0	1	0	0	0	0	0	0	3	0	1

PROVEN	BOTCLOS	APPAREL	PERSCNT	WINGLASSCT	WRTNAILCT	CUTNAILCT	WIRNAILCT	INDNAILCT	OFASTDCNT	STRUCTCT	STRUCTWT
N200 E154, STRA 1 TOTALS	0	0	0	0	0	0	1	0	0	22	328.50
N200 E154, STRA 2 TOTALS	0	0	0	4	0	0	1	2	0	24	379.60
N200 E154, STRA 3 TOTALS	0	0	0	1	0	0	0	1	0	1	3.60
N200 E154, STRA 4 TOTALS	0	0	0	0	0	0	0	0	0	2	1.20
N200 E154 TOTALS	0	0	0	10	0	3	3	7	0	132	1517.70
N205 E153.5, STRA 1 TOTALS	0	0	0	0	0	0	0	0	0	19	26.20
N205 E153.5, STRA 2 TOTALS	0	0	0	0	0	0	1	6	0	27	2695.40
N205 E153.5, STRA 3 TOTALS	0	0	0	0	0	0	0	0	0	1	70.70
N205 E153.5 TOTALS	0	0	0	0	0	0	1	6	0	47	2792.30
N210 E150, STRA 1 TOTALS	0	0	0	2	0	0	1	0	0	8	101.10
N210 E150, STRA 2 TOTALS	0	0	0	0	0	0	0	0	0	1	2.50
N210 E150 TOTALS	0	0	0	2	0	0	1	0	0	9	103.60
N210 E153.5, FEAT 3 TOTALS	0	0	0	2	0	0	2	0	0	1	2.40
N210 E153.5, STRA 1A TOTALS	1	0	0	0	0	0	0	3	0	6	50.80
N210 E153.5 TOTALS	1	0	0	2	0	0	2	3	0	7	53.20
N220 E150, FEAT 1 TOTALS	1	0	0	0	0	0	0	0	0	4	137.30
N220 E150, STRA 1 TOTALS	0	0	0	5	0	0	1	4	0	17	203.50
N220 E150 TOTALS	1	0	0	5	0	0	1	4	0	21	340.80
N230 E153, FEAT 2	0	0	0	0	0	0	0	0	0	2	23.40
N230 E153, STRA 1 TOTALS	0	0	0	1	0	0	8	4	0	47	299.90
N230 E153 TOTALS	0	0	0	1	0	0	8	4	0	49	323.30

PROVEN	HARDWCNT	FIREFUELCT	FIREFUELWT	SHELLCT	SHELLWT	BONECT	BONEWT	VEGETALCT	VEGETALWT	SAMPLECT	SAMPLEWT
N200 E154, STRA 1 TOTALS	1	17	74.60	0	0.00	0	0.00	0	0.00	0	76.70
N200 E154, STRA 2 TOTALS	0	45	120.80	0	0.00	0	0.00	0	0.00	0	76.80
N200 E154, STRA 3 TOTALS	0	1	1.80	0	0.00	0	0.00	0	0.00	0	107.10
N200 E154, STRA 4 TOTALS	0	1	0.70	0	0.00	1	0.60	0	0.00	0	86.90
N200 E154 TOTALS	3	115	424.70	0	0.00	10	96.75	0	0.00	2	51033.00
N205 E153.5, STRA 1 TOTALS	0	33	44.40	16	15.30	1	0.10	0	0.00	0	0.00
N205 E153.5, STRA 2 TOTALS	0	32	180.10	103	182.60	0	0.00	0	0.00	0	0.00
N205 E153.5, STRA 3 TOTALS	0	0	0.00	16	11.40	0	0.00	0	0.00	0	0.00
N205 E153.5 TOTALS	0	65	224.50	135	209.30	1	0.10	0	0.00	0	0.00
N210 E150, STRA 1 TOTALS	0	9	38.50	21	18.20	1	1.80	0	0.00	0	0.00
N210 E150, STRA 2 TOTALS	0	1	0.90	30	33.30	0	0.00	0	0.00	0	0.00
N210 E150 TOTALS	0	10	39.40	51	51.50	1	1.80	0	0.00	0	0.00
N210 E153.5, FEAT 3 TOTALS	2	18	94.50	1	0.40	0	0.00	0	0.00	0	0.00
N210 E153.5, STRA 1A TOTALS	2	26	25.10	11	10.10	1	0.60	0	0.00	0	0.00
N210 E153.5 TOTALS	4	44	119.60	12	10.50	1	0.60	0	0.00	0	0.00
N220 E150, FEAT 1 TOTALS	0	7	30.60	3	1.70	0	0.00	0	0.00	0	0.00
N220 E150, STRA 1 TOTALS	0	46	120.10	34	55.60	2	0.90	0	0.00	0	0.00
N220 E150 TOTALS	0	53	150.70	37	57.30	2	0.90	0	0.00	0	0.00
N230 E153, FEAT 2	0	2	17.30	0	0.00	0	0.00	0	0.00	0	0.00
N230 E153, STRA 1 TOTALS	0	35	204.50	19	12.60	0	0.00	0	0.00	0	0.00
N230 E153 TOTALS	0	37	221.80	19	12.60	0	0.00	0	0.00	0	0.00

PROVEN	MISCHISTCT	CHPSTNCT	CHPSTNWT	CORECT	COREWT	SHATTERCT	SHATTERWT	FLAKECT	FLAKEWT	FIRECRKCT	FIRECRKWT
N200 E154, STRA 1 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, STRA 2 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154, STRA 4 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N200 E154 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	6	346.90
N205 E153.5, STRA 1 TOTALS	0	1	4.20	0	0.00	1	4.20	0	0.00	0	0.00
N205 E153.5, STRA 2 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N205 E153.5, STRA 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N205 E153.5 TOTALS	1	1	4.20	0	0.00	1	4.20	0	0.00	0	0.00
N210 E150, STRA 1 TOTALS	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N210 E150, STRA 2 TOTALS	3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N210 E150 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N210 E153.5, FEAT 3 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N210 E153.5, STRA 1A TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N210 E153.5 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N220 E150, FEAT 1 TOTALS	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N220 E150, STRA 1 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N220 E150 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N230 E153, FEAT 2	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N230 E153, STRA 1 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
N230 E153 TOTALS	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

PROVEN	GROUNDS TCT	GROUNDS TWT	STONECNT	STONEWT	PRCERAMCT	PRCERAMWT	PRSHELLWT	ALLOTHCT	ALLOTHWT	TOTARTCNT	TOTARTWT
N200 E154, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	41	497.21
N200 E154, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	81	602.30
N200 E154, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	12	131.00
N200 E154, STRA 4 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	12	95.70
N200 E154 TOTALS	0	0.00	6	346.90	6	3722.82	6012.11	0	0.60	1018	64889.08
N205 E153.5, STRA 1 TOTALS	0	0.00	1	4.20	0	0.00	0.00	0	0.00	70	90.20
N205 E153.5, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	176	3124.30
N205 E153.5, STRA 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	17	82.10
N205 E153.5 TOTALS	0	0.00	1	4.20	0	0.00	0.00	0	0.00	263	3296.60
N210 E150, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	47	228.00
N210 E150, STRA 2 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	37	41.70
N210 E150 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	84	269.70
N210 E153.5, FEAT 3 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	27	160.33
N210 E153.5, STRA 1A TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	55	146.80
N210 E153.5 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	82	307.13
N220 E150, FEAT 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	16	171.00
N220 E150, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	117	438.90
N220 E150 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	133	609.90
N230 E153, FEAT 2	0	0.00	0	0.00	0	0.00	0.00	0	0.00	4	40.70
N230 E153, STRA 1 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	123	577.30
N230 E153 TOTALS	0	0.00	0	0.00	0	0.00	0.00	0	0.00	127	618.00